Comparative Study on the Role of Universities for Rural Development

Agricultural University of Hebei, Hebei, China and Charles Darwin University, Northern Territory, Australia

Wang, Li

A thesis submitted to the Charles Darwin University in fulfillment of the requirements for the degree of Doctor of Philosophy

May 2005
I hereby declare that the work entitled “Comparative Study on the Role of Universities for Rural Development---Agricultural University of Hebei, Hebei, China and Charles Darwin University, Northern Territory, Australia”, to the best of my knowledge and belief, now submitted as a thesis for the degree of Doctor of Philosophy of the Charles Darwin University, is the result of my own research, and all references to ideas and work of other researchers have been specifically acknowledged. I hereby certify that the work has not been submitted for a degree to any other university or institution.

Name: Wang, Li

Signed:

Date:
Acknowledgements

This thesis is presented to my parents-Chuan Wang and Huifen Song, my wife-Professor Ning Wang, and my daughter-Jia Wang. Without their full support and long time encouragement and tolerance for my absence, it would have been very hard for me to finish this study.

Special thanks are given to my supervisor, Dr. Darol Cavanagh, Associate Professor of Charles Darwin University for his valuable advice, comments and guidance, as well as his help, encouragement and friendship during my study.

I thank the Chinese National Commission for UNESCO, Beijing, China and the UNESCO International Research and Training Centre for Rural Education (INRULED), Baoding, China to allow me almost four years leave; thanks are also given to my colleagues in China who did many things during my absence from my position.

I thank Australia Commonwealth Government and Charles Darwin University for providing me with two competitive scholarships, International Postgraduate Research Scholarship and University Postgraduate Research Scholarship as well as other help necessary for my study.

I also thank the following people who have been significant for me during my “long journey” with my study.

1. Dr. Greg Shaw, for his comments on the first five chapters and his long time help, and encouragement during my study;

2. Dr. Peter Wignell, who spent time checking my English writing, such as spelling, grammar;

3. Mr. Ben Hoffman for solving my computer network problems;

4. Ms. EA (Janie) Mason for her help in identifying my supervisor’s handwriting when he was on leave in Sydney, NSW, Australia.
Finally, I wish to acknowledge all people who have helped or given me any assistance during my study, as well as spending time with me for interviews, surveys, and field visits both in China and in Australia.
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<tr>
<td>AAA</td>
<td>Agriculture Advancing Australia</td>
</tr>
<tr>
<td>AAACE</td>
<td>Australia Association of Adult and Community Education</td>
</tr>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>AFFA</td>
<td>Department of Agriculture, Fisheries and Forestry</td>
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<tr>
<td>AMRI</td>
<td>AUH Mountain Research Institute</td>
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<tr>
<td>ANTA</td>
<td>Australian National Training Authority</td>
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<tr>
<td>APPEAL</td>
<td>Asia-Pacific Programme of Education for All</td>
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<tr>
<td>AUH</td>
<td>Agricultural University of Hebei, China</td>
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<tr>
<td>BIITE</td>
<td>Batchelor Institute of Indigenous Tertiary Education</td>
</tr>
<tr>
<td>CAEFS</td>
<td>Certificate in Access to Employment and Further Study</td>
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<tr>
<td>CCP</td>
<td>Chinese Communist Party</td>
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<tr>
<td>CDU</td>
<td>Charles Darwin University, Australia</td>
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<tr>
<td>CHIC</td>
<td>Certificate in Horticulture for Indigenous Community</td>
</tr>
<tr>
<td>CINCRM</td>
<td>Centre for Indigenous Natural and Cultural Resource Management</td>
</tr>
<tr>
<td>CRC</td>
<td>Cooperative Research Centre</td>
</tr>
<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organization</td>
</tr>
<tr>
<td>CTLDEC</td>
<td>Centre for Teaching and Learning in Diverse Educational Contexts</td>
</tr>
<tr>
<td>CUTSD</td>
<td>Committee for University Teaching and Staff Development</td>
</tr>
<tr>
<td>DBIRD</td>
<td>Department of Business, Industries and Resource Development</td>
</tr>
<tr>
<td>DEET</td>
<td>Department of Employment, Education and Training</td>
</tr>
<tr>
<td>DETYA</td>
<td>Department of Education, Training and Youth Affairs</td>
</tr>
<tr>
<td>DK-CRC</td>
<td>Desert Knowledge Cooperative Research Centre</td>
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<td>EHS</td>
<td>Faculty of Education, Health and Science, CDU</td>
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<td>FI</td>
<td>Field Visit and Investigation Schedule</td>
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<td>ESOs</td>
<td>Essential Services Operation</td>
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<td>GCs</td>
<td>Graduate Catalysts</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>Institute of TAFE</td>
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<td>Non Government Organization</td>
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<td>NTCOSS</td>
<td>Northern Territory Council of Social Service</td>
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<td>Northern Territory, Australia</td>
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<td>NTCE</td>
<td>Northern Territory Certificate for Education</td>
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<tr>
<td>NTRC</td>
<td>Northern Territory Rural College</td>
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<tr>
<td>PPE</td>
<td>Popular Primary Education</td>
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<tr>
<td>QCOSS</td>
<td>Queensland Council of Social Service</td>
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<tr>
<td>R &amp; DCs</td>
<td>Research and Development Corporation</td>
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<tr>
<td>SAP</td>
<td>Student Action Programme</td>
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<tr>
<td>SEAMEO</td>
<td>Southeast Asian Ministers of Education Organization</td>
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<tr>
<td>SS</td>
<td>Survey Schedule</td>
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<tr>
<td>TAFE</td>
<td>Technical and Further Education</td>
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<tr>
<td>TAFETPS</td>
<td>Technical and Further Education Triennial Planning Submission</td>
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<tr>
<td>TERC</td>
<td>Tropical Ecosystems Research Centre</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>TMM</td>
<td>Taihang Mountain Model</td>
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<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational Scientific and Cultural Organization</td>
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<tr>
<td>UNESCO PROAP</td>
<td>UNESCO Principal Office in Asia and the Pacific</td>
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<tr>
<td>VAS</td>
<td>Village Adoption Scheme</td>
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<tr>
<td>VET</td>
<td>Vocational Education Training</td>
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<tr>
<td>VTC</td>
<td>Vocational Training Centre</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
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<tr>
<td>WEFTSU</td>
<td>Weighted Equivalent Full-Time Student Unit</td>
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Abstract

World wide experiences and practices have shown that universities, especially agricultural universities, have played a very important and a key role in helping rural populations become literate, in upgrading farmers’ living quality and accelerating rural economic development. Universities are becoming the main forces for transforming knowledge and technology into agricultural productivity, especially in developing nations.

The activities carried out by universities in rural development programs cover many areas through the dissemination of new technologies for income-generation, delivering short courses and of expertise for the promotion of quality of rural life. Experience shows that universities have a strong technical expertise to enable them to become a major vehicle in promoting development in rural areas.

Implementing development changes also prove to be a very tedious and a costly endeavor for universities as they are limited by both human and financial resources. However, there are many experiences and cases of successful and unsuccessful university activities gathered by some universities that are already engaged in rural development.

In this context, two universities’s experiences have been selected concerning their role in rural development. These are Agricultural University of Hebei (AUH) China, and Charles Darwin University (CDU), Australia. AUH has been providing extension services to rural farmers since the late 1970s. CDU has been involved with education/training, research and services for rural, remote and Indigenous communities and made a contribution for their development.

This thesis focuses on a comparative analysis of the roles of these universities in rural development between China and Australia. A simple linear model is developed. Complex model development has been suggested for further study.
But the old man was wise  
To show them before he died  
That learning is the treasure.

-----------------Mr. Jacques Delors, Chairman of UNESCO International Commission on Education for the Twenty-first Century. (“Learning: The Treasure Within”)

Chapter 1. Introduction and purpose of the study

1.1 Introduction and personal context

In 1998 there was an APPEAL (Asia-Pacific Programme of Education for All) Symposium on Basic Education and Lifelong Learning jointly organized by UNESCO (United Nations Educational, Scientific and Cultural Organization) APPEAL and UNESCO International Research and Training Centre for Rural Education (UNESCO INRULED) in Baoding, China from 7-12 September. For this symposium one participant from Charles Darwin University (CDU), Dr. Brian Devlin, Associate Professor, was invited to China. This was my first contact with CDU, Australia. In November 1999, UNESCO INRULED conducted a regional (Asia-Pacific) workshop on income generating activities for the rural population in Yellow Mountain, Anhui Province China. Dr. Darol Cavanagh, Associate Professor, Faculty of Science, Information Technology and Education (now called Faculty of Education, Science and Health), CDU presented the Australian paper. We had a very long discussion about CDU and its activities for Aboriginal education, training and rural participation. I decided that CDU was the place for me to do my Ph.D. (author’s diary). Finally, having gained two scholarships (Commonwealth Government Overseas Postgraduate Research Scholarship and CDU Postgraduate Research Scholarship) with Dr. Darol Cavanagh as my supervisor, I enrolled in my PhD program.

To become a Doctor is a long time dream for me. I enrolled in CDU, Australia in June 2001 for a PhD in Education when I was 43 years old, and that means my dream will be realized after another four years study and hard work. While writing my PhD thesis, many memories have been in my mind and I have recalled some of these in this study to develop a context.
I was born in 1957 in Tianjin City and in 1962 I was removed to Beijing City, the capital of the People’s Republic of China. My young teenage (childhood) time was very good; I really enjoyed my study, life and sports, among them the preference was for study and learning, as I was born in a traditional Chinese family that was well educated. I was following the traditional Chinese philosophy and believed that “Wan Ban Jie Xia Pin, Wei You Du Shu Gao.” (Chinese words to show respect for the people who have knowledge). It was in 1966 when the Cultural Revolution commenced, my parents (Beijing Teacher’s College) were sent to the countryside for farm work “to change their mind” and “to accept re-education by farmers”. As an only child in my family, I could not go with them and had to stay in Beijing alone. At that time I was only 10 years old. It was a very difficult time for me and for Chinese people. Society was in disorder, tradition, attitude, values and morals had changed. The society was full with the ‘ideal’ that ‘learning is useless’, ‘more books reading, more foolishness’, and ‘more knowledge, more anti-revolution’. Schools and universities were closed, and students went into the street to realize their mindless ‘revolution’. University professors became ‘Feng, Zi, Xiu’ (Chinese words for feudalism, capitalism, and revisionism). Libraries were closed. Few people at that time respected knowledge. “Gong, Nong Bing” (Chinese words for workers, peasants, and soldiers) went to the leading positions in society and illiterate or less-knowledged people become the mainstream workers in the society. Fortunately, I spent time with my uncle who was in Tsinghua University and my aunt who was in Beijing Medical University, since in their families there were a lot of books which really attracted me. Even though I was very young, I believed a traditional Chinese philosophy that a successful person should “read ten thousands books and walk ten thousands miles.” (Mr. Gu Yanwu). And I also respected Chairman Mao’s idea that: “If you want to know the taste of a pear, you should eat it by yourself.” Therefore, reading, learning and participating in a lot of scientific experiences, whatever knowledge or skills I could, became the only interesting activities for a 10-year old boy. Even though the society was in disorder, I still could read books and learn by myself. It can be said that I have not wasted too much time during this terrible period in China. In the beginning of 1970, I was also going to a small town in the country, about 300 km northwest of Beijing City. I spent 8 years there, finished my junior and senior high school study in a school affiliated to Hebei Normal University. After one year of unemployment, I became a plumber, electrician and car repair worker
successively for two years. It was hard for a young teenager to be in a university at that time, because university students only can be enrolled from “Gong, Nong and Bing” (Chinese words for workers, peasants, and soldiers). What this means is that university admissions at that day were based on political recommendations, not academic examinations. In 1978 I passed the Chinese National Enrolment Examination (first enrolment exam after the Cultural Revolution) and went to one of the universities of Water Resources and Hydroelectric Power. I studied and started to learn English from the very beginning, like A, B, C…At that time I was 21 years old (the foreign language I learnt during my junior and senior high school years was Russian). It was really hard work for me.

In the beginning of 1982 I graduated from the university and was assigned to the Department of Water Resources, Agricultural University of Hebei as a teaching assistant. In 1996, after 14 years of continuous learning, hard work and my personal contributions to the knowledge in my areas as well as achievement at the academic level, I was promoted to be a full professor (the youngest one at that time in my area). I was told many times that you are quite successful, you have got what you want and promoted to be a nationally recognized full professor when you are still very young. You will have an easy life and be quite successful in the future, why do you give up something you have already got, become a PhD student, select education as your study area, and use English as a study medium? This seems to anyone to be a great change and a big challenge.

The answer is simple and quite acceptable. It is only because when I worked for UNESCO, I found my knowledge base was weak in the areas of social science, education and English language skills. In order to improve my knowledge and capacity to fulfil my work, my duty and my responsibility for a position, I needed time and opportunity to refresh my knowledge. I am also a person who never stops pursuing the knowledge and I am willing to face any challenges.

Three months after graduation (in 1982), I joined a research group working in the area of Taihang Mountain. I spent half a year in this area, and found that this mountainous area is not short of natural resources, but the people who lived in this area were still very poor, and some could not get enough food, warm clothes or clean drinking water. There was a real shortage in education, knowledge, technical skills
and a consciousness of how to change their situation. P. Oakley and C. Garforth (1985, p. 4) in their book – Guide to Extension Training, described a similar aspect.

There are very strong reasons why resources should now be put into rural development. More than half the people of the world and the vast majority of the people in developing countries (Asia, Africa and Latin America) live in rural areas and gain part or all of their livelihoods from some form of agriculture. Most of these people are also still very poor and dependent on agricultural practices that have benefited little from modern technology. They live in isolated and often inhospitable places, with little access to the resources they need to improve their agriculture. Many lead their lives barely at subsistence level. Solely in terms of numbers of people, there is a very strong case for giving high priority to rural development.

This working experience along with my early 8 years in rural areas before I studied in the university was the time needed for me to know the real situation of the mountain people. Besides my teenage time’s dream, that is, to become a professor and Doctor, another comes to my mind, that is I really hope every child in rural villages can go to study in schools; every family in rural areas can have a good life; every rural person should not have to worry about medical treatment; and people should enjoy staying in rural China. The one thing I can do is to contribute myself in education for rural development. From that time on, I visited this area many times, and closely worked with various groups, for example, local officials, technicians, educators and farmers. After working with them, especially farmers, I felt that what the farmers needed was not only financial or material support, but also educational and technical contribution. I feel that only knowledge, education and actual skills can empower them to change their life and practise sustainable development. Psychologically, I think that I have a responsibility to do something for them. And from that time on, my life and career have been closely linked with rural people and their life (author’s diary).

I was asked many times why I selected “rural education” as my PhD topic, since my background is hydrology and water resources and I have 20 years working experiences in this area. My explanation is because as a university professor in water resources and hydrology, I have carried out many projects in these fields, and most of them have been in rural areas. I spent a lot of time in rural areas working with rural people, including farmers. Finally I found that techniques alone can not change the rural situation. Even as we introduced many new techniques into the rural area, most
of them free, the real situation has not been changed very much. Therefore, I think we must find out through research a way to educate the rural population, to change their thinking and behaviour. Then we must find the best way to transfer the knowledge and skill into rural areas, to develop rural society. In this case, I finally selected rural education as my career and it is in this area that I will make my contribution for the rural development through such transformation.

1.2 Study Background

1.2.1 Education for rural development

At present, three billion or 60 percent of the people in developing countries and more than half the people in the world live in rural areas. They live in isolated and often inhospitable areas and gain part or almost all of their livelihoods from agriculture with little access to modern education, technology and resources to improve their ability and life (INRULED, 2001). Even with the economic and social progress in terms of income-generation and promotion of people’s living standard in rural areas and “although social indicators on infant mortality, life expectancy, nutrition and education show remarkable improvements, the proportion of people living in conditions of abject poverty is still scandalously high at about one third of global population.” (Ordonez, Kasaju and Seshadri, 1998, p.2). The world, therefore, should give a high priority and special attention to rural people, rural education and rural development.

The problems facing rural education can be identified as non-attendance in school, early and high incidence of dropout rate of students, adult illiteracy, technological illiteracy, gender inequality in education, concentration of poverty in villages, lack of modern information in agricultural techniques and skills, urban-rural disparity in educational investments and in the quality of teaching and learning (INRULED, 2001, p. XI).

“Enhancing peoples’ capacities and expanding their choices in life though education will be a vital component in rural economic development”. (INRULED, 2001, p. XI) For this issue, it should be mentioned that rural education could not solve all of the problems, but “education and training are two of the most powerful weapons in the
fight against rural poverty and for development.” (Atchoarena, et al, 2003, p. 29), and also rural education is at least one critical factor for promoting people’s life in rural areas.

It is essential to turn the continuing and inevitable transition of rural areas, often with adverse consequences on the rural economy, environment and people’s life, into an active and positive process for the development of rural communities. Educational programmes have to become a vital part of this development through committed partnerships of the government, educational institutions, communities, businesses, and civil society as a whole (INRULED, 2001, p. XI).

Poverty alleviation and rural development must become one of the main issues of education for all (a UNESCO Policy agenda). Not taking up this challenge is to imperil the total education-for-all effort. Some theories and practices have been developed, covering aspects of rural life. Robert Chambers and his book, Rural Development: Putting the Last First, discussed unseen rural poverty (Chambers, 1983); Victor Ordonez et al discussed basic education for empowerment of the poor (Ordonez, Victor, Kasaju, P.K. and Seshadri, C., 1998); and David Atchoarena and Lavinia Gasperini discussed education for rural development (Atchoarena, David and Gasperini, Lavinia, 2003). My study will not produce a grand theory. However, by focusing on the links between education, especially higher education and rural development, it seeks to underscore the forces of change rural communities face and how education, by equipping people with appropriate knowledge, skills and information, can empower rural population’s ability, expand their choices and enable them to exercise these choices.

For a long time, rural development has been a universal concern in many countries, especially developing countries. Rural education has been considered as a powerful vehicle to improve the advancement of rural economy and society. Therefore, rural education should not only meet the present and short-term needs of rural areas, but also undertake the necessary work to a prepare high quality rural population for upgrading rural life and economy. For this reason, rural education and rural development have been given the strategic priority by many countries for the country’s prosperity and stability, particularly in developing countries.
1.2.2 The roles of universities for rural development

Universities have a potential role for rural development, particularly through the dissemination of new technologies for income-generation and of supplying expertise for the promotion of quality in rural life. Experience shows that universities have a strong technical expertise that enables them to become a major vehicle in promoting development in rural areas. Meanwhile, universities and institutes are becoming the main forces for converting science and technology into productivity in agricultural production. Since the teaching targets and research work of the universities are closely related to the real production demand in rural area, all kinds of introduction of new-technology, high-technology and training programs are welcome by the farmers and agriculture related students. It is only wise to encourage more participation of many of them in order to obtain massive effects in terms of development of rural areas especially in developing countries.

For many higher educational institutions, there are two major roles and functions, namely, education and research. For some universities, a third function, extension services, is a very important issue, especially agricultural universities in developing countries. “The universities cannot sit aloof in the ivory tower separated from the actual environment.” (Noguchi, 1998, p. 42) Universities are more and more expected to provide useful services to the society, particularly in developing countries.

To quote Mr Jacques Delors, Chairman of UNESCO International Commission on Education for the Twenty-first Century in his report of “Learning: The Treasure Within”:

Nowhere is the universities’ responsibility for the development of society as a whole more acute than in developing countries, where research done in institutions of higher learning plays a pivotal role in providing the basis for development programmes, policy formulation and the training of middle- and high-level human resources. The importance of local and national institutions in raising the developmental levels of their countries cannot be overemphasised.

Higher education is the dynamic power needed by any country for economic development and social progress, because universities are regarded as a cradle of
nurturing high quality personnel. In today's world, the national population quality is becoming one of the fundamental reasons which influences a nation’s development potential and differentiates the socio-economic development level from different areas in the country and among the different countries. Taking this into account, many developing countries have attached great importance to rural education, including: the higher learning of agricultural technology, the universalization of the scientific knowledge in the rural societies, the promotion of the quality of rural population, the empowerment of farmers applying science and technology in order to change the backward situations of rural development.

There are many experiences and cases that can be examined, both successful and unsuccessful, that have been gathered by some universities that are already engaged in rural development. Therefore, it is worthwhile, both practically and theoretically, to conduct a study on how these universities have implemented their development strategies in order to learn from them and be able to draw theoretical implications that are common and conducive for general practices.

In this thesis, the Agricultural University of Hebei (AUH) China and the Charles Darwin University (CDU) Australia have been selected as focal institutions to carry out a comparative study to pursue these ends. The following section will briefly look at AUH, CDU and papers presented at a UNESCO Regional Meeting to gauge the perceived importance of the university’s role in rural development.

1. Agricultural University of Hebei (AUH) China

The Agricultural University of Hebei China (AUH) has been selected as a case for in-depth analysis, interpretation, description and discussion. AUH has been providing extension services to rural farmers since the late 1970s. University professors, on the basis of their scientific research and laboratory experiments, have been providing farmers with practical training, advice and suggestions on improving crop production, developing skills in upgrading animal husbandry, planting high yield fruit trees, etc. (Investigation 1, 2001) The Agricultural University of Hebei (AUH), China is a provincial and comprehensive agricultural university, with comprehensive faculties and expertises in both social and natural sciences and technologies (AUH Information Handbook, 2001).
AUH, established in 1902, is one of the oldest agricultural institutions of higher learning in China and one of the key universities in Hebei Province with a concentration on agronomy and forestry, covering 7 fields of: agriculture, industry, basic sciences, economics, management, literature and law. Located in Baoding city the campus is only 138 kilometres away from Beijing. There are 25 colleges in the university with 51 undergraduate programs, 24 Masters and 4 Doctoral Programs. The total enrolments of students reached 21,000, with 738 master and 35 doctoral candidates.

The university consists of 3 campuses, one farmland and one forestland. The main campus covers an area of 61.8 hectares with a total enrolment of over 17,000. Apart from the main campus, there are two other campuses; one is located in Qinhuangdao City which is 350 kilometres away from the main campus, with a total enrolment of 2,000; and another in Dingzhou City, 50 kilometres away with a total enrolment of 2,000. AUH has a 300-hectare farmland located only 4 kilometres away from the main campus, and a 2700-hectare forestland located 100 kilometres away in Yixian County, Hebei Province and 39 experiment bases of teaching-research-production dot the different regions of Hebei province (AUH Information Handbook, 2001).

Agricultural universities in China compared to non-agriculturally focused universities assume a greater potential for agricultural extension education, poverty alleviation as well as for sustainable development of agriculture while protecting the ecological environment than do other specialist universities.

Hebei is one of the most populated and agriculturally based provinces in China with a vast territory, and a great disparity in soil texture and climate from north to south among the mountain areas and the plains. The educational provision levels for rural population are usually low. They often result in agricultural development in the different parts of Hebei province varying greatly. The following maps locate the area within China (Fig. 1.1 & Fig. 1.2).
AUH has a long-time involvement with rural education and development. From the late 1970s, it has been actively participating in a comprehensive development program in Taihang Mountain Areas, where there were still a lot of poor farmers. AUH has made a great contribution to the development of this region. Apart from this program, AUH has also set up a broad network in the rural and mountainous
areas of Hebei and it has aimed to build dozens of technical bases using educational interventions to develop an alternative model of university’s education, training, research and extension for rural development which empowers farmers and serves the rural communities. These technical bases can also serve as resource centres for villages to improve the quality of life within rural contexts. This initiative serves a dual purpose. It provides actual farming experiences for both teachers and students from the technical bases. These experiences contribute to the development of teaching materials, and provide a constant source of input for research. The university (AUH) thus promotes rural development and as well it has enhanced its own standing and developed and extended the university capability.

It is worthwhile, therefore, to document these techniques and methods as case studies to show how the university has promoted rural development and at the same time show how the university has grown as it performs an active role in helping the rural masses improve their farm productivity and living standard. AUH has earned the reputation as “The Taihang Mountain Road” entitled by the Chinese government. The goals of the “The Taihang Mountain Road” are: to integrate agriculture, science and education in rural area; to facilitate the transformation model of economic development of the countryside; to develop the economy by using the science and technology, and to enhance the quality of labour. This model of rural activities is now nationally recognized in China as “Taihang Mountain Model” (Zhou et al., 1990).

Since 1994 AUH trials in rural areas have been constantly monitored by external evaluators, both domestic and international, through AUH seminars and workshops. Numerous studies have also been carried out, which have confirmed that the AUH approach is a highly innovative model suitable for developing countries. A systematic study should therefore be undertaken to see if such a practice should be extended.

2. Charles Darwin University (CDU) Australia

As another study focus point in this thesis, Charles Darwin University (CDU) has also been involved with education/training, research and services for rural, remote and Indigenous communities and made a contribution for their development.
Unlike China, Australia does not have a national education system, education being the responsibility of six separate states (New South Wales, Queensland, South Australia, Tasmania, Victoria, and Western Australia) and two territories (The Australian Capital Territory and the Northern Territory) (Anderson, 1991). Universities are established by states and are autonomous institutions; however their funding is mostly provided by the Australian Commonwealth Government. Charles Darwin University was established by an Act of the Northern Territory Parliament which was ratified by the Australian Parliament (Interview 19, 2004 (In 19, 2004)) (The actual interviewee can be found in Appendix 3. Charles Darwin University Ethics Committee approval was obtained for the approach. Where the permission was not given, their names have been deleted).

Charles Darwin University is located at Darwin, Northern Territory (NT), Australia. The history of events leading to the foundation of the Charles Darwin University (at that time, it was called Northern Territory University) begins soon after the end of the Second World War with the formation first of Darwin Adult Education Centre and then of Darwin Community College which became the Darwin Institute of Technology (DIT) at the end of 1984. By then a determined NT government had launched a long campaign for a university which came to fruition first with the opening of the University College in 1987 and then with its amalgamation with DIT to form the university (at that time, it was called Northern Territory University) in 1989. (Berzins and Loveday, 1999). In the beginning of 2004, in order to extend higher education to cover more territory, Alice Springs’ Centralian College joined with NTU to become Charles Darwin University - the only Australian University to offer the full spectrum of education options from senior secondary through to Vocational Education Training (previously known as TAFE), undergraduate and postgraduate degree programs (Website 1.6).

This university and the former institute have been engaged in rural communities and Aboriginal Indigenous education for a long time. The identification of fruitful experiences and data collection could be used for a comparative study.

The Northern Territory is an autonomous territory of Australia, and one of two mainland territories of Australia, the other is the Australian Capital Territory (Shaw, 1999, p. 4). It accounts for 17.5% of Australia's landmass with just 1% of the
country's population, which is 0.1 person/km² and has the lowest population density of any state (ABS No. 5220.0). Of this population 2 out of 3 are in the two major cities; Darwin, the capital, and Alice Springs, over 1,500 Kilometres down to the south. Approximately 25% of the population of the Territory are Aboriginal people. (Shaw, 1999)

The Northern Territory has a wide range of post-compulsory institutions providing school education and training. Charles Darwin University (CDU) is a dual sector institution that provides a range of higher education undergraduate and postgraduate programs in areas of Arts, Fine Arts, Education, Business, Hospitality and Tourism, Engineering, Information Technology, Sciences and Law, as well as Technical and Further Education (TAFE) programs. Batchelor Institute of Indigenous Tertiary Education, a college specifically for the educational needs of Indigenous people provides a range of higher education diploma and associate diploma programs as well as a range of TAFE programs. Also, there are ranges of private educational providers through church and community organisations, as well as larger companies such as Nabalco and Gemco who offer in-house training of their staff (Shaw, 1999, p. 6).

Even though most of those educational providers deliver the programs in rural, remote and Indigenous communities, CDU as the only higher education institution in NT plays an important role for education, training, research, consultancy and extension in rural NT. For example:

The Northern Territory Rural College (NTRC) is a college belonging to Faculty of Education, Health and Science (EHS), CDU. It primarily provides training for Vocational Education Training (VET) and delivers Technical and Further Education (TAFE) programs. It is located 16 km north of Katherine and 300 km south of Darwin. Katherine is the centre of a rapidly developing mining, agricultural, horticultural and tourist region. The college has excellent facilities located on its 4,000 ha main campus and also has its own 700 sq km cattle station.

The College is currently expanding its mode of delivery to incorporate both regional and remote delivery into other Northern Territory centres to include Alice Springs and Tennant Creek and the Far West Kimberley region of Western Australia.
External study and remote training packages and training workshops are constantly expanding to include delivery to cover Northern Australia from Broome and Kununurra in the west and from Townsville to Cape York, in North Queensland.

The college has provided the training areas of agriculture, aquaculture, horticulture, beef cattle production, farm chemical safety & application and other chemical user program, childcare, horsemanship skills, lands, parks and wildlife management, station maintenance skill, vehicle maintenance and operation, welding, computers, new apprenticeships/traineeships, pest management, etc.

The NTRC has excellent teaching facilities with well-equipped workshops, cattle handling facilities, stables, modern air-conditioned classrooms and a library/computing facility located on its 4000 ha main campus. The college also has its own 700 sq km cattle station situated 90 km south of Katherine at Mataranka. The NTRC has full residential facilities for those who attend the NTRC and the CDU Regional Centre in Katherine. Students are provided with individual rooms, all meals and a full laundry service. A full-time residential supervisor is responsible for the personal welfare of students. Students with medical problems are referred immediately to the local hospital or the private medical clinic. College staff is on duty after hours to provide guidance and supervision to all students.

The Tropical Agriculture, Horticulture and Aquaculture Sections within the college provide Training Packages customised to suit the needs of the horticultural or the aquaculture industry. Customised Training is used to upgrade the skills of current staff to meet the immediate demands of a customer’s workplace. Flexibility in delivery is the key. Training can be offered in the workplace at times that best suit customer’s enterprise (NTRC Pamphlet).

The following maps locate the area within Australia (Fig. 1.3 & Fig. 1.4).
Figure 1.3 Map of Australia and location of NT (Website 1.3)

Figure 1.4 Map of NT (Website 1.4)
3. Other universities in developed and developing countries for rural development

The history of the developed countries and the roles of the university for rural development show agricultural universities have been taking a key role in serving rural communities. About 140 years ago, for example, many universities in America were agriculture-oriented universities. In the initial stage, most of them were Land Grant Universities, to name a few of them, Maryland State University, Cornell University and so on. Specifically, the law required each land grant university to offer programs for working farmers and homemakers in agricultural and relevant sciences. Those universities continue the strong concern for agricultural research work through agricultural extension for the development of the national economy in America (Website 1.5).

Furthermore, in developing countries, for example, serving rural communities for their development is also the main function of universities, especially agriculture-oriented universities. Many universities have been involved with rural development programs. In September, 1998, there was an Asian and Pacific regional meeting organized by UNESCO and INRULED on the Role of Universities for Rural development. The participants shared information and also devolved arguments on the role of universities for rural development. For instance, Dr. Paitoon Sinlarat (Thailand) in his paper, “Role of the Thai Universities in Rural Development: Time for new concepts and methods” reviewed what Thailand and Thai universities have developed in the field of agriculture and in the areas of rural development studies. He stated that “There is a need for a shift in the thinking of universities for new or alternative models of rural development with diversified approaches, which make proper use of local resources and knowledge for sufficiency while making profit as well” (Sinlarat, 1998, p. 51-58).

Mrs Priscilla Cabanatan (INNOTECH (Southeast Asian Ministers of Education Organization-Regional centre on educational Innovation and Technology), Philippines) with her paper, “Contribution of universities to rural agricultural development through science and technology”, argued that Asian countries generally see the development of the higher education sector as integral to their economic and social development plans. In this context, universities are seen as furthering national goals. They contribute to achieving such goals through their three-fold functions of
teaching, research and extension. Her paper also gives some examples, drawn from developed and developing countries, on how universities have performed their functions so as to contribute to rural development. Examples with strong technology components have been emphasised to show that technology has great potential for enabling universities to maximise their contributions. (Cabanatan, 1998, p. 63-69)

Dr Darwin Karyadi (Indonesian) with his paper, “Poverty Alleviation Strategies: Indonesian Case”, pointed out that the 21st century is a challenging time for new roles and functions of universities for rural development. Indonesia has a long-standing experience of tripartite co-operation between students, social communities and universities in rural development, notably through the so-called SAP (Student Action Programme) in rural areas. The SAP has pre-set objectives and roles for each component: student, society, local government, and enables the university’s leadership in fostering better and harmonised partnerships to deliver appropriate systems to fulfil the basic human needs of the poor households such as food, health education, sanitation, shelter, income, etc. Another model established by SEAMEO (Southeast Asian Ministers of Education Organization)-University of Indonesia in the rural community, under the framework of the Poverty Alleviation Programme with other development sectors, are the approaches targeting the poor household, particularly vulnerable sub-groups. The intervention design for the improvement of nutritional/health status, impact evaluation may contribute to further regional and international institution cooperation. (Karyadi, 1998. p. 91-96)

Dr Pracob Cooparat (Thailand) presented the paper, “Information Technology as strategies for Rural Development”, and emphasised that rural development is an issue of global concern; however, most colleges and universities in Southeast Asia are urban and biased not in favour for rural development. Now it is more important than ever that most universities and colleges should have their strategies in contributing to rural development in their own possible ways. At present, traditional modes of teaching and learning in most universities require resources which are too expensive and have limitations to contribute to teaching and learning activities for the mass of rural people. For entering the 21st century, it is suggested that Information Technology should be used. (Cooparat, 1998, p. 77-85)
The India experiences shared by Dr. K.V. Raman in his paper, “Role of universities: Indian Scenario”, highlighted that rural development is a comprehensive and multi-dimensional concept with an objective of improving the quality of life of the rural people. It can be achieved by the development of (a) agriculture and allied activities; (b) socio-economic infrastructure and (c) human resources through skill development and improvement. The university can efficiently perform the above rural development functions only through: (a) education by appropriate curricular involvement; (b) systematic studies and research on rural problems and constraints; (c) developing appropriate technologies in areas like health, sanitation, agriculture and animal husbandry, family welfare, education, employment rural industries, energy and resource use and management, and ensure that they are location-tested, adapted and disseminated; (d) to act as ‘resource Centres’ for information by networking with other institutions. A novel experiment of a one-semester study for students in a farm and rural environment, known as ‘Rural Agricultural Work Experience’ has been a successful experience in providing two-way interaction between farmers and students, exposing the former to modern science and technology while the latter learn the rural socio-economy and constraints (Raman, 1998, p. 107-111).

Other experiences in India discussed by Prof. Ram Takwale in his paper, “Experience of and expectations from Indian Universities”, emphasized the developments in Information Technology (IT) should be used extensively to create distributed classrooms through interactive television, to transmit instructional materials, and to ensure close interaction amongst students and teachers who could be living and working at a distance. He also proposed that a campus-based structure of the university should be changed into a decentralised university having its centres at or near villages. They should be well connected through electronic communication. Students and teachers should live/study/teach/train/work and learn at these centres along with villagers. The university campus should become a resource centre for specialised facilities. Working and learning collaboratively and achieving development should be the activities of the university. In this endeavour, the university should establish partnerships with agencies and organisations – governmental; and non-governmental in carrying out its educational and developmental activities (Takwale, 1998, p. 131-137).
Dr. Mohammad H. Rahman (Bangladesh) in his paper, “The Case of Bangladesh”, argued that clearly, universities can provide support at three levels, (a) policy support at the national level (e.g. advisory support, policy advocacy, policy experimentation); (b) technical support at the sub-national level (e.g. consultative support to research organisations on species selection, input and agricultural extension service selection etc.); and (c) implementation support at the local level (e.g. pilot scheme, innovative strategies and linking students and researchers with agricultural/rural development projects and replicating the successful programmes for wider implications). But, a somewhat generally agreed upon conclusion is that neither poverty alleviation nor sustainable development has been achieved to a recognisable degree. While other institutional problems are partly responsible for this, the lack of linkage with universities is also seen by many, as an important reason for Bangladesh’s rural under development. Although there are good numbers of universities that can be linked with rural development efforts at both government and NGO (Non Government Organization) fronts, the faculty resources have been largely unutilised for agricultural as well as rural development. (Rahman, 1998, p. 119-126)

Dr. Yar Muhammad Khan (Pakistan) described “The role of the university in the rural development, in the context of 21 century”, and expressed the view that to fix the role of university in the context of rural development in the 21st century, the university has to change its present mandate from mere academics and some sort of research and extension, to developing a more viable strategy for a holistic developmental process in rural areas and act as advisor, implementers or partner in the implementation of rural development plans. The university on the one hand shall train and produce Graduate Catalysts (GCs) to live with the local community, to listen and learn from them, and help them in solving their problems and developing and executing plans. GCs should guide them toward self-reliance through the process of social mobilisation, capacity-building, capital formation transfer of technology, skills enhancement, productive linkages, viable inputs, and delivery system. The university in the future has to have more elaborated integration and co-ordination with national building departments, the political lords, NGOs, private and public entities to have an integrated and collaborating working. To achieve the above stated objectives, the university has to frame new instructional methodologies, programmes to sensitise their students and teachers in social dynamics and operational paradigms.
The university has to use the advanced information technology to update its working with communities and international resource centres. A new innovative rural development and educational policy would be a prerequisite. (Khan, 1998, 145)

Dr. Wan Hashim Wan Teh (Malaysia) described the Malaysian experience in his paper, “Role of Universities for Rural Development the Malaysia Experience”. The story is through its village adoption scheme (VAS); approximately a hundred villages have benefited from new knowledge, ideas, technology practices and innovation from the university’s faculty members. The aim of the VAS is to empower self-help communities guided by such related principles as participation, diligence, group discussion, working through trustworthiness, and community responsibility. Development in this context is focussed on the community members themselves who will plan and implement their own ideas while the university provides technical expertise and advisory services.

It is also suggested that effective rural development could be achieved through a smart-partnership and close co-operation of three parties: the university, government agencies, and people where the relationship is mutually beneficial to one another. (Teh, 1998, 151-154)

As one of the developing counties, rural development was set up as a fundamental goal by Chinese universities. Apart from AUH’s contribution for rural development, other universities in China, for example, have also engaged in the similar activities that can be summarized as followings.

Mr. An Ning (China Northwest Agricultural University) in his paper, “The challenge and expectations of China’s agricultural education and development”, shared a view that agriculture is strongly affected by local conditions, therefore agricultural education should be carried out in the light of local specific conditions and their distinctive characteristics. For the local community and the regional economy, the only way to better run the agricultural university is serving the agricultural-rural economy and farmers. As the intellectual economy approaches, agricultural universities should also accelerate its reform in the fields of teaching, research and extension. In particular, agricultural science and technology, demonstration and extension services need to be strengthened, so as to meet the needs of regional
economic development, while the agricultural university will also benefit from the service. (An, 1998, p. 59-62)

Dr. Luo Xiwen (South China Agricultural University) gave an example of how contributions by South China Agricultural University to the development of agriculture was through helping the government and the farmers prepare development strategies and participate in the development of the rural area; demonstrating the university’s scientific research achievements for the farmers; running training courses and giving lectures on modern agricultural knowledge and techniques to farmers; co-operating with farmers’ enterprises to transfer the university’s scientific research achievements to farmers and enterprises and to develop a new way to contribute to education with research and production serving as a technical consultant for the development of farmers’ enterprises to provide high quality products (Luo et al, 1998, p. 71-76).

Mr. Guan Chunyun (China Hunan Agricultural University) presented the practices of Hunan Agricultural University to serve local economic development, which are readjusting the structure of specialities; deepening educational innovation and training qualified technicians in the construction of rural areas; carrying out scientific research closely around practical problems faced in rural production; and making efforts to turn research achievements into productivity (Guan, 1998, p. 147-150).

Dr. Li Xiaoyun (China Agricultural University) analysed a gap between the current existing structure of the university set-up and the realities of rural development work. He noted criticism, that the current university set-up is very much western-industrialisation based/oriented and this needs to be first reviewed and changed in order to meet the needs of the rural population. The characteristics of the rural farmers of Asia (e.g. small-scale farmers are the predominant population) is very different from the rural population configuration of the western society (Li, 1998, p. 139-143).

From the above description (AUH, CDU, and the UNESCO papers), it can be concluded, therefore, that universities can play important roles for rural development both in developed countries and developing countries, but different countries have different situations, requirements and considerations, and all those required the
universities to have different strategies, principles, and priorities for their rural
development programs. However, are there any principles to guide best practice in
rural development?

1.3 Why this study topic was selected?

“The past quarter century has been a period of unprecedented change and progress in
the developing world.” (Chambers R., 1983, p. 1) Even though a great achievement
in economic development and social progress has been obtained worldwide, more
than one billion (1.115 billion) people in the developing countries continue to live in
absolute poverty. Three quarters of them live in the countries of the Asia-Pacific

With the biggest rural population in the world, China has made great achievements in
education, social and economic development in rural areas. The universities,
especially agricultural universities, have played significant roles for rural
development through their teaching, training, research and extension work. Australia
as one of developed countries and probably among the smaller group of rural
populations in the world has also paid attention to rural, remote and Indigenous
communities. With the view of sharing and exchanging experiences in the
development of rural areas, the University and Rural Development were selected as
areas of study. This study will document largely through case study how universities
use their knowledge base to help rural transformation within an ecologically
sustainable tradition with the view to developing a model of general principles that
can be applied within a comparative perspective.

1.4 Significance of the proposed research

Though rural development is a goal of all societies, especially for developing
countries, both the concepts of development and the prevailing development models
and policies have come under serious questioning during recent times. Attention has
been drawn to structural adjustment policies that have severely affected social sectors
such as education, health, agriculture and so on (Ordonez, et al., 1998, p. 4).

Rural development, “in any case, is not just a matter of altering economic growth
rates and paths. It has to be viewed in much broader terms and encompass the
fulfilment of each person’s human potential in its material, spiritual, individual and social dimensions” (Ordonez, et al., 1998, p. 4).

Before talking about and implementing rural development, the priority should be to give consideration to human resources development. The Human Development Report adopted by UNDP explained that “Human development is a process of enlarging people’s choice. Three essential areas are for people to lead a long and healthy life, to acquire knowledge and have access to resources needed for a decent standard of living” (UNDP, 1991)

In practical terms, education is considered by governments, societies and communities as a social instrument for developing human resources and increasing national productivity. And the university has played significant roles in this regard. The proposed study will examine what different roles universities play in rural development; outline strategies of implementation done by these universities in implementing development in rural areas and thus compare these strategies made; determine strategies that are successful and unsuccessful; analyse what common features that make some strategies successful and others to fail; formulate a common strategy of action that can possibly generate more success in project implementations.

### 1.5 Study Contents and Approaches

Two selected universities, one in Australia and the other in China, will be considered and compared. Universities considered in this study are included under the program of UNESCO-INRULED University-Link Programme, which are: Charles Darwin University (CDU-Australia) and Agricultural University of Hebei (AUH-China); the two universities have played important roles of development in rural, remote, and Indigenous communities in their own countries. By conducting a comparative study between these universities, methods and strategies can be outlined and analysed as to their success/failures. From these outcomes, experiences and success can be shared, mistakes can be avoided as well as common methods and strategy of action can be formulated so as to ensure a high probability of success in rural development which will replicate them in other areas with similar conditions. In doing this, there will be a wider exchange of expertise, knowledge, information, data, sharing and learning. It is hoped that when the stories of two universities serving rural communities are
developed, a comparative study method can be used and the “trial and error”
approach to project development can become more efficient and effective through
adopting best practice principles.

1.6 Why I want to do this study?

How to promote development in rural areas? What would be the strategies needed to
translate knowledge and technologies from universities into a project, such as an
income-generating project (IGP) in rural areas? How can these activities be sustained
so that when the project implementors leave the project site, residents will still
continue to pursue the same activities for their own betterment without the necessary
policing of project implementors? These questions have always bothered me since
my involvement in some projects implemented in rural areas. In every phrase of
project implementation, especially in income generating programs, there have always
been different sets of problems to handle. However, in many instances I have
recognized that project implementors’ visions cannot be sustained after several
months, when the project was terminated. Sometimes the termination comes earlier
as the implementors leave the sites. Is it because, the people simply seemed to have
no knowledge or skills? Or they do not have the required motivation or education
thus to further increase their aspiration in life? It seemed to me that providing
knowledge and technology alone without letting people know or understand what
they will benefit from, does not prove worthwhile or cannot provide enough
ingredients to increase people’s motivation and aspirations to better their life. These
questions keep on pressing me and give me the motivation to look deeply into
methods and strategies for universities delivering rural development programs.

There are many factors that appear to contribute to the success of rural development,
for example, ownership, organization, the source of capital, the education level,
government policy support and the peoples’ aspirations and motivations themselves.
Which among these factors are more important for rural development? Are they
interrelated or independent to each other? With these questions in mind, the study
hopes to develop an understanding of the mechanism of rural development and
transformation and the success factor affecting its sustainability.
1.7 Who will make use of the study results?

The results will have importance not only so that the researcher will be able to understand the mechanism of the role of universities for rural development but also the results of the study will benefit the following:

First, the development implementors especially those who are working in income-generating projects (IGP) in rural areas could gain knowledge from this study that could be important for them. Information derived from this study will give them an understanding of how to transfer knowledge or technologies not only into a small IGP’s but also to be able to identify strategies and models, and to institutionalise a local community and to sustain them.

Second, rural community businesses and people will be able to identify what they need to obtain, sustain and expand their requirements for development;

Third, the universities will be informed for their expected future role and hence be able to redirect their efforts, resources and manpower to the achievement of their objectives in line with rural development.

A thorough literature review revealed little information in this area of study

1.8 Framework

This study is grounded in this assertion: that the universities as educational institutions can help in rural development both directly and indirectly by:

1. Providing appropriate technologies and skills to farmers through the university extension, research and training programs.

2. Providing technical support as needed by the farmers to back-up their limited knowledge of scientific theory and principles that they may need.

3. Increasing farmers’ literacy levels through education and training. In this way the farmers’ skills and capabilities will be increased. Thus they will become more productive and increase their incomes.
Questions to be addressed by the study:

1. Can a model be identified that enhances the universities’ role in serving rural communities?

2. How can university involvement promote development in rural areas?

3. What strategies are available to translate the knowledge and technologies from universities into rural areas? and

4. How can rural transformation activities be sustained when the project implementors leave the project sites?
Chapter 2 Literature review on the roles of universities, adult education, and agricultural extension education

2.1 Introduction

This chapter is a literature review and is intended to find out relevant information related to my study areas, set up a theoretical base for the study and determine the nature of the study. But what is a literature review? What are the purposes of the literature review? What are its functions? Why does the study need to have a literature review?

A Literature review is to review “the research literature---the body of research information related to the research problem.” (Wiersma, 2000, p. 52)

In writing the literature review, the purpose is to convey to the reader what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are. The literature review must be defined by a guiding concept (e.g. your research objective, the problem or issue you are discussing, or your argumentative thesis). It is not just a descriptive list of the material available, or a set of summaries (website 2.1).

Merriam (1989) explains that “The purpose of a literature review is to summarize and integrate previous work and to offer suggestions for future inquiries” (p. 29). She further adds:

An important step in the research process is to review the thinking and research relevant to the topic at hand. Only by becoming thoroughly familiar with prior research and theory can you hope to contribute something that others will build upon, thereby extending a discipline’s knowledge base. A review of the literature thus safeguards against understanding a study that may have already been done, that may not be feasible to conduct, or that may be trivial or insignificant when set against the research needs in a particular field. (p. 29)

Tuckman (1994) considers the purposes of the literature review, and mentions that “Research begins with ideas and concepts that are related to one another through hypotheses about their expected or anticipated relationships.”(p. 44). But “where the ideas or concepts come from” and “how can they be linked to form hypotheses?” are important questions. All of those come from the researcher’s head to some extent,
but to a large extent, “they come from a collective body of prior work referred to as the literature.” (Tuckman, 1994)

Further on Merriam (1989) highlights the functions of a literature review and the reason why the study needs to have a literature review as following:

A literature review, then functions as a means of conceptualizing, justifying, implementing, and interpreting a research investigation. Without it you court the possibility of duplicating earlier work or investigating an insignificant problem. Without a literature review it is also impossible to ascertain the significance of the proposed study for contributing to the knowledge base of a field (p. 31).

What are the specific issues, problems, or research questions that the literature review may help to define? It is obvious that most programs universities carried out for rural development could be categorized as adult and extension education. Since most of the learners for these programmes are farmers who have finished primary education or secondary education and are already adults, the most interesting learning fields for them are about up-to-date knowledge, technologies or skills in the areas related to improve their quality of life, increase agricultural productivity, generating incomes, etc. Therefore, before commencing the rest of the study, a bulk of theoretical reviewing of issues on adult and extension education appears to be necessary to support this contention. Bell (1993) supports this opinion as “Ideally, the bulk of your reading should come early in the investigation, though in practice a number of activities are generally in progress at the same time and reading may even spill over into the data-collecting stage of your study.”

This chapter will deal with the literature on the role of universities, adult education, as well as extension education.

2.2 Roles of universities

Universities as higher educational institutions have many advantages in terms of human (staff and students) and intelligent resources for rural development, and they were, have been and will be playing a positive contribution to development in this area. Universities should identify the real needs of rural people and have a responsibility to provide teaching and training opportunities for their development. Ping (1998) says that a university should be a place for the three-fold functions of
teaching, research and extension/consultancy. For an agricultural university all these should be closely linked with the rural human resources capacity building and rural development. Higher agricultural education has played a key role to ensure that knowledge and skills are transferred from teachers to students and other community members in rural areas. It has also helped the rural development sectors accept the role of agriculture and sustainable natural resources management. (Atchoarena et al., 2003, p. 312).

According to the definition given by the 27th UNESCO General Conference (1993), higher education includes “all types of studies, training or training for research at the post-secondary level, provided by universities or other educational establishments that are approved as institutions of higher education by the competent State authorities”. Thus, the core missions of higher education are to educate, to train, to undertake research and to provide services to the community. The Declaration of UNESCO Asia and Pacific Regional Conference on National Strategies and Regional Co-operation for the 21st Century (Tokyo, Japan, 8-18 July 1997) notes:

…we reaffirm that the aims of higher education can be summarized as: to educate responsible and committed citizens, to provide highly trained professionals to meet the needs of industry, government and the professions; to provide expertise to assist in economic and social development, and in scientific and technological research; to help conserve and disseminate national and regional cultures, drawing on the contributions from each generation; to help protect values by addressing moral and ethical issues; and to provide critical and detached perspectives to assist in the discussion of strategic options and to contribute to humanistic renewal.”

The above paragraph outlines the roles of universities as a total enterprise, but my thesis in the following chapters will focus as a priority, on the university role for rural development. Since “…In many countries, higher institutions are heavily concentrated in urban areas, whereas the majority of the population lives in rural areas, thus requiring new mechanisms to address rural disadvantage”. (The Declaration of UNESCO Asia and Pacific Regional Conference on National Strategies and Regional Co-operation for the 21st Century, Tokyo, Japan, 8-18 July 1997). In this thesis I am developing a comparative view of the Agricultural University of Hebei (AUH) China and the Charles Darwin University (CDU) Australia. The intention is to search for a model of development within these
universities which can be used in a more general application.

China, for example, is a developing country with a long tradition of Eastern philosophy; Australia is a developed country with a modern Western concept, therefore this comparative study will make a contribution as “…Many leaders of higher education in the region see the need for better integration of western concepts and values of countries with Eastern philosophy and culture” (The Declaration of UNESCO Asia and Pacific Regional Conference on National Strategies and Regional Co-operation for the 21st Century, Tokyo, Japan, 8-18 July 1997).

It is particularly important for the universities to find new development models which can be used in their own regions on a case-by-case basis, to enhance lifelong learning and rural development as these two concepts are closely connected.

The concept of lifelong learning is of utmost importance. In rapidly changing economies, the labour market will constantly require new and different skills and so mechanisms must be enhanced to allow professionals to upgrade their skills at regular intervals and to develop new competences. People’s needs of lifelong learning have expanded in all countries of the region. Higher education institutions thus offer learning opportunities in response to diverse demands and work co-operatively with other agencies and employers to ensure that appropriate courses are widely available. Ready access and flexibility in timing are of utmost importance. (The Declaration of UNESCO Asia and Pacific Regional Conference on National Strategies and Regional Co-operation for the 21st Century, Tokyo, Japan, 8-18 July 1997)

In his report of “Learning: The Treasure Within”, Mr. Jacques Delors has identified four key functions of universities.

• To prepare students for research and teaching.
• To provide highly specialised training courses adapted to the needs of economic and social life.
• To be open to all, so as to cater for the many aspects of lifelong education in the widest sense
• International co-operation.

A great deal of successful work in rural areas has been done by the universities through their training, research and extension. University extension has not only served the community by its contribution to intellectual advancement and social progress, it has also been of benefit to the universities themselves-by extending their
influence and indeed their knowledge of the society that sustains them. More, it has promoted the multiplication of the universities themselves since many of them owe their foundation to the extension movement (Burrows, J. 1976).

Some of the critical considerations on the relationship between university and rural development could be summarised as: empowerment of the rural people to be self-sustainability; university’s rural development programs could be accountable to the community; establishment of a broad network and partnership in rural communities; program integration; community participation and two-way communication; information technology and digital media; reform of existing structure and models, etc. (Final Report of UNESCO Asia and the Pacific Regional Meeting on the Role of Universities for Rural Development, INRULED, 1998, Baoding China p. 18)

If universities are to play a constructive role in rural development, they have to adjust their programs towards innovative and non-traditional topics, innovative teaching and learning models, as well as new partnerships with governments, academic persons, research institutes and rural communities (Atchoarena et al., 2002, p. 321). Universities can not succeed in participating in rural development programs unless they make their own contributions and establish successful models. This study will attempt to add both theoretically and practically, to this end.

2.3 Adult education

2.3.1 What is adult education?

Generally speaking, adult education refers to the education of persons who missed some period of their education. Some individuals receive only a very incomplete education, and it is adult education’s role to complement or substitute for elementary and professional education (Coles, 1977, p. xvii). Coles (1977) also states that adult education is for those whom it helps to deal with a new environment or requirement; it is also a further education to those who have already received training; conclusively, it is an educational activity aimed at individual development for everybody. Additionally, the meaning of the term, adult education, needs to be examined by looking at a number of statements that have been written about it. For example, some writers like Holster (1977) and Knowles (1990) suggest the education and training of adults and adult education are essentially the same. Others (Jarvis,
explain that in the United Kingdom, the term adult education has a specific meaning which implies liberal education, stereotyped as middle-class spare time education pursuits. While such a meaning to some extent existed in Australia, researchers concluded that adult education often reflects all educational activities of post schools (Shaw, 1999, p.15). The Australia Association of Adult and Community Education (AAACE) adopts the following definition of adult education (AAACE, 1997), “Adult education is any activity that deals with the education or training of adults.”

The Chinese explanation of adult education can be summarized as follows: first, adult education should include both adult and education, which means adult education will provide systematic and continuing learning opportunity for an adult who has already held a role in the society in order to promote changes in personal knowledge, skills, attitude and value; second, with a view of the functional meaning, adult education includes all organized education processes, regardless of the contents, levels and methods as well as formal, informal, non-formal education. It is a replacement or extension of school education so that adults can acquire new knowledge and develop their potential; to promote professional qualifications and to change their thinking and behaviour; third, adult education is a process, a social movement, a discipline and a study area (Chen, Jinzhan el al., 1999, p. 17-18).

Adult education has been viewed as providing the part time organized learning opportunities for the adult. It is an educational process and it aims to promote change of personal knowledge, skills, attitude, habit and value. Adult education covers literate education, continuing education, vocational education, social and cultural education, as well as certificate education and so on. It is one of the important components of lifelong education.

Adult education in Australia is also identified as technical and vocational education. It also includes some higher education courses (personal investigation). In China, adult education was known as education of workers and peasants or spare-time education, and only recently, it was officially called adult education, with an expansion of educational scope and diversification of educational reform. (Adult Education in China, Chinese Ministry of Education, originally in Chinese, translated by Wang Li)
Adult education has been considered as a second chance for adults (Shaw, 1999, p. 15). Adult education both in Australia and in China is a significant area. The percentage of adults accessing education is considerable, as six out of ten Australians have had some form of educational experience as adults (Aulich, 1991) and in China, 76.93 million people became literate from 1987-1998, and nearly 200 million since the founding of the People’s Republic of China in 1949. The literacy rate for two-thirds of counties (cities) in China reached 95% or over. Illiteracy can hardly be found among the workers in cities and towns. 500 million participated in various forms of practical skill training from 1979 to 1998. Annual attendance of rural adult school training was over 70 million people in recent years (Adult Education in China, Chinese Ministry of Education, originally in Chinese, translated by Wang Li).

2.3.2 Adult learning

Adult learning not only has formal education but it will also need non-formal and informal education as well, to cater to learners’ different needs. Adult education is a way of providing access to knowledge for all. Adult learning also helps people to understand the world and to understand others, and it offers an opportunity of learning and fulfilling one’s potential. Adult learning is a period of learning in people’s life and should be seen as a sub-set of lifelong learning (Sakya, T.M., 1993).

Learning can be defined formally as the act, process, or experience of gaining knowledge or skills. Learning helps people move from novices to experts and allows them to gain new knowledge and abilities, to change attitudes, value and to promote people’s living standard. Delors (1996) suggests:

> Education throughout life is based on four pillars: learning to know, learning to do, learning to live together and learning to be… Formal education systems tend to emphasize the acquisition of knowledge to the detriment of other types of learning; but it is vital now to conceive education in a more encompassing fashion. Such a vision should inform and guide future educational reforms and policy, in relation both to contents and to methods (Delors, J., 1996, p. 37).

What motivates adult learners? Typically, adults have different motivations for learning. Jeffrey A Cantor suggests that some motivation for adult learners can be summarized as to make or maintain social relationships; to meet external expectations, for example, to upgrade some kinds of skills to keep a job; to learn
better to serve others; professional advancement and the pure interest (Cantor, 1992, 37-38).

Furthermore, there are different motivations for adults to keep learning. For instance, some might look for a better job; others might want to have higher studies. Moreover, some might be interested in what they learnt, or what they wished to know. In rural areas, most adult learning contents are in agriculture, health, and social welfare, etc., which is closely linked with the adult’s daily life and improvement in the quality of life.

The main aim for adult learning is to improve the quality of adult labours and make the better life (Coles, 1977). Through adult learning, the adults can change their mind, attitudes, values and ability, and become confident in a society and in their own roles, as well as knowing what they want to do, and what to obtain. Mr. J.K. Nyerere, the former President of Tanzania stresses that:

> The education provided must therefore encourage the development in each citizen of three things; an enquiring mind; an ability to learn from what others do, and reject or adapt it to his own needs; and a basic confidence in his own position as a free and equal member of the society, who values others and is valued by them for what he does and not for what he obtains (Nyerere, J. K., 1973, p. 247 as quoted in Coles, 1977, p. 11).

Coles (1977) states that:

> The three ingredients signify the liberation of man from ignorance, not to become a thought-less robot passively receiving and executing orders without dissent, but to be a creative, sensitive, aware, participating member of society, making the fullest contribution of which he or she is capable (Coles, 1977, p. 11).

The field of adult learning was pioneered by Malcolm S. Knowles (1950), who has identified the following characteristics of adult learners, or outcomes that adult learning should produce, that is:

> Adults should acquire a mature understanding of themselves; adults should develop an attitude of acceptance, love, and respect toward others; adults should develop a dynamic attitude toward life; adults should learn to react to the causes, not the symptoms, of behavior; adults should acquire the skills necessary to achieve the potentials of their personalities; adults should understand the
essential values in the capital of human experience; adults should understand their society and should be skillful in directing social change (Knowles, 1950, p. 9-10).

In adult learning, a range of critical issues has been developed. Zemke (1988) suggested that “increasing and maintaining one’s sense of self-esteem and pleasure are strong secondary motivators for engaging in learning experiences”. He also mentioned that “new knowledge has to be integrated with previous knowledge; that means active learner participation”. (Zemke, 1988). Brookfield (1986) shares the same opinion and emphasized that “prior learning experiences have the potential to enhance or interfere with new learning”. “The effective adult learning entails an active search for meaning in which new tasks are somehow related to earlier activities”. (Knox, 1977 as quoted in Brookfield, 1986). Unlike the formal learning, adult learning is a non-formal learning process. Some people stressed that “adult learning must be problem and experience centred” (Gibb, 1960 as quoted in Brookfield, 1986). Adults experience anxiety and ambivalence in their orientation to learning. (Smith, 1982)

Brundage and MacKeracher (1980) have expressed how adult learning is facilitated:

…when the teacher can give up some control over teaching processes and planning activities and can share these with learners; adult learning is facilitated when teaching activities do not demand finalized, correct answers and closure; express a tolerance for uncertainty, inconsistency, and diversity; and promote both question-asking and -answering, problem-finding and problem-solving; adult learning is facilitated when the learner’s representation and interpretation of his own experience are accepted as valid, acknowledged as an essential aspect influencing change, and respected as a potential resource for learning; adult skill learning is facilitated when individual learners can assess their own skills and strategies to discover inadequacies or limitations for themselves.

Some examples in the literature suggest learners who are actively engaged in the learning process will be more likely to achieve success (Dewar, 1996; Hartman, 1995). When adult learners are actively involved with their learning process they begin to feel empowered and their personal achievement and self-directed levels can be raised. A key issue to getting adult learners actively involved in the learning process lies in understanding learning style preferences, which can positively or negatively influence learners’ performance (Birkey & Rodman 1995; Dewar 1996;
Hartman 1995). It has also been shown that adjusting teaching materials to meet the needs of different learning styles benefits all learners (Agogino & Hsi 1995; Kramer-Koehler, Tooney & Beke 1995).

Thus it is apparent that adult learning is an educational activity, and it is an effective tool to affect change in attitude and behaviour towards life; to empower adults’ unharnessed potential so as to be capable to attaining the best in life.

2.3.3 Adult education and human resources development

Human development is a comprehensive development; it is creating an environment in which the people can have more potential, more productive and creative lives, therefore, human development is to enlarge the people’s choices, to keep confidence, and to realize their values. (UNDP Human Development Report 2001, p. 9)

There was a special contribution within the UNDP Human Development Report 2001 from Mr. Kim Dae-jung, former President of the Republic of Korea. He states:

> We are living in an age of knowledge and information, fraught with both opportunities and dangers. There are opportunities for the underprivileged and poor to become rich and strong. But at the same time there is a danger that the gap between rich and poor nations could widen. The message is clear. We must continue to develop our human resources. The success or failure of individuals and nations, as well as the prosperity of mankind, depends on whether we can wisely develop our human resources (UNDP Human Development Report, 2001, p. 24).

In any society, if its members are educated and have high qualifications, capacity and ability, even though they are still very economically poor, they are a “rich” society in terms of valuable cultural capital. There will be a great potential for their development. Mr. Kim Dae-jung also shared his opinion as “If we succeed in developing the potential of our citizens by fostering a creative spirit of adventure, individual and nations will become rich, even if they are without much capital, labour or national resources.” (UNDP Human Development Report, 2001, p. 24).

Education is an important vehicle to empower human beings and societies for their development and progress. It is clear that illiterate or functionally illiterate people cannot become the main forces for development of local economy and improvement of social progress in rural areas. It is also obvious that rural development cannot be
realized without paying great attention to its human resources development. It is also
undoubted that if the adult population, who are the main working force in any society,
remain non-literate, and unproductive, unresponsive to the changing environment of
the world, the society will remain poor even though it is rich in natural resources.
Therefore, adult education as a part of continuing education can increase the adult
literacy rate, which is one vital human development index, so as to make a direct and
significant contribution for human resources development, and also for economic
development and social progress. Coles (1977) stressed that “real development must
depend on the balanced growth of the person, both as an economic and social being.”
Furthermore, as quoted in Coles 1977, Harbison (1965, p.71) emphasized that “the
wealth of a country is dependent upon more than its natural resources and material
capital; it is determined in significant degree by the knowledge, skills and motivation
of its people”. Singh (1998, p. 10) stated that “Education is a process of personal
development through the harness of cognitive competencies”.

Adult education is as an important part of lifelong learning and plays a significant
role for human resources development and adult capacity building. It has been paid a
great deal of attention by different countries and the international society. In 1997,
UNESCO held the “Fifth International Conference on Adult Education” in Hamburg,
Germany, and used “Adult Learning: A Key for the Twenty-first Century” as its main
theme. A hundred and fifty countries participated in the conference, and two
important documents have been adopted, that is the “Hamburg Declaration on Adult
Learning”, and the “Agenda for the Future of Adult Learning”, which focused on the
roles of adult learning and lifelong education in the 21st century. An important follow
up event was the “United Nations Week of Adult Learning” in September 2002 with
the topic of “Build Learning Society: Knowledge, Information and Human
Development”, which took the “global dialog” as its initiative. All these efforts are
intended to create a learning society.

Although the relationship between adult education and development is not simply
considered as a cause and a result, and adult education can not in itself guarantee
new jobs and automatically result in the individual or community development, adult
education can empower the people and provide individuals with more opportunities
and abilities, as well as give them more potential.
Some theories and literature about adult development have emerged. Merriam and Caffarella (1999), as well as Clark and Caffarella (1999a, b) indicate four models for adult development: biological model, which is concerned with how physical changes affect development; psychological model, which mentions that development is either sequential, a lifelong process or a series of transformation, or relational, a part of adult education; sociocultural and integrative models, which identify a new way of thinking about adult education for adult development. “Adult development is considered to be the transformation of individuals’ existing knowledge to construct new knowledge as well as the reinforcement of existing knowledge. Changes are individually, socially, and culturally determined” (Billett, 1998, p. 21-34). Dirkx (1998) summarizes four theoretical meanings on transformative learning in adults as consciousness raising, critical reflection, development, and individuation. The three alternative views of adult education and development, such as the person centred view, the production centred view, and the problem solving view were examined by Kuchinke (1999). Transformative learning in the adult is to make changes through transformation of the adult’s perspective and meaning; to make senses of these changes frequently involves development (Dirkx, 1998, p. 1-14). Daloz (1999) considers education as a transformational process and suggests that it is a way that adults can make meaning from their lives. Hobson (1998) carried out a study and indicates that “adult development, from a transformative viewpoint, is more than adjustment to a particular society. It is a qualitative change in how the world is viewed and involves productive tension and struggle”. Singh (1998, p. 3) writes that:

The changing world of work is a multifaceted issue of enormous concern and relevance to adult learning. Globalization and new technologies are having a powerful and growing impact on all dimensions of the individual and collective lives of women and men. There is increasing concern about the precariousness of employment and the rise of unemployment. In developing countries, the concern is not simple one of employment but also of ensuring secure livelihoods for all. The improvement needed in terms of production and distribution in industry, agriculture and services requires increased competencies, the development of new skills and the capacity to adapt productively to the continuously changing demands of employment throughout working life. The right to work, the opportunity for employment and the responsibility to contribute, at all ages of life, to the development and well-being of one’s society are issues which adult learning must address.
2.4 Agricultural extension education

Agricultural extension education exists throughout the world in different forms as a means of disseminating useful knowledge about agricultural technologies to rural communities for the purpose of improving agricultural productivity and production, and bringing about change as well as improving the lives of farmers and their families. Agricultural extension education is a function of governments and specialized agricultural institutes, such as universities, research centres, or extension agents, because of the importance of agricultural production to a national economy, and the welfare of its people (Oakley, P. et al., 1985).

Agriculture extension education and development have long been a topic for discussion for many countries, especially developing countries. All extension activities in rural areas in developing countries take place within a process of development. The concept of rural development must be considered with particular reference to agriculture, since agriculture is a basis not only for the national economy of developing countries, but also the livelihood of most rural families.

Development is an action or intervention process of social change. “It is a dynamic concept, which suggests a change in or a movement away from a previous situation” (Oakley, P. et al., 1985, p. 3). Rural development aims at changing rural people, and rural society. It is not static but is continually evolving into new and different forms. Rural development introduces new ideas and new methods into rural society so as to improve people’s living level. It is a process of transformation of a traditional society into a more advanced one. During the changing or transformation, rural people can build a future for themselves and choose what to do by themselves, providing government support, university involvement, community participation and so on. Rural development involves three elements: economic, social and human.

It should not concentrate upon one to the exclusion of the others. The economic base of any society is critical, for it must produce the resources required for livelihood. But we must also think of people and ensure their active participation in the process of development (Oakley, P. et al., 1985, p. 3).

Agriculture is closely linked with rural development both for food and cash crops. It is an important economic activity for most countries in the world. In the developing
countries agriculture is usually the pre-eminent economic activity, and is crucial for overall economic development and social change. However, the vast majority of the people in developing countries live in rural areas, part or almost their entire livelihood comes from agriculture which has benefited little from advanced technology. Agricultural extension education has become a crucial tool for disseminating knowledge, technologies, information and skills in rural areas for rural development.

Extension work is a means by which new knowledge, skills, and ideas are introduced to rural communities in order to bring about change and improvement in their livelihood. Without extension work, farmers would hardly be able to access the services for improving their agricultural production and other activities. P. Oakey and C. Garforth have pointed out in their book: Guide to Extension Training, Food and Agricultural Organization of the United Nations that: “The critical importance of extension can be understood better if its three main elements are considered: Knowledge, Communication, Farm Family” (Oakley, P. et al., 1985, p. 7).

Extension is an informal educational process, taking the rural population as a target group to provide them with technology and information so as to help them solve their problems and empower their abilities for their own future development. P. Oakey and C. Garforth have concluded that “if the current ideas and practice of extension are considered, four main elements can be identified within the process of extension: Knowledge and skills, technical advice and information, farmers’ organization, and motivation and self-confidence.” (Oakley, P. et al., 1985, p. 8).

Extension is a process of training and learning, but it is different from normal university study, since most trainers are farmers who already have a lot of knowledge about their own areas and farming systems. From this point of view, extension education must build on the existing knowledge and provide new ideas and information.

It is recognized that extension can play an important role for food security. Gasperini (2000) emphasized agricultural extension education for food security and pointed out “All for education and food for all”. He also highlighted the idea of education as being essential for empowering the poor and achieving food security. Sommer (2001)
shared the same opinion and addressed “Education and Food for All”, and described the cases that contribute to the process of enabling rural people to improve their living and livelihoods. Bawden (1996), Crowder (1998) and Muny (1997) stressed the relationship between agricultural extension and sustainable development and expressed the integrating sustainable development theme in agricultural extension. Economic impact and contributions are critical issues for agricultural extension programs and rural development. Evenson (1997) reviewed and analyzed those issues in 75 studies (countries). Other literature has been found regarding agricultural extension education and rural people’s welfare and rural sustainable development, such as, Adhikarya (1995), Crowder (1996a, 1996b, 1996c), Deshler (1997), Farrigton (1997)), and Zinnah (1998).

The world is changing. There are more challenges for agricultural and extension education, and more demands of rural populations for their development. Maguire (2000) emphasized that rural development is a complex process and many dimensions are considered with and referred to, such as, sustainable production agriculture, natural resources management, institutions, infrastructure, health, education, markets, finance, policy, local government, and so on. In order to reach successful rural development, agricultural education coming from universities to non-formal adult education has to make changes to meet the expectations of the people and society. He also suggested that:

Increasing competition from other educational institutions and non-traditional sources makes a strong and urgent case for agricultural education systems to make changes in order to influence a wide range of stakeholders including those in academia, in farming and non-farming rural areas, policy makers, and the private sector (Maguire, 2000, p. 1).

It is time for change. Innovative approaches and models should be identified that enable knowledge and technologies to be transformed for rural communities in order for them to make contributions for rural development.

2.5 Conclusion

The roles of universities, adult education, and agricultural extension education have been discussed with the view to develop an acceptable definition of each. Thus the conceptual focus of this study has been set up. All of these areas are relevant to the
particular issues, and areas of the thesis. The significant literature discussed in this chapter offered an overview on aspects of the study topic. This chapter then has identified significant areas of the study that will be of interest in analysing the role of the university in rural development. The areas concern the universities themselves, adult education, extension education and rural development connections. The next chapter will deal with the methodology of the study.
Chapter 3 Study Methodology

3.1 Introduction

The previous chapter reviewed the literature on several critical components of this thesis, namely, universities, adult education, extension education and rural development connection. In this chapter, the study methodology will be described generally. This includes data collection, interviews, questionnaire, personal surveying and observation, case study, comparative study and so on. Some of these approaches reflect different views of education and human activities, while others reflect the demands made by the area of study. The general methodology and specific methods used in this study have been influenced by my knowledge and experience, by my reading and by the nature of the topic, and context.

For the proposed study area, which focuses on the roles of universities in serving rural communities and highlights the influential and innovative role played by both case study universities for knowledge, technology transforming approaches and processes, a qualitative comparative case study between China and Australia will be adopted. In some contexts, quantitative data will also be collected, used, and analyzed to support the points of the study.

Judith Bell (1993) has pointed out: “a study making use of a questionnaire will inevitably be quantitative, but it may also have qualitative features. Case studies, which are generally considered to be qualitative studies, can combine a wide range of methods, including quantitative techniques.” (p. 63) Quantitative and qualitative methods have been used in this project since it is believed that. “the distinction between quantitative and qualitative paradigms in education is gradually reducing as it is realized that both approaches may be combined in well designed investigations” (Cavanagh, D. M. and Rodwell, G. W., 1992, p. 288). Strauss and Corbin (1990) as quoted in Cleary (1998) suggest that qualitative research “can refer to research about person’s lives, stories, behaviour, but also about organizational functioning, social movement or interactional relationships” (p. 17)

Generally speaking, the study will be carried out by data collection for two universities and their located administrative zones in China and Australia, data analysis, case study and comparative study. The approach used in the thesis is to build up two case studies, Hebei Province and Agricultural University of Hebei
China, and the Northern Territory and Charles Darwin University Australia with qualitative and quantitative data. As dictated by the method, description, interpretation, juxtaposition and comparison in the role of universities to transform their knowledge bases to serve the rural, remote and Indigenous communities for their development will be dealt with at the appropriate time.

3.2 Data collection

Data collection is an important process for any kind of research. It is used as an initial stage to find out what I need to know for this project and why. Since this research is a case study and a comparative one between Australia and China, two broad areas are identified. Travel to China for field visiting and revisiting, data collection, interviews with people and other institutions, collecting Chinese version books will occur several times during the study. Data will also be collected in Australia according to the research framework over a four-year residential period.

Patton (1990) as quoted in Cleary (1998) believes that “The data for qualitative analysis typically come from fieldwork”. Cleary (1998) also mentions that the data should be collected from the results of fieldwork.

Wiersma (2000) notes some key methods for data collection: “Among the numerous methods of data collection, those most commonly used include observation, interview, collection and review of related documents, taking specimen records and taking oral histories. (p. 201)” In this thesis, the data collection will be done in the following ways: 1. Field visiting, consists of visiting the research sites for general information from which specific case study questions can be generated, 2. Interviews, 3. Questionnaires, 4. Surveying development, 5. Retrospective recall, 6. Government documents on rural policies, 7. Workshop papers, 8. Own journal/diary and personal translation from Chinese sources.

The worst thing that happened early in my study is that my computer (lab top) and backups were stolen on June 2002, one year after my enrolment for PhD study. A lot of data, references, documents and relevant materials I had collected for more than five years were lost. In addition five draft chapters have also gone (fortunately, two of them came back from my supervisor). This incident required me to revisit the sites and rewrite first the five chapters and modify my approach to comply with time.
constraints. Unfortunately, some data lost is from my personal diaries and rural working experiences records, which can not be recovered. This is my biggest regret for this thesis. However, I re-collected data and have sufficient data to reconstruct the major work.

1. Field visiting

This study is intended to first build up two knowledge bases for two universities on the roles they have for transforming knowledge and technology into rural communities for their development. Therefore, the field visiting or fieldwork is an important component of data collection used in this thesis. Merriam (1988) as quoted in Cleary (1998), says the characteristic of qualitative research is “that it usually involves fieldwork. One must go physically to the people, setting, site, institution, (“the field”) in order to observe behaviour in its natural setting” (p. 19). Further on Cleary (1998) expresses that “Merriam (1988) mentions strengths when she says that fieldwork better captures situations and settings (p. 32). Cleary (1998) in his thesis goes on to quote Patton (1990) and notes “his ideas on strengths when he claims that fieldwork is the central activity of qualitative enquiry. It means having direct and personal contact with people under study in their own environment”. Patton (1990) also emphasized “the importance of getting close to the people and situations being studied in order to personally understand the realities and minutiae of daily life.” (Quoted by Cleary, 1998)

Selected parts of Hebei province in China, and Northern Territory in Australia will be used as the sites for the case study. These sites will be visited and university staff, local officers, educators and farmers will be interviewed over a four-year period.

Field visiting is one of methods for this project. Visiting research sites can lead to obtaining first hand materials and feelings. For example, the research sites in China have been visited since 1982, and from that time on, I have visited these particular places many times for different missions. Sometimes I wrote down diaries to record what happened and compared them with former documents, sometime I participated in university’s rural development programs to spend time in rural areas with local farmers. These visits have enabled me to review my personal feelings and experiences to reframe the ideas so that evidence could be found to identify the
achievements or shortcomings information regarding rural transformation will become available to me from this source. Denzin writes that

Fieldworkers can neither make sense of nor understand what has been learned until they sit down and write the interpretive text, telling the story first to themselves and then to their significant others, and then to the public (Denzin 1994, p 502)

In the Northern Territory (NT), Australia, according to my research framework and time limitation, I will be visiting sites connected with CDU’s activities for rural communities. I will keep diaries view local staff and farmers, and collect data so as to identify any approaches that will be useful in developing a comparative model being used by CDU to serve rural communities. I will also live in the location for several years to gain valuable insights into the culture as determined by the role of comparative method.

2. Interviews

As one of the important media for data collection, “Interview is an effective method of conducting a survey” (Wiersma, 2000, p. 183). And as one of face to face conversations and surveys, “interviews can reach the parts which other methods can not reach.” (Wellington, 2000, p. 71) Further on he argues that an interview also “allows a researcher to investigate and prompt things that we cannot observe. We can probe an interviewee’s thoughts, values, prejudices, perceptions, views, feelings and perspectives.” (p. 71) Therefore, one of the primary methods to be used in this research is to gather data from the subgroup who will be interviewed. The subgroup will include university staff and students, educators, agricultural technicians, local officials and farmers both in China and in Australia. Subgroup members will be asked to participate in an interview in addition to completing the questionnaire, and keeping a journal as a reflection of their responses. The information from such journals will be used as data in this research. This process of keeping a journal and the interviews may help build a context for my studies as the people reflect on learning practice and how to participate in rural communities.

Interviews will normally take place with the subgroup members in their own context both in Australia and in China. Telephone interviews may be required on some occasions, to “reduce the cost of survey” (Wiersma, 2000, p. 185), especially for the interviews or re-interviews in China. The interviews will be digitally recorded and later transcribed. The digital files and transcripts of these interviews will be given a
code to preserve confidentiality as required by Charles Darwin University Human Ethics Committee. This code will identify the subgroup members and interview to allow easy identification by myself. If participants give permission their names and positions may also be used. In addition, notes will be taken during the interview to record information not available from an audio recording.

As my study focuses on the roles of universities to move their knowledge base into rural communities for their development, the interviews also concentrate on this field and will be carried out two or three times according to the requirements and feasibility of in-depth investigation. The interview results, conversation or outcomes should be “huge” in terms of the broader investigation areas. Therefore, “some editing was required.” (Shaw, 1999, p. 47)

3. Questionnaires

Apart from interviews, in which the data are collected orally, or an oral data collection, another data gathering technique is questionnaires (Merriam, 1989, p. 129). Questionnaires are also used in mail surveys, through which anyone can send the exact same instrument to a wide number of people, and they are relatively inexpensive to administer (Trochim, 2001, p. 108). Tuckman (1994) states that “Questionnaires and interviews can be used to discover what experiences have taken place and what is occurring at the present” (p. 216). Further argument has been made by him that “Questionnaires and interviews are a way of getting data about people by asking them rather than by observing and sampling their behaviour” (p. 216). But whatever the situation, “surveys involving questionnaires require a series of sequential activities.” (Wiersma, 2000, p. 166)

In the study, questionnaires will be used before, after or during the interviews and other study activities. All the questions will be brief and will contain several focus questions which require an open ended response. The specific content of each successive question will be influenced by the responses to earlier questions and other data gathered. A code number will be used to identify each respondent so that it will be possible to examine changes in response of individuals over the period of the study. However, confidentiality will be stressed on each occasion and the name will be kept separate from the completed questionnaire once received and filed. The code key file, that links names to code, will be kept secure and separate to respondent files.
The questionnaires will be distributed electronically by emails in order to have “advantages of speed, efficiency and novelty.” And also it is a “more safety” alternative. (Wellington, 2000, p. 103)

According to Merriam (1989), there are two general types of questionnaires. One is open questionnaires, which the items “allow greater freedom of response”, and other is a closed questionnaires, which “forced to choose one of the alternatives provided”. (Merriam, 1989, p. 129). For this thesis, the combined questionnaires, which include both open and closed items were used to meet different research problems.

4. Surveying development (investigation)

The survey was chosen for the study as the most suitable part of the methodology for obtaining information about the extension role. “The aim of a survey is to obtain information which can be analyzed, and patterns extracted and comparison made.” (Bell, J. 1993, p. 13) The following seven factors are considered when carrying out the survey activities for case studies both in China and in Australia. These factors were extracted from Bereday’s Comparative Research Methodology (1967).

1. Geographical factors will provide information about the natural environment of the study sites, for example, location, map and so on.
2. Historical review will describe the educational development process in the study sites.
3. Political context will talk about the government influence on educational system.
4. Social factors deal with social expectation of individuals and groups, and also deal with the nature of the society, like culture, history, tradition. Those will finally influence education.
5. Economic factors of the study sites are most important, because it will result in the development of educational strategies. Education is a key issue for economic development.
6. Administrative (Organisational) issues will give a clear concept about the educational system and its management in the study sites.
7. Curricular practices in adult and extension education show in detail the relevant curriculum on adult and extension education.

In this thesis, Hebei Province China and Northern Territory Australia have been used as the surveying sites for more investigation. What I am trying to do is to get data from the above mentioned seven areas before commencing (the comparative) study on the roles of universities in rural development. The data will be collected by “…(utilizing) existing data sources including newspaper accounts, statistics collected
by government departments, corporate records, and files of correspondence” (Cavanagh, D. M. and Rodwell, G. W., 1992, p. 274). Much data can be obtained from government reports, year handbooks, statistical publications, websites etc to give a general background to the study as necessary in comparative research.

5. Retrospective recall

The two universities, Charles Darwin University (CDU-Australia) and Agricultural University of Hebei (AUH-China), have played roles in rural development in their own countries. By conducting a retrospective recall from the major decision makers between these universities, methods, and strategies can be described and analyzed as to their success/failures. From these outcomes we can learn from mistakes and successes.

6. Government documents on rural policies both in China and Australia

It is impossible for educational institutes to carry out the activities successfully in rural areas without government commitment. Therefore, appropriate government policies both in China and Australia relevant to rural areas will be identified, collected and used within the case study to extract policy frameworks that could inhibit or enhance rural transformation.

7. Workshop papers

From my position as Deputy Director of UNESCO International Research and Training Centre for Rural Education (INRULED) and Professor at AUH, I have organized and participated in many agricultural based and rural education or education for rural development workshops in China and in other parts of the world. Most of the workshops are international (UNESCO) in the areas of rural education and development. These workshop papers, Khan (2001), Wang li (2003), Cavanagh (2003), Shaw (2001), Cleary (2003), will form a valuable collection for use in this study.

8. Own journal/diary

Before, and during the study period, I have recorded and will record a journal/diary for all relevant activities which could be used for part of my PhD thesis.

The data collected by the above methods will be used as triangulation exercises, using “two or more methods of data collection in the study of some aspect of human
behaviour.” (Burns, 1994 as quoted in Cleary, 1998), to validate various parts of the study.

3.3 Data analysis

The data analysis is “the process of systematically searching and arranging the interview transcripts, field notes, and other materials that you accumulate to increase your understanding of them and to enable you to present what you have discovered to others” (Bogdan and Biklen, 1982, p. 145)

Different working files have been built for different data collection, for example, interviews records, questionnaires, field visiting reports, observation, personal recall and retrospective analysis. “The data preparation stages involve a series of steps, commencing with the raw information supplied by the respondents and ending with the organized, collected files for use in analysis and interpretation” (Cavanagh, and Rodwell, 1992, p. 288).

The data collection and analysis were almost simultaneous processes in this thesis. For example, questionnaires were coded, recorded, glanced at and analysed as soon as the first questionnaires were available.

3.4 Case studies

Generally speaking, there are many aspects of the roles of universities for rural development that are known. However, there are also some successful stories and cases which have not been identified and described. This thesis will focus on these cases, comparing them, the aim being to discover if there is an underlining model for success. Therefore one methodology used in this thesis is “Case Study”. (Bogdan and Biklen, 1982) explained the general idea of a case study approach:

The general design of a case study is best represented by a funnel. The start of the study is the wide end: the researchers scout for possible places and people that might be the subject or the source of data, find the location they think they want to study, and then cast a net widely trying to judge the feasibility of the site or data source for their purposes.

The “funnel” here means that the end of case study is narrower than the beginning. Cleary (1998) asserts the concept of “funnel-like-design” is to give “the impression that qualitative studies start with questions of a broad scope, then the research
narrow down, as in a funnel, to confirmation of questions asked of the data.” The funnel case study idea will be used in this thesis. Bogdan and Biklen (1982, p. 58) has also further explained the meaning of case study: “A case study is a detailed examination of one setting, or one single subject, or one single depository of documents, or one particular event”.

Case study is an ideal method when a holistic, in-depth investigation is needed (Feagin et al., 1991). And it has been used in varied investigations, particularly in sociological studies (Tellis, 1997). The case study used in this thesis is a historical-organizational case study of the type described by Bodgdan and Biklen (1982) as quoted in Wellington (2000), since the study will deal with “a unit, e.g. an organization, over a period, thereby tracing its development. This may involve interviews with people who have been involved with the organization over a lengthy period and also a study of written records. (Wellington, 2000, p. 91)” Merriam (1989) has expressed the four essential properties of a qualitative case study as:

1. Particularistic. Case studies focus on a particular situation, event, program, or phenomenon; 2. Descriptive. The end product of a case study is a rich thick description of the phenomenon under study; 3. Heuristic. Case studies illuminate the reader’s understanding of the phenomenon under study. They can bring about the discovery of new meaning, extend the reader’s experience, or confirm what is known; 4. Inductive. Qualitative case studies for the most part rely upon inductive reasoning for the formulation of concepts, generalizations, or tentative hypotheses. (p. 96)

In the following chapters, Agricultural University of Hebei (AUH) China and Charles Darwin University (CDU) Australia will be used as two comprehensive cases in order to gain insight into the roles of their activities for rural community development. Cavanagh, suggests in “Dialogues in Educational Research” that

The case study is specific to an area of interest. It enables the researcher to ask direct questions of people involved in the study and the research can also be guided by what the participants think is valuable. It is dynamic, pleasant and at time highly unpredictable. Those people affected by the study are often directly involved in it and often critical issues can be solved on the spot. (Cavanagh and Rodwell, 1992, p.161)

Trochim (2001) notes that “A case study is an intensive study of a specific individual or specific context.” (p. 161) It “seeks holistic description and interpretation”
(Merriam, 1989, p. 97) and will “make accessible to the readers all the information necessary to understand” (Patton, 1980, p. 314 as quoted in Merriam, 1989, p. 98). “The case study is particularly appropriate for individual researchers because it gives an opportunity for one aspect for a problem to be studied in some depth within a limited time scale” (Bell, 1993, p. 10) and it aims “to identify some features and to show how they affect the implementation of systems and influence the way an organization functions” (Bell, 1993, p. 11)

There are several steps for conducting a case study according to Merriam (1989). First is to select the case, which should be “a particular person, site, program, process, community, or any other social unit” (p. 97); next is to collect raw data by “observation, interviewing, document analysis… surveys and other instruments” (p. 97); this step might be carried out by conducting “a site visit” (Tuckman, 1994, p. 378); and then data analysis begin with “aggregating, organizing, and classifying the data into manageable units” (p. 97); the last step is to write a narrative case, which is a “readable and descriptive picture of a phenomenon or social entity” (Merriam, 1989, p. 98) and “It should “take the reader into the case situation, a person’s life, a group’s life, or a program’s life” (Patton, 1980, p. 314 as quoted in Merriam, 1989, p. 98). Furthermore, Yin (1994) asserts that there are three important tasks to successfully carry out a case study project, which is, preparing data collection, distributing the questionnaires, and conducting interviews. He also identified and categorized six different sources for case study data sources as: documentation, archival records, interviews, direct observation, participant observation, and physical artefacts.

Therefore, as Merriam (1989) summarized in her book, A Guide to Research for Educators and Trainers of Adults, the case study is:

A particular useful methodology for exploring an area of a field of practice not well researched or conceptualized. In-depth describing and understanding of a phenomenon is needed before generalizations can be made and tested. Case study, which has as its purpose the description and interpretation of a unit of interest, can result in abstractions and conceptualizations of the phenomenon that will guide subsequent studies.
3.5 Comparative study

AUH, located in China, has made great contributions towards rural development through education, training, agricultural extension and other activities. The Chinese government has determined that this university should be a model to be followed by other universities in China; CDU is located in the Northern Territory, in which 13.4% of the total Aboriginal population in Australia lives (ABS No. 3102.0). Therefore CDU has a long tradition of dealing with Indigenous people through various activities. If we systematically analyze and comparatively study these two universities and their participation in rural communities through case study, we could identify their successes and failures. From these outcomes we can formulate a common and an effective strategy of action that given due consideration to the nature of the diverse cultural contexts might be replicated in other areas with similar conditions.

Before the discussion in the comparative study, comparative education should been considered. Almost all comparative educationists have identified and defined comparative education in their own considerations and methodologies. In a practical view, the differences of the definitions directly resulted in different research directions, affected the people’s understanding and recognition of educational activities, and even dealt with the explanation of the research results (Feng, 2001, p. 120). Feng also summarized the different options and further highlights that “A comparative education is a social science used to compare the education in different countries and regions over the cultural diversity. It will explore the educational development principles and specific displaying forms. By using the useful information and experiences, it will promote the educational reform and research worldwide.” (Feng, 2001, p. 120, original in Chinese, translated by Wang Li)

The comparative education method, like its name, is to compare theoretically and practically and generalize social science consisting of “theories, hypotheses, models and laws which facilitate our understanding of the processes of education.” (Jones, 1973, p. x) Jones has further pointed out that the aim of the comparative study is to: “build up a pattern of testable hypotheses and develop conceptual models which will enable complex data to be classified and functional relationships examined.” (p. x) Anderson (1969) explains comparative education as “cross-cultural
comparison of the structure, operation, aims and achievements of various educational systems and the societal correlates of these systems and their elements. (p. 27)” In terms of the purposes of the comparative study, Jones (1973) suggests that it “may be viewed from a number of different angles” and “range from that of academic interest and curiosity” to practical attempts at solving educational problems, which shows these purposes “are inevitably intertwined and dependent on one another” (p. 26)

George Z. F. Bereday (1964), Professor of Comparative Education, at Teachers College, Columbia University, defines comparative education in his Preface as “the analytical survey of foreign educational systems”. (P. ix) He has outlined the steps of the comparative study and asserts that “Comparative education seeks to make sense out of the similarities and differences among educational systems.” (p. 5). Further on he argues that the comparative dimension exists because of the “need to explore systematically the quality of foreign schools as a means of evaluating one’s own educational system.” (p. 4)

In terms of the method of the comparative education, Beraday (1964) points out in his book, Comparative Method in Education, a systematic way to look at data for comparative method. He suggests four procedures:

- **I. Description**
  - Pedagogical Data
  - Only

- **II. Interpretation**
  - Evaluation of Pedagogical Data

Description, the systematic collection of pedagogical information in one country, then interpretation, the analysis in terms of social science, then juxtaposition, a simultaneous review of several systems to determine the framework in which to compare them, and finally comparison, first of select problems and then of the total relevance of education in several countries (Bereday, 1964, p. 27).
Fig. 3.1 mentions four steps of a comparative study: Description, Interpretation, Juxtaposition and Comparison. Description means “systematic collection of pedagogical information in one country” (Bereday, 1964, p. 27). It should include historical review of the educational system, educational achievements, and practice by means of interviews, observation and surveying; interpretation means “analysis in terms of social sciences” (p. 27). It aims to understand both school and society in terms of geography, philosophy, environment, economic and political system. It starts with “extensive reading” (Jones, 1973, p. 86). Interpretation is the second step Bereday proposed. Its aim is to evaluate pedagogical data of the country or countries studied in terms of their historical, political, economic, social, geographical, philosophical, and other background (Jones, 1973). It will “expose school data to a test of social relevance” and “exposing data to a rosette of different disciplines (Jones, 1973, p. 87)”. These two steps are “the stages of area study (Jones, 1973, p. 87)”. In this study, the case study methodology combined with other methods will be used to carry out interpretation.

“The comparative approach begins with juxtaposition” (Bereday, 1964, p. 22). It means “preliminary matching of data from different countries to prepare for comparison” (Bereday, p. 172). Its aim is “to establish similarities and differences in the data gathered so far (Jones, 1973, p. 90)”. The data used for the juxtaposition
stage, Bereday suggests, is “no more than a preliminary matching of the data secured from the first two stages in order to prepare the way for comparison” (Jones, 1973, p. 90). It is a process to make “a simultaneous review of several systems to determine the framework in which to compare them” (Bereday, 1964, p. 27). This process includes a searching for a unifying concept and hypothesis. Since the juxtaposition, Bereday considers, is somehow “the formulation of an hypothesis for comparison”, the term “preliminary comparison” is used by Bereday in place of juxtaposition (Jones, 1973, p. 91).

Comparison is a simultaneous study of countries to analyze the hypothesis made from the previous steps. “A comparison is in a final analysis an ordering process; it means not laying out but highlighting educational materials previously processed” (Bereday, 1964, p. 22).

In this thesis, the comparison is made by using information from one country and one university experience with comparable information from another. Thus this comparative study aims to explore the following:

1. Can a general model be identified that enhances the universities’ role in serving rural communities in two different cultural contexts?

2. How can university involvement promote development in rural areas?

3. What strategies are available to translate the knowledge and technologies from universities into rural areas? and

4. How can rural transformation activities be sustained when the project implementors leave the project sites?

3.6 Ethical Issues

There are several ethical issues addressed here and in the conduct of the research. To reduce this bias this study has adopted a multi-method approach, which involves the respondents directly in identifying issues through open response questions and through opportunity to mediate and clarify meaning in interviews and questionnaires. Confidentiality is a primary concern in research. In cases where it is unsure if publication of material may cause a problem, the specific issue will be negotiated
with the respondent concerned. Raw data, questionnaire response, and interview digital files and transcripts will be kept secure with access limited to myself. Completed questionnaires, interview digital files, transcripts and notes will be kept secure for a minimum of five years after the thesis submission. The purpose of the research, the use that will be made of individual data and the form in which data will be made public, will be explained to each individual involved in the study through a plain language statement. Individuals will be asked to give their consent to the research and told that they may withdraw this consent at any time.

Before conducting the research, “one of the most critical design problems that needs to be confronted early in the research is that concerned with obtaining permission to conduct the case” (Cavanagh, 1992, p.160). Concerning this matter, consent letters have been sent to the relevant office in both universities to obtain formal permission to do research involving CDU and AUH. Consent letters had authority to approve the research on behalf of their committee members. I have been given permission to carry out the investigation in both sides (China and Australia) with their staff members and students in terms of their practices in rural development.

After I obtained permission, research work has been conducted with careful considerations about the ethical issues. Bouma has commented on this:

The responsible researcher is considerate, does nothing to injure, harm, or disturb the subjects of research, keeps data collected on individuals and groups secure, accurately records information, and reports the findings of the research in a public manner (Bouma 1993, p. 146)

In addition to having the consent letters from universities, I have also obtained permission from farmers and their families in China who worked with me during a previous time. Sometime during my travel back to China, I lived in the villages and conducted interviews and other activities. This enabled me to have up to date community information and it has enabled me to reflect upon new ideas.

I tried to involve as many people as I know who have contributed to my study. Unfortunately, there are, however, still other people, I knew very well, who have died, or who it was impossible to contact to make a contribution to this study with their stories. I hope that my choice expresses my respect to all involved and represents their own concerns and events into this study.
In some cases, with permission the real names and positions of the people have been used.
Chapter 4 Educational development in rural Hebei China 1949-2000

4.1 Introduction

Before going into the roles of universities in rural development, some important issues must be identified to understand the educational and social situations in rural Hebei. This chapter will discuss the educational, social and demographical issues of rural Hebei, where the Agricultural University of Hebei is located, as is necessary within comparative research methodology.

The review of experiences in China’s social development and economic growth shows that education has made great contributions to development in the rural sector. However, the relationship between progress in education and aspects of national development is not a cause and effect relationship, but an interactive one. It is in this consideration, that the first inquiry will be made regarding the natural and socio-economic contexts of rural education in Hebei province. This inquiry will help in understanding the impact of social and economic factors on the role of education for rural population in rural development of the province.

It was decided that Hebei Province, China, would occupy a chapter, the Northern Territory, Australia would occupy a chapter too and then a concluding comparative summary would be made rather than attempting to compare and contrast each within one chapter. It is hoped that this approach will facilitate the reading and allow for a smoother summary analysis. In this way it is hoped much repetition will be avoided.

4.2 The Social and Economic Context

4.2.1 Geographic context and administrative structure

1. Geographical context

Hebei Province is in the northern part of the North China Plain, to the north of the lower Yellow River and to the west of Bohai Sea with a coastline of about 500 km long. It is between longitude 113° 27' E. ~119° 50' E. and latitude 36° 3' N. ~42° 4' N., bordering on Liaoning, Inner Mongolia, Shanxi, Henan, and Shandong provinces. The Chinese name for “Hebei” means “to the north of the river”, because
the province, with Beijing, the capital of China in the centre, lies to the north of the lower Yellow River.

With the sea in front of it and mountains at its back, Hebei province slopes down from northwest to southeast, and it is roughly divided into four parts, such as North Plateau, North Hebei and West Hebei mountainous regions and Hebei Plain. The hilly area and plateau take up 57 per cent of the total area of the province.

The Plateau is 1,200 to 1,500 metres above sea level. The hilly land is an excellent natural pasture of Hebei. The Yanshan Mountain ranges in the north of it and the rolling Taihang Mountains ranges in the west, vary widely in height and have many high cliffs. As part of the North China Plain, the Hebei Plain is generally less than 50 metres above sea level. Its crisscrossing rivers and vast fertile land serve as an important grain and cotton growing area in the province.

The flat and low central part and the Binhai Plain contain lakes and rivers for example, Baiyangdian Lake and Wenan depression. With most of their sources from the mountainous areas in the west and the north, the rivers all gather in the east before flowing into the Bohai Sea and form a water drainage system which mainly consists of Luanhe, Chaobaihe, Jiyunhe, and Haihe rivers. The Haihe River system comprises five branch tributaries including Yungding, Daqing, Ziya, Nanyun and Beiyun rivers, with a total length of 1,100 kilometres.

With a temperate continental monsoon climate, it is cold with a little snow in winter, hot and rainy in summer, windy and dusty in spring and has fine weather in autumn. The average annual temperature ranges from 1°C to 13°C. With the average annual temperature of 1°C, the plateau area, in the north part of Hebei, is the coldest part, the lowest temperature will be 40°C below zero. Handan in the south is the warmest, with an average annual temperature of about 13.6°C. The frost free period lasts between 120 days and 200 days. Annual precipitation is 500 mm, and the rain falls mainly in July and August.

Hebei ranks 14th in land resources in China with a total area of 187,700 square kilometres (website 4.1), but with its large population, the resources per capita are poor. There are over a thousand utilizable flora and fauna species that make up 25
per cent of China’s total. By the end of 1989, 106 types of minerals had been found in this province. Hebei’s marine resources are rich and also there are many locations that attract tourists (Hebei Statistical Yearbook, 2002).

2. Administrative structure

China’s governance is based on a four-level structure dividing the nation into provincial, prefecture, county, and township level administrative units.

The country (China) has 23 provinces, 5 national minority autonomous regions, 4 municipalities and 2 special administrative regions directly administered by the Central Government. The Constitution specifically empowers the State to establish special administrative regions when necessary. A special administrative region is a local administrative area directly under the Central Government and free to maintain the capitalist system. At present, Hong Kong and Macao are the two special administrative regions of China (China Statistical Abstract, 2001). (Fig. 4.1)

![Figure 4.1 Administrative structure of China](image)

A province or autonomous region is divided into cities, prefectures, and/or autonomous prefectures. A municipality or a city is divided into districts, counties, autonomous counties, and/or county-level cities. The district is the administrative unit covering the urban areas of municipalities and large cities. A prefecture or an autonomous prefecture is subdivided into counties, autonomous counties, and/or county-level cities. A county, an autonomous county or a county-level city is subdivided into townships, national minority townships, and/or towns.
In rural areas, the government has divided the big natural villages in the plains or grouped small ones in the mountains to form administrative villages, which are the basic unit of administration in China. An administrative village is managed by a village committee consisting of an elected chairman (usually called “village head”), a village accountant, a representative of the Women's Federation, a representative of public security, and the village technicians for agricultural and livestock production. The village committees are responsible for primary education and literacy training as well as other social services including family planning, food distribution and public security at the grassroots level in rural areas. The size of a natural village (One administrative village may include a few natural villages) is between 50-3000 persons (China Social and Economic Statistical Abstract for Counties or Cities, 2000).

Figure 4.2 Administrative units of Hebei Province (Hebei Social and Economic Yearbook, 2000)

4.2.2 Economic Development

1. Present Economic Position of Hebei, China

Hebei province belongs to China’s “around Bohai Sea economic region”. But amongst the fast developing eastern coastal provinces, the economic growth of Hebei is comparatively slow. In fact, Hebei is in the upper-middle level of economic development in China. (In this chapter I have also used the data from Jiansu province, which is in the most developed region in China, and data from Gansu province,
which is one of the inland, remote, and less developed provinces. The data from above provinces could reflect the different development levels in China.)

In 2000, the gross domestic product (GDP) of Hebei was valued at 507.63 billion Yuan, with per capita gross domestic product being 7,527 Yuan. The per capita gross domestic product and per capita income of rural residents are higher than the national average, while the average salary of employees and per capita consumption level were lower than the national average (See Figure 4.3, Chinese Statistical Handbook, 2001)

![Figure 4.3 Economic development level of Hebei](image_url)

Figure 4.3 Economic development level of Hebei

The industrial sector of the province developed greatly after the 1950s. Hebei is currently a major industrial base for coal, steel, and textiles. Total provincial government revenue was 24.88 billion Yuan.

Hebei has a long history of agriculture. It is one of the important areas for production of grain and cotton in China. Animal husbandry and fisheries are also important components of the economy. In 2000, the grain output of Hebei was 137.51 million tons, with per capita yield of grain being 2039 kg; the cotton output was 1.3 million tons, with per capita yield of cotton being 19 kg. The animal husbandry product was 61.37 billion Yuan; the fisheries product 5.89 billion Yuan. The outputs of grain and cotton, and the values of animal husbandry and fisheries of Hebei accounted for an important proportion amongst the 34 provincial administrative units of China (See Figure 4.4, Data from Hebei Provincial Statistical Bureau)
2. Economic development before the opening up policy

The People's Republic of China was formally established on 1 October 1949 with its national capital at Beijing. Since the foundation of the People's Republic, among China's most urgent needs in the early 1950s were food for its 583 million population, domestic capital for investment, and purchase of Soviet-supplied technology, capital equipment, and military hardware. To satisfy these needs, the government accelerated the redistribution of land in rural areas during 1951-52, which had actually begun under the Agrarian Reform Law of 28 June 1950, and began to collectivise agriculture. Preliminary collectivisation was 90 per cent completed by the end of 1956. In addition, the government nationalized banking, industry, and trade. Private enterprise in Mainland China was virtually abolished.

The period of “transition to socialism” begun in 1953 and corresponded to China's First Five-Year Plan (1953-57). The period was characterized by efforts to achieve industrialization and collectivisation of agriculture.

In 1958 the Chinese Communist Party launched the Great Leap Forward campaign under the new “General Line for Socialist Construction” principle. The Great Leap Forward was aimed at accomplishing the economic and technical development of the country at a vastly faster pace and with greater results. However, it was an economic failure followed by a 5-year period of readjustment and recovery (1961-1965) before the Great Cultural Revolution, which lasted 10 years and made negative influence on China’s economic development again.

In this political context, economic growth in Hebei was comparatively slow (See Figure 4.5, Data from Hebei Provincial Statistical Bureau).
3. Economic development after the opening up policy

Generally speaking, Hebei has experienced a rapid economic growth since the founding of the People’s Republic of China. After the Cultural Revolution, Hebei entered a new era of development and the gross domestic product increased at an annual rate of 10.6 per cent. In 2000, the GDP of Hebei province registered 507.63 billion Yuan, ranking the 6th in China (See Figure 4.6, Data from Hebei Provincial Statistical Bureau).

![Figure 4.5 Growth of GDP by type of industry](image)

<table>
<thead>
<tr>
<th>Year</th>
<th>primary industry (million CNY)</th>
<th>secondary industry (million CNY)</th>
<th>tertiary industry (million CNY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>252.3</td>
<td>76.1</td>
<td>76.5</td>
</tr>
<tr>
<td>1956</td>
<td>250.1</td>
<td>121.3</td>
<td>126.9</td>
</tr>
<tr>
<td>1960</td>
<td>234.3</td>
<td>308.8</td>
<td>191.3</td>
</tr>
<tr>
<td>1964</td>
<td>271.5</td>
<td>160.9</td>
<td>126.4</td>
</tr>
<tr>
<td>1968</td>
<td>403.5</td>
<td>200.1</td>
<td>168.7</td>
</tr>
<tr>
<td>1972</td>
<td>383.5</td>
<td>419.1</td>
<td>227.4</td>
</tr>
<tr>
<td>1976</td>
<td>458.6</td>
<td>630</td>
<td>250.9</td>
</tr>
</tbody>
</table>

![Figure 4.6 Growth of GDP in Hebei by type of industry](image)

<table>
<thead>
<tr>
<th>Year</th>
<th>primary industry</th>
<th>secondary industry</th>
<th>tertiary industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>4.586</td>
<td>6.3</td>
<td>2.509</td>
</tr>
<tr>
<td>1980</td>
<td>6.809</td>
<td>10.588</td>
<td>4.527</td>
</tr>
<tr>
<td>1984</td>
<td>11.146</td>
<td>14.584</td>
<td>7.492</td>
</tr>
<tr>
<td>1988</td>
<td>16.231</td>
<td>32.3</td>
<td>21.562</td>
</tr>
<tr>
<td>1992</td>
<td>25.708</td>
<td>57.315</td>
<td>44.827</td>
</tr>
<tr>
<td>1996</td>
<td>70.094</td>
<td>166.461</td>
<td>108.742</td>
</tr>
<tr>
<td>2000</td>
<td>82.46</td>
<td>255.18</td>
<td>169.99</td>
</tr>
</tbody>
</table>
The per capita GDP was 7,527 Yuan in 2000, ranking the 11th in China. (See Figure 4.7, China Statistical Handbook, 2001).

Economic development in Hebei has accelerated after “cultural revolution” and with the national opening door policy, which is a Chinese social and economic reform which enables foreign nations easier access to China, the increasing rate has kept at 10.6 per cent annually. In 2000, it ranks as the 6th in China for total GDP and 11th in China for per capital GDP.

4.2.3 Demographic Context

1. China’s fifth largest populated province

In 2000, the total population of Hebei Province was 67.44 million, China’s 5th largest, and the population density was 359.3/km². The density is higher in the south and central part, lower in the north and west, higher in the plains, and unevenly distributed in the mountainous and hilly areas. The density is highest along the Beijing-Guangzhou railway line and Beijing-Shanhaiguan highway. Generally speaking, the rural population is larger than the urban population.

By the end of 1997, Hebei had a work force of 43.1716 million, 66.16 per cent of the total provincial population. The wages of staff and workers totalled 38,597.72 million Yuan (1 million Yuan is about US$ 120,000); total social insurance and welfare funds of employed and retired staff and workers were 12.21 billion Yuan. The per capita net income of rural residents was 2,286.01 Yuan. The average wage of staff and workers was 5,692 Yuan per year. The average household consumption was 2,151 Yuan, 1,641 for rural residents and 4,468 for urban residents. The ratio of
hospital beds per 10,000 persons was 25.1, and the ratio of doctors per 10,000 persons was 35.8.

In China, people are officially categorised into agricultural and non-agricultural status (which is called the “household registration system”). Since the 1950s, every citizen had been assigned as a permanent personal status as a resident of the locality where he or she was born. In rural areas, all the people, except officials and teachers employed by the government, are labelled and registered officially with an agricultural status. The percentage of agricultural population of Hebei was lower than the average of China (Table 4.1 and See Figure 4.8, Data from China Population Statistical Yearbook, 2000).

Table 4.1 Proportion of agricultural and non-agricultural population in Hebei (%) in 1999

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>City</th>
<th>County</th>
<th>Town</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-agricultural</td>
<td>25.51</td>
<td>41.34</td>
<td>13.04</td>
<td>19.86</td>
</tr>
<tr>
<td>Agricultural</td>
<td>74.49</td>
<td>58.66</td>
<td>86.96</td>
<td>80.14</td>
</tr>
<tr>
<td><strong>Hebei</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-agricultural</td>
<td>18.98</td>
<td>38.43</td>
<td>8.87</td>
<td>14.24</td>
</tr>
<tr>
<td>Agricultural</td>
<td>81.02</td>
<td>61.57</td>
<td>91.13</td>
<td>85.76</td>
</tr>
<tr>
<td><strong>Jiangsu</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-agricultural</td>
<td>28.95</td>
<td>37.39</td>
<td>1670</td>
<td>24.65</td>
</tr>
<tr>
<td>Agricultural</td>
<td>71.05</td>
<td>62.61</td>
<td>83.30</td>
<td>75.35</td>
</tr>
<tr>
<td><strong>Gansu</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-agricultural</td>
<td>18.83</td>
<td>46.21</td>
<td>8.49</td>
<td>29.6</td>
</tr>
<tr>
<td>Agricultural</td>
<td>81.17</td>
<td>53.79</td>
<td>91.51</td>
<td>70.24</td>
</tr>
</tbody>
</table>
After the founding of the People’s Republic of China, the non-agricultural population had increased by 12.22 percentage points in 50 years, from 6.76 per cent in 1949 to 18.98 per cent in 1999 (See Figure 4.9, Data from Hebei Provincial Statistical Bureau).

In fact, many people registered as agricultural population have migrated to the cities and lived in urban areas in the last two decades since China’s reform and opening-up to the outside world. Hebei has the second highest level of internal emigration size; Sichuan Province has the highest rate. The main reason for emigration is to find a job.
or do business; the other reasons are job transfer or living with relatives. Finding a job or doing business, study or training, and marriage are the main causes of emigration. Marriage, job transfer, and following the family are the main reasons for immigration from other provinces (See Table 4.2 and Figure 4.10, China Statistical Yearbook, 2001).

Table 4.2 Number of population in Hebei living in other county/city/district by place of current residence (1999)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>District &amp; county-level city</th>
<th>Town</th>
<th>Township</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hebei</td>
<td>13,392</td>
<td>8,607</td>
<td>277</td>
<td>4,508</td>
</tr>
<tr>
<td>Gansu</td>
<td>5,473</td>
<td>2,766</td>
<td>976</td>
<td>1,741</td>
</tr>
<tr>
<td>Jiangsu</td>
<td>30,382</td>
<td>19,015</td>
<td>3,154</td>
<td>8,213</td>
</tr>
</tbody>
</table>

Figure 4.10 Emigration: proportion of people in Hebei living in other county/city/district by place of current residence in 1999

The agricultural work force has become the main force of economic activities in both urban and rural Hebei. In 1999, 32 per cent of the total work force with agricultural status was employed by non-agricultural sectors, for example, manufacturing and service industry. (See Table 4.3, Data from Hebei Provincial Statistic Bureau)
Table 4.3 Employment of rural labour in Hebei by type of industry

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Industry</strong></td>
<td>Employment</td>
<td>14,567,400</td>
<td>16,176,100</td>
<td>16,390,300</td>
<td>17,804,200</td>
<td>17,154,200</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>97.74</td>
<td>83.83</td>
<td>80.75</td>
<td>72.24</td>
<td>67.19</td>
</tr>
<tr>
<td><strong>Secondary Industry</strong></td>
<td>Employment</td>
<td>0</td>
<td>374</td>
<td>2,491,300</td>
<td>3,227,400</td>
<td>4,828,700</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>2.26</td>
<td>12.74</td>
<td>14.64</td>
<td>20.34</td>
<td>23.78</td>
</tr>
<tr>
<td><strong>Tertiary Industry</strong></td>
<td>Employment</td>
<td>0</td>
<td>0</td>
<td>671</td>
<td>1,016,600</td>
<td>1,762,300</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>0</td>
<td>0</td>
<td>3.43</td>
<td>4.61</td>
<td>7.42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>14,567,400</td>
<td>16,550,100</td>
<td>19,552,600</td>
<td>22,048,200</td>
<td>23,745,200</td>
</tr>
</tbody>
</table>

Amongst the work force with agricultural status that stays in rural areas, more than 30 per cent are involved in the secondary (In China, we categorized agriculture, manufacture and service as primary, secondary and tertiary industries) and tertiary industries (See Figure 4.11, Data from Hebei Provincial Statistical Bureau).

Figure 4.11 Composition of rural employment in Hebei by type of industry

The Hebei population is characterized by an increasingly educated population and a decreasing rate of illiteracy.
2. Fertility Level and Changes

The overall birth rate in Hebei has gone from high to low. The highest birth rate was 38.61 per 1,000 in 1963. This change is mainly the effect of economic and social development, and implementation of the family planning policy. In 1999, the birth rate in Hebei was 12.99 per 1,000, a natural increase rate of 6.73 per 1,000. According to population projections in three scenarios, high, medium, and low, the population of Hebei will still continue to increase during the early part of the new century with the natural increase rate recorded to be not less than 7 per 1,000 by the year 2010.

Mortality decreased sharply since the establishment of People’s Republic, much earlier than the decrease in the birth rate. The mortality rate dropped from 12.73 per 1,000 in 1949 to 6.26 per 1,000 in 1999, remaining below that of national average. The infant mortality rates experienced a great decrease. Currently, the male mortality rate is higher than that of females.

The average life expectancies during 1929-33 were 40.03 years for males and 35.76 for females in Hebei; in 1990, they were 70.01 and 73.60 years respectively, or an average of 71.70.

Hebei experienced a mortality transition from high mortality and low life expectancy before 1949 to low mortality and high life expectancy, close to the levels of developed countries (See Figure 4.13, Data from Hebei Provincial Statistical Bureau).
Figure 4.13 Natural changes of population in Hebei

The population of Hebei has more than doubled since the 1950s. The process can be divided into five periods:

The period 1950-57 was one of rapid increase of the total population with an annual rate of 2.19 per cent, or about 730,000 annually; in 1958-61, there was a trough in population increases; in 1962-72, population growth bounced back and a peak in fertility was observed. The net population increase during the 11-year period was 9.3248 million, the average being 847,700 annually; in 1973-81, the speed of increase slowed down to the annual rate of 1.33 per cent, or 587,400 annually.

In the 5th period, from 1982 to the present, population growth swung back with 795,000 additional people annually; the net increase during the last 16 years was 12.7204 million (See Figure 4.14, Data from Hebei Provincial Statistical Bureau).
3. Aging of the Population, Population Structure by Sex and Age

Since 1949, the sex ratio (F:M) of Hebei has increased gradually and smoothly to around 102 to 106 (M=100) on the whole. It was 104.03 in 1997 for the provincial total population. However, there is an uneven distribution of the sex ratios: Yanshan Mountain and Taihang Mountain have high sex ratios. This means that there are more females than males.

In 1997, out of a population of 66.283 million, the population aged 0-14 was 16.918 million, or 25.52 per cent of the total; the population 15-64 was 67.83 per cent of the total (44.959 million); and the population aged 65 and above was 4.406 million, or 6.65 per cent of the total. The total dependency ratio was 47.73 per cent, with the young age dependency ratio being 37.63 per cent and the old age ratio 9.80 per cent.

According to the 1990 census, the population aged 60 and older reached 5.4567 million in Hebei, comprising 8.93 per cent of the total population. The aged population increased rapidly, and is still increasing. The median age and life expectancy of the elderly are rising, and the dependency ratio for the aged population is also rising, which makes the dependency burden heavier for the working age population.

As for the distribution of the aged population, there were more people in the younger age groups: those in the 65-69 age group were 61.82 per cent of the total, those in the 70-79 age group comprised 30.00 per cent of the total, and people who were 80 years and older made up 8.18 per cent of the total aged population. Mostly (72.52 per cent)
of the aged population were illiterates or semi-literates. Most of this aged population had been married and their employment rate was 29.78 per cent.

4.2.4 Summary

This section has dealt with the social, economic and demographic contexts of rural Hebei, based on statistical data. It is important for a comparative study to have a general background about this information, which could lead to a better understanding of how these contexts influence the education system in rural areas.

4.3 Development of Rural Education

4.3.1 Introduction

This section presents the experiences obtained and lessons learnt in the effort to provide education for rural population in Hebei province since the founding of the People’s Republic of China in 1949. The current structure of educational system in China appears simple as compared to that of the 1950s. The general system of education comprises four stages: the primary, the junior secondary, the senior secondary, and higher education.

In terms of access to education, China's system represents a pyramid; because of the scarcity of resources allotted to higher education, student numbers decrease sharply at the higher levels. Although there were dramatic advances in primary education after 1949, achievements in secondary and higher education were not as great. By the end of 1998, there were 46 institutions of higher education in Hebei Province, with number of students enrolled being 144,400 and teachers 16,656; 5,932 secondary schools with 4,942,800 students and 273,000 teachers; 45,343 primary schools had 8,954,400 students enrolled and 326,100 teachers (New Hebei of 50 Years: 1949-1999).

During the process of rural transformation, rural education refers to education for the rural population, including the children of the few government employees who have non-agricultural status. In 1999, population labelled as agricultural status accounted for 81.02 per cent of the total population of Hebei province. Provision of education service to rural population is still the main educational effort in Hebei province.
Rural China usually provides only the first three stages, which have been re-established at present as a 6-3-3 system (six year primary, three years junior secondary, three years senior secondary) in general education in Hebei province.

Children usually enter primary school at seven years of age for six days a week. The two-semester school year consists of 9.5 months, with a long vacation in July and August. Urban primary schools typically divide the school week into twenty-four to twenty-seven classes of forty-five minutes each, but in the rural areas the norm is half-day schooling, more flexible schedules, and itinerant teachers. The primary-school curriculum consists of Chinese, mathematics, physical education, music, drawing, and elementary instruction in nature, history, and geography, combined with practical activities on the school campus. A general knowledge of politics and moral training through courses named communist ideology and morality, which stress love of the motherland, love of the party, love of the people, and love of the environment are another part of the curriculum. Chinese and mathematics accounts for about 60 percent of the scheduled class time; natural science and social science accounts for about 8 percent. *Putonghua* (Website 4.2) is taught in regular schools and Romanised pinyin in lower grades and kindergarten. Most schools have after-hour activities at least one day per week - often organized by the Young Pioneers - to involve students in recreation and community service.

The regular secondary-school year usually has two semesters, totalling nine months. The academic curriculum consists of Chinese, mathematics, physics, chemistry, geology, foreign language, history, geography, politics, physiology, music, fine arts, and physical education. There are thirty or thirty-one periods a week in addition to self-study and extracurricular activity. Thirty-eight percent of the curriculum at a junior secondary school is in Chinese and mathematics, 16 per cent in English. Fifty percent of the teaching at a senior secondary school is in natural sciences and mathematics, 30 per cent in Chinese and English (China Statistical Data in Education, 1993-2000).

The system of rural secondary education has undergone several transformations since 1980. In each of the counties a comprehensive centre for vocational education and training has been established on the bases of schools and short-term training classes established by different government departments, businesses, trade unions,
professional societies and clubs, and other organizations have been undertaken to reduce the administrative cost.

For the purpose of convenience, the section divides the development of education in rural Hebei into five major periods:

The Transition to Socialism, 1949-57;
From Great Leap Forward, 1958-60;
Readjustment and Recovery, 1961-65;
Cultural Revolution, 1966-76; and
Post-Cultural Revolution Reforms and Opening-up, 1976-present

4.3.2 The Transition to Socialism, 1949-57

Before 1949, there were 32,484 primary schools and 173 secondary schools (50 general and 123 technical) in Hebei province, and almost no adult education in rural Hebei except in the liberated areas led by the Chinese Communist Party and the Dingxian county rural education experiment led by Dr. James Yen (Y. C. James Yen is a Chinese scholar, who received his PhD from Yale University and served in China until 1949. He is also a founder of International Institute for Rural Reconstruction, Manila, Philippines). In November 1949, to answer the call of the Education Department of the People’s Government of Hebei Province, 7,608 winter literacy classes were organised in rural Hebei to offer courses on basic literacy, and numeracy for 902,025 peasants. In 1951, literacy classes were established in 70 per cent of the province’s villages. In 1956, peasant schools were established in 80.8 per cent of the province’s villages on the basis of literacy classes (Data from Hebei Provincial Statistical Bureau).

At the primary level, the new government mobilised the villagers to establish a primary school in each village. Priority was placed on quantitative expansion of primary education to solve the problem of access to primary education in rural areas and realise the idea of equal opportunity in education.
Secondary education in China has a complicated history. The secondary school was stratified into 6 types as enumerated below.

Great importance had been attached to both general education and vocational education. The collectives are mobilised to share the educational burden with the government to solve the problem of deficiency of financial resources. Secondary teacher training schools were established to meet the needs of rapid expansion of primary schooling. In 1957, every county of the province had established at least one secondary school (See Table 4.4).

Table 4.4 Development of education in Hebei before the Great Leap Forward movement (Data from Hebei Provincial Educational Commission)

<table>
<thead>
<tr>
<th>Item</th>
<th>Year</th>
<th>Primary education</th>
<th>General secondary education</th>
<th>Higher education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>General</td>
</tr>
<tr>
<td>No. of schools</td>
<td>1949</td>
<td>32,484</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1957</td>
<td>40,337</td>
<td>933</td>
<td>847</td>
</tr>
<tr>
<td>Enrolments</td>
<td>1949</td>
<td>2,265,621</td>
<td>20,501</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1957</td>
<td>4,122,907</td>
<td>372,567</td>
<td>22,982</td>
</tr>
<tr>
<td>No. of teachers</td>
<td>1949</td>
<td>55,483</td>
<td>1,150</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1957</td>
<td>102,610</td>
<td>14,106</td>
<td></td>
</tr>
</tbody>
</table>

During this period, general secondary schools, technical secondary schools, and secondary teacher training schools were developed. Winter literacy classes were established in rural areas, some of which were developed into peasant schools. Moreover, accelerated-learning secondary schools for peasants were also established, and students from these schools could be promoted to higher education institutions to continue their education. Furthermore, regular full-time remedial schools for officials were set up to alleviate illiteracy among officials.

4.3.3 From Great Leap Forward, 1958-60

In 1958 the Chinese Communist Party (CCP) launched the Great Leap Forward campaign under the General Line for Socialist Construction. The Great Leap Forward was aimed at accomplishing the economic and technical development of the country at a vastly faster pace and with greater results. Although the party leaders appeared generally satisfied with the accomplishments of the First Five-Year Plan, Chairman Mao Zedong and his followers in particular believed that more could be
achieved in the Second Five-Year Plan (1958-62) if the people could be ideologically aroused and if domestic resources could be utilized more efficiently for the simultaneous development of industry and agriculture. The Great Leap Forward centred on a new socio-economic and political system that created the people's communes in the countryside. The Chinese people started to embrace the slogans of “Long live the three banners of the Great Leap Forward, the General Line, and the people’s commune”. The “People’s Commune is the golden bridge that leads to the paradise in the world – the Communist society” and “The stronger the will of the people, the greater the soil will produce”.

The individual commune was placed in control of all the means of production and was to operate as the sole accounting unit; it was subdivided into production brigades (generally coterminous with traditional villages) and production teams (i.e. work groups). Each commune was planned as a self-supporting community for agriculture, schooling, marketing, administration, and local security.

During the Great Leap Forward campaign, more and more rural children finished primary education due to the establishment of primary schools or learning posts (extension of complete primary schools in remote villages) in their villages. The development of secondary education for rural children became an urgent task. In 1958, the State proposed “to establish enough agricultural secondary schools, industrial secondary schools and handicraft industrial secondary schools” to meet the needs of rural development. In 1964, Hebei province started to practice a new educational policy of “dual educational system, dual labour system” proposed by the central government. The number of agricultural secondary schools, which were not preparatory for higher education, but to train an educated labour force for rural development increased rapidly in Hebei province. In this type of school, courses on agricultural technology were added to the curriculum (See Table 4.5).

Table 4.5 Growth of secondary & higher education in Hebei during the Great Leap Forward (Data from Hebei Provincial Educational Commission)

<table>
<thead>
<tr>
<th>Year</th>
<th>Secondary teacher training education</th>
<th>General secondary education</th>
<th>Higher education</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of schools</td>
<td>49</td>
<td>124</td>
<td>847</td>
</tr>
</tbody>
</table>
The above table shows that during the period of the Great Leap Forward, which was in 1958-1960, more schools and universities in Hebei have been established in terms of secondary teacher training education, general secondary education and higher education.

4.3.4 Readjustment and Recovery, 1961-65

In 1961, in an effort to stabilize the economic front, the Party, under the dominant influence of Liu Shaoqi and Deng Xiaoping, and others, a series of corrective measures were initiated. Among these measures was the reorganization of the commune system, with the result that production brigades and teams had more say in their own administrative and economic planning.

In this context, Hebei province began to carry out the policy of “readjustment, consolidation, enrichment and improvement”. In 1963, because of a deficiency of government financial resources, some schools administrative management were transferred. This resulted in 20 per cent of gongban schools (public schools funded by the State) switching to minban schools (rural schools funded by the collectives).

The policy of “dual educational system, dual labour system” was criticized and all the agricultural secondary schools were transferred into general secondary schools. By early 1965 the country was well on its way to recovery under the direction of the Party apparatus, or, to be more specific, the Central Committee’s Secretariat headed by Secretary General Deng Xiaoping.

In the early 1960s, educational planners followed a policy called “walking on two legs,” which established both regular academic schools and separate technical schools for vocational training.

The government of Hebei carried out the policy of “walking on two legs” sincerely during the adjustment and recovery period after the great Leap Forward movement and readjusted its secondary and higher education (See Table 4.6).
Table 4.6 Readjustment of secondary & higher education in Hebei province (Data from Hebei Provincial Educational Commission)

<table>
<thead>
<tr>
<th>Year</th>
<th>Secondary teacher education</th>
<th>General secondary education</th>
<th>Higher education</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of schools</td>
<td>124</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>Enrolments</td>
<td>69,298</td>
<td>7,543</td>
<td>12,605</td>
</tr>
<tr>
<td>No. of teachers</td>
<td>3,523</td>
<td>3,364</td>
<td>808</td>
</tr>
</tbody>
</table>

As a result of readjustment, the number of secondary agricultural schools increased almost 10 times from 375 in 1962 to 3,625 in 1965 (See Table 4.7).

Table 4.7 Development of secondary agriculture education in Hebei (Data from Hebei Provincial Educational Commission)

<table>
<thead>
<tr>
<th>Year</th>
<th>1962</th>
<th>1963</th>
<th>1964</th>
<th>1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of schools</td>
<td>375</td>
<td>261</td>
<td>791</td>
<td>3,625</td>
</tr>
<tr>
<td>Enrolments</td>
<td>29,749</td>
<td>19,925</td>
<td>55,716</td>
<td>195,570</td>
</tr>
</tbody>
</table>

Peasant spare-time education also entered a new phase in 1964, in which peasant education began to shift from literacy through political study to learning agricultural technology according to local productive needs. For example, Agricultural technology learning groups were organised in grain and cotton planting areas; Electronic and mechanical groups were established in areas where agricultural machines and electricity were used; Fruit tree planting technology groups were established in fruit planting areas; Livestock veterinary medicine groups were established in mountainous areas and the pasture areas in the plateau; and Accounting and Hygiene learning groups were established in all of the above named areas.

4.3.5. Cultural Revolution, 1966-1976

On August 8, 1966, at the eleventh plenum of the Eighth Chinese Communist Party Central Committee, the scope and strategy of the Great Proletarian Cultural Revolution was defined, and once again it was proclaimed that education had been controlled by bourgeois intellectuals, and that the creation of a new system more closely based on Chairman Mao Zedong's teachings was needed.
During the next three years, campuses were controlled in turn by propaganda teams of Red Guards, soldiers from the People's Liberation Army, and finally workers and peasants.

The primary schools were the least affected by the Cultural Revolution, and by August of 1967 most had reopened for normal operation. However, primary education was, for the most part, shortened from six years to five years. The concept of Key Schools (in each city and/or county there are a few good schools in which students can have a better achievements) was abolished, with enrolments in primary and secondary schools based on proximity. In 1968, the Provincial Revolutionary Committee (replacement of Hebei provincial government during the Cultural Revolution) gave orders that all the gongban primary schools (public schools funded by the State) in rural Hebei should be transferred down to the productive brigades as minban schools (rural schools funded by the collectives). Since 1970, in order to reach the goal that primary schooling should be accessible within the production team, junior secondary schooling should be accessible within the production brigade, and senior secondary schooling should be accessible within the people’s commune, primary and secondary schools expanded rapidly in rural areas. The rapid expansion of primary and secondary education during the Cultural Revolution, however, created serious problems; because resources were spread too thinly, educational quality declined. Further, this expansion was limited to regular secondary schools; technical schools were closed during the Cultural Revolution because they were viewed as an attempt to provide inferior education to children of worker and peasant families. The curriculum was reconstructed so as to conform to practical needs, resulting in the elimination of subjects such as history and geography. Even such core science subjects as physics and chemistry gave way to courses in industrial skills, biology to courses in farming skills (In 7, 2001).

In June of 1966, the system of university entrance examinations was halted. However, a few colleges and universities admitted new students until the early 1970s, and selection of students was based on political virtue. Those from families of workers, peasants or soldiers were deemed the most “virtuous”, and were among the first admitted. This has generated the label of worker-peasant-soldier student for those students entering college during the early 1970s.
In all, the period of the Cultural Revolution was a very disruptive one for Chinese society in general and its education in particular. The educational infrastructure in Hebei was decimated as a result of the revolutionary struggles, and students suffered because of a vastly watered-down or non-existent curriculum. Perhaps the only gain, again at the expense of quality, was the delivery of primary education to an unprecedented percentage of school aged-children, largely because agricultural collectivisation allowed for the creation of large numbers of “commune schools, overseen directly by the collectives rather than by higher-level agencies (See Table 4.8).

Table 4.8 Quantitative expansion of basic education during the Cultural Revolution
(Data from Hebei Provincial Educational Commission)

<table>
<thead>
<tr>
<th>Year</th>
<th>Primary education</th>
<th>General secondary education</th>
<th>Secondary teacher education</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of schools</td>
<td>48,954</td>
<td>45,879</td>
<td>897</td>
</tr>
<tr>
<td>Enrolments</td>
<td>6,878,336</td>
<td>7,533,739</td>
<td>422,328</td>
</tr>
<tr>
<td>No. of teachers</td>
<td>192,545</td>
<td>248,354</td>
<td>20948</td>
</tr>
</tbody>
</table>

Retaining literacy was as much a problem as acquiring it, particularly among the rural population. In 1966, peasants were involved in the political movement and no one attended literacy classes. Literacy rates declined between 1966 and 1976. Political disorder may have contributed to the decline, but the basic problem was that the many Chinese ideographs can be mastered only through rote learning or in verbatim and are often forgotten because of disuse. In 1968, literacy classes in rural Hebei enrolled 0.42 million learners. In 1972, the peasant schools in Hebei transferred into political evening schools.

4.3.6 Post-Cultural Revolution reforms and opening-up, 1976-present

1. Reform of educational system

The provision of basic education for all in so vast a country as China was a formidable accomplishment. Modernizing China, however, was tied to modernising education. Decentralization of educational management from the central to the local level was the means chosen to improve the education system.
Rural secondary education has undergone several transformations since 1980. In 1982, the government of Hebei province initiated the reform of the administrative system of education in rural Hebei and started to transfer the responsibility of primary and junior secondary schools in rural areas to the local government. The junior secondary schools were transferred to the people’s communes and the primary schools to the production brigades. After decentralization of the educational administrative system in the province, education boards were established at commune and production brigade levels to mobilise educational funds, improve educational infrastructure and physical conditions of rural education. In 1983 the communes were eliminated. In 1985 educational reform legislation officially placed rural secondary schools under local administration. The reform guaranteed quality primary education for all in rural Hebei.

Since the fall of the “Gang of Four”, China entered the new era of post-Cultural Revolution reforms and opening-up to the outside world. Among the notable official efforts to improve the education system was a 1984 decision to formulate major laws on education in the next several years. The definitive reformulation of the earlier decrees came in 1985 with the “Decision of the Reform of the Education System.” This has been the guiding document of reform for all levels of education during the reform and opening-up years. The major aims of the reform were to bring about the four modernizations; to increase State funding for education; to ensure that the education system shall supply a sufficient number of highly qualified personnel; to institute a 9-year compulsory education policy; to expand the system of technical and vocational education; and to give provisions for reform of higher education, e.g., to change the system of job-assignments to graduates, and to grant the colleges and universities more decision-making powers.

The Law on Nine-Year Compulsory Education, which took effect on 1 July 1986, established requirements and deadlines for attaining universal education tailored to local conditions. It also guaranteed school-age children the right to receive education. People's Congresses at various local levels were, within certain guidelines and according to local conditions, to decide the steps, methods, and deadlines for implementing nine-year compulsory education in accordance with the guidelines.
formulated by the central authorities. The program sought to bring rural areas into line with their urban counterparts.

Academically, the goals of the reform were to enhance and universalise primary and junior secondary education; to increase the number of schools and qualified teachers; and to develop vocational and technical education.

One of the first changes in higher education after the end of the Cultural Revolution was the restoration of the national unified university entrance exams in 1977.

As mentioned earlier, Key Schools shut down during the Cultural Revolution, reappeared in the late 1970s and, in the early 1980s, becoming an integral part of the effort to revive the lapsed education system. Because educational resources were scarce, selected institutions - usually those with records of past educational accomplishment - were given priority in the assignment of teachers, equipment, and funds. They also were allowed to recruit the best students for special training to compete for admission to top schools at the next level. Key Schools constituted only a small percentage of all primary and secondary schools and funneled the best students into the best secondary schools, largely on the basis of entrance scores. In 1980 the greatest resources started to be allocated to the Key Schools that would produce the greatest number of college entrants (In 8, 2001).

2. Popularized primary education

Hebei province declared popularized primary education (which means every primary school aged child must attend primary school) in 1985 after an assessment and approval by an Evaluation Group organised by the provincial government.

Under the education reform after the Cultural Revolution, a major concern in Hebei was that scarce resources should be conserved. This meant that secondary education should not be blindly pursued while quality primary education was still developing. Money, teaching staff, and materials should not be diverted away from primary schools as it was during the Cultural Revolution.

In fact, in Hebei province, the enrolment in primary education was higher in 1975 than in 1993, and the enrolment rate in 1975 had reached the same level of 1985 (See Table 4.9 and Figure 4.15).
Table 4.9 Enrolment and enrolment rate of primary education in Hebei (1975-1993)
(Data from Hebei Provincial Educational Commission)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Net enrolment rate (per cent)</td>
<td>97.7</td>
<td>97.0</td>
<td>97.7</td>
<td>98.50</td>
<td>99.94</td>
</tr>
<tr>
<td>Enrolments (in million)</td>
<td>7.87</td>
<td>7.35</td>
<td>6.01</td>
<td>7.76</td>
<td>7.76</td>
</tr>
<tr>
<td>No. of school-aged children (in million)</td>
<td>6.05</td>
<td>5.94</td>
<td>4.57</td>
<td>7.36</td>
<td>7.36</td>
</tr>
<tr>
<td>Per cent of school-aged children</td>
<td>12.32</td>
<td>11.50</td>
<td>8.24</td>
<td>11.63</td>
<td>11.63</td>
</tr>
</tbody>
</table>

Although by 1975 the percentage of students enrolled in primary schools was high in Hebei province, schools reported high dropout rates and regional and gender enrolment gaps. Most enrollees were concentrated in the cities and more rural girls than boys dropped out of school. Furthermore, the conditions of the physical facilities of primary schools were extremely poor in rural areas, especially in the mountainous areas, and many pupils were attending classes in dangerous schoolhouses and were being taught by untrained minban teachers (this means that the salary is not given by government, it is given by the people from the district).

The impact of regularization on the schools led to a number of them closing and merging, especially among the primary schools. In the rural sparsely populated areas, this resulted in declining enrolments. Rural parents were generally well aware that their children had limited opportunities to further their education. Some parents saw little use in having their children attend even primary school, especially after the establishment of the agricultural responsibility system, which began in 1978. This provided for a remuneration system based on output in rural areas, and so for some families, education for their children, as opposed to working at home, was not always the most advantageous choice. Under that system, many parents preferred their children to work to increase family income - and withdrew them from school - for both long and short periods of time.
Under the Law on Nine-Year Compulsory Education, primary schools were to be tuition-free and reasonably located for the convenience of children attending them. Thus pupils could attend primary schools in their villages. Parents paid a small fee per term for books and other expenses such as water, electricity, transportation, food, and heating during winter. Previously, fees were not considered a deterrent to school attendance in Hebei, although some poor parents felt even these minor costs were more than they could afford.

An illustrative case: Sanhe County: The First County to Attain Popular Primary Education (PPE) In Hebei Province (FI4, 2002)

Sanhe county is the first county that reached the standard of Popular Primary Education (PPE) set by Ministry of Education in Hebei province. As early as 1983, the primary education completion rate of children aged between 12-15 had reached 96.1 per cent.
The main problem of the achievement of the goal of popular primary education was the lack of resources to improve the physical conditions of primary education in rural areas.

Sanhe County had 351 primary schools in its 395 villages in 1983. In 1978, the county had approximately only 40,000 sets of desks and chairs, and 37 per cent of the schoolhouses were identified as dangerous. In order to improve the facilities of primary education, the county closed 36 senior secondary schools and 54 junior secondary schools, and focused their financial resources to develop primary education. The schoolhouses and furniture of the closed secondary schools were used to improve the physical condition of primary education. From 1978 to 1983, the county invested 700,000 Yuan to improve the physical condition of primary education. During these 5 years, they build 7 new Key Schools and repaired about 1,000 classrooms in 70 poverty-stricken production brigades. The county government announced that is would provide financial assistance to the communes or production brigades. Furthermore, enthusiasms of the communities had been aroused, and villagers of the county were active in supporting schools of their village to improve physical conditions since the government transferred the rural primary schools to local administration.

3. Popular 9-year compulsory education

The May 1985 National Conference on Education recognized five fundamental areas for reform to be discussed in connection with implementing the party Central Committee's “Draft Decision on Reforming the Education System.” The reforms were intended to make the county-level government responsible for developing “basic education” and to systematically implement a nine-year compulsory education program.

The Law on Nine-Year Compulsory Education, which took effect on July 1, 1986, established requirements and deadlines for attaining universal education tailored to local conditions and guaranteed school-age children the right to basic education. People's Congresses at various local levels were, within certain guidelines and according to local conditions, to decide the steps, methods, and deadlines for implementing nine-year compulsory education in accordance with the guidelines.
formulated by the Central Authorities. The programme sought to bring rural areas, which had four to six years of compulsory schooling, into line with their urban counterparts.

Chinese secondary schools are divided into junior and senior levels. Junior secondary schools offer a three-year course of study, which students began at twelve years of age. Senior secondary schools offer three-year course, which students begin at age fifteen. Since 1986 popular junior secondary education has become part of the nine-year compulsory education.

In 1985, the 5,423 junior secondary schools in Hebei enrolled 2,123,700 students. In 1999, the junior secondary school enrolment in Hebei increased to 3,844,400 students, while the number of junior secondary schools lessened to 4,272. The promotion of primary school graduates to junior secondary schools increased from 70.1 per cent in 1985 to 98 per cent in 1999 (See Table 4.10).

Table 4.10 Basic data on junior secondary education in Hebei by area (1985-1999)
(Data from Hebei Provincial Educational Commission)

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of schools</th>
<th>Enrolment</th>
<th>Primary school graduates promotion rate (per cent)</th>
<th>No. of teachers</th>
<th>Pupil-teacher ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>General</td>
<td>5,423</td>
<td>2,123,700</td>
<td>128,700</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td>Vocational</td>
<td></td>
<td>44,179</td>
<td>70.1</td>
<td>17.43</td>
</tr>
<tr>
<td>1999</td>
<td>General</td>
<td>4,272</td>
<td>3,844,400</td>
<td>199,300</td>
<td>19.29</td>
</tr>
<tr>
<td></td>
<td>Vocational</td>
<td></td>
<td>49,950</td>
<td>98</td>
<td>18.18</td>
</tr>
</tbody>
</table>

The desire to consolidate existing schools and to improve the quality of key secondary schools was, however, under the educational reform, more important than expanding enrolment (See Figure 4.16, Data from Hebei Provincial Educational Commission).
In 1999, another 23 county-level units in Hebei province have passed assessment and approval of popular 9-year compulsory education by an Evaluation Group. This group is made up of the CCP Provincial Committee, the provincial government, the provincial People’s Congress, and the provincial political consultative conference, and the number of county-level units approved by the provincial evaluation groups as counties that reached the goal of popular 9-year compulsory education totalled to 170, which covered 98.5 per cent of the province’s total population.

4. Technical and Vocational Education in Rural Hebei

China’s secondary schools are evaluated in terms of their success in sending students into higher education, although efforts persist to educate young people to take a place in society as highly valued and skilled members of the work force.

In rural China a senior-secondary-school graduate is considered as an educated person, although secondary schools are viewed as a training ground for colleges and universities. And, while secondary students are offered the prospect of higher education, they are also confronted with the fact that university admission is limited. Beginning in 1976, the "unitary" approach of the Cultural Revolution was criticised for its ignorance of the need for two kinds of graduates: those with an academic college preparatory education and those with specialized technical and vocational education. After 1978, the serious problem appeared that a large number of secondary school graduates returned back to their villages without any practical skills
and they could not meet the needs of rural economic development. To develop secondary vocational education then became the main task (FI7, 2003).

With the renewed emphasis on technical training, technical schools reopened, and many general secondary schools were converted into vocational schools. The secondary school consisted of four types:

1. Key general secondary schools,
2. Non-key general secondary schools,
3. Specialized technical secondary schools,
4. Vocational secondary schools.

In spite of the need for technically trained manpower for the economic reconstruction of China, the acceptance of technical and vocational secondary schools was slow, at least initially. The perception lingered that these educational streams were only for those not able to pass in the traditional stream to climb the social ladder through higher education. In 1978, enrolment in technical and vocational programmes in Hebei comprised only 1.29 per cent of the total enrolment. However, in 1998, of the junior secondary graduates that continued their schooling, 9.69 per cent preferred specialized education in technical or vocational schools, the highest proportion recorded, whereas 90.31 per cent entered general secondary schools. (See Table 4.11)

Table 4.11 TVE enrolments in secondary education in Hebei (1978-1999) (Data from Hebei Provincial Educational Commission)

<table>
<thead>
<tr>
<th>Year</th>
<th>1978</th>
<th>1995</th>
<th>1998</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total TVE enrolment</td>
<td>3,345,100</td>
<td>4,607,400</td>
<td>4,939,700</td>
<td></td>
</tr>
<tr>
<td>Proportion of TVE enrolment</td>
<td>1.29 per cent</td>
<td>7.26 per cent</td>
<td>9.69 per cent</td>
<td>9.42 per cent</td>
</tr>
</tbody>
</table>

However, after 1978, vocational education, including agricultural technical education, recovered and developed rapidly in rural Hebei. In addition to educational authorities, other sectors also felt the need for technically trained manpower and developed their own technical and vocational schools or short-term training programs. In this context, in one county there could exist more than one independent technical and vocational school or short-term training courses. Statistics shows that in 1998 there were
altogether 1,297 small vocational secondary schools in Hebei, an average of 9 in each of the 138 counties and county-level cities of the province that enrolled 4,939,700 students (See Figure 4.17, Data from Hebei Provincial Educational Commission).

Figure 4.17 Enrolment of technical and vocational secondary schools in Hebei

In order to reduce the management costs, Hebei province created the county-level comprehensive vocational training centre (VTC). By the end of 1995, each of the 139 county-level units of the province had established a VTC through merging the vocational secondary schools and short-term courses run by different government departments or quasi-government organisation.

A county VTC is administrated by a board chaired by the head of the county with the directors of the related departments of the county. The county VTCs offer one-year, two-year, three-year and four-year as well as short-term training programs for junior secondary graduates. Apart from fostering trained technical workers for the society, VTCs also conduct applied scientific research, provide technology extension, conduct production demonstration and business workshops, and conduct research in vocational education.

An illustrative case: Beihaoqian Agricultural Junior Secondary School (FI3, 2002)

An agricultural junior secondary school in Hebei practices a system of 3+1, which after finishing the three-year courses of general junior secondary education as part of the 9-year compulsory education adds a one-year course on practical agricultural
technology. It is open to any primary graduate who is willing to study in it. The agricultural junior secondary school offers 3,060 class-hours of ordinary courses, which are the same as general junior secondary schools, and 1020 class-hours of specialised agricultural courses in the four years. Beihaoqian Agricultural Junior secondary School, located in the rural town in the hilly plateau, was established in 1985 on the basis of a general junior secondary school and under the administration of the township government. It has 21 teachers and administrative staff, four regular classes and a short-term class enrolled 224 students. The school has an agricultural farm of 3.73 hectares, a grass slope of 6.67 hectares, a wood farm of 1,987 young trees, and a small animal farm.

According to local needs, the school provides courses in three specialisations: agronomy, animal grazing and fruit planting. The main special courses are an Introduction to farming, Soil and fertiliser, Vegetable planting, Sheep raising. With the help of experts of the county Science and Technology Commission, teachers of the school developed local textbooks such as practical technologies of Animal raising and Crop planting.

In the school, experimentations on the school farms are also part of the curriculum.

A girl who graduated from the school, started raising rabbits and earned 2000 Yuan in the first year after graduation through selling 110 rabbit feeders. She also provided 150 rabbit feeders to her fellow villagers and transferred scientific rabbit raising methods and knowledge on rabbit disease prevention to them. With her help, some other households had specialised in rabbit raising, and it developed into a small industry in the whole village. Later, she was employed as a rabbit-raising technician by the school and assigned to teach in training classes on rabbit raising technology.

5. Technical education for peasants

Literacy education and technical training courses for peasants were other components of basic education in rural Hebei. In 1999, the literacy rate of Hebei had reached 95.87 per cent and registered a record higher than that of the State standard for basic elimination of illiteracy (See Table 4.12, Data from Hebei Provincial Educational Commission).
### Table 4.12 Literacy rate of Hebei

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy rate (per cent)</td>
<td>87.6</td>
<td>95.2</td>
<td>92.25</td>
<td>95.87</td>
</tr>
</tbody>
</table>

In order to sustain the results of literacy education, the Provincial Education Commission of Hebei prepared a series of applied technical courses like horticulture, fruit tree management, livestock feeding, fishing and so on suitable for rural Hebei, and established spare-time primary and secondary school for peasants.

In 1980, the priority of education for farmers in Hebei started to transfer from running literacy classes to the establishment of part-time primary and secondary schools and farming technical schools. In 1999, the 43 part-time secondary schools for farmers in Hebei enrolled 4,213 students, the 2,232 part-time primary schools for farmers enrolled 89,532 students, and the 48,048 part-time agricultural technical schools for farmers enrolled 3,995,100 (See table 4.13, Data from Hebei Provincial Educational Commission).

### Table 4.13 Basic data on peasant education in late 1990s

<table>
<thead>
<tr>
<th>Year</th>
<th>1995</th>
<th>1998</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical secondary school for farmers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of schools</td>
<td>18</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Enrolments</td>
<td>4263</td>
<td>4621</td>
<td>4208</td>
</tr>
<tr>
<td>Teachers</td>
<td>357</td>
<td>285</td>
<td>269</td>
</tr>
<tr>
<td><strong>Part-time secondary school for farmers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of schools</td>
<td>121</td>
<td>1492</td>
<td>43</td>
</tr>
<tr>
<td>Enrolments</td>
<td>6,982</td>
<td>150,769</td>
<td>4,213</td>
</tr>
<tr>
<td>Teachers</td>
<td>215</td>
<td>702</td>
<td>361</td>
</tr>
<tr>
<td><strong>Part-time primary school for farmers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of schools</td>
<td>2,798</td>
<td>6,672</td>
<td>2,232</td>
</tr>
<tr>
<td>Enrolments</td>
<td>87,094</td>
<td>138,752</td>
<td>89,532</td>
</tr>
<tr>
<td>Teachers</td>
<td>820</td>
<td>1,127</td>
<td>548</td>
</tr>
<tr>
<td><strong>Part-time agricultural technical school for farmers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of schools</td>
<td>34,892</td>
<td>70,781</td>
<td>48,048</td>
</tr>
<tr>
<td>Enrolments</td>
<td>3,030,700</td>
<td>5,410,400</td>
<td>3,995,100</td>
</tr>
<tr>
<td>Teachers</td>
<td>8,660</td>
<td>17,505</td>
<td>9,726</td>
</tr>
</tbody>
</table>

In the above table, much of the 1999 data is less than that in 1998. There are two reasons for this. One is because that from 1998 the adjustment for the schools started, where many schools have been merged. Second farmers’ income from agriculture declined, and farmers paid less attention to discussions aimed at improving agricultural productivity because even with increasing productivity, the income from agriculture was still very low due to the low price of agricultural products.
4.4 Conclusion

This chapter has discussed and analysed the data, as well as built up the knowledge base for Hebei Province, China, which was studied in terms of its educational, political, economic, social, geographical, philosophical, and other background. The next chapter (Chapter 5) will focus on the Agricultural University of Hebei and its rural development activities, and the following two chapters (chapter 6 and chapter 7) will represent a similar knowledge base for Northern Territory and Charles Darwin University. These chapters then give the knowledge base for the two stages of the comparative research methodology, description and interpretation, which are necessary prerequisites for the later juxtaposition and comparison sections.
Chapter 5 Agricultural University of Hebei and its Rural Development Case Studies

5.1 Introduction

This chapter discusses the role of higher education in the development of rural areas within the Chinese context. One agricultural university in Hebei province (i.e. Agricultural University of Hebei (AUH)) had been involved in the advocacy of an education model “Combining Theory with Practice”. This model has proven to be suitable in the context of rural China for its fast effects and substantial outcomes. The education model is the key strategy in implementing “The Taihang Mountain Model: a Road to Prosperity”, which is a development model that integrates education, science and technology in reconstructing the rural economy and reclaiming the ecological environment of the mountainous areas” (Zhou, et al., 1990, p. 56). The university which has been mandated by the state government to serve rural areas has responsibility over farmers living in these remote, impoverished regions. The university responded to this challenge when university professors had decided to move out from their university offices and embrace a new principle (to combine theory with practice) and provide leadership in the reformation of the vast rural areas of the province especially that of the Taihang mountainous regions. In a period of 20 years (1979-1999) of extension work in these regions, farmers have not only become self sufficient but have ended their life of poverty and have become more progressive (INRULED, 2000, p. 13).

5.2 A brief review of AUH

Agricultural University of Hebei (AUH) founded in 1902, is one of the oldest higher agricultural educational institutions in China, and now is one of the key universities of Hebei Province. There are 25 colleges with 51 undergraduate programs, 24 programs for master’s degree and 4 for doctorate degree (website 5.1). Currently the university has developed into an institution mainly of agriculture with agronomy, engineering, economics and management as core specializations.

The main university campus is located in the ancient city of Baoding, Hebei Province, about 138 kilometres south of Beijing. Baoding is known as the ‘South Gate’ of the state capital (Beijing). The university has an area of 617,342 square metres with a
300-hectare university farm located only 4 kilometres away from the main campus. Its experimental forestry base (with total coverage of 2,700 hectares) is located near the Western Tombs of Qing Dynasty in Yixian County. In addition, there are two other campuses, one in Qinhuangdao City with an area of 73,000 sq. metres, the other in Dingzhou City, 60 kilometres south of Baoding City. A campus is under construction in the Western part of Baoding City.

The total number of the faculty and staff members is approximately 2,000 and the total student enrolment is in excess of 21,000. There are 800 postgraduate students, master and doctoral candidates within this total (University Information Handbook, 2001)

5.2.1 Functions

The University has a trilogy of functions which are teaching, research and extension services (AUH, 1998, p. 21).

1. Teaching

In catering to the needs of the 21st century, an integrated discipline system centring on agriculture has been formed which includes forestry, engineering, and economics. This enables the integration and combination of different specializations. The coverage of the various fields of study is thus expanded. In order to develop qualified scientists and technicians equipped with both solid agricultural science foundation and professional knowledge, competitive and encouraging systems have been introduced. The integration of teaching, research and extension has been implemented with an emphasis on the development of skills. This policy was endorsed by the Chinese Ministry of Education.

2. Research

Scientific research is fostered as a general goal of national economic development and reconstruction. Taking the application and development of research as the main aim of economic development, both basic and hi-tech research are used as main branches of study. The policy has already achieved some good results. Since 1991, the university has made 225 achievements in research programs of different levels, of
which 68 reached international level. The university has obtained 134 awards above provincial level, of which 8 were awarded by the State government and 2 were awarded by UNDP (United Nations Development Programme). (website 5.2).

3. Extension Services

Under the Chinese education system, each province has at least one agricultural university. The agricultural universities are mandated by the state to serve the agricultural and rural needs of the province. As such, AUH has to play a major role in servicing the rural areas and it has a duty to the farmers in Hebei Province.

AUH has a very strong background of extension services that span over 20 years (from 1979) when it started the implementation of the Taihang Mountain Project that led to the development of the Taihang Mountain Model: A Road to Prosperity (Zhou, et al., 1990). This development model was based on the experiences generated while doing an integrated research and extension programme in developing the Taihang Mountainous Regions. The main aim of the integrated research program was to reclaim the ecological balance of these vast mountainous regions while at the same time economically reconstructing the area. The case study of the Taihang Mountain Model Development is the main focus of this part of the thesis.

5.2.2 AUH Mission and Vision

Traditionally, this university (AUH) emphasizes the integration of teaching and agricultural production, theory and practice, so as to train students to become agricultural technicians equipped with sound basic knowledge, high skills and good practical experiences (University Information Handbook, 2001).

From this mission statement AUH has formulated the following guiding principles and ideology (University Information Handbook, 2001, p. 5).

The main task of the university is to train qualified personnel. It emphasizes 4 main education principles: 1. to carry out national education policies, 2. to serve the development of the rural economy, 3. to put the principle of teaching as a priority and 4. to persist in integrating theory with practice (AUH, 1995, p. 6).

1. To carry out the national education policies.
The university adheres to the policy of carrying out the national education priorities. For example, in 1992, an initiative from the national government on actively implementing the integration of agriculture, science, and education with the purpose to improve the development of rural economy has been delivered (AUH, 1997, p. 59). University personnel are inculcated to become academically competent as well as morally upright and physically healthy public contributors of the country. The students are cultivated to love the peasants, uphold agriculture and to serve rural development.

2. To serve the development of the rural economy.

AUH advocates a policy that education should fit in with the needs of economic development. According to this policy the key to the development of agriculture and rural economy lies in the training of qualified personnel, making scientific research and extending and transferring these technologies back to the farm. The vital objective of education is concerned with training qualified personnel to become practitioners (Wang, 2000). The university curriculum contains both basic theory and practice. AUH scientific research applies and exploits the achievements from scientific research. These research outcomes are then utilized to extend and transfer knowledge and technologies from AUH according to the conditions of different localities.

3. To put the principles of teaching as a priority.

In the process of promoting rural development, AUH decisively manages the interrelationship between teaching, scientific research and production. Teaching is seen as a priority. The system of teaching, combining theory with practice, had been strengthened and improved. Qualified practitioners have been recruited who will promote rural development (Wang, 2000).

4. To persist in integrating theory with practice

The integration of theory with practice will promote the development of both teaching and research. It will advance the teaching level of AUH and stimulate the succession of scientific research. From the development of fundamental theory, study projects are made and applied, leading to new concepts being discovered. Through
effective feedback, new concepts are gathered and integrated into the teaching course content. These new concepts are serving as inputs for new scientific research (Wang, 2000).

AUH has always attached importance to scientific research and the extension of science and technology (AUH, 1997). Concrete outcomes like awards, development of new breeds, strains and varieties generated from AUH research projects have played significant roles and provided benefits to users. These results are highlighted at website 5.3. The note has been inserted in the list of abbreviations (p. xiii).

5.3 The Development of the Taihang Mountain Model

In this section, a model developed by AUH in their 20 years of practice in integrating theory with practice—combining extension, research and teaching as a tool for productivity will be discussed. The focus will be on how the AUH was able to combine educational reforms with economic reforms to achieve rural development.

Taihang Mountain is the largest mountain area in Hebei, China. Changing its poor underdeveloped status and its ecological environment is of great strategic significance for Hebei Province in order for it to be an economically strong area. It is also a key area for the improvement of the whole ecological environment of Northeast China (Zhang, 1992).

5.3.1 The Taihang Mountain Model (TMM)

TMM is a developmental model. It has been generated from the continuous experience of AUH for more than two decades using an approach of integrating teaching, research and extension education. The model combining theory with practice is used in the reconstruction of rural areas and the reclamation of the ecological environment of Taihang Mountainous region (Wang, 1998).

5.3.2 A brief review of the Taihang Mountain project

In view of the adverse natural environment and many farmers living in poor conditions, the exploitation of the Taihang mountainous area is concerned not only with the improvement of the ecological environment but also in finding immediate
solutions to remove farmers from poverty. The experts from AUH conducted investigations and analysed the characteristics of the mountainous area in 1979. Based on the results of the investigations they made, and with due consideration of the society, economy and natural resources, it was proposed by these experts to adhere to the following development principles: “poverty transformation before mountain transformation, ignorance eradication before poverty eradication and intellectual transformation before poverty transformation” (Zhou, et. al., 1990, p. 56).

It was decided that exploitation should be initiated from available resources using some advanced technological projects. Investment was to be small but with fast effect and great economic benefits, in order to lift farmers from poverty quickly. Comprehensive exploitation was started with an experiment in combining demonstration and extension services, comprehensive development in combination with comprehensive management, exploitation technology in combination with economy and poverty transformation in combination with ignorance eradication and disaster prevention. Based on the scientific research and analysis, the university’s professors and other staff have provided very useful and practical advice and suggestions to the farmers, for instance, how to grow strawberries in simple locally made green houses, how to grow persimmon trees in mountainous areas better, how to raise rabbits better, how to improve crop production, etc. Thanks to these services from the university, after the first 3 years (in 1981), many farmers in the mountainous area (experiment site) had greatly improved their productivity and increased income generation, and they were also freed from poverty. Moreover, the ecological environment in this area saw some preliminary improvements (Zhang, 1992).

5.3.3. Chronology of TMM development

1. Introduction

The involvement of AUH in rural development that led to the development of the Taihang Mountain Model is not a chance event. It is emphasized that during this period, the Central Government mandated every sector of government to be involved in rural development. The public outcry wanted reform in all aspects: education, economic, etc. In both urban and rural sectors there was a thirst for reformation but the need was more urgent in the rural areas (Zhou, et al., 1990).
2. When it started?

In 1979, Hebei Provincial government made a decision to develop the Taihang mountainous region (AUH, 1998). It established a research project, which was named the “Comprehensive Research and Exploitation of Taihang Mountainous Area in Hebei Province” (Zhou, et. al., 1990, p. 5). AUH undertook the responsibility for this project and organized professors, teachers, technicians and hundreds of students in 6 departments of the university to initiate the comprehensive exploitation of Taihang Mountainous areas.

3. Initial achievements of the experimentation was brought in line with the State Plan

The local government affirmed and set a high value on the exploiting of the model of this mountainous area experiment. Thus, in 1981 a key project called “Research on Exploiting Taihang Mountainous Area in Hebei Province” was established and was brought in line with the State Plan. Hebei Provincial Government organized some local institutions and cooperative units to accomplish this key project. Again, AUH bore the technological responsibility. Later the exploitation of the mountainous area was expanded further in 24 counties of Hebei Province. The research project was satisfactorily accomplished as a result of the coordination of numerous scientists, technicians in Hebei Province and farmers in Taihang Mountainous area. There were 40 achievements made in this project among which 16 achievements came up to advanced world standards. (Achievements are further discussed in succeeding sections) (AUH, 1998).

4. Initial expansion of the TMM

After 1985, AUH further developed the TMM expanding it from the research base (experiment site) where it was created. TMM was extended to the plain and Heilonggang area in Haihe river valley. The methods of exploitation were adjusted from single-technology, for example, apple trees pruning, into the development of multiple branches of science turning the place into a comprehensive economic area. Then the mainstay industries were established according to different local conditions. The development was extended from scientific research as the main point to the teaching in combination with scientific research and production. The achievements of the exploitation were introduced and integrated both into higher education and
teaching methods reforms. This initiative led to the further development of both teaching and scientific research levels of the AUH. At the same time new achievements, and new technologies of the university were also used back at the extension bases. More social and economic benefits were achieved in Taihang mountainous area. While the technical team focused on education, combining science and technology with economy, economic and social benefits took effect jointly with ecological benefits. The development of an explicit holistic new approach using scientific methods in extension education was based on the key principle “combining theory with practice.” (AUH, 1996)

5. The Affirmation of the Development Model by the Central Government

The research project on exploiting the mountainous area (started in 1981) was appraised by the Central Government in February 1986. The acknowledgement at the national level showed that the approaches, methods and the measures applied in this research project were commendable and that they had quite an evident effect. The project has shown a new explicit way to manage and exploit mountainous areas, which was acceptable to the Central Government (Zhou, et al., 1990).

6. Further expansion of TM Model

Since 1991 experts from AUH have further extended the Taihang Mountain Experience to most parts of the plain in Hebei Province. The area covers from the Huanghai to the Plateau of Bashang Zhangjiakou district. More than 20 relatively stable three-in-one (teaching, research and extension combination) extension education bases were set up in different types of ecological regions, including 98 three-in-one work sites for teaching, research and production. The scientific and technical expansion area covers 78% of the whole province (AUH, 1998). A lot of activities were done to improve the farmers’ scientific and cultural awareness, centring on sustainable development. This is evidenced by the cases in this chapter.

The project content, strategies, approaches and methods used in the implementation of TMM are discussed in the next section.
5.4. The project content and way of running it

AUH launched massive income generating activities (IGA) aimed at opening up the main areas of production and development of mainstay industries at County levels in Taihang mountainous areas. For example, marmot rabbits raising and related industries became the mainstay in Linzhang county (case 8, and In 3, 2001). The general objectives of the project were (1) to educate people on the knowledge of science and technology to improve farming practice; to improve productivity to have not only more food for consumption, but also in order to gain more income from the sales of their produce. (2) To develop mainstay industries while simultaneously developing the rural enterprise to absorb the surplus labour force into it. (3) To reverse the condition of deteriorating natural environment of Taihang Mountainous area that threatened the sustainable development of North China in both the physical and economic environment (Wang, 1999).

The project aimed at three specific objectives:

1. To make full use of the local natural resources and put them into the market.

2. To introduce and spread practical technologies among the villagers to elevate their income; and

3. To bring in technology items which needed fewer funds but were easily done and could get much profit in a short time (Wang, 1999).

5.4.1 The team and resources

The project was carried out primarily by AUH and its Task Group composed of experts drawn from its faculty and staff. A number of students were also mobilized during their social practice (generally speaking, that means students spend some time in factories, farms and mines instead of in classrooms to know what the real situation of society is and also to help local people). The project has preferential support from the Provincial Government of Hebei through the different bureaus and government organizations in the province. Linkages with the local industries, private organizations, and non-government organizations (NGOs) had been pushed through during the course of the project implementation bringing in both personnel and
logistics support. Total financial investment amounted to 7.2 million RMB (Zhou, et. al., 1990).

5.4.2 Training materials and methods.

There was a vast variety of methods and materials used in the implementation of the model. These included Bulletin boards, blackboard, poster, broadcasts, technology prescriptions (white paper), slide shows, video tape film showing, scientific advertisements, on the spot live performances using indigenous approaches (for example, operas), farmers’ night schools, winter schools, one-on-one/face-to-face technical consultations, experimental bases and demonstration spots, inputs service stations, science and technology market, model households, and a snowball dissemination effect (In 4, 2001).

5.4.3 Basic approaches employed in Taihang Mountain project

There were many approaches adopted in the Taihang Mountain project. These were (In 5, 2001; In 6, 2001; AUH, 1996; AUH, 1997; AUH, 1998).

1. Experts made a comprehensive system analysis, an holistic approach in considering the existing problems and potentialities of the Taihang Mountainous area. Based on the data (as of 1979), although natural resources are rich, the output value is only 0.00012% of the total provincial output value. 1978 statistics recorded an average annual income of local residents as low as 50 RMB (Zhou, et al, 1990).

2. Setting up of experimental bases. Based on analysis, suitable crops were introduced to enhance productivity. Existing crops with great production potential were also developed. Research projects were implemented and based on the results of the study—scientific based technologies were derived and extended to the farmers. Experimental bases served as a focal point for demonstration spots, which were aimed at disseminating the agricultural technologies, which are coupled with the setting up of service stations (like demonstration stations) for both technology and farm inputs (AUH, 1998).

3. Establishing a system of extension and training for agricultural technology and over-all quality improvement of the science and technology workforce. This was accomplished by:
a. The compilation of practical technologies based from actual research done in the site.

b. Technological training of farmers to adopt necessary technologies that require less work hands but with high production efficiency.

c. Organizing a rational technical delivery service system (i.e. consultative group) under the technology network.

d. Advocacy in setting up of various Professional Technical Societies (e.g. Fuji Apple Development Society) to serve in the consultative group

e. The establishment of the scientific and technology market of AUH (in 1988) linking the university with farmers for mutual benefit.

f. Selecting poor counties (10 out of 39 in the whole province) to set up experimental villages to implement the ‘well-to-do-village’ project to carry out poverty alleviation strategies.

g. Pushing forward the Liao Yuan Plan and promoting rural professional education.

h. Training a large group of farmers to become chief members of an extension work force under the Green Certificate Program (Note: The Green Certificate is a national program for farmers conducted by the Chinese Ministry of Agriculture as well as an award given to farmers who have undergone technical training and who have proven potential and capability to extend the acquired practical skills. They must also have some management and supervision capabilities. The farmers who have the Green Certificate obtain many benefits, for example, it is easy for them to have a loan from bank.)

i. Setting up Beigu Farming School with assistance from AUH experts training 16,000 farmers among whom 240 were appointed as farmer technicians by the County government –which led to the farming output in 1993 being raised by 56% compared to 1988 (AUH, 1998).

4. Mobilizing human resources. A scientific technical extension team was established. AUH was the base unit, vocational students were the means and farmer technician
were the main participants. Every year in over 20 departments of AUH about 500 specialists and researchers, over 100 masters degree students and 1000 bachelors’ degree students go down to the rural areas, living and staying in farms and assisting farmers (AUH, 1998).

5. Building up/providing a powerful system of leadership (prefecture, county and university level) to make up a complete body of policy-makers, administrative support and implementing units. This was achieved by (In 6, 2001):

a. Organizing a logistical service system (e.g. distribution centres of production inputs).

b. Drawing up an over-all plan; making feasible quotas (structural plans of the annual target within five years).

c. Evaluating achievements made by research to guide the local production activities.

6. Networking

a. By joining efforts with local seed company, AUH set up a strong marketing network for Chinese Cabbage seed in Gaoyi County.

b. To provide information and training facilities, AUH contributed 6,000 books and reference materials and other teaching equipment to Yongnian County Professional School and to Anping County Beigu Farming School (In 5, 2001).

7. AUH organized farmers in various technical associations to bring into play the initiative of farmers to learn and use science and technology. The following mentions some of these technical associations: Mushroom Association in Tang County, Chicken Association in LaiYuan County, Red Fuji Apple Association in Shunping County, Watermelon Association, Peach Association, Vegetable Association, Maize Association, etc. Farmers’ associations opened up market links in China and abroad. Chicken and Vegetable Associations market produce not only in Baoding but also to nearby cities in Tianjin and Beijing. Red Fuji apples gained market access to neighboring countries in Asia (In 5, 2001).
5.4.4 Innovative approaches initiated by AUH

Through the development of TMM, AUH accumulated many experiences. Some significant ones are mentioned here such as (In 13, 14, 2002, and AUH, 1998):

1. Establishing joint ventures using a contract package. AUH initiated this new extension service in a range of counties. The pre-requisite of this approach was to provide services for farmers. The operation of this particular approach is that the service provider signs a contract package of technical service. The provider charges some fees for the overall service as the resource of technical research. This approach brought a change of delivery pattern from only a special department towards an overall operation pattern by mobilizing many departments like administration, material, supply, financial and monetary bringing service closer to the needs of rural economic development. AUH and Ding Xing County formally signed the contract for agriculture comprehensive technological package service in January 1989.

On the basis of self-willingness and mutual benefit, AUH established more joint ventures of teaching, scientific research, social practice bases. By signing contracts with the bases (since the bases were operated independently) AUH gradually changed the extension service mode from totally free to the combination of free and charged services. This new approach is aimed to benefit both sides, the university and local communities, to mobilize the initiatives of both providers and recipients and to further enhance the enthusiasm of providers. Through many years of practice, AUH and the local partners of joint ventures have expanded the practice to a bigger scale. The range of services was enlarged from science and engineering to art and more social sciences, from introduction to the expansion of extension service, from techniques of increasing production to post-harvest processing technology, and from economic development to the combination of economic and education reforms. AUH formed such joint ventures with Shunping, Fuping and Xiongxian Counties from 1982.

2. Setting up of Science and Technology Consulting Centres (in 1984). These centres offer various special and technical training courses for rural people. Some courses and consultations are free but some are charged with minimal fees. This income in turn was added to the investment resource of scientific research for purchase of
equipment to further enhance research. Moreover, the training courses graduated many groups of skilled labour.

3. Launching the social practice approach. The social practice approaches initiated by the Chinese Communist Youth League (i.e. Chinese student volunteers with over 200 AUH students in 10 different groups) in 1995, using a one-on-one teaching method (e.g. one student assists one farmer, one group assigned in one village). Activities used were broadcasting, blackboard writing, bulletin board announcements, and farmers’ night school learning. Course content includes promoting new high quality products, disseminating new technologies, offering training courses for local agricultural technicians, and delivering technical consultation and on-the-site instructions. A total of 120 social practice teams (generally speaking, that means students spend some time in factories, farms and mines instead of in classrooms to know what the real situation of society and also to help local people to do something) were developed.

4. Deploying homecoming practice teams. This initiative followed on with that of social practice, and it resulted in 1,500 teams being developed by AUH, who submitted 18,000 investigation reports, technical consultations for approximately 40,000 people and 60,000 copies of scientific and technical materials were distributed 80,000 farmers were provided with technology education classes.

5. Adopting the shareholding cooperation system. The mountain development programs were invested in by the government and implemented by experts and scientists. Farmer beneficiaries received a lot of assistance towards improvement of their life and productivity for free. Continuing this approach may lead to farmers becoming dependent, on assistance, draw money away from scientific research initiatives universities and research institutes and government may suffer more economic burdens. In 1996, after the investigation of the aspects of natural production conditions and farmers economic income situation, the AUH Mountain Research Institute (AMRI) contracted with the Provincial Science Commission in Hebei hilly and dry land agriculture sustainable development comprehensive experiment zone in Taihang Mountain, to transform the hills for 50 years through shareholding cooperation with local farmers. The farmers’ group (Party A) in Yushanzhuang Village, Gouchang Town in Tangxian County in Baoding area agreed
with AMRI task team and both parties signed a contract for transforming and developing the barren hills. Party A provides 134 hectares barren hills and an experimental land of 13.3 hectares, takes responsibility for engineering, organization, providing labour and entire production investment including seeds, young plant, fertilizers and explosives, and urging every contracting household to achieve their tasks in time. AMRI as Party B, provides the technologies needed in transforming engineering including engineering design, technical instruction and training, and introducing an appropriate project for Party A, providing all inputs for experimental land production. The profit division is 90% shares belonging to Party A, 10% shares belonging to party B. The validation of contract will last 20 years. Party A signed subcontracts with each contracting farmer in the village to ensure the benefit of both sides are protected.

5.5. Achievements made in Hebei province

There have been a number of achievements through this model (Taihang Mountain Model). These are (AUH, 1998):

1. Agricultural production increased and the agricultural structure changed. Hebei province is one of the agricultural production regions in China and it has had good harvests for many successive years since 1991. It has reached up to 25 million tons in 1994 and was maximized to 27.8 million tons in 1996 reaching the highest record in the history of the province. The crop harvests have now created the favorable conditions for the livestock breeding industry.

2. The establishment and opening up of main production and development of mainstay industries: for example, Red Fuji Apple in Shunping County, Chinese Cabbage Seed Production in Gaoyi County, Strawberries in Mancheng County, Marmot Rabbits Production in Linzhang County. Dates, persimmons, walnuts and maize are among the products in Taihang Mountainous areas.

3. The development of local enterprises to absorb surplus labour force from the farm. The contract groups have pushed the development of rural enterprises forward and liberated a productive force. Several forage processing plants have been set up in Ding Xing County; Yan Tai Chicken farm kept on enlarging its operation scale, making, hatching, feeding, slaughtering, processing and marketing a coordinated
process. By the end of 1993 farmers had set up main group enterprises mainly in the fields of car part assembly, hat handicrafts and chemical production.

4. An investment of 7.2 million RMB in scientific and technological research got in return an economic benefit of 300 million RMB (The university and various governments had invested 7.2 million Yuan for projects to develop the Tiahang Mountain Area in 1979). After three years, the benefit was up to 300 million Yuan, which covered the agriculture, horticulture, forest and livestock in this area (Zhou, et al., 1990).

5. The average personal income and living standards of inhabitants in rural and urban areas improved. In 1997, the average income of inhabitants in Hebei province reached 4,958 RMB and the average income of farmers reached 2,286 RMB, which was an increase of 1.6 and 2.3 times, respectively compared to 1992.

6. Improved workforce quality through training. The capability of farmers has been greatly improved. For example, farmers became expert seed breeders of Chinese Cabbage seeds and the county agricultural and farming machinery schools have trained tens of thousands of people. The technical competence of farmers has improved. Over 2,000 farmers reached the level of agricultural technical workers and over 400 reached the level of assistant technicians and more than 70 farmers achieved the level of technicians in Ding Xing County alone.

7. The improvement of the ecological environment. Now that farmers have been more than self-sufficient in grain, they are willing to develop a diversified economy to reforest the barren hills to improve the ecological environment. In the last ten years (since late1980’s) they have improved the hills of 2,666.7 hectares, reforested hillsides of 566.7 hectares and planted 96 thousand fruit trees and established 150 orchards (in Juncheng alone).

8. People’s attitudes change. A farmer and his wife in Gaoyi County learn to read and write with their son at night to improve his literacy level. The farmer learns in order to read and understand more practical technologies according to him. More and more families are sending their children to study and acquire higher education. Girls are now given equal opportunities to study as boys (In 14, 2002).
5.6. Summing up the achievements made and their implications for this thesis

Massive social transformations were brought about by initiating economic reforms coupled with educational reforms in the mountainous areas. The former poverty-stricken desolate villages, which were characterized by barren hills, rough treks impassable by any sort of transportation, and low mud huts have now turned into lively progressive villages with an accessible road system, green hills crowned with fruit trees, diverse crops growing in the field, tall brick houses with telephones, television sets, and other household equipment that were before considered a luxury item for village people. People’s initiatives have also changed, not only in money-making pursuits but they now consider their environment and try or become involved to improve it. Health and sanitation issues that did not appear to bother them much before are becoming a major concern. This is a good indication that rural people are looking forward to a better tomorrow by continuously striving to improve their living conditions.

Not only have the rural families benefited from the Taihang Mountain Project but also the university developed itself. Below is an account of how the university has continuously prospered while in the process of helping the village to prosper.

5.7. The university grows while it serves rural development.

Implementing the delivery approach of the three-conjunctions of teaching, scientific research and production for 20 years, the Agricultural University of Hebei (AUH) positively adapted itself to the environment of economic reconstruction, and made its contribution in extension education service to rural development. AUH also developed and upgraded itself. John Burrows (1976) has written in his book, University Adult Education of London:

University extension has not only served the community by its contribution to intellectual advance and social progress, it has also been of benefit to the universities themselves-by extending their influence and indeed their knowledge of the society that sustains them. More, it has promoted the multiplication of the universities themselves since many of them owe their foundation to the extension movement (Burrows, 1976).
The following developments are further evidence of this opinion.

1. The university gained recognition in December 1996 when AUH was designated as one of the model key universities of Hebei provincial government. The State government commended AUH in 1986 for the development of TMM (INRULED, 2000).

2. The university scale was enlarged. Since 1979, the construction of AUH has been carried out reasonably faster. In 1995, a new Agricultural University of Hebei emerged from the merging of AUH with the Hebei Forestry College. The size of AUH has been increased in terms of faculties, departments and number of staff and students. For example, in 1980, AUH operated 7 departments and 10 specialties. As of 2001, AUH covers 16 colleges, 4 departments and 9 teaching and research facilities. The university offers a total of 29 bachelor degree courses, 24 Masters degree courses and 3 doctorate degree courses. The total number of student enrollment is more than 13,000 with more than 400 postgraduates for master and doctorate degrees. The teachers and other staff members are still 2000 (the same as that of previous years) (University Information Handbook, 2001).

3. The specialties were adjusted and developed. In order to fit with the changes of rural industry structure, especially to meet the urgent need of rural commodity production and market economy development, AUH broke from the traditional concept of teaching of agricultural production when setting up course specialization. The different fields of specialization were adjusted in accordance with the development of comprehensive agriculture. The social demand changed quickly under the market economy condition. AUH took the attitude of respecting reality and being practical and realistic when developing fields of specialization. Present needs were considered as well as long-term adaptability so that the university gained a stable and healthy development. Prior to 1980, for example, the course settings of AUH contained some biases: for instance, concentrating on production but neglecting post-harvest; attaching importance only to crop planting but neglecting product processing; regarding traditional farming techniques but having a low opinion of new techniques; attaching importance to production but neglecting trade and sale. This approach resulted in course settings being not responsive to the
complexity of a changing rural economy and diversity caused by farming modernization (University Information Handbook, 2001).

5.8. Some Significant Cases

This section will deal with eight cases AUH has done during more than two decades of participating in rural development. Two decades is a long period for the university staff to be in rural areas. There would be many stories during that time. Owing to the limitation of both time and space, only a few can be presented here. The aims are “to identify some features and to show how they affect the implementation of the systems and influence the way an organization (such as a university) functions” (Bell, J., 1993, p. 11). The cases include:

1. Empowering Villages through Education, Science and Technology;
2. Fruit Growing;
3. Training the Farmers and Extension Workers;
4. Establishment and Development of Scientific and Technical Market in AUH;
5. Sustainable Development;
6. Organizing Farmers’ Associations;
7. Group Contract;
8. Livestock Growth.

5.8.1 Empowering villages through education, science and technology: the Chaichang village case (In 5, 2001, and FI1, 2001)

The first case to be examined concerns empowering villages through education, science and technology: the Chaichang village case. At the end of 1995, AUH participated in the project of Empowering Villages through Education, Science and Technology initiated by the Chinese Association of Agriculture. After consulting the Yixian County Government and the Chinese Association of Agriculture, AUH organized experts study visit to Yixian County in cooperation with the Provincial Government of Hebei. As a result of the field investigation Chaichang Village was identified and selected as the first pilot village of the project, where action research and theoretical analyses were to be undertaken in the pilot program.
By 1999, AUH had extended its programs into 9 villages of 3 pilot counties where about 800 AUH professors had offered about 600 various technical courses for about 80,000 trainees, distributed about 60,000 copies of training materials, donated about 10,000 scientific and technical books and periodicals. As a result 100 of the latest techniques out of AUH research projects were introduced to the farmers, which made a great contribution to the economic growth and social progress in the pilot villages and the counties.

The approaches or strategies of implementation that were adopted are many and varied; a few significant ones are highlighted below:

Approach 1. An expert from AUH is assigned by AUH to live in the village (year-round) to provide technical service to the farmer residents. The selection is based on the person who has a relevant program and some other specific strategies to implement in the desired area. The university often gives incentives to academics to spend some considerable time in rural areas. For example, spending one year in a rural area could lead to exemption from the English exam requirement for promotion to a higher academic level (English exam is a requirement for Chinese university staff for promotion).

This is supplemented with a door-to-door campaign plus a cash incentive is provided to pioneering farmers who attend technical training.

During the period of 1996-1999 there were 50 technical training classes conducted on forest and fruit trees, animal husbandry and crop planting. These have benefited 6,000 farmers/times (which means 6,000 farmer once or probably 3,000 twice) and technical key members of more than 100 persons/times. Now, it is common that in each household in the village there is always one person who has mastered at least one or two practical techniques for livelihood. 36 villagers were awarded the Green Certificate. Some women farmers became excellent in fruit tree growing.

Approach 2. Utilizing existing resources and improving production by applying scientific principles.

In this case, two fruit tree types existed in the village but their production was too low. One is the persimmon plantation consisting of 6,000 persimmon trees. It was
also found that this variety of Millstone persimmon was the best kind and suitable under local conditions. The technical experts pruned these trees. But before that, local technicians signed contracts with two model households to identify 10 demonstration trees to be managed scientifically. Harvest production increased. Using these two model households 80% of the population in the village began to prune their trees and become technology adopters. In 1998 yield reached a high record of 300,000 kg and in 1999 another 350,000 kg yield was recorded in the village book. Realizing the value of science and technology in agricultural production, farmers began to develop hilly land and grow more fruit trees—while reforesting wild mountains. A single tree of persimmon can produce 250-300 kg and at best times even yielded 500-1,000 kg per tree with scientific management. The issues of marketing were considered especially when persimmon production was reaching this record high. The production of persimmon has become a large scale industry today and because of the good quality the persimmon from this region demands a good price.

Another fruit tree is the wild apricot where about 6,000 wild trees are found in the mountains. The fruits ripen and drop down with no one noticing them because these fruits are difficult to store and because of the fruit characteristics (it rots quickly after ripening) is not convenient to transport. In 1997 AUH organized students to make systematic investigations of usable resources in this village. Experts from AUH introduced a variety of apricots with thin flesh and big kernels. It was realized that planting new seedlings and for the tree to mature and bear fruit takes time. Therefore, experts introduced at the same time a grafting technique- where the upper part of the wild apricots is cut and a graft of the new variety on the wild ones is undertaken. This new variety taken from Zhangjiakou has proven to be robust and the kernels have been processed into a famous beverage.

Approach 3. The introduction of new varieties and production techniques and other technologies. Under the assistance of AUH and the Chinese Association of Agriculture, other fruit varieties and grain varieties (i.e. 2 wheat, 4 maize, 22 rice), apple, grapes, Chinese chestnuts, walnuts, lean meat pigs, beef cattle, etc. were also introducing. Up to 95% of the village was involved. Other practical techniques included up to 60 different technologies in agricultural production were adopted, for
example: combined production technique of increasing the quality of wheat and maize, vegetable planting in greenhouses, cut-flower growing, pruning and grafting of fruit trees, and the use of methane tanks for power and light. In the Chaichang village alone there are 35 established greenhouses for vegetables, flowers and seedlings.

Approach 4. Protecting vegetation by grazing sheep and cattle in fenced areas. In the past, in this village all the domestic animals (cattle and sheep) strayed in the mountains, so they destroyed the surface vegetation. This practice did not accord with the aim of sustainable development of the mountainous areas. Under the guidance of the technicians, all the domestic animals have been raised and fed in confinement, instead of having them stray freely in mountains. This method is favorable for raising and feeding techniques and also such practice protects the surface vegetation of the mountainous regions, and the practice is monitored for animal welfare.

5.8.2 The case of fruit growth (In 2, 2001, and In 10, 2002)

The second case concerns fruit growth in Shunping County. Shunping County, one of the poor counties in Hebei province lies in the eastside of Taihang Mountain, with a total area of 708 sq. km, a population of 264 thousand and arable land of 26,800 hectares. In 1981 the average income per year per person was only 73 Yuan RMB.

In 1983 based on the investigation of the region by technical experts from AUH the Red Fuji apple was introduced. Through research and development over 10 years practical techniques were packaged and extended to farmers. By 1995 nearly 400 hectares of Red Fuji apples gave an output of 30 million kg with an output value of more than 100 million RMB. This made Red Fuji apples a major industry of the county.

Mancheng County is an area of strawberry production. It lies in the eastside of the Taihang Mountain. The fertile soil and climate is suitable for growing strawberries. However the yield was low due to poor varieties and mono-planting and backward farming techniques. There were only 80 hectares planted with strawberry in 1980s with the yield of 10 ton per hectare. At that time strawberry production was of little importance to the local economy. Based on investigations made by local leaders
together with AUH Horticulture Department it was proposed to set-up a base of strawberry production in Mancheng due to the strategic location of the county neighboring major markets in cities like Beijing and Tianjin.

Initial improvements gave good results, using the research capability of AUH Department of Horticulture and a variety of strawberries that were collected both local and from other countries. From 1981-1985 a total of 100 varieties were introduced to the base. Seed plots were set up to provide a stable source of planting materials for successive production seasons. Research continued on increasing yield and producing varieties that were resistant to pests and diseases. Local farmers were highly motivated and took strawberries production seriously. The initial area planted with high yield varieties increased from 20 hectares in 1992 to 1000 by 1997. With more technology support, for example, off-season growing of strawberries in greenhouses, the most recent figure of area planted with strawberries recorded 2200 hectares taking up 50% of the total area of Mancheng.

5.8.3. The case of training the farmers and extension workers (In 13, 2002, and FI2, 2001)

The third case, professional education, occupies an important position in the national economy of China. There are close links between education and science, technology and economy, and each can be switched over in the modern work force directly and efficiently. The development of professional education especially in the rural area links that of the rural economy with the improvement of farmers’ quality. Since 1987, the university (AUH) actively took part in rural teaching reform, and has made contributions to the setting up of county level Vocational and Technical Education Centres working with Hebei provincial and local government. The university has also taken part in the construction of Centres for Professional Education and other activities, for example, holding varieties of training classes and writing a compilation of practical texts. In 1999 the university developed a special course enrolling 3 groups of farmer students coming from the rural areas. They were chosen and paid for by the provincial government. These farmer students were trained with practical production skills and were required to go back to the farm after their graduation. Now, many graduates gained many achievements in agricultural production. In 1997, the Institute of Adult and Vocational Education of AUH was established to enrol
students from the county level Vocational and Technical Education Centres. The students were trained here and most of them have been back to their own counties.

In 1995 the university held training classes in Fuping County (an old liberated area but one of the poorest and the most backward) on agricultural technology and management which lasted for one and a half years. Trainees include both students and village leaders. The students were mainly graduates from high schools who returned to the rural area and worked in the county over two years. The town and village leaders studied the relative technologies in agriculture, administrative management, basic laws, economic laws and the management of town and village enterprises, etc. which could help them lead the people in getting more prosperous. The university also held lectures on special practical technologies. Thirty graduates from the class have been assigned by local governments as the heads of villages after they graduated with college certificates.

5.8.4. The establishment and development of the scientific and technical market in the Agricultural University of Hebei (In 6, 2001, and FI5, 2002)

The fourth case to be examined concerns the establishment of the technical market. In 1988, in order to help the development of rural marketing, the AUH set up the General Developing Company of High Technology. Meanwhile, they built an AUH market street – the first market supported by the university in the country. The market served as a bridge between the university and rural areas and it is the extension of the development model of Taihang Mountain. The market brings together up-to date farming methods and advanced farming technology. The whole business of the market includes the marketing of the varieties of farming materials, transferring technologies and technical consultations, etc.

The guiding principle of the market project is to put social benefits as a priority, as well as to popularize farming technologies, to direct service work and to spread technical achievements in the rural area. The market has made full use of the resources of the qualified personnel, information and data from AUH. There have been many technical achievements, and the market has now accelerated the transformation of these technical achievements into productive action. The university
thus discovered a new way for universities and colleges to open the technical market, and made contribution to the economic market system.

This market has a number of scientific and technical features; for example, business shops selling high yield varieties of over 13 kinds of crops in 1995; 15 kinds of hybrid maize, which used new varieties developed by the university and placed into the market, which expanded business up to 24 provinces since 1994. The annual turnover rate is over 100 million RMB.

Another features of the market refers to the expert clinics which have been set up to give free consultation, and to answer the farmers’ questions about crops and livestock pests and diseases. In 1995 the consulting clinics developed over 2000 pieces of reference data and distributed them. Over 200 thousand farmers, for example, were trained in new technologies used in vegetable growing and management.

The technical market has become the fieldwork site for students in agricultural courses, before graduation. Students gained practical skills and acquired competences.

The market has been an effective way for the university to increase its income. The more prosperous the market, the higher the turnover, so is the profit and income which can replenish the funds of running the university.

The market can link the university with the farm, where problems are used as input for research.

5.8.5. The case of sustainable development (In 1, 2001, In 9, 2002)

The fifth case to be examined concerning Qian Nanyu Village, the typical case that engineering system utilized in Enriching Mountains and Protecting Plains, has promoted sustainable development of the rural economy.

In 1963, a heavy flood occurred in Xingtai City, Hebei Province. At that time I was teaching in a branch college of the Agricultural University of Hebei. Wang Fawu, the president, at that time, assigned me to undertake the task to help the local farmers to recover from the flood disaster. I organized a group of teachers and began to make
investigations. We decided to have Qian Nanyu Village, Jiang Shui Town as our pilot site.

The whole village was underwater. The cultivated land was destroyed and the hillsides used for farming were damaged. When we got there, all the villagers had almost no arable land to live on, so they were talking about how to get away from their native village and move to another better place for survival. The terrible situation helped us make up our minds to work with the farmers and assist them to change their adverse circumstances.

I majored in water and soil conservation in my college days. After graduation, I taught this specialty in the university. My scientific research projects were also oriented to this direction, so my wish was how to transform the mountains and tame rivers to benefit future generations.

At that time, in Qian Nanyu Village the situation was very serious, and the people were living a hard life with the per capita annual income of only 50 Yuan RMB per person. The reality there and the villagers’ hard life made us even more willing to live together with them and help them to get out of poverty quickly using our scientific technologies.

Based on the real situation, we thought that the most important thing was how to solve the shortage of food and housing first. So, together with the villagers, we transferred soil to flooded land to reclaim enough basic farmland. When the villagers had food to eat, we organized them to transform mountains and tame rivers scientifically step by step. During the process of implementing the project, we applied ecological economic theory to the construction in mountainous areas, which means to rationally combine ecological economy with transforming mountains and taming rivers. Our task was to change the ecological environment, to solve the problems of flood, drought, poor soil and erosion which affected the development of mountainous areas and to gain the greatest economic benefits. This was the principle used to implement the project in Qian Nanyu Village. It was this motivation that encouraged us to live and work in the village for many years, and now great changes have taken place there.
In 1999, there were 375 households in this village, with the population of 1,297 people, among which there were 762 labourers. The cultivated land had been developed to 821 ha. The average cultivated land was 0.63 ha per person. The hilly land was 553 ha. The average area was 0.4 ha per person. The team clearly realized that the limited cultivated land and also the hilly land should be made available for full use to help the local farmers improve their income. After thorough investigation and research, we developed the technologies of “Enriching Mountains and Protecting Plains”, which aims at guaranteeing the lower reaches to be safe when flood happens; accumulating enough water with little rainfall; changing the thin soil layer into a thick soil layer of 1 metre to prevent soil erosion. In this way, half of the hilly land became arable.

The procedure was as follows.

First we made a general investigation of each piece of hilly land in this village. Then we worked out an overall plan, adopting the orientation of terraces to transform the hilly land. We have been working in the village for more than 30 years. What we did there has thoroughly changed the poor villager with a hard life, bad condition, and intensive physical labour and with the annual average income of only 50 Yuan RMB per person to a better living place than before. The details of this are that now in this village, the total grain yield is about 550 tons. The villagers have enjoyed the free supply of grain. The total amount of dry and fresh fruits has been increased to 820 tons, among which are 320 tons of apples, 125 tons of Chinese chestnuts and 1,500 kilograms of walnuts; the total profit reached 2,200,000 Yuan. The average income from fruits is 1,698 Yuan per person. The net income of the rural economy is 37,590,000 Yuan, while the industry income is 33,820,000 Yuan (2,800 Yuan per person). The total output value of forestry is more than 2 million Yuan. In Qian Nanyu Village, there are 10 big ravines, among which fruit trees grow everywhere. The winding mountain roads have connected the 10 ravines, so it is convenient to go to each of them. To drive through all the orchards takes more than one hour. So one can imagine how many orchards and how much fruit there is. The mountains have become green, and the farmers live a better life. The mountainous village has thoroughly changed into a new one and has become one of the richest villages in Taihang Mountainous Region. This village is also named as the ‘Greenest Place in
Taihang Mountainous Areas’ by ecological authorities, for its forest cover rate has reached 90.7%. As one of the best 500 demonstration sites of environmental protection throughout the world, the village gained the nominee prize awarded by UNEP (United Nations Environment Programme) in 1995.

The economy in the village has developed, and the living standard has improved. This was part of evaluations to be awarded by UNDP. The villagers’ attitudes have improved with no more fighting and gambling. It has become a famous village in the county.

In 1998, Mr. Song Jian, the state secretary for Scientific and Technology Affair of People’s Republic of China, interviewed me and took pictures together with me. After acquainting himself with the details, he stressed that the experiences in Qian Nanyu Village should be popularized widely to benefit the mountainous areas with similar conditions. Now the experiences accumulated in Qian Nanyu Village have been popularized and applied to 65,000 ha of farmland in Hebei Province, which brought about economic benefits of 650 million Yuan in recent years.

5.8.6. The case of organizing farmers’ associations (In 4, 2001 and In 12, 2002)

The sixth case to be examined concerns the organization of farmers’ associations: why the farmers in this mountainous region lived in poverty owed much to their low educational level, and backward farming practices. They could not apply scientific techniques in their agricultural production, neither could they make full use of the rich geographical resources in the mountains. The principle that the Agricultural University of Hebei adhered to when it first initiated the development of the Taihang Mountainous Region was “to deal with ignorance before developing mountains”. It is a common understanding in these areas and it is UNESCO’s experience in developing countries that only when farmers’ cultural knowledge level and the ability to apply science and technology has been improved and their enthusiasm to learn science and technology has been stimulated, can the farmers possess the ability to develop themselves soundly. AUH helped to establish various farmers’ technical associations based on the farmer paying more attention to outcomes, the real situation of resources, communication, history, geography, human culture and so forth in different regions. AUH followed such a concrete way, namely, “Experts take
the leading position; local government coordinates for them; model households are selected as the core units; farmers are encouraged to join the associations; and agricultural practical techniques are developed first” (personal observation). Thus experts of agricultural technology train members of the associations with advanced practical techniques in agricultural production. They stimulate farmers’ enthusiasm for learning science and technology. They also apply this learning through the model households. It appears that the farmers like to learn knowledge actively instead of being educated passively (personal observation).

Based on this principle, the Agricultural University of Hebei has successfully organized more than 10 farmers’ technical associations, which have brought about social and economic benefits. For instance, the farmers have proposed to establish a “Mushroom Association” in Tangxian County, “Chicken Association” in LaiYuan County, “Red Fuji Apple Development Association”, “Watermelon Association” and “Peach Association” in Shunping County. Similar organizations of apple, vegetable and maize have also been set up in Wuyi and Zanhuang Counties.

The establishment of these associations has played a very important role in promoting the development of the rural economy. It also has been really helpful for farmers to study science and technologies and apply them in an active manner. The establishment of these associations has enhanced extension work and scientific research to improve the farmers’ awareness of science and technologies. The Red Fuji Apple Development Association of Beicheng Town in Shunping County was set up by Huangpu Zhongsi, an associate professor in the Horticulture Department from the Agricultural University of Hebei in November 1990. This Association has brought about grand economic profits and social benefits. The association not only provides technical training courses, but also instructional services as well as farm inputs and marketing of products. The Association is mainly composed of model households while Huangpu Zhongsi acts as the technical consultant. Every year, Professor Huangpu goes to rural areas to hold technical training classes, which will last 1-3 days according to farmers’ practical needs in production. The following training programs are included: the management of orchards, the prevention and control of apple trees’ diseases and elimination of pests, quantity of watering and fertilizer, storage and post-harvest handling of fruits, management of seedlings, even
the establishment of orchards and so on. Each time over 1,000 farmers are trained. Up to now, the association has a 10,000 membership, having Shunping County as the centre, inclusive of 110 villages in 6 nearby counties. The area of orchards has also been up to more than 2,000 hectares compared to a few orchards area that existed for demonstration previously.

The Association has the function of integrating scientific research, extension, production and marketing. Some of the scientific research projects by colleges and universities are carried out in these farmers’ orchards. Even a joint “Sino-Japanese Friendly Orchard” by Japanese Huajia Association was set up in one of the Association members’ orchards. The projects that were implemented there have a close relationship with local production and have the function of demonstration to farmers. For example, scientific researchers have found the latest technique of bag covering for apples, including the best covering bag and the best time for covering, which has shown farmers a new way of improving the quality of apples. This set of new techniques was spread and applied at almost the same time when it was developed. There are some other techniques such as early harvest, quality cultivation and growing, storage and keeping the fruit fresh that were also adopted and applied, which has greatly shortened the period of transformation of the achievements.

Under the guidance of the Associations, orchards are managed scientifically and systematically. The apple output produced by the association members has been up to 37,500 kilograms per hectare, with the total output value of 30 million kilograms. The yield and quality of apples in Shunping County has exceeded that of Japan, the original place of Red Fuji. The Red Fuji apple production in Shunping County has become a primary industry in Taihang Mountainous Region in Hebei Province.

5.8.7 The case of the group contract (In 14, 2002 and FI6, 2004)

The seventh case to be examined concerns the technical contract group of synthetic agriculture in Ding Xing County.

In Hebei province the plain area is more developed than the mountainous area. The application and dissemination rate of science and technology is quicker due to two main factors influencing its acceptability by the farmers. These are high yield per unit area and favorable natural conditions. The continuous development of the
agricultural production is affected not only by one or more technical measures but also by a series of factors occurring before sowing, crops growing and the management before the harvest. So as is in the case of Ding Xing County, agricultural production fluctuated. In order to change the situation and provide the means to coordinate the development of science and technology and link it with economic growth, in 1989, the Agricultural University of Hebei organized the technical contract group of Synthetic Agriculture in Ding Xing County to advance the local economic development. The main measures taken were the following:

1. A powerful system of leadership was developed

In Ding Xing County, a leading group was set up. It consisted of the leaders from the prefecture, the county and the university. The vice-commissioner of Baoding prefecture worked as the chief of the group, two vice-presidents from the University as assistant directors, and relevant departments and the staff from the scientific research section of the university as group members. The staff, sent by the university as vice governor of the county in charge of scientific research, was in charge of a coordinating group. The group was composed of the personnel from the prefecture, from the county and the university. Meanwhile, many leading groups and offices were organized in each town. Five teachers from the university were sent to the key towns as vice-directors for the scientific research, and similarly as the case for each key village. In this way a complete system of science and administration was formed, which could effectively link with every department concerned. In the system the overall plans were made, the concrete activities arranged, the technical measures carried out, the contradictions settled and the materials provided. Thus, a complete body of policy-makers, administrative support and implementing units was formed.

2. Organize the rational technical delivery service system.

The university established a consultative group with professors and specialists majoring in agronomy, plant protection, fruit trees, vegetables, veterinary science, hydraulics, agricultural machinery, and foodstuffs. Thirteen technical contract groups were organized by the university and local governments throughout the county concerning wheat, maize, cotton, peanuts, vegetables, plant protection, fruit trees, lean meat pigs, Xialuo-lai sheep, beef cattle, agricultural machinery, irrigation and
drainage, and foodstuffs. The technical groups consisted of 50 university teachers who were stationed at the test spots and 100 technical leaders from different departments, and about 1,000 village technicians. An agricultural extension network was formed covering the whole county. This network proved to be effective in transferring technologies from the university to the villages. The technicians were key players in this transformation.

The contract group established a close connection between responsibility, rights and benefits, combined production and supply with marketing, took administrative management, scientific technology and supply as a whole, especially with science and technology as its guide. The single department, different individuals and individual technical contracts were combined into a group composed of many departments of different levels and fields. These offered a series of services for farmers during the entire production period.

The group paid special attention to the 3 key links during the course of performing the contract. First, they defined the contract quotas and made concrete plans. Each contract group’s over-all macroscopic plan was drawn up by the professors from the university and leaders and technicians of townships. These were then approved by the administrative levels and implemented by the town technicians and farmers. Second, they found the key issues in one area and solved technical problems as they occurred together. Then, they promoted the work in all areas by drawing experiences gained at the testing points.

Since the local farmers did not have enough courage to take risks using the new production technologies, because of fear of failure, the university tried to demonstrate to them the basic points, and then spread the experience from test spots to nearby areas. According to the real situation of wheat production in Ding Xing County, the wheat professors from the university, through the demonstration spots, adopted the "5 s" measures. This means: spreading pest-resistant fine quality seeds; spreading the technique of applying fertilizer separately both in spring and summer; spreading the application of the compound fertilizer; spreading the dense sowing; and spreading the planting using the new sowing method with less, but fine quality seeds. The maize contract group centred on practicing "1 f and 2 i ", which means, using fine quality seeds, increasing close planting, and increasing the adoption of
chemical fertilizer. In this way, the farmers in Jiu-han village realized the target of 1,000 kg maize per mu (Chinese unit, one ha equals to 15 mu) in the same year.

The professors majoring in cotton from the university put forward 5 technical measures to improve cotton output, namely, use improved varieties; dense planting; scientific pruning; two times fertilizer application during cotton ball growing and chemical control of cotton pests. At the same time, great efforts were made to disseminate the technology of plastic film covering. In 1991, Dong Hai-bao town realized the target of 50 kg of ginned cotton per mu. They then disseminated this achievement by using the mass media, e.g. radio and television broadcasting, to supplement the traditional training classes. The county set up demonstration areas on the spot and promoted their work in the whole county by drawing experience gained from the test spots. To make the scientific and technical achievements widely known to the local farmers, 100 mu of test fields, 1000 mu of demonstration fields and 10000 mu of spreading fields were established by the county.

3. Organize logistical service system

The effect of science and technology relies on the supply of materials, and logistical service. When AUH and local government had organized the leading group chosen by both condition and willingness, a service network with the departments of finance, banking, supply and marketing, materials and oil supply, and town service stations was formed. Technicians can therefore spread technologies among farmers with enough materials needed. This process is similar to the physician’s "writing out a prescription, and then making it up".

4. Establish the system of extension and training for the agricultural technology and over-all quality improvement of science and technology workforce.

On the basis of a group contract, the Agricultural University of Hebei, making use of its advantages, has combined agricultural production with science and education and enforced the training for agricultural and scientific technology. To carry out the "Liao Yuan plan" as put forward by the National Education Committee, the university extended education outside the university by training the staff from the middle schools and the vocational school as active technology carriers to spread the agricultural technologies in rural areas. An overall plan was drawn up to train the
young farmers to master the necessary skills in agricultural production. Now a great number of technicians and managing persons are constantly emerging. In the meanwhile, the experts of science and technology from the university, combining with the local technicians, renew their knowledge to meet the need of the rapid changes in the countryside, through further education.

5. Draw an overall plan, make feasible quotas

The aim of setting up the agricultural and technical contract in a county as a unit, is to build the county into a demonstration area composed of all kinds of productive factors, combined with the full utilization of all resources, a rational structure of industries with low cost and high efficiency. This needs an overall scientific and a well-drawn plan, upon which, feasible quotas can be drawn up. Based on investigation of the area, the university built an overall model system which included agriculture, forestry, animal husbandry, fishery and rural enterprise and a four model subsystems: crops planting, fruit processing, animal husbandry and rural enterprise. A structural plan of the annual targets within 5 years for overall agriculture was worked out. The plan not only reflects the production quotas, but also took into consideration the economy, society and the environment to bring the rural economy into good shape.

6. Take part in the macroscopic policy-making and local guidance of the county government

Through the overall group contract and participation in the policy making, the university was able to send their vice magistrates and vice-directors who were in charge of science and technology to guide the local production work. With the help of the comrades in charge of finance and banking, clear directions on the distribution of the quotas and the agricultural investment were made. In order to bear the risks, an AUH team cooperated with the Science Committee to make concrete plans and work out the measures for the scientific items and to evaluate the achievements made by research. By means of full participation in every respect, the university aided the development of agricultural production and economic development, both in macroscopic policy making or microcosmic guiding.
Since the group contract was carried out by the university with the cooperation of the departments of the county, the rural economy has made great progress, as evidenced by:

Firstly, the output of food, cotton, edible oil, meat, fruit and vegetables has increased sharply. In 1993, the total output value of agricultural products reached RMB 450 million, 25% higher than that of 1988. The total yield of food reaching 305,923 tons had increased by 60%. Cotton yielded 862.5kg per hectare, increasing by 116%. Latest peanut produce is 3,015kg per hectare and total yield gets 1,5637.8 tons, an increase of 90% and 149%, respectively. The output of fruit increased from two million kg to 6.5 million kilograms, 10 thousand kilograms increase each year. The annual average income got to RMB 740 Yuan per person, RMB196 Yuan more than that of 1988, with an average increase of RMB 39 Yuan each year.

Secondly, the capability of farmers has been greatly improved. The county broadcasting and television stations held more than 80 technical lectures, reaching about one million in attendance. The county vocational training schools provide the villagers with 150 specialists each year. The county agricultural and farming machinery schools have trained about 10 thousand people within 5 years. Every year, the university accommodates more than 10 graduates from senior middle schools for direct and professional training. The technical contingent of farmers has increased quality. Over 2,000 farmers reached the level of agricultural technical workers. Over 400 reached the level of assistant technicians. More than 70 farmers got to the level of technicians and one senior technician. One farmer technician is in charge of 33.3 hectare of farmland, an assistant technician for 133.3 hectares, and a technician for 667 hectares.

Thirdly, the contract group has pushed the development of rural enterprises forward and liberated the productive force. They have set up several forage-processing plants, and the annual consumption of grain is 20 million-kg. Yan-tai town's chicken farm, for example, kept enlarging its operation scale, making hatching, feeding, slaughtering, processing and marketing a coordinated process. The annual number of processed chickens reach 500 thousand heads. These were delivered to the markets of Beijing and Tianjin etc. By the end of 1993, the farmers set up 5 main group enterprises, mainly in the fields of car parts assembly, hat manufacture, handicrafts
and chemical production. There are also many other privately run enterprises that emerged.

**5.8.8. The cases of livestock growth** (In 3, 2001 and In 11, 2002)

Case 1. The farmers in Linzhang County raised marmot rabbits.

1. The conditions of Linzhang county

Linzhang County lies in the southern part of Hebei Province, the eastside of Taihang Mountain, and it is named after the Linzhang River, with the total area of 744 km$^2$, with the farmland of 750 thousand mu. There are 14 towns with 425 administrative villages and the population of 550 thousand, among which 520 thousand are farmers. It mainly relies on the farming, and few industries with poor financial sources. In 1994, the average annual income per person was RMB 894 Yuan and the number of marmots rabbits raised was less than 1000. There were no scientific bases of raising them and there was no breeding farm for marmots rabbit then.

The village, Dongqianfangbiao, has 468 families with a population of 2,033; total farmland area is 1,680 mu, with only 0.7 mu per person to cultivate. The majority of the farmers in the village plant crops as their living. There were also 112 vehicles in the village, mainly used for transportation. Before the end of 1994, none of the families raised marmot rabbits and only 3 families fed 15 heads by March 1995.

The marmot rabbits mainly are grass-eating little animals, and they can gain high-benefit with little investment in a short time. The rabbit skin can be used as raw materials of fur coat making and the rabbit meat is high protein-low fat food. Realizing the potential of raising marmot rabbits, farmers started raising marmot rabbits on a large scale. In the later part of 1995, the number of marmot rabbits increased rapidly. The village and the county were well known as the marmot rabbit demonstration bases only within 3 years. During this period, the professor from the university, Zhang Bao-qing, often went from one village to another, to spread the techniques among the local people. He held lectures, and conducted training classes, and gave advice and guidance to the local farmers such as raising management, the housing management and location of marmot rabbit’s sheds, the choice of marmot rabbit breeds and breeding techniques and the prevention and cure of the diseases.
He also wrote the technical articles and book on how to raise marmot rabbits. Many farmer technicians have now been trained and are greatly involved in promoting the development of the marmot rabbit production.

2. The profits gained from the rabbit raising

Because of the cooperation with scientific and technical workers and the enthusiasm of the farmers who are raising rabbits, the teachers from the university were more encouraged to promote continuously the development of the marmot rabbits. More farm families have become rich through rabbit raising which pushed forward the local economy resulting in high benefits gained by the society. The annual average net income per person in Dongqianfangbiao village was only RMB 890 Yuan in 1994. Then after March 1995, the only 3 families raising rabbits soared up to 96 families with the income RMB 40 thousand-Yuan the same year. More and more families were attracted to join marmot rabbit raising. By the end of 1996, there were 263 families with RMB 680 thousand-Yuan income. In 1997, the total income of RMB 1.16 million took up 80% of the total village income with 378 families involved. There were also 3 family rabbit farms. The number of the rabbits of the whole village was 16 thousand heads, and 46 thousand of rabbits were sold with the total income up to RMB 2.20 million Yuan. The average personal income of RMB 1,100 Yuan was achieved in 1997. Under the leadership of the Branch of Party Committee of the village, mostly all village folk young and old, both men and women are pre-occupied and are quite busy with rabbit raising. They have no more spare-time to “waste” and less time for gambling. For example, women are busy with rabbit raising and men are transporting supplies and marketing produce. A popular jingle, "Push over the mahjong table, set up the rabbit sheds" is embraced by the villagers." Rabbit raising has enabled the farmers to live well.

Case 2. A rich man from raising rabbits

Mr. Zhao Erzeng is a local farmer of a village keeping a five-member family including his mother, his wife and two sons. He likes raising rabbits in his spare time. His 10 head of rabbits bred 100 lovely little cute rabbits. But soon after, all the rabbits died. This shocked him and his family very much. Later Mr. Zhao heard that there was an expert in rabbit raising named Prof. Gu Zilin in AUH. One day in 1987,
Mr. Zhao, with an education level of primary school, spent a whole day on writing a letter to Prof. Gu for help. He received Prof. Gu’s reply in just five days. This surprised him. In the reply letter, Prof. Gu tells Mr. Zhao some problems, which should be paid special attention to when raising rabbits and encouraged Mr. Zhao to write him often. After several rounds of letter communication, Mr. Zhao benefited quite a lot and wanted to see Prof. Gu himself. One morning, Mr. Zhao arrived at Prof. Gu’s office in an inquisitive mood. Prof. Gu explained to Mr. Zhao many techniques in raising rabbits. He told Mr. Zhao that if one wants to become wealthy, he must be literate in both science and techniques. Prof. Gu gave Mr. Zhao some reading materials about raising rabbits and a list of books, newspapers and periodicals to be bought and read. Mr. Zhao followed Prof. Gu’s advice. Mr. Zhao applied the knowledge learned from the books, practicing the technology learned to good effect. This in turn increased Mr. Zhao’s interest in learning more about science and technology. Mr. Zhao’s attitudes towards learning changed from passive to active. Mr. Zhao and his wife learn basic literacy from their sons at night. Mr. Zhao noted down the question and problems for future consultation with Prof. Gu. Gradually Mr. Zhao improved his techniques of raising rabbits. Therefore, Mr. Zhao told the other villagers with pride that he had a brother professor at AUH.

With the instruction and help of Prof. Gu, Mr. Zhao’s family changed greatly. Firstly, Mr. Zhao’s rabbit farm grew larger and larger. Mr. Zhao has got 300–500 heads of breeding rabbits so far and he has been keeping 1,000–3,000 heads of rabbits in his farm for rabbit meat. The old farm was small and not enough for large-scale production, so Mr. Zhao recently built a large new rabbit farm in the village. Mr. Zhao’s income increased continuously these years, from RMB 2,000–3,000 Yuan in 1987 to RMB 5,000–6,000 Yuan in 1988. Since 1988, Mr. Zhao’s income went up to RMB 20,000–30,000 Yuan or even more for a year. Mr. Zhao had paid off all his debts and bought some new furniture and facilities. The Zhao’s family has become the “rich family” in the village.

5.9 Conclusion

In this chapter, AUH’s activities in connection with agricultural extension and rural development have been discussed. It was thought necessary to include a lot of detail in this section, that is, a “thick” descriptive account of AUH’s involvement. The
writer understands that some of the material could have been included alternatively in the appendices but decided the level of detail would be minimised instead. This content will enable me to extract salient points concerning data for the development of a model of best practice once the second case study is completed. The combined data will then be ready for juxtaposition and comparison.
Chapter 6: Educational Development in Northern Territory, Australia

6.1 Introduction

The previous two chapters discussed educational development in rural Hebei, China and a case study of Agricultural University of Hebei, China. In this chapter and the following one, I am going to talk about educational development in the Northern Territory, Australia and a case study of Charles Darwin University concerning participation in rural activities, before carrying out the comparative study on both universities. I think this is the best way to understand the educational and social issues, the role of universities in rural development, as well as the requirement of comparative study methodology for description and interpretation.

The initiative for this chapter (chapter 6) and following chapter (chapter 7) is to build up the knowledge base about the Northern Territory and Charles Darwin University. During the time I did this, I found that due to the different population sizes and situations between Hebei, China, and the Northern Territory, Australia as well as the limited information available from CDU, the knowledge base is not as vast as that of Hebei, China and AUH. This is so for the following reasons: 1. In China, the government pushes the efforts of universities to carry out rural development programs, whereas in the NT, it is a free enterprise government, therefore the situation is different; 2. AUH has a long involvement with rural services and development programs, whereas CDU has had a short period dealing with rural and remote services; therefore, less data and information from CDU are available; 3. In the NT, governments and other organizations or agents as well as the university are responsible for the service and extension programs in rural, remote and Indigenous areas, but in China, in that specific period, most programs are carried out by universities. There is an imbalance in the amount of content collected regarding the NT and CDU compared to that available about China and AUH. Finally, in 1974 Cyclone Tracy was responsible for the destruction of many records in the NT.
6.2 The Social and Economic Context

6.2.1 Geographic context and administrative structure

1. Geographical context

The Northern Territory is the third largest territory/state of Australia, the total land area is 1,347,525 square kilometres and it occupies 17.5% of the total territory of Australia. Surrounding areas include Queensland in the East, West Australia in the West, South Australia in the South, and the Northern part is bordered by the Timor Sea, the Arafura Sea, and the Gulf of Carpentaria. The Northern Territory is between longitude 129° E. ~141° E. and latitude 11° S. ~26° S, with desert in the south and seas to the north. Darwin is the capital of the Territory. In the north are lowlands, in the southeast are low plains sloping toward the Lake Eyre depression, and in the southwest are the MacDonnell Ranges. The main rivers are the Victoria, Daly, Adelaide, and Roper, all of which drain into the northern seas. (Website 6.1)

The Northern Territory actually has two climates: tropical heat of the Top End and the crisp desert air of Central Australia. The Top End has two seasons: tropical winter or dry season from 1 May to 31 October. The minimum average temperature is 21.7 °C, and the maximum average temperature is 31.6 °C. This is the time of year with blue sky, warm dry days, low humidity and cool nights. Another season is tropical summer or wet season from 1 November to 30 April. The minimum average temperature is 24.6 °C, and the maximum average temperature is 32.2 °C. During this season, the Top End has lightning shows, sun showers, warm weather and high humidity. For the climate of Central Australia there are four seasons; summer, winter, spring and autumn, but for much of the surrounds of Darwin there are two seasons- the wet and the dry. (Website 6.2)

The northern part of the Territory receives seasonal rains which are heavy and predictable near the coast, but increasingly unpredictable at greater distances from it. Much of the Territory is unsuitable for any form of agriculture (Dick, Gordon, 1986, p. 13).
2. Administrative structure

Australia’s governance is based on six separate states (New South Wales, Queensland, South Australia, Tasmania, Victoria, and Western Australia) and two territories (The Australian Capital Territory and the Northern Territory) (Jonathan Anderson, 1991). Unlike other states and territory, “On 1 July 1978 the Northern Territory (NT) became Australia’s first and only self-governing territory. In institutional terms this was a watershed in NT political history.” (Loveday, P. and Wade-Marshall, D., 1985)

The Northern Territory has three different administrative levels: Federal Government, Territory Government and local government. And the local government is divided into city councils, township councils and village councils.

3. Administrative units of Northern Territory

![Diagram of Administrative units of Northern Territory](Website 6.3)

Figure 6.1 Administrative units of Northern Territory (Website 6.3)

There are 6 Municipal Councils in the Northern Territory, namely: Darwin City Council, Palmerston City Council, Litchfield Shire Council, Katherine Town Council, Tennant Creek Town Council, Alice Springs Town Council; as well as 32 Community Government Councils; 29 Incorporated Associations and 1 Special Purpose Town in Northern Territory. (Website 6.4)
6.2.2 Economic development

1. Present economic position of Northern Territory in Australia

The Territory's economic development has been accelerating in recent years. Gold is worked to a small extent; uranium, bauxite, manganese, iron, lead, and zinc deposits are increasingly exploited. Stockbreeding, encouraged by government development projects, is the major rural activity. There is very little farming of national significance in the Territory. However, there are continual experimentations with rice, cotton and the other grains. Peanuts, pearl shell, and trepang are the principal exports (Website 6.5). And “The dominant rural industry of the Northern Territory has been cattle, and it still accounts for most of the Territory’s agricultural earnings (Dick, Gordon, 1986, p. 1).

The Northern Territory’s economy relies on its abundance of natural resources, importance to national defence, relatively large public sector and a short distance to Asia. With the completion of the railway from Adelaide in the southern to Darwin in the northern in 2004, it is expected that GSP will increase. During 2000-2001, the Territory Gross State Product (GSP) was valued at around $7.45 billion, which accounts for approximately 1.3% of national Gross Domestic Product (GDP).

The following table and figure show the industrial share of GSP/GDP (2000-2001) in NT and Australia.

<table>
<thead>
<tr>
<th>Table 6.1 Industry as a % of GSP/GDP (2000-1), NT and Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Percentage:</td>
</tr>
<tr>
<td>Agricultural</td>
</tr>
<tr>
<td>Mining</td>
</tr>
<tr>
<td>Manufacture</td>
</tr>
<tr>
<td>Electricity, gas &amp; water</td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td>Wholesale Trade</td>
</tr>
<tr>
<td>Retail Trade</td>
</tr>
<tr>
<td>Accommodation, cafés &amp; restaurant</td>
</tr>
<tr>
<td>Transport &amp; storage</td>
</tr>
<tr>
<td>Communication</td>
</tr>
<tr>
<td>Finance &amp; insurance</td>
</tr>
<tr>
<td>Property &amp; business</td>
</tr>
<tr>
<td>Gov't admin &amp; defence</td>
</tr>
<tr>
<td>Category</td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Health &amp; community</td>
</tr>
<tr>
<td>Culture &amp; recreation</td>
</tr>
<tr>
<td>Personal &amp; other</td>
</tr>
<tr>
<td>Ownership of dwellings</td>
</tr>
<tr>
<td>General government</td>
</tr>
<tr>
<td>Taxes less subsidies</td>
</tr>
</tbody>
</table>

Industry as a % of GSP/GDP (2000-1)

Figure 6.2 Industry as a % of GSP/GDP (2000-1), NT and Australia (Website 6.6)

Note: The computer program only allows four categories from the table above. Thus Agriculture is column 1, Wholesale Trade is column 6, Finance and Insurance is column 11, and Culture and Recreation is column 16.

2. Economic development after self-government

The Northern Territory was formally granted self-government on 1 July 1978 with its capital at Darwin. From that time on, the Northern Territory has experienced rapid economic growth. GSP in 2001 has reached $7.45 billion, which is 10 times more than that in 1978. The economic growth includes mining and tourism industries and an important location for the Australia defence forces. And there is also a potential development of rural and manufacturing industries. But there are economic development constraints in some areas, for example, a relatively narrow industry base, deficiencies in transport links, and isolation from major Australian centres of population and economic markets. However, on 13 March 2002 one important event happened when the Alice Springs to Darwin rail project was realised. Australia Southern Railroad delivered its first locomotive for use between NT and other states. This was an historic milestone for the transportation and for the future development of the Northern Territory (Website 6.7). The following table and figure show the economic development from 1978 to 2001 in the Northern Territory.
Table 6.2 NT Gross State Product at Current Prices (1978-2001)

<table>
<thead>
<tr>
<th>Year</th>
<th>GSP</th>
<th>Year</th>
<th>GSP</th>
<th>Year</th>
<th>GSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>0.72</td>
<td>1986</td>
<td>2.57</td>
<td>1994</td>
<td>4.62</td>
</tr>
<tr>
<td>1979</td>
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<td>1987</td>
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<td>1995</td>
<td>5.00</td>
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<tr>
<td>1980</td>
<td>1.00</td>
<td>1988</td>
<td>3.08</td>
<td>1996</td>
<td>5.45</td>
</tr>
<tr>
<td>1981</td>
<td>1.22</td>
<td>1989</td>
<td>3.42</td>
<td>1997</td>
<td>5.71</td>
</tr>
<tr>
<td>1982</td>
<td>1.38</td>
<td>1990</td>
<td>3.94</td>
<td>1998</td>
<td>6.01</td>
</tr>
<tr>
<td>1984</td>
<td>1.91</td>
<td>1992</td>
<td>4.46</td>
<td>2000</td>
<td>7.03</td>
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<td>1985</td>
<td>2.11</td>
<td>1993</td>
<td>4.57</td>
<td>2001</td>
<td>7.45</td>
</tr>
</tbody>
</table>

Source: ABS No. 5220.0

Figure 6.3 Gross State Product of NT at Current Prices

6.2.3. Demographic Context

Northern Territory is Australia’s smallest populated jurisdiction. It accounts for 17.5% of Australia’s landmass with just 1% of the country's population. In 2001, the total population of the Northern Territory was 200,000 with a population density of 0.1 person/km². Generally speaking, the urban population is much larger than the rural population, and occupies three quarters of the total population. The following table and figure show the population growth from 1978 to 2000 in the Northern Territory.
Table 6.3 NT Population Growth (1978-2000)

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Year</th>
<th>Population</th>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>110</td>
<td>1987</td>
<td>158</td>
<td>1995</td>
<td>177</td>
</tr>
<tr>
<td>1980</td>
<td>114</td>
<td>1988</td>
<td>159</td>
<td>1996</td>
<td>182</td>
</tr>
<tr>
<td>1982</td>
<td>122</td>
<td>1990</td>
<td>164</td>
<td>1998</td>
<td>191</td>
</tr>
<tr>
<td>1983</td>
<td>129</td>
<td>1991</td>
<td>166</td>
<td>1999</td>
<td>194</td>
</tr>
<tr>
<td>1984</td>
<td>134</td>
<td>1992</td>
<td>167</td>
<td>2000</td>
<td>197</td>
</tr>
<tr>
<td>1985</td>
<td>149</td>
<td>1993</td>
<td>171</td>
<td>2001</td>
<td>200</td>
</tr>
</tbody>
</table>

Source: ABS No. 5220.0

Figure 6.4 Population Growth of NT

By the end of 2001, the total population of the Territory was 200,000. Over three quarters of the population live in urban centres. The 1996 Census identified that 22.5% of territory’s population was born overseas, with many from non-English speaking backgrounds. And also the Aboriginal population occupied 28.5% of the Northern Territory’s population and represented 13.4% of the total Indigenous population in Australia.

Fertility rate of the Northern Territory has changed from high to low. The highest crude birth rate after World War II was 33.7 per 1000 persons in 1970. In 2000, the
The crude birth rate was 18.9 per 1000 persons. According to population projections, by the year of 2011, the population in Northern Territory will reach 250,700; 380,700 in 2021; and 506,600 in 2051 (ABS No. 3102.0 and 3222.0).

Since the beginning of the 20th century, with the improvement of living standards in water supplies, sewage systems, food quality, health, education, improvement of social condition and more extensive medical treatment, the Northern Territory has experienced a general decline in mortality and an increase in life expectancy. The crude death rate declined from the highest year of World War II 9.4 per 1,000 persons in 1966 to 4.7 per 1000 in 2000. (ABS No. 3102.0). The average life expectancies of Northern Territory were 60.7 years for males and 64.0 years for females in 1971; 68.5 years for males and 74 years for females in 1995; as well as 70.3 years for males and 75.2 years for females in 2000. (The average life expectancies of Australia were 76.6 years for males and 82.0 years for females in 2000, which is among the highest life expectancies in the world) (ABS No. 3311.7). The main reason why NT’s life expectancies were so low is because this number is an average one, which includes a huge percent of the Indigenous population that have very high death rate.

![Crude Birth and Death Rate per 1000 Mean Population (1945-2000)](image)

The national gender ratio (F:M) is 100:99, which is almost balanced. By contrast, the Northern Territory has more males than females, with an estimated 100:112 in the year 2000. (Northern Territory Economy 2001-2002, Government Printer of the Northern Territory)
By the June of 2000, out of a population of 197,000, the population aged less than 15 years old was 26% of the total; the population of working age group of 20-54 years old was 57% of the total; and the population aged 65 or over was 3.5% of the total. The Northern Territory’s population continued to be the youngest of any jurisdiction of Australia. It had the largest population under 15 years old, and smallest population over 65 years old, of any State or Territory in Australia. (Northern Territory Economy 2001-2002, Government Printer of the Northern Territory)

6.3 Educational development in Northern Territory after self-government (after the 1974 cyclone)

6.3.1 Introduction

On the first of July 1978, the Northern Territory became a self-governing territory of Australia. This last quarter of a century is a significant period for educational development in various aspects of the Northern Territory. My focus in the chapter is only on educational issues after self-government for adult and vocational, Aboriginal, tertiary and TAFE, because of a lack of statistical data before this time.

In the time when the Northern Territory became a self-governing Territory, there have been some problems in education, such as: high student turnover, high absentee rate, health and nutrition problems, and isolated communities with limited direct experiences. Teachers also faced problems, for example, teachers isolated from the mainstream, difficult living conditions, teachers lacking the opportunities for further education and training, limited teachers and lack of relief staff and so on (Gammon, E. 1992). It is clear that there have been significant improvements to various areas of education in the NT, but there still exist some of the above-mentioned problems, especially in rural, remote areas and Indigenous communities.

The last Report issued by the Federal Department of Education, Northern Territory Division was in 1978. In 1979, responsibility for education was transferred from the Federal Government to NT Government. The aim of this Act that transferred the power is: “To encourage more direct involvement by parents in the education of their children. The Act also provides for the creation of local councils for government schools.” (NT Department of education Annual Report 1979/1980)
Before 1980, the school design and construction was often a copy of the southern states. After self-governing, it was planned to have smaller, air-conditioned buildings in consideration of local weather conditions, for example, “separated modular units linked by walkways, with provision for natural ventilation and having windows providing natural light and verandahs for shade” (Gammon, E. 1992, p 37).

The Annual Report 1982/1983 was a year with another milestone in the Northern Territory’s educational development. The Annual Report 1982/1983 shows that “The Northern Territory schools’ first comprehensive statement of education policies was tabled in the Legislative Assembly by the Minister for Education.” (1982/1983 Annual report, p 5). This identified Northern Territory Schools – Direction for the Eighties and provided “a framework for the planning and administration of education programs within the Department and in the schools.” This concluded many policy directions taken since 1979. “It marked the end of the phase of breaking away from the commonwealth education system which existed in the Territory until mid of 1979.” (Gammon, E. 1992, p 40)

The Annual Report 1983/1984 mentioned the Northern Territory Department of Education’s commitment to computer education. From this period, a three-year program had been carried out to ensure that all schools had appropriate computers and relevant equipment as well as providing basic staff training (1983/1984 Annual report).

The Annual Report 1985 gives me a strong feeling of emphasizing many curriculum initiatives and policies. For example, the Department provided for effective assessment strategies for literacy, recommending daily physical education, education in early childhood and of girls and also opportunities for the professional development of teachers.

In 1987, the document – Towards the 90s: Excellence Accountability and Devolution in Education was issued by NT Department of Education. The Annual Report suggested School Improvement Plans in all areas, e.g. buildings, grounds, human resources and curriculum.

Accordingly, the Northern Territory comes to the 21st century. In the beginning of the new century, the data in 2001 show that there are 149 schools in the Northern
Territory including 104 primary schools, 11 secondary schools, 21 community education centre, 3 area schools, 2 senior colleges, 3 open education centers, 5 special centers (NT Music School, NT School of Languages, Language Other Than English Centre, Sport Health and Physical Education School). The total student enrollment number is 32,726 with 23,785 pre-students and primary students (41% are Indigenous) and 8941 secondary students (29% are Indigenous) (DEET Annual Report 2001-2002, p 52). See figure 6.6.

![Enrolments by Preschool/Primary/Secondary, NT Government Schools 1997-2001](image)

Figure 6.6 Enrolments by Preschool/Primary/Secondary, NT Government Schools 1997-2001 (DEET Annual Report 2001-02, p 21.)

The above figure shows us that there are few changes from 1997 to 2001 in student enrolment numbers, which means the education system is more stable than in previous years.

The following table shows the percentage of year 12 students who received NTCE (Northern Territory Certificate for Education). Those who did receive it are eligible to apply for entry to all Australian tertiary institutions.
Table 6.4 Percentage of year 12 students, who received NTCE

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yr 12 Total</td>
<td>1,129</td>
<td>1,118</td>
<td>1,225</td>
<td>1,126</td>
<td>1,202</td>
</tr>
<tr>
<td>NTCE Issued</td>
<td>517</td>
<td>545</td>
<td>579</td>
<td>636</td>
<td>609</td>
</tr>
<tr>
<td>% of NTCE Issued</td>
<td>46%</td>
<td>49%</td>
<td>47%</td>
<td>56%</td>
<td>51%</td>
</tr>
</tbody>
</table>

Source: DEET Annual Report 2001-02, p 80

Northern Territory schools have a higher proportion of Indigenous students than any other state or territory. In 2001, Indigenous students covered 38% of the total student number in NT (DEET Annual Report 2001-2002). From this report, we can also see that NT’s Indigenous students have a much lower success rate on national performance benchmarks than non-Indigenous students. Data from this report show that there is improvement in some areas, for example, in government schools the Indigenous students who achieved Year 3 reading benchmark increased from 158 to 207 in 2001, achieving Year 3 numeracy benchmark increased from 314 to 483. Indigenous students’ schooling attendance is also another major issue for improving Indigenous education outcomes. In 2001, the Indigenous student attendance rate average was 63% for primary students enrolled in remote schools. Achievements for Indigenous education are a vital factor for the Northern Territory rural development, as most Indigenous students live in rural communities.

90% of the Territory's Indigenous students are from a background where English is a second language. These live in remote communities. Therefore, education and training for those target groups are significant, urgent and important to build capacity for them to successfully become involved in the surrounding “western society” (DEET Annual Report 2001-2002).

Before 1978 self-government of the Northern Territory, higher education was weak. In 1989, The Northern Territory University was founded on the basis of a merger of the University College and the Darwin Institute of Technology in response to the commonwealth government’s announcement of replacing the binary system of higher education, and to meet the increasing educational needs in the Territory. This university soon became the key player in higher education provision in the Northern Territory and it plays a vitally important role in the NT’s economic and social development. It does this through its generation and transmission of knowledge that is essential to the Northern Territory’s long term economic growth, social and
cultural improvement and competitiveness. In 2004, Alice Springs’ Centralian College merged with NTU to become Charles Darwin University.

6.3.2 Adult, Technical and Further Education in the Northern Territory

Education provided as Technical and Further Education (TAFE) includes education and training provided by government institutions other than programs of full time education in pre-primary, primary or secondary schools, higher education courses, and on the job training (Selected Northern Territory TAFE Statistics 1990, 1991). It is a well-established system which covers the whole of Australia. Students enrolled in TAFE study are more flexible, and are full time, or part time.

Technical and Further Education (TAFE) in the Northern Territory is provided by Charles Darwin University. The aim of TAFE education is “to meet the technical and further education needs of the Northern Territory’ population who live beyond the city of Darwin” (Northern Territory Department of Education, April 1983, Technical and Further Education Triennial Planning Submission for 1985-1987, manuscript). This act also requires that educational bodies be concerned with the complex and changing TAFE needs of Aboriginal people in remote communities widely dispersed through the Territory and other urban areas. Attention is also paid to regional TAFE needs and other post-school needs, to the specialized requirements of the Territory’s rural industries, to the needs of adult migrants throughout the Territory for whom English is a second language, and to a centralized and local provision of teacher and management education for Aboriginal people (Northern Territory Department of Education, April 1983, Technical and Further Education Triennial Planning Submission for 1985-1987, manuscript).

The Northern Territory’s TAFE education services are also provided through regional centres, which makes it possible to extend limited staff resources to remote areas. TAFE has also provided well-organized courses to the various clients to meet the different and specific needs. For example, there is a course called the Certificate in Access to Employment and Further Study, which contains Name of Course, Location of the Program, The Need for the Course, Typical Positions, Mode and Duration, Course Aim, General Objectives, Methodology and Assessment. There are more detailed descriptions for the above mentioned courses, for instance, the
methodology used for this course is based on the eight principles of teaching/learning adapted from the Australian Language Levels Guidelines, which are:

- Students are treated as adult learners with specific needs and interests. Therefore, the learning contexts have been taken from real life.
- Students are provided with opportunities to participate in communicative use of English in a wide range of activities related to the module being studied.
- Students are exposed to communicative data that are comprehensible and relevant to their specific needs and interests.
- Students focus deliberately on various language forms, skills and strategies in order to support the process of English acquisition. Therefore, provision has been made for modeling by the teacher and through oral and written texts.
- Students are exposed to social cultural data and direct experience of the culture embedded within English language contexts of the local community. Therefore, purposeful experiences of the work/study place have been provided.
- Students become aware of the appropriate feedback about their progress, through the formative assessment procedures detailed in the document.

Students are provided with opportunities to manage their own learning in western contexts through experiencing a variety of learning activities, and joining in effective group work where they negotiate content and methodology with others. Learning “How-to-learn” strategies are objectives in every module (CAEFS, 1991, p 3-6).

6.3.3 Tertiary and TAFE education

There are two tertiary education institutions in the Northern Territory. Those are Charles Darwin University and Batchelor Institute of Indigenous Tertiary Education (Website 6.8). Both of them were established after Northern Territory self-government (after 1978). Both have made significant contributions to the educational, cultural, social and economic development of the Northern Territory.
1. CDU’s TAFE education

Since chapter 7 will discuss CDU in more detail, my focus in this section will be a brief introduction to NT TAFE education.

As one of Australia dual universities, CDU not only pays attention to higher education, but also has had more emphasis on TAFE education as well, than single sector universities.

In 2002, Charles Darwin University’s TAFE general recurrent profile consisted of approximately 220 courses allocated to 18 industry groups for the purpose of funding (Website 6.7).

The Following table shows data on CDU TAEF students from 1997-2001.

Table 6.5 CDU TAFE Student Data (1997-2001)

<table>
<thead>
<tr>
<th>Year</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Students</td>
<td>7574</td>
<td>7443</td>
<td>8682</td>
<td>8793</td>
<td>9379</td>
</tr>
<tr>
<td>Course Enrolments</td>
<td>8691</td>
<td>8727</td>
<td>10220</td>
<td>10681</td>
<td>11610</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1997</td>
<td>1998</td>
<td>1999</td>
<td>2000</td>
<td>2001</td>
</tr>
<tr>
<td>Male</td>
<td>3368</td>
<td>3333</td>
<td>3905</td>
<td>3836</td>
<td>4225</td>
</tr>
<tr>
<td>Male</td>
<td>4206</td>
<td>4110</td>
<td>4780</td>
<td>4957</td>
<td>5154</td>
</tr>
<tr>
<td>Attendance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full time</td>
<td>1997</td>
<td>1998</td>
<td>1999</td>
<td>2000</td>
<td>2001</td>
</tr>
<tr>
<td>Part time</td>
<td>698</td>
<td>499</td>
<td>628</td>
<td>709</td>
<td>703</td>
</tr>
<tr>
<td>Part time</td>
<td>7993</td>
<td>8228</td>
<td>9592</td>
<td>9972</td>
<td>10907</td>
</tr>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 19</td>
<td>1208</td>
<td>1161</td>
<td>1407</td>
<td>1564</td>
<td>1827</td>
</tr>
<tr>
<td>20-24</td>
<td>1430</td>
<td>1295</td>
<td>1475</td>
<td>1355</td>
<td>1413</td>
</tr>
<tr>
<td>25-29</td>
<td>1149</td>
<td>1081</td>
<td>1238</td>
<td>1175</td>
<td>1171</td>
</tr>
<tr>
<td>30-34</td>
<td>1002</td>
<td>991</td>
<td>1142</td>
<td>1220</td>
<td>1256</td>
</tr>
<tr>
<td>35-39</td>
<td>928</td>
<td>978</td>
<td>1142</td>
<td>1220</td>
<td>1256</td>
</tr>
<tr>
<td>40-44</td>
<td>754</td>
<td>738</td>
<td>887</td>
<td>898</td>
<td>982</td>
</tr>
<tr>
<td>45-49</td>
<td>530</td>
<td>578</td>
<td>648</td>
<td>660</td>
<td>711</td>
</tr>
<tr>
<td>50 or Older</td>
<td>573</td>
<td>559</td>
<td>745</td>
<td>837</td>
<td>882</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>62</td>
<td>1</td>
<td>2</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: Statistics Data, Charles Darwin University, Darwin, NT

From the above table, it is noted that there is not a big number difference between the genders of the CDU’s TAFE students, but they do have a big difference in attendance, and most of TAFE students are part time. The interesting thing is age group. There is almost the same number of students from different age groups from
less than 19 to 39 years old, and this seems to me that TAFE education in CDU is much more flexible and suitable for almost all ages of people.

2. Batchelor Institute of Indigenous Tertiary Education

1). Introduction

A study of the impact of education on rural development in the NT would not be complete without reference to the Batchelor Institute of Indigenous Tertiary Education. Whilst the Institute is not a university at this stage of its development, it has unique characteristics that need to be included in this study for the sake of completeness.

The Batchelor Institute of Indigenous Tertiary Education, formerly known as Batchelor College, began as a small annexe of Kormilda College, then a residential school for Aboriginal students on the outskirts of Darwin, in the mid-1960s, providing short training programs for Aboriginal teacher aides in community schools. In 1974, the college moved to Batchelor, about 100 kilometers south of Darwin, and has occupied its present site in the township since 1982 (Website 6.8).

During 1990, in order to meet the educational needs of Aboriginal people from Central Australia, a second campus was established in Alice Springs. Later in the same year, annexes were opened in Darwin, Nhulunbuy, Katherine and Tennant Creek (Website 6.9).

After its establishment, the Batchelor Institute of Indigenous Tertiary Education served as an “educational institution for tertiary education of the Indigenous people of Australia and the provision of other education training programs and courses, and facilities and resources for research and other related purposes” (BIITE, 2002, p.2).

From a 1985 enrolment of about 100 students undertaking one teacher training program, the institute has currently grown to about 3000 Indigenous students with 1000 enrolled in higher education courses and the other 2000 in vocational training and education courses (BIITE, 2001). From 143 cultural and geographic communities across Australia, 51 languages are represented at Batchelor Institute of Indigenous Tertiary Education (White and Brands, 1999).
Batchelor Institute currently enrolls more Aboriginal and Torres Strait Islander students at the higher education level than any other tertiary institution in Australia. The majority of the Institute's students are mature-aged—between 30 and 45 years—while almost 70 per cent are women (Website 6.10).

The courses are flexible and acceptable to Indigenous students and communities. They are delivered through mixed modes and with emphasis on community-based study and research, field visit and study, supervised working experience with short periods of intensive residential workshops in campuses, regional centers and communities (Donna Williams-Sowter, 2002).

There are many centres related to Batchelor Institute inside of Northern Territory and interstate regions in Australia. Some centres have their own staff, but most of them have no staff, Batchelor sent staff to these centres to deliver lectures. The assistants or tutors come from local communities, and selected from the former trainees. Most of training is short term courses, 1-2 weeks, and once a term. Normally, most of trainees come back to their own communities after graduation; some gets jobs instead of back to their communities. Batchelor also sent staff to live in communities to do some training courses. (In 24, 2004)

2). Location and composition

Batchelor Institute currently comprises campuses, annexes and study centers in 43 locations throughout the Northern Territory and eastern Kimberly region. See following figure 6.7 (Website 6.11).

![Figure 6.7 the composition of Batchelor Institute](image)

3). Structure

The following figure out lines the structure of Bachelor Institute (Website 6.12).
4). The Batchelor Vision

The institute presents itself as a unique place of knowledge and skills, where Aboriginal and Torres Strait Islander Australians can undertake journeys of learning for empowerment and advancement while strengthening identity (Website 6.13).

The Bachelor Institute has specific responsibility for the provision of teacher education and management training opportunities for Aboriginal community people and for those other people who wish to work in communities and are seeking specific orientation for this work, “As well as the provision of assistant teacher and teacher training for up to three years” (TAFETPS, 1983, p 37).

5). Teaching, learning and practice activities

The teaching and learning activities of Batchelor Institute include different mixed-mode delivering, workshop-based teaching and learning, resource-based teaching and learning, community-based teaching and learning. Those educational activities could be delivered either in internal or external mode, and have emphasized the practical ways (Donna Williams-Sowter, 2002).
Most courses at Batchelor Institute are delivered by mixed-mode, which uses community-based learning and intensive workshop learning, and with appropriate guidance to support study and learning (Donna Williams-Sowter, 2002).

Batchelor Institute also worked closely with the Vocational Training Commission identifying needs in Aboriginal Communities and in providing appropriate programs to cover these identified needs. The courses delivered by the Institute are on a regular basis which provides Indigenous adults with the opportunity of upgrading their basic skill levels in order to proceed to further education and training. For example, the courses on community management type programs have an emphasis on basic business and accounting procedures, management practices for local councils and basic administrative procedures and so on (TAFETPS, 1983, p 37). Some programs are designed to develop the skills required for people to manage effectively their own communities. These are short term specific skill courses. Some of modes are provided onsite in Aboriginal communities, and residential at the Institute, in which students identified from a particular region come together in one of a number of larger communities for the period of the program.

6.3.4 Indigenous education

The Northern Territory is a unique place and includes many culturally and linguistically diverse Indigenous communities with their own knowledge and contributions. An important challenge of the Northern Territory is to develop a shared sense of the future with the active participation of all people (DEET Annual Report 2001-2002, Department of Employment, Education and Training of Northern territory). In order to develop this potential, improving education for Indigenous students in the NT remains a high priority. The Northern Territory schools have a higher proportion of Indigenous students than any other state or territory in Australia. In 2001 Indigenous students represented 38% of the NT Government’s total student population (DEET Annual Report 2001-2002, Department of Employment, Education and Training of Northern territory). Therefore, Indigenous education becomes more and more important for Northern Territory rural development, and also social, cultural, economic and sustainable progress.
Thus at the tertiary level, there are two higher education institutions in the NT to provide higher education and TAFE; they are Charles Darwin University and Batchelor Institute of Indigenous Tertiary Education.

The objective of Indigenous Education set by Northern Territory Department of Employment, Education and Training is:

To ensure that all Indigenous students achieve the level of skill, knowledge and understanding necessary for participating in society and undertaking tertiary and vocational education; and that parents, students and the entire community places a high value on education (IESP 2000-2004).

Three outcomes for Indigenous education are emphasized: to maximize Indigenous students’ attendance and participation in schooling; to meet recognized literacy and numeracy benchmarks and community expectations; to develop an effective system to manage the Indigenous education program (IESP 2000-2004).

One of the key issues to achieve the outcome is to maximize Indigenous students’ attendance and participation in schooling is to ensure that Indigenous students go to school regularly, which might be effectively assisted by students’ parents, community and schools themselves. In order to do so, schools and communities should be supported to develop local attendance and enrolment initiatives to keep timely reporting of student attendance and achievement. Families should also participate in their children’s education both at school and at home (IESP 2000-2004).

Another key issue for achieving the outcome to maximize Indigenous students’ attendance and participating in schooling is to ensure the Indigenous students are healthy enough and that provision of special needs, like disability needs, nutrition and early language development is a priority (IESP 2000-2004).

Curriculum, teaching and assessment methods, principals, teachers, and school infrastructure need support to ensure Indigenous students achieve satisfactory learning outcomes. And those achievements should be measured and reported to students’ parents and the government (IESP 2000-2004).
Finally, in order to meet the last outcome to develop effective systems to manage Indigenous education programs, there are still two key issues; how the education program is managed with full accountability and how Indigenous family, communities and government can share responsibility for education outcomes (IESP 2000-2004).

Many courses delivered to Aboriginal people are on community training. Their preference is that the services are provided in their own local communities rather than for the people to travel somewhere for TAFE provision. This on-site delivery includes formal and non-formal education programs determined principally by expressed community needs wherever this is feasible (TAFETPS, 1983).

6.4. Conclusion

The Northern Territory is a unique place with geographic, administrative, social, cultural, educational and economic diversity different from other states or Territories in Australia. It has a tropical Top End location, self-governing administrative structure, large Indigenous population and a multicultural society. After self-government the Territory’s economy has increased rapidly. GSP in 2001 has reached to 7.45 billion dollars, which is 10 times more than that in 1978 (ABS No. 5220.0). Even though the population only occupies 1% of total population of Australia, the Territory covers 17.5% of Australia’s landmass, and GSP has reached up to 1.3% of the total (ABS No. 5220.0). The Indigenous population occupies 28.5% of NT’s total and 13.4% of the total Indigenous population in Australia (ABS No. 3102.0).

These have been significant achievements in education since self-government in all sectors (from primary to tertiary, from formal to non-formal, higher education and TAFE) at all levels for Indigenous and non-Indigenous. This has shown up as a great enlargement of school numbers, students’ enrolment and attendance numbers, benchmarks achieved, CDU’s establishment and its contribution, Indigenous education and so on.

After self-government, one of the first initiatives in education was to devise a core curriculum in all subject areas, which made it possible to provide the knowledge and skills necessary for the people to take part in society. Prior to this, the NT used other
states’ curricula which was typically not suited to the NT as it was only marginally modified.

There were many great changes in NT education after self-government, but the final goals are unchanged, to deliver the quality education in well-resourced schools to meet the various needs of target groups in different communities.

Community involvement is still a priority of running school in the Northern Territory. The government provides the facility and staff, and is responsible for the operating cost; and the community sets and collects fees and upgrades and maintains curriculum resources (Gammon, E. 1992). In this way the parents and community representatives are included on schools’ activities, such as on the Curriculum Advisory Committee and Educational Advisory Council. With the Northern Territory Government’s policy of devolution, school councils (including parents and teachers) are more responsible for running their community’s school, such as deciding the budget and financial priorities, overseeing areas like repairs and maintenance of grounds and buildings, and having input into school policies and other decision-making activities (Gammon, E. 1992).
Chapter 7 Charles Darwin University (CDU) and its participation in rural development

7.1 Introduction

This chapter discusses Charles Darwin University (CDU)’s role in rural development. That role is presented as a case study.

CDU is one of Australia’s higher education institutions. It is the major tertiary education institution in the Northern Territory. It provides higher education as well as TAFE-level training. In 1999, there were approximately 4,500 higher education students and 9,200 TAFE students at CDU. Almost all of CDU’s higher education courses are offered from its main campus at Casuarina in Darwin. In addition, through amalgamation with Centralian College, CDU offers on-campus degree programs in Business and Visual Arts in Alice Springs. CDU’s Palmerston campus, Tiwi (in Darwin) annexe and regional campuses at Jabiru, Nhulunbuy and Katherine offer mainly TAFE-level courses. CDU is also the largest research & development provider in the Northern Territory, undertaking more than a quarter of all research & development carried out in the NT. CDU has rich experiences in involvement with the activities in rural, remote and Indigenous areas, which meets the Territory's social, economic, cultural and environmental needs (Website 7.1).

7.2 A brief review of CDU

Charles Darwin University (CDU) is part of the Australian national unified system of Higher Education. Funded by the Commonwealth of Australia Government, it is a member of the Commonwealth Association of Universities. CDU also receives Vocational Education and Training (VET) funding from the Northern Territory Government to provide courses similar to those provided by Technical and Further Education (TAFE) colleges in southern Australia (Dondas, Moira, 1998, Profile Australia’s Northern Territory, Lifestyle Publishing). Located in Darwin, capital of Australia’s Northern Territory and situated in the tropical zone, it is Australia's closest University to Asia. CDU was founded in 1989 on the basis of a merger of the University College of the NT and the Darwin Institute of Technology.
Charles Darwin University is unique because it is located in the “Top End” of Australia, where it is geographically close to South-East Asia. These characteristics have provided many opportunities for people to experience Northern Australia and to study in a tropical city with a multi-cultural profile.

CDU’s position is also in a developing region amongst countries which share a similar climate. The Aboriginal population represents 28.5% of the Northern Territory’s population and 13.4% of total indigenous population in Australia (ABS No. 3102.0). These factors influence directions in research. Areas of research concentration include Asia Pacific Arts, Energy Studies, Environmental Remote Sensing, Indigenous Resource Management, Tropical Built Environment, Tropical Environmental Science, Tropical Plant Science, Tropical Wetlands Management, South-East Asian Studies, South-East Asian Law, Clinical Nursing Research, Social Research, Studies of Language in Education, and Teaching and Learning in Diverse Educational Contexts. The sector also offers programs in Arts, Education, Business and Science through the faculties in this university, namely, Faculty of Education, Health and Science; Faculty of Indigenous Research and Education; Faculty of Law, Business and Arts; Faculty of Technology and Industrial Education. Figure 7.1 on page p. 158 identifies the current academic structure of the university.

The main campus is in Darwin, 15km from the Darwin city centre. Courses are also provided at Palmerston Campus, 20km to the south, and at Alice Springs, in the heart of the Australian desert (see fig. 7.2 on p. 159). The NT Rural College at Katherine offers students the opportunity to experience life on a working cattle station. Besides, there are still a few regional study centres located at Jabiru, Nhulunbuy, Katherine and Tennant Creek, giving the Charles Darwin University a spread of facilities across the breadth of the Territory and exposure to tropical and desert environments as well as the rich Indigenous culture of Australia. Each Regional Centre acts as CDU’s link to regional and remote Northern Territory making courses and training more accessible.
Figure 7.1 CDU Organisational Chart (Website 7.1) (new Chart under construction)
In line with the national system the university has identified education, training and research as its priorities. CDU now has positioned itself as a place for a comprehensive response to the needs of students, industry and farmers, both for vocational education and training sector and higher education opportunities, with approximately 14,000 students.

Being a dual sector university (Higher Education and Technical and Further and Adult Education), the only one of its type outside of Victoria, CDU has offerings from the certificate level through to doctorates. This gives students a number of study pathways. Students can start out in the TAFE sector and progress through to complete their PhD at CDU. The University is formally linked to a number of universities in Brunei, China, Indonesia, Malaysia, Papua New Guinea, the Philippines, Thailand and Vietnam. Offshore courses are run in Brunei, Hong Kong, India and Malaysia (website 7.4).
CDU is also the largest Research and Development performer in the Territory and, is now responsible for almost 25 per cent of all research and development performed in the Northern Territory.

“Charles Darwin University is an example of a small university achieving excellent outcomes by adopting a structured and highly focused approach to research and research training. The University addresses issues that are of particular relevance to the Northern Territory including social, cultural, environmental and technological problems affecting development. Its research has a strong regional focus covering northern and central Australia and the western Pacific. The University has a distinctive focus on early career and new researchers, including those in non-traditional fields such as the vocational education and training sector. Charles Darwin University has clearly defined its areas of research strength and research priority, which are reviewed on an annual basis. These areas include tropical environmental science, tropical plant science, environmental remote sensing, tropical aquaculture, tropical health and international business. Research in these areas is underpinned by centres which provide a focus for research among academics throughout the University and beyond. Its participation in Cooperative Research Centres and an ARC Key Centre for Tropical Wildlife Management also provides further opportunity for collaborative research and the development of postgraduate studies programmes.” (DETYA, 2000, Innovative practices: Research and research training, page 150, Higher Education Report for the 2000-2002 Triennium)

CDU and its precursor institutes have been engaged in extension service and education for rural development in Australia for a long time and it has a close affinity with its local community. CDU has developed niches in areas of greatest importance to its local community and its development. These include tropical and desert region studies, international (particularly South East Asian) law and business and Indigenous research and education. However, as the only university in the Northern Territory, CDU offers a broad range of courses in traditional areas of study as well (Website 7.5).

7.2.1 CDU’s mission

As the only university in Northern Territory, and located in Darwin, the top end of Australia, CDU has conducted social, educational, scientific, economical and cultural promotions of Australia’s Northern Territory by its various activities and has defined its mission as following:
The University will provide education, training, research and related services locally, nationally and internationally to support and advance the social, cultural, intellectual and economic development of Australia's Northern Territory (Website 7.6).

7.2.2 The Dual-Sector University Model

In recent years, cross-sectoral education and training in dual-sector universities in Australia has brought about effective outcomes and practices.

The Charles Darwin University is one of the few Australian universities which offer a full suite of programs incorporating: Training And Further Education (TAFE); and Higher Education (Website 7.7). These universities characterise the amalgamated approach whereby the TAFE and higher education sectors co-exist within one institution but possess different internal structures. This has promoted educational benefits to create more opportunities for the articulation of units, credit transfer, the dissemination of new knowledge and the multiple pathways for study. Clearly, with collaboration of this nature, both sectors have experienced an economy of scale from the ability to share resources and facilities efficiently.

Research in the university is one way of supplying TAFE programs with new knowledge as well as applying knowledge in new ways. By working collaboratively, technical skills can be improved in horticulture, agriculture, numeracy, literacy and so on in rural areas. Appropriate and efficient production systems can be developed, technologies developed and integrated, and agricultural productivity sustained and enhanced over the long term. For example, completed research projects at the Tropical Savannas CRC (Cooperative Research Centre) at the CDU have enabled the results to be used for training packages in TAFE or in many instances, improved training programmes (Website 7.8). Further, research results from the Centre for Tropical Wetlands Management have led to the development of a suite of training courses ranging from management planning for wetlands to hands-on weed control. Some examples of projects include (Website 7.9).

1. Collaboration for better Aboriginal land management
2. Overview of weeds in Aboriginal land
3. North Kimberley traditional owners’ land and sea management
planning project

4. Guidelines decision tools and education programmes for sustainable grazing management of savanna woodlands in the Burdekin River catchment

5. Grazing Land Management which will be available in various forms

6. Biodiversity in Pastoral Lands to be available for delivery in workshops TS-CRC (Cooperative Research Centre for Tropical Savannas Management)

7.2.3 CDU’s Involvement in Rural Development

CDU, like other Australian universities involved in an Extension and Vocational Education and Training for the delivery of rural and related education and training, does not have a formal mission for Extension Services or to provide formal extension courses. In the Northern Territory government, the Department of Business, Industries and Resource Development (DBIRD) has a function for Extension Services. Similar Departments of Agriculture in other States have a similar function. In the past five years, CDU in cooperation with the NT Governments, has provided workshops and short courses on various topics to rural communities (In 15, 2003). Some programs run by CDU have been recognized as a good example of how TAFE and industry can work together with training packages to make more flexible and practical instruction for the students. In some horticulture training packages, for example, the horticulture knowledge (theory component) is delivered by CDU lecturers and experts from local industry, and the on-job component of the course is completed within normal work schedules with assessors visiting students in the workplace (Intuition, page 8, Vol. 13, No. 11, December 2001).

There is a key centre in CDU, the Key Centre for Tropical Wildlife Management, which has a long-term involvement in wildlife management in northern Australia and the wider region through its research, training and education in rural and remote areas. It focuses on human capacity building and on commercial benefits. Its major activities are to recognise and meet the needs of Indigenous people in wildlife management; support the efforts of Aboriginal people in maintaining culture through the enhancement of customary and contemporary wildlife use and management;
enhance sustainability of commercial use of wildlife in biological, economic and
social terms; and promote better public understanding of the significance of wildlife
use as an alternative to other forms of land use. The Centre’s training programs
include both formal and informal education for undergraduates, postgraduates,
agencies, and Indigenous communities. Another major focus is on working with
Aboriginal people to develop commercially viable, wildlife-based industries.
research in conjunction with several Aboriginal organisations across Top end and Cape York has been conducted to examine the feasibility of local, small scale

Another example for Indigenous community development shows that some courses
CDU has delivered are short term and focus on practical contents and apprenticeship
training in multidisciplinary studies. Other courses CDU provides for Indigenous
people have a strong theoretical content with practical and field-based experiences.
Students therefore have the opportunity to apply their theoretical knowledge with
practice. “The course structure allows all students to integrate their work and
research practice with theoretical insights the course offers.” (Intuition, page 7 Vol.
14, No. 4, June 2002) Other Northern Territory organisations conduct research
involving Indigenous people; for instance, Danila Dilba Health Service, Menzies
School of Health Research and the Aboriginal and Torres Strait Islander Commission.

CDU is investigating the use of satellite links to its regional centres, for example,
regional centres at Katherine, Nhulunbuy, and Jabiru, which may provide better
service (e.g. greater bandwidth) at less cost (Intuition, page 2, Vol. 14, No. 3, May
2002). The connection to CDU is via NT Government’s Wide Area Network (WAN).
Other centre connections will also occur soon.

7.2.4 Training materials and learning methods for rural communities

CDU has delivered its training materials for rural communities, both internally and
externally through internet, hardcopy materials, CD-ROM, etc. For example, CDU
has cooperated with TIO (Territory Insurance Office) to run the University’s Remote
Area Driving Program to develop a set of programs, for example, a road safety video,
driver training, licensing needs for remote and Indigenous communities for the
purpose of making driving training more accessible in communities and helping to
reduce road deaths among Indigenous people throughout the Territory (On Campus, page 2, Vol. 4, No. 10, June 2002). The video is a set of segments, which covered cyclists, traveling in open road space, road conditions, pedestrians, alcohol and other drugs, obtaining a licence, first aid and management of a suspected spinal injury, trip planning and community road safety. The video is delivered with an accompanying workbook including an outline for small group training. There are also questions for discussion, suggestions for activities and role plays, and list of focus points. These CDU remote areas’ training programs were established four years ago and focused on driver-in-training and licensing needs in remote communities. Before that, there was no driver training for Aboriginal people based in remote communities. People in these communities drove cars without training and without a driver’s licence. Aboriginal people represent 28% of the NT population but account for 50% of annual road deaths (Intuition, page 9, Vol. 14, No. 5, July 2002).

Some short-term courses or rural participating programs have been delivered by using face to face, tele-conference and video-conference communication methods (Intuition, page 12, Vol. 13, No. 11, December 2001). With online teaching and learning becoming the major part of university’s activity to deliver knowledge and information for rural and remote areas, CDU has encouraged its staff to adapt online teaching modes. These three modes were defined by the Australia Commonwealth’s Department of Education, Training and Youth Affairs. They include: a web supplemented program (mode A), in which participation online is optional for the student; a web dependent program (mode B), in which participation online is compulsory; and also a full online (mode C), in which there is no face-to-face teaching and learning in the program, all interactions with staff and students and other activities are integrated and delivered online (Intuition, page 10, Vol. 14, No. 2, April 2002), which makes greater use of advanced remote area telecommunications for open learning, working in partnership with communities.

Education and training are long-term interests and set the future of any society, and CDU has proposed to make more contribution in rural areas by suggesting: “…Wider use of recognition of prior learning and the flexible delivery of programs to remote and regional areas; and the establishment of a Sub-tropical/ tropical agriculture
school, based jointly at NTU (CDU) and James Cook University” (Queensland) (Website 7.10).

7.3 Cases studies

7.3.1 Introduction

In order to collect first hand data for the case study, and learn the experiences in an Australian’s university, I have carried out surveying, delivered questionnaires, and interviewed staff in appropriate centres and faculties. I also paid a visit to NTRC (Northern Territory Rural College) on 8 December 2001 and talked with the staff in this college, as well as visited and discussed with and interviewed staff in the target research centres for the study. The common activities I found are explained in the following paragraph.

7.3.2 Northern Territory Rural College (NTRC) (Katherine Campus)

1. Location

The Northern Territory Rural College (NTRC), which merged with the CDU in January 2000, is located at Katherine, 300 km south of Darwin, which is the heart of the beef cattle land, and a rapidly developing mining, agricultural, horticultural industry and tourist region (Tan, et at, 2001, p. 8). “The site of present-day Katherine was the junction point of the traditional country of four Aboriginal tribes, the Djuuan, Wadaman, Sjamindjund, and Dagaman people” (1981 Student Handbook for One-year Certificate Course in Rural Studies, Katherine Rural Education Centre, 1981, p. 3). As one of the four campuses of CDU, the NTRC has excellent teaching facilities with well-equipped workshops, cattle handling facilities, stables, modern air-conditioned classrooms and a library/computing facility located on its 4000 hectare main campus. It also has its own 700 sq km cattle station situated 90 km south of Katherine at Mataranka. Full residential facilities are provided for those attending the NTRC and the CDU Regional Centre in Katherine. The NTRC also provides a daily return bus service for students commuting between Katherine and the centre (Website 7.11).
NTRC provides training programs according to the needs of the individuals, industries and communities of northern Australia. Its key functional responsibilities include:

1. Developing, in conjunction with industry and community bodies, an annual training profile which meets identified training needs.
2. Delivering quality training programs for people seeking careers in agriculture, horticulture and associated industries.
3. Delivering appropriate training to clients located in areas remote from the NTRC, with emphasis on Aboriginal training.
4. Maintaining facilities for the delivery of training and residential services.
5. Providing a Northern Territory Certificate of Education (NTCE) Program which meets the requirements of the NT Board of Studies (Tan, el at, 2001, p.8).

Programs range from on-the-job and off-the-job training for disadvantaged youths, certificate level courses in agriculture, horticulture, to diploma and advanced diploma level courses relevant to the overall management of tropical beef cattle properties, horticultural enterprises and the aquaculture industry (Tan, el at, 2001).

Short courses are also available throughout the year. There are designed to meet the needs of the community. Some examples are Car Care, Chainsaw Operations, Fencing, Four Wheel Driving, Horse riding, Horse shoeing, Motor Bike Operations, Record Keeping, Vehicle Maintenance, Welding and Communication in the Workplace. Sometimes, NTRC delivers an individual course; sometimes a few subjects have been selected from a national training package depending on local requirements. For example, in August 2002, a group of students completed a 15 weeks Stock and Station Skills Course and began their new career in the rural industry. The course is for practical content with students completing horsemanship, cattle handling, health and safety, fencing, water supplies, safe use of chemicals and chainsaws and welding and maintenance training. Students who gained competence in all of these subjects will graduate with a certificate II in Agriculture (General) (On Campus, Page 5, Vol 4 No. 15, August 2002).
In so far as agriculture in the Katherine Area is concerned

Katherine is the commercial centre for some 80 pastoral properties in the Elsey, Gulf, and Victoria River districts and 40 smaller farms along the Katherine and Edith River. The traditional industry is cattle raising with associated horse breeding, but there is an emerging cropping industry and some quite successful flower, fruit, and vegetable production (Student Handbook for Certificate Course in Rural Studies, Katherine Rural Education Centre, 1985, p. 18).

It has also long been recognized as an important horticultural centre in the NT and some of NT’s most experienced growers produce fruit and vegetables for local, interstate and international markets.

TVET (Technical and Vocational Education/Training) subjects at the college are integrated into the secondary school curriculum. The program’s objective is to ensure that students wishing to complete Year 12 have access to a practical alternative to obtain the NTCE (Northern Territory Certificate of Education). Courses are designed to equip students for employment in the automotive, metal and rural industries, as well as providing credits towards a variety of TVET courses.

3. Teaching areas provided by NTRC

The NTRC provides the following teaching areas:

1) Horticulture
2) Agriculture
3) Aquaculture
4) New Apprenticeships/Traineeships
5) Pest Management
6) Farm Chemical Safety & Application
7) Parks & Wildlife Management

4. New opportunities
The incorporation of the Tropical Savannas CRC into the Katherine Regional Centre and the NTRC have opened up avenues of opportunities for both training and funding for CDU, its students, industry and the community at large. CDU ran its first full-time horticulture course outside Darwin in 2001. The small established mango orchard on the NTRC’s 4000 hectare property at Katherine is used both as a training centre and a commercial venture: students are trained in pruning, picking, pest management and crop care and at the same time, the fruit is exported. Potential areas of expansion include improving the flexibility of the National Apprenticeships to deliver on- and off-the-job training and assessment, with emphasis on networking with industry to assist developing partnerships (Tan et al, 2001). NTRC also provided training before the job. This included horsemanship, health and safety, wildfire operation, advanced first aid, mechanics and welding (Intuition, page 11, Vol. 14, No. 2, April 2002). In addition, potential exists for the development of strong research and global links. CDU in the Katherine region will aim to expand its course delivery in the areas of Business Development to include Business, Farm and Pastoral Management to meet the diverse needs of rural community and regional industries (FI8, 2001).

As part of my field work for this research I visited NTRC on 8 December 2001 and interviewed the staff in this college, using a structured interview schedule (see Appendix 3).

7.3.3 Cooperative Research Centre for Tropical Savannas Management (Tropical Savannas CRC or TS-CRC)

Australia's tropical savannas are shown in the following figure (Website 7.12) and cover almost a quarter of the continent. The Tropical Savannas CRC (Cooperative Research Centre) was established in 1995. Its aim is to help ensure that this vast area is healthy and managed to provide long-term benefits (economic, aesthetic, social and cultural) to those who use them and to sustain the biodiversity and habitat endemic to them (Website 7.13). The most important mission for the Tropical Savannas CRC is to make land management research more useful to various land managers and agencies across the tropical savannas. The work has been undertaken by the centre through its research, extension, education and training.
1. Research

The Centre’s research activities focus on Landscape Ecology and Health, Industry and Community Natural Resource Management, Regional Planning and Management, and Human Capability Development in order to develop and intensify the use of natural resources in northern Australia. One of the Centre’s concerns in its research is that the tropical savannas still retain the natural and cultural values, unlike the loss typical of southern Australia. On the other hand, the low population of the tropical savannas makes it difficult to develop a "critical mass" of researchers in many disciplines. The Centre helps to overcome this problem by creating projects that bring together researchers from its 16 partner agencies spread across Queensland, Western Australia and the Northern Territory (Website 7.15).

2. Education and training

The Centre provides educational materials at four levels, and delivery of courses, catering to a wide range of users. The activities include three parts: 1. Graduate Certificate, Diploma and Masters Degree in Tropical Environmental Management, which provides students with the opportunity to study, develop, and gain skills in the sustainable management of tropical ecosystems. All core units are delivered flexibly, to suit students' individual learning needs. Most of the material is presented in self-
paced learning mode, using online, print-based and CD-ROM formats; 2. Student research projects which require the work of PhD, Honours and Masters students supported by the TS-CRC to contribute directly to the Centre's research themes and projects. It also helps link graduate students directly with practice, helping ensure a practical research focus into sustainable land management research in the savannas; 3. Extension and Vocational Education and Training, the key objective is to develop and deliver appropriate and relevant learning materials/packages to meet the different needs of the six sectors it serves: pastoral, Aboriginal, conservation, tourism, mining and military (Website 7.16).

The Key Centre was funded by the Commonwealth Government, not the Territory Government. Its primary purpose is not to promote community development services, it is research, but one of the purposes can be the community development. For instance, most research programs are related to rural, remote and Indigenous areas and can contribute to community development.

3. Cases for extension, vocational education and training

Learning packages, materials, videos, books and case study reports have been developed and are available, such as Fire Management, weeds, grazing sustainability and conserving biodiversity. A new degree in tropical agriculture has been set up to focus on three themes: Extension and Communication, Grazing Land and Animal Management and Healthy Savannas. For example, a video on weed management resulting from the research in Aboriginal communities was completed and distributed by 2001. The video aims to raise awareness about the spread of invasive weeds on Aboriginal land in northern Australia, with a focus on mimosa. A pocket guide on weed identification and control for two Aboriginal communities in the Northern Territory was proposed. Fifteen weeds of significance in the tropical savannas of the Northern Territory were selected. This project was placed on hold pending a review of the Centre's extension program (Website 7.17). Fire management is another example of CDU carrying out extension and training activities to serve the rural areas. For instance, the fire management learning package and materials fall under the headings, such as, fire management book, case studies of practical fire management. These include the book Savanna Burning: Understanding and Using Fire in Northern Territory, which features a number of fire-management case studies assembled by
this project. The property case studies were written to illustrate the book with real situations. Fire-management case studies have also appeared in the Grazing Land Management learning packages (Website 7.18). These fire management cases have covered the major research and management issues previously identified for northern Australia, and results of projects undertaken by the Tropical Savannas CRC fire program, which shows that: “the way fire might be managed to maintain diverse wildlife habitats and to maintain those patches that are rich in resources and crucial for maintaining regional wildlife population” (Intuition, Vol. 14, No. 6, August 2002).

CDU has also paid attention to people from rural and isolated areas, and adopted strategies to improve access and participation for students from these areas. The goal is to improve access and participation of such students, which includes the following activities:

1) Continue to enhance the programs offered through the University's remote campuses;

2) Continue to support the Isolated Children Parents Association;

3) Offer all CDU programs externally and on-line; and

4) Provide enabling programs on site to isolated students (Website 7.19).

Many courses focus on the rural, remote and Aboriginal areas, for example, a Graduate Diploma in Midwifery states that:

unique to this course has been the development of remote clinical placement requirements, where students are encouraged to work within an Aboriginal community to enhance the theoretical cross-cultural learning. With a strong Indigenous population within the Northern Territory, the opportunity to learn from both health care professionals and community members in remote settings is of great value, and will translate into experiential learning of unquestionable relevance (Website 7.20).
7.3.4 Centre for Teaching and Learning in Diverse Educational Contexts (CTLDEC)

CTLDEC is located in the Faculty of Education, Health and Science. Its research is conducted nationally and internationally in all aspects of learning for sustainable socio-economic well-being.

The research areas cover formal, non-formal and informal learning, which focus on learning communities: organizations, schools, workplaces, communities, rural and remote regions, Indigenous contexts, on-line, civic, public and cultural as well as enablers of lifelong learning: literacy, language, leadership and management, social capital, community development, policy, resiliency (Website 7.21).

The Centre collaborates with state and territory government departments and agencies, professional bodies, industry and other groups and individuals in the provision of research and consultancy services in addition to continuing professional development for parents, teachers, trainers, and community educators. It also acts as the “clearing house” to publish and disseminate the outcomes of its research and consultancy activities.

The Centre’s activities have included teaching in isolated and small communities; compulsory and post-compulsory education and training; educational delivery; formal and non-formal education in the Asia-Pacific region; the education of Indigenous peoples; education at a distance; health education; social capital and community development; policy determination and implementation in remote circumstances (Website 7.22).

CTLDEC members are involved in a range of research and consultancy projects with significance for Northern Territory education. These projects have tended to emphasise rurality and/or remoteness, accompanied with complexities in educational delivery or access. Following are some successful stories from this centre.

1. Literate Practices in Indigenous Communities

According to the 1996 Census the Aboriginal population occupied 28.5% of the Northern Territory’s population and represented 13.4% of the total indigenous population in Australia (ABS No. 3102.0). Therefore, indigenous education becomes
more and more important to the NT. The Centre has concentrated its research in this area. For instance, the centre in conjunction with Central Australian Remote Health Development Services explored the links between literacy, social capital and community capacity in relation to culturally appropriate ways of improving health and wellbeing. The two projects were designed to complement each other in that each examined one whole Indigenous community’s literacy practices in order to establish implications for more effective education and training to enhance health and wellbeing outcomes. One community was located in the Centre (Utopia) and two in the Top End (Wudicupildyer and East Arnhem Land) (Website 7.23).

2. Discontinuities in literacy and numeracy practices between Indigenous community schooling and urban high schools

A team of researchers from CTLDEC are investigating how the literacy and numeracy skills of Indigenous students are affected when making the transition from community schools to urban high schools. The two-year project, funded by the Innovative Links Project through Department of Education, Science and Technology, involved community schools and communities in the Northern Territory. An important outcome of the project will be the opportunity for community members to become involved and trained as research assistants (Website 7.24).

3. Workplace literacy

Another program carried out by a CTLDEC members was to engage in the context of workplace literacy by examining what happened at a particular place and time when a group of Indigenous workers were confronted with a set of literate practices which were new to them. The location is a mine site in the remote Kimberley region of West Australia. The specific context is the development of workplace literacy training materials. The project was small in the broad scheme of things but involved negotiated engagement in a larger context of culture and sub-cultures (In 17, 2003)

4. Future directions for secondary education in the Northern Territory

The CTLDEC team has been involved in undertaking a comprehensive report on secondary education in the Northern Territory, commissioned by the Northern
Territory Government. The report will consider all aspects of secondary education provision by Government schools in these settings, and recommend future directions.

Input will be sought from the non-Government school education sectors. CTLDEC members will be involved at all levels, in the reference group, project management committee, steering committee, making submissions, researching, analysing data and writing. The team will meet with a range of key stakeholder groups including parents, students, school teachers, principals, and tertiary education providers, as well as representatives of business, community, the Australian Education Union and the Department of Employment, Education and Training. With the focus on identifying priorities and strategies to improve secondary education in the future, CTLDEC members will be able to contribute their considerable knowledge and experience of secondary education and the Northern Territory (Website 7.25).

From 1999–2001 A project was funded by the Committee for University Teaching and Staff Development (CUTSD) at Northern Territory University, now CDU to Facilitate flexible online teaching and learning.

The project began in 1999 as a joint project involving lecturers in the Faculty of Education and staff of the Open Learning Branch at Charles Darwin University. The key elements of the project include 1. An environmental Scan evaluating the learning environments of students in urban, rural, and remote north Australia, to ascertain appropriate modes of electronic delivery of educational activities; 2. Development of on-line templates, including the development of pedagogic and technical frameworks for four nominated online teaching strategies; 3. The development of four units of study, utilizing the four teaching strategies, is currently being developed. After pilot delivery and evaluation they will be available as exemplars; and 4. Professional development (Website 7.26).

7.3.5 Centre for Indigenous Natural and Cultural Resource Management (CINCRM)

The Centre for Indigenous Natural and Cultural Resource Management was established in February 1997 at the Charles Darwin University with its initial funding from the Australian Government's Indigenous Higher Education Centres program. The Centre is the research sector of the CDU’s Faculty of Indigenous Research and
Education. It is composed of staff and students in the faculty with the contributions from some other institutions such as Aboriginal Land Councils and other Indigenous organizations external to the Centre’s core activities, e.g. supporting and facilitating the participation of Indigenous people in research through project partnerships and steering committees. This network of Indigenous partner organizations plays a key role in assisting research activities and participation by Indigenous people, and the dissemination of research outcomes to Indigenous communities (F19, 2001).

The key issue for the Centre is to help Aboriginal people find knowledge in an unbounded repository to reconstruct themselves. The first director of the Centre for Indigenous Natural and Cultural Resource Management (at that time it was called the Centre for Aboriginal and Islander Studies), and one of the first Indigenous people who worked in higher education said: “We lost our economic productivity, our creativity. It was taken away and we’re only just beginning to cope with that. We need to be able to reproduce the productive society we used to be, to reconstruct the cultural frameworks we lost. We need that to move on” (Intuition, page 6, Vol. 13, No. 11, December 2001)

The main missions of this Centre are to support Indigenous students and scholars to undertake research in natural and cultural resource management, and issues of sustainable community development affecting Indigenous Australians, particularly in curriculum development for Indigenous resource management, partnerships with Indigenous communities to incorporate Indigenous knowledge systems as a respected and valued body of knowledge in the Australian Higher Education system, and to establish and further refine research methodologies appropriate to Indigenous communities, so as to empower and inform Indigenous people in Australia and internationally (Website 7.27).

The major achievements of research and consultancy are in the environmental sciences and the role of Indigenous knowledge and practice in the management of natural resources. The Centre’s researchers have undertaken collaborative research involving Indigenous countrymen and partners in other organizations in a number of key areas, such as: development of an integrated management plan for the Arafura Wetlands, traditional fire regimes in tropical northern Australia, sustainable use of trepang, Indigenous participation in tourism, and Indigenous turtle management. The
Centre has also paid attention to some strategic research themes. These are identified as: Indigenous governance and capacity building, and Indigenous ecological knowledge.

Besides its research activities, the Centre publishes a series of discussion papers and a series of occasional papers and reports, workshops and conference proceedings and occasional monographs.

The Centre in cooperation with other faculties of CDU has a close connection with local industries and companies for Indigenous community development through training, research and projects. The participating areas include:

1. Horticulture, especially as it relates to the delivery of information about growing fresh fruits and vegetables, developing orchards of exotic and native fruits, growing bush tucker and bush medicines for health issues, and developing lawn and parks/garden areas for dust suppression on Aboriginal communities and so on.

2. Conservation land management issues, as it relates to the delivery of a new training package in community and outstation areas, specifically on how ‘Western Science’ could complement Indigenous knowledge in the care and management of country. It also is concerned with how to upgrade skills for women on communities and provide basic scientific knowledge for Indigenous youth in diversionary and employment oriented programs.

For example, the environmental company EcOz, which provides specific bioregional expertise in the wet/dry tropics and the arid zone of Australia, has pledged $1500 annually to the CDU Foundation over the next 5 years in support of an Aboriginal student in the final year of their biology or environment degree, which has started in 2003 (Intuition, Vol. 14, October 2002, Page 10).

7.3.6 Government commitment to support CDU financially and administratively for its rural development projects.

CDU has strong support from various government agencies financially, administratively, and project-oriented supports. For example, in 2002 CDU within partnership with the NT Department of Community Development, Sport and Cultural Affairs developed a project, called the Territory Housing Project, using the
university’s online learning facility to provide two programs: the Diploma in Front Line Management and the Certificate IV in Public Housing Management. The training programs have been delivered to staff in the workplace, using online learning technologies, facilitated by CDU staff and supported by workplace mentors from among Territory Housing staff. This is a government support project and would make contributions to NT government Indigenous affairs. The aim is to have staff in Territory Housing receive a formal accreditation training so as to improve frontline staff skills and capacity to identify innovative and creative solutions in service, which will better be able to meet the diverse needs of Indigenous clients. “In a first for Australia, this will be on-the-job training utilizing an e-learning program called ‘Blackboard’” (Intuition, page 7, Vol. 14, No. 3, May 2002).

In July 2003 CDU signed a new Partnership Agreement with the Northern Territory Government on Internet-based education for remote communities and a virtual DNA facility. CDU Acting Vice-Chancellor Professor Ken McKinnon said the partnership agreement signaled a new level of interaction between the University and its community. “As a University for the Territory, it is critical that our intellectual resources, in collaboration with those of the Government, are brought to bear on the issues of most importance to the Territory,” and “This Agreement includes 25 schedules based around four themes, which are: Increasing resident professional capacity to address Territory opportunities; Meeting Government needs; Reorganising the University to meet Territory needs better; Enabling Indigenous social and economic development. The main activities focused on remote communities with the specific needs of the Territory such as, community development, conservation biology, natural resource management and tropical environmental science, health and diagnostics as well as Indigenous social and economic development (Website 7.28).

Another example shows the strong Federal government commitment:

The Department of Education, Training, and Youth Affairs has long recognized the higher costs of delivery of higher education at the NTU (CDU) and has provided operating grant funding accordingly. The NTU (CDU) has, and continues to receive, operating grant funding at a rate that is 20% higher than the national average funding rate per WEFTSU (weighted equivalent full-time student unit). The 20% loading is provided to offset the
NTU (CDU)’ remote location, its scale of operations, and its position with respect to higher education provision in the Territory (Website 7.29).

In the vocational education and training sector, the implementation of Industry Training Packages (comprising competency standards, assessment guidelines and qualification outcomes) enables training providers to develop flexible training programs more easily. These programs can be tailored to meet the needs of clients, including distance delivery arrangements better.

Under the National Training Framework, training organizations must meet national standards before being registered. These standards include the capability to deliver client services, the recognition of prior learning, and the design and adaptation of training products.

These national quality assurance arrangements assist in providing the foundation for the wider use of the recognition of prior learning and flexible delivery for training, which would be driven principally by State and Territory policies.

In the higher education sector, the Commonwealth encourages higher education institutions, including Batchelor Institute and the Charles Darwin University, to develop systems further which recognize prior learning. Universities are responsible for determining their own academic entry provisions and are best placed to decide who may be accepted. The CDU and Batchelor Institute have been supported by the Commonwealth in developing infrastructure to deliver programs to remote and regional areas. The Commonwealth encourages them to explore innovative means of delivering educational support to students, including through flexible delivery.

For instance, the Charles Darwin University received almost $1.6 million (2001 prices) from the Rationalization and Restructuring (R&R) program jointly with Flinders University for the development of tele-teaching links between the two Universities and other linked distant sites. The idea of this development is to facilitate better delivery of programs to remote and regional areas. In addition, the Government has announced total funding of $3.2 million to facilitate bandwidth access to the Charles Darwin University and six other regional universities under the regional Universities Bandwidth Project. The increased bandwidth will improve communication links, enable more cost-effective flexible delivery and will allow
these universities to have access to Internet and other data services at a level comparable to their metropolitan counterparts (Website 7.30).

7.4 Other institutions’ involvement with rural, remote, and Indigenous development programs

Within Australia the university is not the only research institution. Private and government instrumentalities also conduct research and trials. For example, the CSIRO, Forestry Department, Aboriginal Board, Trade Department, Wildlife Conservation, Educational Department, Commerce Department and Indigenous Development, Trade Development Zone also have diverse research functions.

7.4.1 Research and development:

Research and development are a priority and are seen by the Northern Territory as the key issue to enable the region to make better use of resources, both human and physical, and to take greater advantage of opportunities. Some programs undertaken by the Department of Agriculture, Fisheries and Forestry (AFFA), focused on “expanding Australia's rural research and development effort, improving its efficiency and effectiveness by investing in high priority areas, and enhancing industry's international competitiveness through more effective uptake of research results” (Website 7.31). There are twelve rural-industry based Commonwealth Research and Development Corporations (R&DCs) in the Northern Territory operating within Agriculture, Fisheries and Forestry. For instance, there is a mango flowering project, in which the productivity of Kensington Pride Mango which is low in the NT because of excessive and untimely vegetative flushing and unreliable flowering and fruiting is being studied. Two treatments to regularize flowering in the field will be evaluated. The first derives from CSIRO research which has demonstrated that flowering and fruit production of mangos can be enhanced by cutting a cincture around the tree trunk and applying a plant growth retardant, morphactin, to the cincture. The second flowering treatment uses paclobutrazol as a soil drench. The treatments will be evaluated in a multi-location trial (Website 7.32).

There is a CSIRO (Commonwealth Scientific and Industrial Research Organization) Tropical Ecosystems Research Centre (TERC) in Darwin (Website 7.33) and some
other Cooperative Research Centres located in CDU involved in rural research and development programs. These are the Cooperative Research Centre for Desert Knowledge, Cooperative Research Centre for Aboriginal Health, Cooperative Research Centre for Tropical Savannas Management, Cooperative Research Centre for Sustainable Tourism, Cooperative Research Centre for Tropical Plant Protection and Key Centre for Tropical Wildlife Management (Website 7.34).

In Alice Springs, the Desert Knowledge Cooperative Research Centre (DK-CRC) is another example. Established in September 2003, DK-CRC has become a venture for inland Australia’s social, economic and cultural improvement (Website 7.35). The centre, with a core office in Alice Springs, has set up a network of researchers at 28 locations throughout the desert areas of Australia and worked with many educational and research institutions including CDU to develop:

- Sustainable livelihoods for desert people, based on new natural resource and service enterprise opportunities that are environmentally and socially appropriate;
- More viable remote desert communities that support desert people by developing attractive and efficient services;
- Thriving desert knowledge economies that build self-sufficiency and minimise public subsidy; and
- Increased social capital of desert people, their communities and service agencies. (Website 7.36)

The centre’s research emphasizes: 1. natural resource management for better livelihoods; 2. technical services for improved community viability; 3. governance, management and leadership for sustainable futures; 4. integrated systems for desert livelihoods to provide knowledge and outcomes in order to secure the sustainable future of Australia’s inland. The Centre engages its diverse clients, which are regional communities in desert Australia, and including small business, Indigenous interests, local communities and government, large corporations, and state government agents. (Website 7.37)

**7.4.2 Education and development**

In the Northern Territory, the Commonwealth (the Department of Education, Training and Youth Affairs (DETYA)) and the Territory Government have delivered New Apprenticeships in three sites: Darwin, Katherine and Alice Springs, which is
the only State or Territory to date where both governments have joined together to provide their functions to build on the success of traineeships and apprenticeships. This is a very flexible training package and focus on “employers in non-metropolitan areas under the Rural and Regional New Apprenticeship initiative.” Thus “Industry Training Packages underpin the development of appropriate and targeted industry training in rural and remote areas” (Website 7.38). They combine practical work with structured training and lead to nationally recognized qualifications. In some cases, students can begin a New Apprenticeship while still at school. These qualifications can be delivered on-the-job, off-the-job, or through a combination of both. New Apprenticeships are now available in over 500 occupations. The programs include the qualifications from Certificate II training to Certificate III / IV training in an occupation that is identified as having skill shortages. Opportunities for groups such as Aboriginal and Torres Strait Islanders and young people initiatives are the focus of these (Website 7.39).

Training Packages are a key resource for the delivery of the structured training arrangements of New Apprenticeships. They have been developed for industry by national Industry Training Advisory Bodies, other Recognized Bodies or enterprises to meet the training needs of specific industries or industry sectors. Each provides an integrated set of nationally endorsed competency standards, assessment guidelines and qualifications and offers local employers and industries the flexibility to choose a Registered Training Organization and negotiate an individualized training program suited to their needs and the needs of the new apprentice (Website 7.40).

In addition, the Australian Department of Agriculture, Fisheries and Forestry delivers training programs as a key issue for increasing competitiveness, profitability and sustainability of Australia's agricultural industries. These include Agriculture Advancing Australia (AAA) package, which help rural businesses face the challenges of the future by becoming more competitive, sustainable and profitable; and FarmBis program (AAA- FarmBis Australia), which provides assistance to national projects to enhance the business management skills of Australian agricultural and rural industries (Website 7.41).

For all Training Packages, there is flexibility. Training can be delivered on-the-job, off-the-job, during regular work, by student work experience or work placement, or
(usually) by a combination of these methods. The ability to deliver training on-the-job and during regular work, is an important element to ensure that training can be provided in rural and remote locations (Website 7.42).

7.4.3 Government commitment

The following case shows a strong government commitment. The Departments of Industry, Science and Resources, the Departments of Communications, Information Technology and the Arts, and the Departments of Education, Training and Youth Affairs jointly initiated a rural development package, which is a major beneficiary of this $2.9 billion package which includes: (Website 7.43):

- The $21.7 million New Industries Development Programme which is specifically targeted at agribusiness and technology in rural Australia. (The New Industries Development Programme has been expanded from a $4.6 million three-year programme, to a $21.7 million five-year programme) (Website 7.44).

Through the New Industries Development Programme, Australian agri-business will gain the business skills and resources required to successfully commercialize their business products, technologies and services, and thereby generate significant growth in regional Australia (Website 7.45)

- $155 million over five years for Major National Research Facilities with the potential for locating some of these facilities in regional areas (Website 7.46)

7.4.4 Other activities

It appears as if many of the activities that are carried out by universities in China, for example, in terms of approaches to delivery of knowledge from universities to rural communities, such as visiting experts, setting up experimental bases, establishing extension and training system, leadership building, networking, farmers associations organizing, etc. are shared with other institutions in Australia. This is because of the different social, political, economic and cultural environments of the two countries.

For instance, in AUH’s case analysis, farmers associations are organized by AUH. These are successful stories for bringing farmers into a learning society and use of science and technology. Similar societies in Australia and the NT are organized by farmers themselves or through government initiatives, for example, Dairy Farmer
Cooperation, Goat Breeding Society, Pasture Protection Boards, Water Resources Commission, etc. Furthermore, AUH helps develop local enterprises to absorb surplus labour force from farmers in Hebei China. In the NT, the Gas industry, Rail line, Trade Development Zone, Governments and private entrepreneurs do similar things using the surplus labour force from farmers. (In 22, 2004, and In 23, 2004)

7.5 Conclusion

CDU is a regional university with all the functions that a university should have, for example, teaching, research, and related services to support the social, cultural, intellectual and economic development of Australia’s Northern Territory. Unlike the universities in China, the United States and some other countries, where extension is one of the important functions to transfer knowledge and to serve local communities, especially rural areas, CDU, like other Australian universities is involved in delivering rural and related education and training, they do not have a formal mission for extension work or provide formal extension. However, CDU is one of a number of dual sector universities with TAFE and higher education. In the last five years, CDU has provided workshops and short courses to rural communities (In 15, 2003). In terms of knowledge demonstration, or extension, or serving for rural communities, CDU currently does not focus specifically in this area, especially in Higher Education. However, the TAFE sector has programs serving local communities including Aboriginal people. CDU’s mission is to serve local communities, which includes adult people and Aboriginal people in the communities. The standard way to deliver its units is through its external flexible delivery products, at degree and postgraduate level. At TAFE level, CDU staff have gone out and offered many whole programs, for example, for the Aboriginal people, horticulture staff offered Certificate I and Certificate II, and Certificate in Horticulture for Indigenous Community (CHIC) courses. These are short courses, where staff go to the community for a few weeks to meet with a group of students. They may teach 4 or 5 modules, for example, how to use agricultural chemicals to grow crops. Other programs use farm machinery and equipment. Staff implement the program in a concentrated block by traveling to communities several times a year to offer a whole program. Other programs consist of very specific modules, for example, for the Aboriginal communities and cattle stations, people learn how to use machinery to cut
down trees and fix the fences. Sometimes CDU staff go out to offer one day courses on some subjects, particularly in TAFE, and that is at a practical skills level, using machinery, using chemicals safely, and so on (In 16, 2003). The above activities have been carried out by the Faculty of EHS (Education, Health and Science); the Faculty of Law, Business and Arts has run TAFE level business management units, for example, Crocodylus World located in the faculty, which is a display and business initiative. It is a good example of a cooperative venture between the Crocodylus World business and the faculty. Other faculties also get positively involved with activities serving the rural communities.

CDU has substantial infrastructure to support rural research. For example, it has acquired a cattle station for commercial purposes, investing and establishing high education capacity, to do research with government departments, provide formal, non-formal and informal education for rural people, such as diploma, degree, postgraduate, education, delivering short courses, short time training and so on.

CDU is a university with much cultural diversity in students and staff from different cultural backgrounds; for example, there are 262 students from 47 countries. Even though some students are born in Australia, their original language and culture is not English and Australian. In CDU’s Casuarina Campus there is a “Chinese Garden”. Within it, a Chinese landscape, architecture, and culture has been developed. A bronze statue of Mr. Tao Xingzhi (1891-1946), a famous Chinese educator occupies a key position within the garden. It was presented by Anhui Provincial People’s Government of China, where Mr. Tao was born. Mr. Tao, whose name means “doing, then knowing”, is a well-known educational philosopher in China. He is known as “the great educator of the people” or “the masses education”. Tao’s principles of education progressed from the creation of an experimental school in a rural area named Xiaozhuang to a national education reform movement (Website 7.47). This has clearly shown the educational and cultural diversity of CDU.

There is a close linkage with Asia. This unique location, culturally diverse environment and long history in dealing with Asia allows CDU to grow as a prominent institution in this region and to be involved in many different programs. For example, almost all faculties, schools and research centres have research programs, and students and staff exchange for the Asia partners.
Another important practice of CDU is combining theory with practice to benefit students. The CDU practice firm mentioned earlier, Crocodylus World, sponsored by Crocodylus Park (a private business corporation), is a fine example of this. This program uses simulation: “practice firms have simulated workplaces in which students learn about business by doing it in a safe environment, allowing skills and abilities to be tested and developed” (On Campus, Vol. 4 No. 12, 4 July 2002).

Clearly, CDU has done a great deal in attempting to transfer a knowledge-base from the university to the rural and remote areas, especially for the Indigenous communities.

As mentioned previously, CDU as a higher education institution in Northern Territory, cooperates with other agencies involved in training and it has delivered many programs for the Indigenous communities. It has made contributions to capacity building of Aboriginal people and their representative organizations in fundamental ways, for example, at regional level, concerning economic, social and political development.

As indicated earlier, because of the isolation, climate, soil and other conditions in the NT, development has been restrained. There is little agriculture in this broad territory, only a few examples in horticulture, fishery and stock feeding. Therefore, there is not a big demand for the agricultural extension in this area. But CDU has delivered agricultural extension activities to East Timor, which recently became independent from Indonesia, and it now seeks assistant from CDU. In April 2002, Mr. Flaviano S. Soares, head of the Agricultural Faculty of East Timor National University visited CDU and accepted a national agenda. The number one priority in East Timor’ agriculture is to feed the population. With this in mind, CDU has educated specialists, helped and rebuilt the food economy as well as introduced more productive agricultural techniques for farmers. CDU has participated in this project in a number of ways; its graduates visited farmers and spent time in villages where traditional subsistence methods are still used. CDU staff and students also train farmers in more productive agricultural methods in order to help them to participate in a modern economy. CDU has also worked with the staff from the Faculty of Agriculture, East Timor National University to replace the Indonesian curriculum with a shorter, more intensive curriculum, geared to meeting local community and industry needs. The
teaching methodologies have also been changed with lecturing hours reduced, 
students required to develop their skills in group discussion, report writing and self-

From the above analysis directions and initiatives, there are four important issues for 
CDU in its knowledge transformation activities to rural and remote areas.

First, the university itself. There is an urgent demand for the university to concentrate 
its views on rural, remote and Aboriginal communities. The demand is in 
technological extension, training, and building local people's capacity, in order to 
make benefits for them and improve their living standard and well being.

These kinds of programs could combine with the university’s teaching, research and 
other academic activities so as to obtain mutual benefits for the universities and local 
communities. Besides teaching, learning and research, the university's staff and 
students have the capacity to become more involved in extension programs, 
especially at the Higher Education level.

Second, rural community participation is another important aspect for knowledge 
transformation. The rural development programs carried out by the university or 
other agencies must be attractive to the people both psychologically and 
economically to motivate the local people in the community.

Third, government commitment and actual involvement is very important. Apart 
from financial support, the government’s commitment to CDU to undertake the rural 
service program is mainly built on establishing partnerships or cooperative activities. 
Government priorities, for example, were given to those programs which 
concentrated on areas in rural, remote and Indigenous education.

The next chapter uses the knowledge base developed from the previous chapters on 
Hebei, China and AUH, the Northern Territory, Australia and CDU to develop the 
juxtaposition phase of the comparative methodology.
Chapter 8 Juxtaposition

8.1 Introduction

In this chapter the data, information and knowledge built up in the previous chapters will be used for juxtaposition in the areas of historical, social, economic, educational, geographic, and administrative issues in both countries and universities, and focused on the roles of university for rural development. This is a necessary part of the comparative method. The procedure should enable me to extract the main conclusion for the study.

As has been discussed in chapter 3 - Methodology, this is a comparative study, therefore, the initial few chapters focus on the context of the common comparative framework in which analysis can be made. The recorded concerns for each country and each university have then to be used to examine the central ideas and framework, whilst written as separate chapters, they need to be “juxtaposed”.

The previous chapters have already established initial comparability of the two case studies and the universities (Australia and China). Each has been reviewed for their roles in rural and community development for each country. Therefore, the main aim of this chapter for juxtaposition is to list, side by side, the data which has been processed “to look for similarities and differences, to lead to a formulation of a hypothesis preparatory to final comparison” (Bereday, 1964, p. 43).

Australia and China are quite different countries in many aspects, but at least one thing is very similar, that is the people, communities, institutions, organizations and governments in both countries understand that education is a way to empower people for the improvement of their life, to facilitate society for sustainable development, and to promote the progress to benefit human beings. Education is a vehicle to improve people’s knowledge level and skills, to understand other people and society.

8.2 Juxtaposition

8.2.1 Introduction

The previous chapters have built up similar descriptions and interpretations about the study target areas and institutions, that is, chapters 4 and 5 for Hebei province, China
and Agricultural University of Hebei (AUH), chapters 6 and 7 for Northern Territory and Charles Darwin University (CDU). The data obtained have been used in this section for juxtaposition, which is the “…preliminary matching of data from different countries to prepare them for comparison” (Bereday, 1967, p 171). Juxtaposition is a process of simultaneous review of several areas, for example, social, economic, political, and educational aspects to determine the framework for comparison (Bereday, 1964). The aim of the juxtaposition is to build up the key issues for two comparative bodies in terms of their similarities and differences.

According to Bereday’s suggestion (Bereday, 1964, p 171-172): generally, there are two methods to present the juxtaposed data and materials, one is in tabular or vertical form, in which the data presents in columns side by side. Another is in textual or horizontal form, in which the data and materials have been written up and placed visually in order to identify the persistent elements. The juxtaposition method used in my study is the textual form. Then the data and materials are juxtaposed into two different types: similarities in two Province/Territory and universities; differences in two Province/Territory and universities.

8.2.2 Similarities

8.2.2.1 The similarities on rurality in NT and Hebei Province

1. The rural people’s educational level both in Hebei Province, China, and in Northern Territory, Australia is lower than that in urban areas in terms of school attendance, dropout and literacy rate as well as educational years.

2. Economic conditions in both countries’ rural areas still need much improvement. One of the significant methods to achieve this is to train rural people and empower them to change their situation.

3. In both systems, people living in rural areas tend to be less well off in terms of access to and provision of basic infrastructure such as education, health, transport, communication, and employment opportunities than their urban counterparts.

In rural Hebei:
Generally speaking, educational levels in rural areas are much less than those in urban areas. Low level of infrastructures in schools, shortage of qualified teachers, and lack of financial support create unfavourable conditions for rural education and for sustainable development of education in rural Hebei (Hebei Provincial Educational Report, 2002).

It is also apparent that in rural Hebei, the economic situation is still backward, with agriculture, in most cases, being the main source of the family income. Effective delivery of new applied technologies for the rural population assumes a significant potential to change the modes of economic activities and performance of the rural population, thus contributing to the promotion of quality of rural life and community development. However, to bring about such expected changes, particularly at the grassroots level in the rural context, has remained insufficiently documented both in practical and theoretical perspectives. The communities have obtained new expertise for creating more productive means for income generation while the education institution has also acquired additional roles, apart from its formal training programs, in preparing the villagers for technology-based production. It is also necessary to persistently raise funds through multiple channels into the rural areas.

Some people in this area are still in a condition of poverty since they lack individual capacities. In this context, education has been perceived of as a critical medium to materialize science and technologies into desired productivities and social wealth. Technology extension and quality will definitely exert an impact on the performance of the labor force and the status of the community development (Zou, 1996). The living standards of rural farmers have been identified to correlate closely with their education, especially vocational status of the rural population. A national scale retrospective investigation among 67,000 rural households revealed that the average per capita yearly income level ranged from 442.84 yuan (illiterate background), 542.96 yuan (primary education), 616.3 yuan (junior secondary education), 639.35 yuan (senior secondary education), and 740.9 yuan (secondary vocational education) (Ying, 1993).

The urgent educational needs for the rural population in Hebei province lie in vocational and technical education. Up to now Hebei has succeeded in the provision of basic learning, through decades of effort in massive literacy campaign and
universalization of 9-year compulsory education program. The literacy rate of 85% among youths and adults and 85% completion rate at primary level is a marked achievement. However, the accumulation of vocational skills remains highly inadequate. A recent report reveals a disturbing fact that among the rural active labour force 60 percent have completed 9-year schooling but have obtained only short-term vocational skills training. The number of qualified technicians available for every 10,000 farmers only amounts to 0.16 (Hebei Provincial Educational Report, 2002).

In the Northern Territory:

NT’s rural areas or rurality are considered as remoteness and this has been recognized by D. Griffith (1992). “This uniquely remote nature of Australia rural communities is a significant factor that historically, has shaped the nature of rural education and in itself constitutes a challenge to educational provision” (Wyn, Johanna et al, 2002). These rural, remote and regional areas have problems associated with economic decline in many fields, such as education, health, communication, transport and employment opportunities (FI11, 2002). It is clear that the rural economy and rural development require a broad range of education, training, occupation and skills. Despite the fact that the NT government has policies on providing a common standard of education across all schools, rural education provision still faces difficulties in terms of educational standards, financial support, school maintenance, qualified teachers and educational quality.

The rural population of Australia approximates to 15% of the total population, or up to 30% if the definition of rural includes the inhabitants of large towns (for instance, centres up to 100,000 people) (DEET Report of the Review of Agricultural and related Education, 1991).

The Northern Territory’s rural communities are shaped by very different economic, regional, social and geographical forces. Life in different areas and towns is very different. Rural Northern Territory includes mining towns, coastal towns, regional centres and Indigenous communities, that have their own tradition, expectation of and needs for education.

In Summary:
There are indications that both systems face a low educational status in rural areas, which constrains rural population and rural development. The people in rural areas receive less education compared to urban dwellers. Economic conditions in rural areas are inadequate and not well developed. There exist sharp contradictions between educational demand and inadequate financing, which also constrains educational development in these areas.

**8.2.2.2 The similarities of educational approaches used by CDU and AUH and the common practice as well as the models of effective practice.**

1. Both systems have compiled different levels of learning materials and provided various training programs to meet learning needs in rural areas with an aim to foster rural development.

2. Internet access, distance learning and other media have been used to serve the rural household.

3. On-site training and demonstration have also proved to be effective.

At CDU

Internet service and distance learning is a main approach used by CDU to carry out its community service programs. In some cases, specific training materials have been compiled and used to meet different local situations and different learning needs.

There is also a broad range of courses delivered by CDU for higher education and TAFE to rural, remote and Indigenous communities, both internal and external. Courses are very flexible, short term and long term and available from certificate level one to PhD. Lecturers and program facilitators often go to rural communities for on-site teaching and training. All of these activities are intended to create a learning community in rural, remote and Indigenous areas.

In order to enhance community service in rural, remote and Indigenous areas, CDU has created some positions and programs related to rural, remote and Indigenous communities. For instance, an executive think tank of Indigenous leaders has been formed to help develop Indigenous research. Education strategies have also been organized. The Think Tank members include one professor from Australian National
University; one professor from the University of Melbourne; and two others from the Northern Land Council and the Central Land Council. This consideration is to appoint Indigenous academic and community leaders to assist in developing strategies for a university-wide approach to Indigenous development.

The main reason for this initiative is to foster CDU engagement with Indigenous communities, which is a way to provide and encourage more pathways into the university. The initiative also supports Indigenous students and staff, as well as developing how to enhance the understanding of cross-cultural issues through staff induction program and course offerings.

This is a practical model to expand the university’s knowledge base and capacity for indigenous development, and widen the university’s commitment to engage more fully with the Indigenous communities, as well as set up an adequate understanding of relevant cultural issues (website 8.1).

In another initiative, CDU has appointed a Chair (professorship) on Desert Knowledge, which is located at its Alice Springs Campus, to focus research and disseminate knowledge on the scientific and social development needs of inland desert Australia. This appointment is intended to ensure research into desert knowledge and to deliver the benefits of this into desert communities, since "The health, well-being and ecologically sustainable development of desert communities and arid lands are essential to the Territory's development." (Website 8.2)

In AUH

In rural Hebei, learning resources problems exist such as insufficient teachers, textbooks or training materials, and classroom and other teaching or learning facilities. AUH initiated a number of approaches to enable rural people to have more learning opportunities such as: establishing a village library and editing learning materials for an extensive coverage of knowledge and skills. Internet, telephone, local broadcast and television have been used as a media to disseminate agricultural techniques and skills. Furthermore, university professors and other staff often visit rural communities to work with local farmers, to deliver training courses, and to demonstrate agricultural techniques and skills. The important principle adopted is to create an environment in which participants have self-direction on how to obtain a
new skill and how to use it. How to facilitate farmers to practise this skill and improve their life is another important concern. In AUH’s training process, the participants undertake learning and training programs under the guidance of the experienced facilitators (university professor or staff). These are from various fields with the necessary knowledge to provide specialist information to meet the different learning needs throughout the delivery process. For instance, for each training or learning program, first, AUH creates “a demand” though its broad investigation, information, and motivation methods, and then meets “the demand” by various training and learning methods, so as to give high priority in meeting the interests and needs for the different target participants (FI6, 2004).

Apart from above mentioned activities, like CDU, AUH has also established positions, and institutions like the Rural Development College, and the Mountainous Research Centre to motivate the university’s professors and staff to be involved in the rural development programs.

In summary

Both CDU and AUH have developed effective educational approaches to transform the knowledge, technologies, information and skills, to a large extent, to meet different learning needs for rural households. Furthermore, this has provided practical solutions so that knowledge reaches those target groups.

8.2.2.3 The similarities of knowledge, technology and information transferring from university to rural communities for development (the transforming models)

1. The two universities, CDU and AUH, followed almost the same principles in their transforming knowledge, technology and information for rural development service, which is the comprehensive integration of Teaching/Training, Research and Consultancy (extension or production). Sometimes the universities put all three priorities into one project, sometimes, they used them one by one.

2. The overall objectives for the rural development programs carried out by both universities are to empower local people in rural communities; to build human resources capacity; and to create innovative approaches for the effective implementing of projects.
In CDU

CDU has identified education, training and research as its priorities and positioned itself as a place for comprehensive response to the different needs of students, industry and farmers both for vocational education and training sector and higher education opportunities. Apart from these activities, CDU has also paid great attention to the rural community’s service for a long time through training, research and extension work, and has a close affinity with local communities. Research activities carried out by CDU are closely linked with the Northern Territory’s unique environment. Such research activities are: tropical environmental science, tropical plant science, environmental remote sensing, tropical aquaculture, tropical health and Indigenous related research. Also, TAFE programs focus on new knowledge as well as applying knowledge in new ways. By working collaboratively, technical skills can be improved in horticulture, agriculture, numeracy, literacy and so on in rural areas. Extension services concentrated on the development of appropriate and efficient production systems, new integrated technologies and sustained horticultural productivity, with an aim of education for rural development (see Chapter 7).

In AUH

AUH used to be an agriculture-oriented university. Traditionally, it focused on its teaching, learning, research and extension on crop and animal production. In the beginning of the 1980’s, with rural reform and evolution policies of China, AUH has redirected its mission towards the broader aim of supporting and participating in rural development. This can be summarised as “integrated development of agriculture, science/technology and education” (AUH, 1996). This means AUH must use all means available to disseminate relevant scientific knowledge and productive technologies into the rural communities. The involvement of AUH in rural development initially started in the early 1980s with group and individual service for farmers in Taihang Mountain areas in order increase their income. The project initiatives are to disseminate the productive agricultural technologies by all educational means among villages to enhance the capacity of the target groups and to improve people’s living standards.
The educational approaches used by AUH for rural development activities have been changed from its initial stage until now.

There were a number of approaches adopted by AUH in the Taihang Mountain project. These approaches are documented below:

1. Experts made a comprehensive system analysis, an holistic approach in considering the existing problems and potentialities of the Taihang Mountainous area, so as to assist the village to develop an implementation plan in close response to the local resources;

2. Setting up of experimental bases, which were aimed at disseminating the agricultural technologies, which serve as focal points for demonstration. These bases aim to disseminate agricultural technology as well as acting as service stations (like demonstration stations) for both technology and farm inputs;

3. Establishing a system of extension and training for agricultural technology and over-all quality improvement of the science and technology workforce;

4. Mobilizing human resources to provide various consultancy and service to farmers;

5. Building up/providing and strengthening a powerful system of leadership (prefecture, county, township, village and university levels) to make up a complete body of policy-makers, administrative support and implementing units;

6. Providing various training programs;

7. Networking

a. Joining efforts with a local seed company to set up a strong marketing network for Chinese Cabbage seed in Gaoyi County.

b. Providing information and training facilities; AUH contributed 6,000 books and reference materials and other teaching equipment to Yongnian County Professional School and to Anping County Beigu Farming School;

8. Organizing farmers in various technical associations to bring into play the initiative of farmers to learn and use science and technology. These were: the
Mushroom Association in Tang County, Chicken Association in LaiYuan County, Red Fuji Apple Association in Shunping County, Watermelon Association, Peach Association, Vegetable Association, Maize Association, etc; and,

9. Developing new technologies in response to the forthcoming technology-based agriculture development (see Chapter 5).

In summary

The similarities of the two universities are concerned with adjusting their programs to new and non-traditional topics, new teaching and learning models, new partnerships, so as to play an active and constructive role in rural development. The models used by the two universities emphasize the importance of interactive, mutual learning between formal and informal knowledge or technology systems and they stress linkages with local community members or farmers so that they actively participate in any of the universities’ innovative efforts.

8.2.2.4 The similarities of government commitment to enhance university’s rural service programs from the study

Transforming the university’s knowledge base into rural communities to support rural development can not be realized without government commitment. Several questions must be addressed:

1. What is the government’s commitment to encourage universities to participate in rural development programs? How can the universities initiate and be supported by government? What resources of the universities can be committed to catalysing this? The above questions apply broadly to both universities, CDU and AUH.

2. The lessons from CDU and AUH have shown that government commitment to enhance the university to transform its knowledge base into rural areas for rural development is a critical issue

In CDU

Generally, there is a strong commitment of government to CDU to serve rural areas. This is more so in 2004 as a result of the repositioning of the university under the
Mc-Kinnon (the interim Vice Chancellor appointed to change CDU directions) initiatives regarding policy. The government commitment for CDU to serve rural development has been recognized by its research and training programs as well as consultancy or extension activities. Priority is given to the research programs whose designated areas are in rural, remote or Indigenous areas, or which target people from those areas.

There are several centres established in CDU, such as Tropical Savannas CRC (Cooperative Research Centre), the Centre for Tropical Wetlands Management, The Centre for Indigenous Natural and Cultural Resource Management, the Centre for Renewable Energy Research, and so on, that are specially focused on the NT’s rural and remote areas.

The NT and National governments have also committed money to support the university to carry out programs in rural, remote and Indigenous areas. Generally speaking delivering programs in rural communities are very expensive and difficult to do without concrete funding. The university needs the commitment of funds for staff travel, accommodation costs and so on. Some other funding is needed for students to travel out of communities to take training, for example, to Darwin, Alice Springs or Katherine. Each year the Commonwealth Government gives funds to the Territory government for the vocational education and training programs, and then the Territory government distributes those funds to the educational providers, with 85% of those funds going to CDU (In 21, 2004). For example, in health clinics, which are a part of national rural health training network, $170.6 million has been put by the Federal government for the rural medical training (In 19, 2004).

Another example of the government’s commitment to the university (CDU) is that it funds a certificate program called natural and cultural resources management. Students can start from a certificate level one in the communities and, in theory, continue until they complete a PhD (In 19, 2004).

The rural development programs carried out by CDU sometimes need extra government support. For example, the Territory Government holds money for vocational and technical training programs. If CDU carries out programs in this field, Territory government commitment, permission and support are necessary. But higher
education is funded differently; the federal government funds higher education (In 19, 2004).

In higher education, the NT government provides less money than the national government, but in TAFE more money has been provided for external teaching and learning.

The NT government is very keen for the people to work in the Aboriginal communities and is willing to support them financially (In 20, 2004).

In AUH

Similar programs exist in AHU. Also, government has a very strong commitment to encourage and support AUH to initiate its rural development programs. Policies, strategies and methods have been adopted by government and used to foster the AUH involvement in rural development program.

In order to enhance and improve the close linkage between AUH and local communities, some provincial research centres have been located in AHU to build cooperative partnerships among higher education, various government authorities, and rural communities with empowerment areas or enterprise community designations. This initiative focuses on technical support, agricultural extension, economic opportunity, sustainable community development, community-based partnerships, and a strategic vision for change (FI5, 2002).

This innovative program of government commitment provides research funds to develop and maintain community, extension programs and economic development projects relevant to their community. The project creates strong information sharing and technical assistance links between government authorities, rural development field staff, university, civic organizations and rural communities.

The roles and initiatives of the provincial centres focus on developing capacity within selected educational areas to serve as Resources Centres for community and technical and economic capacity building. These provide continuous information, technical assistance and training for empowerment areas, enterprise communities, other rural communities and the rural development field staff.
The Centres have provided the following for the communities and university staff:

- Technical assistance for community and economic development strategies and methods within communities served;
- Training for local government, local technician assistants, empowerment areas and enterprise community leaders, as well as for community members and local farmers;
- Assisting the universities to sustain themselves as learning laboratories for comprehensive community development in rural areas with high levels of poverty.
- Participating as integral parts of a national network of similar higher education institutions to share information, technical capacity and experience (AUH, 1998).

Some Centres have been established to serve community educational needs directly. They reflect a long-term commitment of both the government and the community, and have many services already in place. They also, in many cases, provide the only affordable entrance to higher education for many rural residents.

These provincial centres located in AUH have shown strong commitment from governments to assist the university to carry out rural development programs.

In Summary

Rural development is not the university’s main mission; it is the government’s responsibility for the human resources development or natural resources development. Thus government should commit resources to the university to ensure a desirable outcome in line with developed policy.

8.2.2.5 The similarities of community participating in university’s rural service programs

Community participation is another key issue to ensure that any rural development program can be successfully implemented and achieve expected objectives. CDU and AUH have paid a great deal of attention to have community participation during the rural development program implementation.
The CDU’s rural development programs have been recognised and participated in by communities. However, the communities themselves want to be independent and prefer to have the people with knowledge and skills already in their communities rather than someone come from outside. This is activity that is motivated by the community. The community wants young people, with knowledge and skills in their communities without losing them. They fear that if they come to study in CDU or other universities, the community will lose them when they graduate (FI13, 2004; In 21, 2004).

An effective way to transform knowledge and skills from university to rural areas is for university staff (lecturers, professors) to go out into the communities, live with them, and find out what is really needed in the communities, as well as to help them to build up knowledge and skills (In 20, 2004). This educational approach also requires that communities have to participate in the program so as to achieve the expected objectives.

In terms of the motivation of community participation, when CDU delivered some training programs, for example, health programs in rural communities, those kinds of programs were recognized by local communities. The reason why the local people and community members want to participate in their program is that the community is very interested getting young people educated and also the training program is closely related to the community getting more welfare (government payment) after the program has been implemented (In 21, 2004).

In AUH

In the implementation of the Taihang Mountain Development Project, various considerations have been put into practice by the project team from AUH to ensure community participation. For example, for any project, the team identified some people who were interested in and enthusiastic for the project, including chairpersons, members of the administration, and key villagers. Those people who demonstrated strong commitment to the projects, and also the chairperson or administrative members ensure support for the projects. Other village members’ participation occurs when their involvement is necessary at different stages of the program implementation. This involvement results in program ownership. Chapter 5
explained and illustrated this process, and indicated the critical roles that communities need to take part in together to accomplish educational and economical development in their villages (see Chapter 5).

But in some cases it is not easy to get people together to participate in the programs, and also some programs have failed due to the lack of the community awareness, mobilization and participation.

Prof. Yu Zongzhou: a case study

Mr. Yu Zongzhou, a professor in AUH, has been engaged in rural development programs for a long time. He has successfully carried out many programs in rural and mountainous areas. But he met difficulties. For instance, when he first went into Qian Nanyu Village in Taihang mountain areas, he prepared to help the farmers prune Chinese chestnuts, which is necessary for fruit trees to produce more fruits, but at that time, the local farmers refused to cooperate with him, and were even very rude to him. They said, “Come on, where will the nuts will bear, if the branches were cut down”. Mr. Yu Zongzhou, facing the embarrassing situation, said: “I talked to them and explained to them patiently, and finally I persuaded one farmer who agreed to let me use three of his apple trees in an experiment for comparison. I only pruned one of them, and left the other two without being pruned. Before I did this, I promised the farmer if in the coming year the pruned tree would not bear much more apples than the other two, I would make up for the loss, and if more apples were produced on the pruned one, all of the fruits would belong to the farmer. The next year, the pruned tree had much more apples in very good quality, which were not only big but also attractive in appearance. This demonstration encouraged and motivated the farmers to learn new knowledge and new techniques. Therefore, I opened up an evening school for farmers. I taught them how to cultivate fruit seedlings, how to prune fruit trees, how to manage them and how to deal with the soil, water and so on. Gradually, I transformed all sets of techniques on growing fruit trees to the farmers. Each of them has already mastered at least one or two practical skills. After that, they began to be more prosperous and, the same time, they felt the importance of new knowledge. So they began to attend various training classes and other development programs to further improve themselves” (In 9, 2002).
Finally, almost all people in this village came forward to participate in the programs carried out by AUH, because they became aware of the common benefits to be gained in economic development from the projects.

Professor Sun: a case study

Another example happened in Su Jiatuan Village of the Taihang mountain areas, which was a well-known poor village. The farmers’ literacy level is very high, and almost all adults have finished primary education with basic literacy and numeracy skills. These skills can help them in their daily life and living. But it is not enough for them to improve their quality of life and raise their income. They need to develop their knowledge and skills. In 1987, they intended to grow apples. However, they had no knowledge and skills about how to grow apple trees well or how to manage the orchards. Consequently, the village leaders invited Dr. Sun Jianshe, a professor in the horticultural department of AUH, and designated him as the head of village to be in charge of the agricultural extension and management of fruit tree growing.

Professor Sun selected Wang Lanqing and another household as the demonstration model households. He looked after these 2 model households, and showed them the effective techniques step by step. In 1992, the fruit trees began to bear apples. The production in only 24 apple trees of Wang Lanqing’s orchard sold at a good price of 9,800 yuan. The income of another model household’s apples amounted to 10,000 yuan. Among all the orchards in the village, the apples in the 2 model households were the biggest and the quality was the best. This demonstration showed the importance of knowledge and skill in agricultural production, and it motivated farmers to participate in training classes for practical techniques, and to attend evening schools for cultural knowledge. These experiences initiated their income generation opportunities, and farmers become more independent and flexible. After a few years, family incomes increased. People of the village became aware of the advantages of new technologies. Active participation increased. In each family there was at least one person who mastered one or two technical skills. Under the guidance of Professor Sun, some local fruit tree experts have emerged, and the area of orchards has been enlarged. The output of fruit has been increasing each year. In 1995, the total output of apples in this village has been up to 500 tons, which is worth 2 million yuan. With only the apple growing, the income per capita amounted to
1,800 yuan. Sun Jianshe was honored Ph. D. Head of Village in the Taihang Mountainous Region. Owing to the apple growing with scientific techniques and management, Su Jiatuan Village has improved economically (FI5, 2002).

In summary

Community participation is a critical issue to ensure rural development programs achieve the expected objectives. Community participation is also necessary to make sure of the effective dissemination of knowledge, technologies, information and skills to the grassroots from the university.

The important issue for the community members is that they should be interested in and be motivated to participate. To ensure this became a reality, university staff carefully designed and planned the programs to make them more attractive to community members, and more closely connected to local condition and to their daily lives so as to achieve the expected aims.

8.2.3 Differences

8.2.3.1 The differences on rurality in NT and Hebei Province

1. Hebei Province is an agriculture-oriented province, and the majority of the total population lives in rural areas. For most of the people in rural areas, agriculture is the only income, which means that Hebei’s rural economy relies on agriculture. Therefore, rural education has been considered as the key issue for national development. The Northern Territory’s rural areas on the other hand have a small population, with large holdings of cattle stations and most of the population lives in urban areas. This means that the NT’s rural economy is not exclusively based on agriculture, but is tied to the urban service industry.

2. The Northern Territory’s rural areas are very different to Hebei province in economic, regional, social, cultural, and geographical aspects with unique characteristics, including mining towns, coast towns, regional centres and Indigenous communities. In rural Hebei, regional diversity is small, and there is no Indigenous population (only a few minorities in rural Hebei). Geographically, it is divided into mountainous areas and plain regions.
In Hebei China:

Hebei Province is an agricultural province with a large rural population of 68 millions, 76% of them living in rural areas. Agriculture, as the primary sector in rural areas serves most of the rural dwellers. Unlike their urban counterparts, in most rural areas, agriculture is the only income for most of the population. Therefore, the status of rural development has always been the primary concern of the Hebei Province. It is clear that, without rural development, without the improvement of rural people’s living standard and wealth, and without educational development in rural areas, national or provincial development can not be realized.

Administratively speaking, China has been managed by government respectively at the state, province, prefecture, county and township levels. The village is a basic administrative organization of the rural community at the grassroots level (see Chapter 4). Consequently, the villages become the contested area for educational intervention (Zhang, 2001). From this point of view, the focus for development must be on the rural society, on the development of rural education and on the growth of the rural economy as a whole, including its farm and non-farm components.

In the Northern Territory of Australia:

The NT is the third largest territory/state but it has the smallest population and the lowest population density (see Chapter 6 (6.1)), which makes it very different from rural communities in Hebei, China. Darwin, a coastal city and the capital of the Territory concentrates the population. This metropolitan pattern has generated a variety of difference in rural and urban landscapes.

Traditional agriculture is in decline, and accounts for a far smaller proportion of the economic output, compared with mining and tourism. But unlike China, most of people in rural areas are working “in fairly universal, service occupations” (Wyn, et al, 2002).

The Indigenous population in the Northern Territory occupies 28.5% of the total Territory’s population, and represented 13.4% of total Indigenous population in Australia (ABS No. 3102.0). Therefore the Indigenous education and Indigenous areas development becomes more and more important in the NT.
In summary:

The most apparent differences within both systems emerge in relation to each of the following: rural population, rural diversity, and reliance to agriculture.

### 8.2.3.2 The differences in educational approaches used by CDU and AUH

1. There are differences between rural Hebei and rural NT, which presented as different learning needs, and different teaching and learning methodologies. Those differences required the universities to consider and carry out relevant programs to meet the needs. For example, AHU is located in Hebei Province, which is an agriculture-oriented area in a developing country. Therefore the most urgent needs for rural people, who make up the majority of Hebei’s population, are up-dated information and technologies to assist them in having income generation so as to change their living standard. They want to know what to grow, what to raise, how to grow, how to raise, whom to sell to and how to improve their economic productivity. All of these required the university to adjust its working emphasis in rural development programs.

2. AUH is a university in a developing country, while CDU is a developed country’s university.

3. Because of its cultural diversity and the Indigenous communities CDU works across cultures to deal with students from different languages, cultures and Indigenous background. The important approach in education and training is to be very patient with them, and to develop understanding of them, retain their culture and build upon their previous learning. Thus teachers need to help, support, understand them, and not criticize them (In 19, 2004).

In CDU

CDU is a comprehensive university, although most of its work on rural development is still concentrated in agriculture or agriculture related faculties. Rural people’s needs and rural area development also concern other departments and faculties.

CDU has delivered short-term courses or rural participating programs by using face-to-face, tele-conference and video-conference communication methods (Intuition, 12,
Vol. 13, No. 11, December 2001). With online teaching and learning becoming the major part of university’s activity to deliver knowledge and information for rural and remote areas, CDU has encouraged its staff to adopt online teaching modes, and interactions with staff and students and other activities are integrated and delivered online (Intuition, 10, Vol. 14, No. 2, April 2002).

Consequently, a variety of ways of communicating its knowledge in terms of educational approaches is used but CDU as policy uses information technology or so called digital means, such as internet access, and tele-centres wherever possible. Compared with traditional media, this technology or information dissemination systems carry tremendous information with wide coverage, and low cost. It also provides an all-round service with its large volume as well as its excellent verbal, sound and image information.

CDU’s rural community learning service is mostly focused on the individual. For example, when someone is enrolled with CDU’s external learning program, CDU will send the learning materials, and lecturers will contact with them individually. Another characteristic is students are very scattered, for instance, in one program across Alice Springs, Katherine, Japan and Malaysia.

Learning activities or approaches:

1. CDU’s delivering knowledge to rural communities is very individually based. Both lecturers and students accept responsibility for the learning;

2. Creating a learning community on line; and

3. Lecturers going out of CDU to work with rural communities (In 20, 2004).

In AUH

AUH as a higher educational institution focused on teaching, learning and research on crop and animal production. In the beginning of the 1980s, with a Chinese national rural reform policies, AUH extended its mission towards the broader aim of supporting and participating in rural development with groups and individuals. The aim is to service farmers to enhance their income generating activities.
AUH also provides one or two year diploma or certificate courses that prepare technicians for entry level extension work or entry level technician work with the public or private sector, in-service training programs for extension staff, farmers’ training of short duration, adult training and young farmer education and training (FI8, 2004).

Entrusted by Hebei Provincial Education Department, AUH implemented a program called “one village, one graduate from AUH”, which means that each village is eligible to send a young farmer (of course, past the basic qualification assessment) to study in AUH free. After graduation, he or she has to return back to their hometown.

The key issue for AUH to deliver its rural development program is to establish a system of extension and training for agricultural technology. The aim is to quality improve science and technology in the work force. In order to do so, some of the following approaches are used such as:

1. The compilation of practical technologies based from actual research done in the site
2. The technological training of farmers to adopt necessary technologies that require less work hands but with high production efficiency.
3. Organizing a rational technical delivery service system.
4. Advocacy in setting up of various Professional Technical Societies (eg. Fuji Apple Development Society)
5. The establishment of scientific and technology market of AUH (1988) linking university with farmers for mutual benefit.
6. Selecting poor counties (10 out of 39 in the whole province) to set up experimental villages to carry out the poverty alleviation strategies.
7. Pushing forward some national projects and promoting rural professional education. eg. Harvest Plan, Spark Plan, the Lia Yuan Plan etc.
8. Training a large group of farmers to become chief members of an extension work force. For example, Beigu Farming School with assistance from AUH experts trained
16000 farmers among whom 240 farmers were appointed as farmer technicians by the county which led to the farming output in 1993 being 56% higher than that of 1988 (see Chapter 5).

In summary

Thus the population in rural Hebei is much bigger than that in rural NT, the educational approaches used in rural Hebei have concentrated on encouraging rural people in self-learning, helping each other, under the guidance of qualified staff, for example, various farmers’ associations.

Cultural diversity and the Indigenous communities have been identified in rural NT. The cross-cultural problem requires the university to consider the target group differences in educational requirements and to deliver relevant programs.

### 8.2.3.3 The differences in knowledge, technology and information transferring from university to rural communities for development

1. AUH is an agriculture-oriented university, in which its typical programs focus on natural science, agriculture, and agriculture related social science, including farm management, agricultural economy, marketing and so on. Therefore its rural development programs

2. CDU, as the only university in the Northern Territory, has rural service programs focused on education/ training, health, Indigenous education, extension and some agriculture or horticulture fields.

In CDU

Most of the programs carried out by CDU to serve rural communities are in adult training, external learning, distance learning in the areas of education, health, environment, horticulture and other practical skills, as well as a variety of research and consultancy/extension (see Chapter 7). For the research program, its primary purpose is not to promote community development service, but some programs can make a contribution to community development (In 21, 2004). For example, Tropic Wetland Management Centre was funded by the Commonwealth Government; its objectives are to promote the wise use of tropical wetlands through cooperation in
research, education and training in relation to wetlands in northern Australia. Therefore rural development is not this centre’s main mission, but through its research activities, the contributions could benefit the rural, remote and Indigenous areas.

In AUH

Most programs to transform knowledge, information and skills from AUH to rural society are through agricultural extension services, income generating, adult training and consultancy.

AUH adopted the following methods to transform knowledge, technology and skills to alleviate technological illiteracy and to promote economic development in Taihang mountain area.

1. First, a large number of various training courses on technology and practical techniques closely related to different local conditions and suitable to local economic development have been offered by AUH.

2. Second, AUH carried out intensive and applied technical training to improve the farmers’ technical skills.

3. Third, through its vocational school and vocational teaching centre, AUH trained qualified reserve personnel.

4. Fourth, professors and other staff from AUH went off campus, worked with farmers and lived in rural communities to demonstrate techniques and shared applied technical knowledge with them.

5. Fifth, AUH initiated the development of the refresher institute and trained higher-level qualified technical personnel.

6. Sixth, AUH disseminated the technology through its students’ social practice activities during their vacation. AUH integrated the students’ social practice with rural technological literacy and technical education of the farmers together. Every year AUH organizes over 40 students’ groups and over 300 back-home groups in rural and mountainous areas. Through technology dissemination, technical
consultation, short-term training and field guidance, etc, AUH is able to transfer technology and technical skill to farmers. AUH has improved farmers’ technology literacy and consciousness and enabled them to apply or make use of technology in their farming practices. Those social practices, on the one hand, have given agricultural students actual exposure during their courses that seek to inculcate love for the land and service for the farmers. AUH has facilitated the spread of technological consciousness among farmers in rural and mountainous areas which improved their technological literacy (AUH, 1995; AUH, 1996; AUH, 1998; Wang, 1998).

In summary

From the above discussion, some differences can be summed up:

China is a developing country; Hebei is an agriculture-oriented province, and AUH is an agricultural university. The majority of the population live in rural areas. Therefore, the urgent educational needs for rural Hebei are increased agricultural knowledge, technology, information and skills. Concerning this unique situation, AUH has successfully transformed these kinds of knowledge into rural areas. It is evident that AUH has made its due contribution to rural communities, and farmers are finding ways out of poverty into prosperity. AUH experience suggests that only when every rural laborer shakes off “technological illiteracy”, will the influence be profound and total, because farm productivity cannot be actually raised until the farmers’ technological consciousness and knowledge skills are upgraded and or duly improved.

Australia on the other hand is a developed country. The Northern Territory’s rural population remains very small and is less dependent on agriculture. However, there is an urgent educational need that needs to be met for rural NT and that is the development of Indigenous communities.

8.2.3.4 The differences of government commitment to enhance the universities’ rural service programs from the study

1. Given the view that rural development is not the university’s main mission, it becomes the governments’ responsibility for human resources and natural resources
development. Therefore governments have made the commitment, either to put some funds or deliver some special policies or strategies in this regards.

2. China has a long tradition of centralized, well established and very organized government. In another words, almost all rural development activity need the support, commitment and financial aid of government. Australia is different. Its constitution of government is about 103 years old. Under this constitution education is decentralized, and education becomes a state/territory government responsibility.

In CDU

The government’s commitment to CDU to carry out rural service programs is, in most cases, to establish a partnership or with cooperative activities. For example, Charles Darwin University, in partnership with the Northern Territory and Commonwealth governments, is developing an intensive implementation and research plan to expand an innovative literacy program in the Territory, including remote and Indigenous communities. This program is designed to accelerate the literacy skills of marginalised learners who have failed to make the appropriate literacy gains in school and/or who are in acute danger of falling behind the Territory average. The expected outcome is that the intervention helps students to gain literacy skills at a much higher level. The Northern Territory Government, working in concert with CDU, was the first Australian State or Territory to open up its schools to the research and development work required to mainstream the program. (Website 8.3)

Both Commonwealth and Territory governments have committed CDU to deliver both higher education and vocational education. The commitment includes enhancing its role in meeting the social and learning needs of Territorians, and to consider how this role as the leading educational provider in the Territory can be further developed. (Website 8.4)

In China, agricultural universities have a mandate for major extension services. Whereas, in Australia, “government services have accepted major responsibility for extension services.” (Donald, 1968, p. 11)
The Taihang Mountain comprehensive development and the transforming program was initiated in the late 1970’s by AUH, along with the Chinese social and economic reform in rural areas. From that time on, the different levels of governments (central, provincial, and local) have made an enduring commitment. China has a centralized government with very strong government leadership.

In 1990, National Instructive Guidelines for the Experimental Areas of Comprehensive Reform in Rural Education (1990-2000) were issued by the Ministry of Education to stipulate that “higher educational institutes, special technical schools and research institutes will be organized to participate in the education reform and economic development in the experimental counties. The provincial and local governments should designate the relevant higher educational institutes, special technical schools and research institutes to connect with and support the work in the experimental counties”, and “encouraging the cities to support the rural area” (Lu, 1996).

The Chinese government committed higher educational institutes to serve rural development through the following ways:

To coordinate the counties and townships to formulate the social and economic development planning and programs; to help the village leaders and farmers change their ideas and concepts; to implement “the joint development project of production, learning and research”; and to help the rural area carry out various forms of education, train the qualified personnel and improve the quality of the laborers (Lu, 1996).

In summary

AUH’s rural development programs have been carried out under coordination, leadership and commitment of government at all levels. Apart from funds from government, special policies or strategies have also been adopted by government. Without government participation, leadership, and coordination, it is very hard to carry out rural development programs successfully, especially in developing countries, like China. Mr. Zhou Zhihua has shown that governments in all levels have played very strong leadership in any development programs in rural areas. (Zhou, et al., 1990).
CDU as a higher educational institution has developed and participated in rural development programs. There is government (federal, Territory and local) commitment during the various project implementations. The federal government commitment is to ensure that CDU is a strong university to deal effectively with meeting the needs of Northern Territory. With the NT government, formal partnership agreements between CDU and NT government or Memoranda of Understanding have been set up, and some activities have been carried out under these agreements. For example, the Faculty of Education, Health and Science, CDU has come down to the rural areas, carried out rural and regional participated research, consultancy and teaching or training work. This work not only helps rural communities and rural development, but initially it also identifies the future things that need to be done in rural development areas (In 18, 2004).

8.2.3.5 The differences of community participating in the universities’ rural service programs

1. Community participation is a core element of a rural development program; the AUH rural development project is based on the principles of community participation, which assert that community participation is fundamentally required to achieve rural development and ensure the expected outcomes achieved at the local level.

In CDU

CDU’s rural development programs have strong participation from people in local communities. For example, there is a research program in rural literacy development which is carried out by CDU which includes talking to rural community members including Aboriginal people and to identify what kind of English literacy they use. The research staff employ local Indigenous assistants. Their participation was as research participants in the project, they got paid, they were engaged in research and they got the training from the research team on how to do interviews, what to do after that and so on (In 18, 2004).

In AUH
Community participation requires going beyond consultation to enable community members to become an integral part of the decision-making and action process. It reflects the need for the development of more active communities in their own right: people seeing a need and acting upon it, for example, as advocates, pressure groups or self-help groups. Community participation draws on the energy and enthusiasm that exists within communities to define what that community wants to do and how it wants to operate. In rural Hebei, a few years ago, many rural people were not willing to participate in the programs carried out by AHU because of the lack of the consciousness of technology, and also they had no confidence in their learning. For example, when AUH implemented the project of Revitalizing Villages through Science and Education, a professor had spent his time living with the farmers in Chaichang Village. When the professor conducted the first technical training class, no one came at the very beginning although the leaders of the village had announced the news several times. After further motivation by the leaders from door to door and under the condition promising to pay those who would attend the training, 8 villagers came at last. Through their training, these 8 villagers realized the importance of applying science and technology in their agricultural production, and they began to encourage others to attend the training class voluntarily. Gradually more and more farmers came to classes. Even those farmers from the nearby villages participated (In 5, 2002).

In summary

Since the most rural development work carried out by AHU is agricultural extension work, the participating members are farmers. If they find that the project is closely linked with their income generation, and they will benefit from the program, they are willing to participate. Their aims to participate are to find answers for many of the questions commonly asked by people when they get involved in agricultural activities, and development initiatives.

8.3 Conclusion

From the comparative study methodology, the juxtaposition here used and ordered includes similarities and differences for selected factors related to critical practices on the roles of universities for rural development. During the juxtaposition of
similarities and differences for two universities delivering their knowledge base into rural communities, the common concept is that the universities have a key role to play in rural development through their teaching/training, research, consultancy/extension or field work. University people must be aware of this and keep doing it effectively, efficiently and creatively working to serve rural development. However, the university itself cannot play such a role if there is no policy support from governments. Failure to work with local people is another barrier to successful implementation. Networking with other institutions is also a critical requirement for rural development.

There are still some critical issues which are hard to be juxtaposed and it is hard to say that some kind of work in one university is better than that in another since the two countries and two universities are so different. However, the main issues related to the universities rural development programs in this study are as follows:

1. Rural diversity in rural NT and in rural Hebei
2. The educational approaches used by two universities for rural development programs
3. Models used to distribute the knowledge, technology and information from universities to rural communities for rural development
4. Government commitment to support and enhance university’s rural development programs
5. Community participating in university’s rural service programs

These issues will be formalized in the following pages as hypotheses and sub-hypotheses. Subsequently each of these will be dealt with in the following chapter 9 in detail as required by the comparative method.

Bereday (1964) points out that “The juxtaposition ends with the formulation of the hypothesis stating the purpose for which comparison it to be made” (Bereday, 1964). There are a few ways to develop such hypotheses, but the effective and concrete method used by Cynthia Brew (Brew, 1980) will be adopted. The following thoughts are based on her views.
There are three main hypotheses or questions:

1. University community believes that universities need to play a role in serving rural communities (why is there a need for universities to play a role in serving the needs of rural communities?);

2. Certain criteria are needed for an effective model to transform knowledge, technology, information and skills from the universities to the rural communities (what activities should be used by universities to carry out rural development programs?);

3. Universities must adopt a variety of approaches in the multiple roles (how are these models realized in practice?).

These three main hypotheses have several sub-hypotheses that can be identified under an “IF---THEN” design. This means that if the “IF” conditions hold then the “THEN” conditions could follow. Hence the various propositions, hypotheses, generalization can be analysed under this arrangement. Thus in example I (hypotheses I), if three sub-hypotheses 1A, 1B, 1C hold, the three “THENs” could follow.

For simplicity, the following set of hypotheses and sub-hypotheses are constructed on an individual IF-THEN basis. A more complex model could see several sub-hypotheses (IF) related to one outcome (THEN). For example, (IF) 1A, 1B, 1C could be conceptualized as IF (1A, 1B, 1C) THEN 1a or 1b or 1c or any combination of these outcomes could eventuate. Thus I am assuming “other things being equal” if 1A then 1a other things being equal. “Ceteras Paribus”. An example, IF I use a knife sharpener to (only) sharpen a knife THEN the outcome is a sharp knife (other things being equal). If I remove this assumption I can say: the sharp knife can also be used as a weapon or a cutting instrument or a screwdriver, etc. So, for simplicity in the first instance I am interested only in the first outcome or sharp knife in this model. However, as the following three diagrams show the model can become very complex with multiple IF-THEN connections.
1. Simple linear model (for first condition only):

IF 1A

THEN 1a

IF 1B

THEN 1b

IF 1C

THEN 1c

2. Complex model (multiple connections for first condition only)

IF 1A

IF 1B

IF 1C

THEN 1a

THEN 1b

THEN 1c

3. More complex multiple connection

IF 1A

IF 1A

IF 1A

IF 1B

IF 1C

or

or

or etc.

THEN 1a

THEN 1a

THEN 1a, 1b, 1c

When applying the models, which are abstractions from reality of the two case studies comparisons, to the real world, the more complex the model, the more the model approaches reality. However, the following hypotheses are listed in accordance with the first (simple) model.
1. Universities need to play a role in serving rural communities (why is there a need for universities to play a role in serving the needs of rural communities?)

If

1A. Universities, especially agricultural universities in developing countries have clearly identified that rural development is their main mission. Universities transform their knowledge base from research and apply it into rural areas.

Then

1a. Universities have a key role to play in rural development.

If

1B. Different levels of government have committed strongly to support universities to deliver rural development services financially, institutionally and with relevant strategies and policies.

Then

1b. A university can not play such a role if there is no policy support from governments.

If

1C. Communities have paid great attention to the programs carried out by a university for rural, remote and Indigenous areas development.

Then

1c. A university’s rural development program may not achieve the expected outcomes if it fails to work with other institutions concerned to form a network serving rural development.

2. Certain criteria are needed for an effective model to transform knowledge, technology, information and skills from the universities to the rural communities (what activities should be used by universities to carry out rural development programs?).
If

2A. Universities establish demonstration communities.

Then

2a. The university’s rural development program can be more successful, effective, active and efficient.

If

2B. University’s professors and staff are willing to go out of the campus and spend time and live in rural community.

Then

2b. Local community members are likely to be more interested in participating in the program.

If

2C. A university has set up a network and build up a partnership with relevant institutions and organizations to share resources so as to transform knowledge, technologies and skills into rural communities.

Then

2c. Expected outcomes can be reached.

If

2D. A university’s training, research and extension programs have been closely linked with the local needs and the university has considered any specific conditions and situation in the program target areas.

Then

2d. More benefits can be achieved by rural communities.

If
2E. Apart from the university’s contribution for rural development, the university itself has also grown while it serves rural development.

Then

2e. The universities themselves can be promoted, developed and make benefits for themselves.

3. Universities must adopt a variety of approaches in their multiple roles (how are these models realized in practice?).

If

3A. Digital technology, Internet access and other simple and effective media have been used by the university for its rural education and agricultural extension, and digital infrastructure has been extended from urban to rural areas.

Then

3a. New findings and new skills according to practice needs can be put into the communities for their development. And efficiency in terms of cost, staff’s time and learner’s achievement will be much more increased.

If

3B. Community members are organized into various technical or learning societies, associations or other NGOs under the guidance of university staff.

Then

3b. A learning society could be created ensuring that all efforts are applicable, appropriate and necessary for rural communities.

If

3C. The university-community partnership has been established by using package contract approaches and establishing joint ventures.

Then
3c. Community members’ ability and capacity can be empowered and a learning society can be created so that long-term benefits can be achieved.

If

3D. University student volunteers are encouraged, especially agricultural university students, to launch social practice work and other practical courses in rural areas.

Then

3d. The rural development projects can be more sustainable when the project implementators leave the project sites.

If

3E. Rural, regional or night training and consulting centres are established.

Then

3e. Apart from serving the rural development, the university itself can also be developed; university staff and students can learn from farmers and get benefits from implementing the programs.

If

3F. A large group of community members are trained and encouraged to become backbone members of an extension work force.

Then

3f. The rural development programs will be more easy to carry out and more benefit will be made for the communities.

From the above hypotheses and sub-hypotheses, simple IF-THEN relationships have been tentatively identified. These will be explored in the following chapter-comparison in more complex detail.
Chapter 9 Comparison

9.1 Introduction

The data and information in previous chapters have been juxtaposed in Chapter 8. After juxtaposition, the next step in Bereday’s comparative method is the Comparison; this is to:

“entail a simultaneous treatment of several and all countries studied to prove the hypothesis derived from the juxtaposition. A comparison is in a final analysis an ordering process; it means not laying out but highlighting educational materials previously processed” (Bereday, 1964, p 22).

In the end of chapter 8, some hypotheses have been presented positing tentative relationships between university knowledge and rural development. This chapter expands on these relationships. “Comparison will be to determine whether this relationship really holds true in the manner indicated in all the above cases.” (Bereday, 1967, p. 174)

According to Bereday (1967), there are two forms of comparison: balanced comparison and illustrative comparison. In balanced comparison, the materials under study are shuttled symmetrically back and forth, especially “every type of information from one country must be matched, ‘balanced,’ by comparable information from other countries” (p. 175). The search is for equivalent materials across national frontiers.

In illustrative comparison: “Educational practices in different countries are drawn at random as illustrations of comparative points suggested by the data” (Bereday, 1967, p. 178). Illustrative comparison is used where balanced comparison is impossible or inadvisable.

In this study, balanced comparison is used since equivalent knowledge and materials at the research sites of both countries, Australia and China, have been built up symmetrically in previous chapters.
9.2 A General comparison of Population, Rurality, Government, Economy, Language, Geography and Education in both sites

9.2.1 Introduction

In this section, some common factors are reviewed and compared. The idea is to revise the general understanding about the two systems and to trace how such understanding is reflected in the educational provisions of both study sites. Following this general comparison, each hypothesis and sub-hypothesis will be developed.

9.2.2 Population:

Comparison:

In 2000, the total population in Hebei, China was 67.44 million, which ranks as China’s 5th largest province. 81.02% of the population lived in rural areas, and the population density was 395.3 persons/km². (Chinese National Statistic Handbook, 2001). In the NT, the population in 2001 was about 200,000, the smallest population jurisdiction in Australia. Less than one fourth of the population lived in rural areas, and the population density was 0.1 person/km². Therefore, in Hebei, total population and population density are much higher than that in NT (Chapter 4 and Chapter 6).

In terms of rural people’s dispersion, in Hebei, China, normally hundreds or thousands of households lived in a village, while in rural NT, people lived separately, and scattered throughout the vast landscape.

Discussion:

Rural population and population density in Hebei, China is much more than those in rural NT. Therefore educational needs and provision of services as well as demand for rural development are far greater quantitatively speaking in rural Hebei.

9.2.3 Rurality:

Comparison:
In rural Hebei, the economic situation is much less prosperous than that in the urban areas. Most people rely on agriculture as the main source for family income. Educational provision is weak. School’s attendance is low, dropout rates are high and the literacy rate is low. The basic infrastructures of education, health, transport, communication and employment opportunities need to be improved greatly. Some people in this rural area are in a condition of poverty since they lack development resources.

Education is one of the main measures to empower people and it appears to be in urgent need. Effective delivery of new applied technology and skills, and promotion of quality of rural life, and community development are becoming more and more important in rural Hebei. All kinds of educational innovative intervention appear to be necessary (see Chapter 8).

In rural NT, the urbanization rate is quite high. About three quarters of the total population live in urban areas (see Chapter 6). There is almost no really “rural population” in the NT. Rurality is considered as remoteness (Griffith, 1992). However, rural NT has suffered as a result of the lack of resources in education, health, communication, transport and employment opportunities.

Discussion:

China is a developing country; Hebei is an agricultural province, where most of the population live in rural areas and fully rely on agriculture. Australia on the other hand is a highly urbanized country, and diversity between rural and urban areas is small, but unlike other parts of Australia, the NT has faced many developing imbalance problems, especially between rural and urban areas.

9.2.4 Government and administrative structure

Comparison:

China has a centralized-government, and its governance is based on a four-level structure and divided into provincial, prefecture, county and township administrative units. In rural Hebei, the basic administrative unit is a village, including a natural village and an administrative village (may include a few natural villages). Generally, the size of a natural village is between 50-3000 people, which normally is related to
the geography of the area, the higher number in plains and lower ones in mountainous areas (see Chapter 4).

In the Northern Territory, generally speaking, there are three levels of administrative units: Federal government, Territory government and local government. The local government includes city council, township council and village council. On 1 July 1978 the Northern Territory became a self-governing territory. However distance from urban centres is a problem for governments (see Chapter 6).

Discussion:

There are some of the key differences between China and Australia of government functions: China has a long time centralized, well established and very organized government. Many social aspects are the government’s responsibility, whereas, Australia has had a democratic government for about 103 years. The NT has had self government for about 26 years.

9.2.5 Economy

Comparison:

In 2000, the gross domestic product (GDP) in Hebei Province was about 507.63 billion Yuan, equivalent to 61.83 billion US$ and ranks 6th in China. GDP per capita is 7,527 Yuan, equal to 916.8 US$, and ranks 11th in China. These statistics show that the economic situation in Hebei is in the upper-middle level of economic development in China. Hebei has a long history of agriculture, and it is one of the main agricultural production areas in China (see Chapter 4).

The economic development of Hebei accelerated after the “Cultural Revolution” and with the national “Open Door Policy” and reached an annual rate of 10.6 per cent growth of the gross domestic product.

In the Northern Territory, the economic capacity is small and only occupied about 1.3% of national gross domestic product (GDP in 2001). In 2001, the Territory’s gross state product (GSP) was valued about AU$ 7.45 billion. Unlike rural Hebei, there is very little farming to contribute to the economy. The economy relies on
substantial Federal government transfer payments, abundance of natural resources and mining, tourism, national defence and a short distance to Asia.

Establishment of self government in 1978 has given a positive opportunity for the economic development in the NT. In 2001 the GSP has increased 10 times compared to 1978 (see Chapter 6)

Discussion:

It is clear that both Hebei, China, and the NT, Australia, have experienced fast economic development in the past 20 years, and strong potential for further growth and development. The scales are vastly different. Furthermore, agriculture has played an important role in rural Hebei, whereas, very little farming has existed in rural NT.

9.2.6 Geography, Language and Cultural Diversity

Comparison:

In the centre of the North China Plain with a total area of 187,700 square kilometres, Hebei Province embraces two big cities, Beijing (the national capital) and Tianjin, which ranks 14th in land resources and about 2% of total area in China. The landscape consists of sea, mountain, plateau, plain, and wet land. With a temperate continental monsoon climate, Hebei province has four seasons: spring, summer, autumn, and winter (see Chapter 4).

Generally speaking, there is only one language-Mandarin used in Hebei province, and almost all people are of one ethnicity-Han. Only a few are Muslim. Therefore, there is limited cultural diversity in Hebei, China.

In the centre of the northern part of Australia lies one self-governing Territory-the Northern Territory with a total area of 1,347,525 square kilometres. It is 17.5% of the total territory of Australia. The Northern Territory is composed of sea, plain, desert, and wet land. There are two seasons in the Top End tropical area: dry and wet seasons, but in the central area of NT, four seasons (spring, summer, autumn and winter) exist (see Chapter 6).
With its special location, and Australia immigration policy, the Northern Territory has great language diversity, and also language is based on culture and tradition. Therefore, cultural diversity appears. The 1996 Census shows that 22.5% of the Territory’s population was born overseas and the Aboriginal population was 28.5% of the Northern Territory’s population and represented 13.4 of the total Indigenous population in Australia (see Chapter 6). Generally, Territorians speak English; but French, German, Chinese, Japanese, Italian, Greek, Indonesian, Tagalog (Philippine language) and other languages, as well as 150 different Indigenous languages, are spoken by the population.

Discussion:

That there are big differences in the study sites of both countries in terms of geography, language and culture diversity.

9.2.7 Educational Development

Whilst the thesis is specifically concerned with university responses to rural development, the nature of the study through comparative research dictates that for completeness the Technical education system must be examined as well. The following pages briefly examine Technical and Further Education (TAFE) at both research sites. It is especially significant for the CDU as it is a dual purpose institution and enrolls greater than half its students in TAFE.

Comparison:

Educational development for both systems is an important issue to be considered and compared in this study.

In Hebei China currently, the general system of formal education comprises four stages: the primary, the junior secondary, the senior secondary, and the higher education. Rural Hebei usually provides only the first three stage as a 6-3-3 system (six-year primary, three-year junior secondary and three-year senior secondary). In the NT almost the same system exists, a 7-3-2 system has been used (seven-year primary, three-year junior secondary and two-year senior secondary). After the establishment of the People’s Republic of China, education in the above four stages has been improved significantly. Generally speaking, there have been five periods of
educational development that correspond to the political, social and economic changes and transformation in China, namely: “1949-1957, the transition to socialism”; “1958-1960, the great leap forward”; “1961-1965, Readjustment and recovery”; “1966-1976, cultural revolution”; and “1976-present, post-cultural revolution reforms and opening-up”. In the NT, educational development in this study is from 1978 when Northern Territory became a self-governing Territory of Australia.

The fastest and most important stage for educational development in Hebei China emerged from the period of post-revolution reforms and opening-up to the outside world, which started from 1976 until now. From that time on, the Chinese Central Government and Hebei provincial government have considered many issues through policy, documents and laws about educational reform and development. For example, in 1983, the government of Hebei province initiated the reform of the administrative system of education in rural Hebei and started to transfer the responsibility of primary and junior secondary schools in rural areas to the local government: In 1985 educational reform legislation officially placed rural secondary schools under local administration: In 1985 the definitive reformulation of the earlier decrees came with the “Decision of the Reform of the Education System.” This has been the guiding policy document of reform for all levels of education during the reform and opening-up years: in 1986, the Law on Nine-Year Compulsory Education took effect, and other issues related to technical and vocational education. All of those changes came from the guiding policy documents of educational reform for all kinds and all levels of education and guaranteed education for all in Hebei province. The main achievements were to popularize primary education, to popularize 9-year compulsory education, and to enlarge higher education as well as to develop technical and vocational education and other kinds of non-formal education (see Chapter 4).

In the Northern Territory the significant educational development started after the Northern Territory became a self-governing territory on the first of July 1978, almost the same time when Hebei developed its educational reform after the “cultural revolution”. The changing of educational administrative system from Commonwealth into Territory government has given the Territory more motivation, opportunity and responsibility to make significant improvement for various areas of
education in NT. The evidence has shown that a lot of changes have taken place. For example, school design and construction used to copy the southern states. Curriculum was implemented by borrowing documents from other states and territories. There are still strong linkages to South Australia at the Higher School Certificate level. However, after 1980, the construction of schools was more closely suited to local climatic conditions (see Chapter 6). Furthermore, Annual Reports of the NT Department of Education from 1982 to 1985 described educational reforms and innovations in many areas, such as, curriculum initiatives and policies, commitment to computer education, human resources and so on.

Unlike Hebei China, in which there is no Indigenous population, and the people speak and use the same language, the Northern Territory includes many culturally and linguistically diverse Indigenous communities with their own culture, languages, and knowledge. As indicated earlier, in the 1996 Census, the Indigenous population occupied 28.5 % of the Territory’s population, and also that number represented 13.4 % of total Indigenous population in Australia. In 2001 Indigenous students occupied 38% of the NT government’s total student population (DEET Annual Report 2001-2002, Department of Employment, Education and Training of Northern territory). Therefore, Indigenous education and development of Indigenous communities became an important component of educational issues in Northern Territory. This is a significant departure from the situations in Hebei, China.

The earliest formal Vocational and Technical Education (VTE) in China may be traced back to the industrial education in the 1860s, more than 140 years ago. The main content at that time (late Qing Dynasty) was to study western technology and train manpower with practical skills. In 1917 the “Chinese Vocational Education Society” was established, which was a precedent for the joint provision of vocational education by the educational sectors and industrial sectors. However, the slow economic progress and backward industry hampered the development of VTE in China before 1949. After 1949 when the People’s Republic of China was founded, some progress was achieved, but the normal pace of VTE development in China was seriously affected by the “Cultural Revolution”. Chinese VTE has achieved tremendous development after 1978 (post “Cultural Revolution and Reform Period”). China is a country in which the government plays a very important role for the main
activities of education. Therefore, governments develop the relevant policies, documents, regulations and decisions to ensure the educational activities occur as planned. This kind of intervention also happened in VTE. For instance, in 1991, the State Council formulated the “Decision on Energetically Developing Vocational and Technical Education” which identified the tasks and objectives for the further development of the VTE in the light of economic and social development in the 1990’s in China. The “Outline on Reform and Development of Education in China” drawn up by the CPC Central Committee and the State Council in 1993 required government in various levels to attach great importance to VTE, make overall plans and energetically develop VTE. The Outline on Reform aimed at mobilizing the initiatives of all departments, enterprises, institutions and all quarters of the society to provide VTE of multiple forms and various levels. Furthermore, in 1996, the first “Vocational Education Law” in China was formally promulgated and implemented, so as to provide legal protection for the development and perfection of VTE (Vocational Education in China, China Ministry of Education, Monograph in Chinese).

The Chinese system of vocational education consists of education in vocational school and vocational training. Vocational education in China is provided at three levels: junior secondary, senior secondary, and tertiary.

When it is conducted mainly in the junior vocational schools, it is aimed at training workers, farmers, and employees in other sectors with basic vocational/institutional knowledge and certain skills. Thus junior vocational education refers to the vocational and technical education conducted after primary school education and it is part of the 9-year compulsory education. To meet the local needs of labour power for the development of rural economy, junior vocational schools are mainly located in rural areas.

The senior secondary level mainly refers to the vocational education in the senior high school stage. It is composed of specialized secondary schools, skilled worker schools and vocational high schools and it is the mainstay of vocational education in China.
Tertiary vocational education programs mainly enrols graduates from regular high schools and secondary vocational schools.

Apart from vocational education, various vocational training schemes exist in China, mostly conducted and managed by the Department of Education and Labour, but enterprises are also encouraged to provide vocational training for their own employees.

In rural China, vocational education is mainly conducted by the specialized secondary schools in agriculture and forestry, rural vocational high schools and farmer schools. (Website 9.1)

Compared with Australia, the vocational education/training in China is still on a low level in terms of organization, management, curriculum, and other aspects.

Currently, compared with China, Australia has a very organized national system of Vocational Education and Training (VET) in terms of development, management and promotion of the National Training Framework, national strategy, curriculum design and advice, evaluation, and developing advice to identify and plan for future growth requirements. For example, there is a national training organization (The Australian National Training Authority – ANTA) in charge of the above mentioned activities and objectives.

VET in Australia started in the mid to late nineteenth century with the establishment of mechanics’ institutes, schools of mines and technical and working men’s colleges to develop the skills of Australia’s working population, typically men. For more than 100 years, the Australia VET system has continued to respond to industry, individual and community needs, focusing on capturing the best advice possible from industry; meeting client needs, and aiming for clearer, higher quality standards, all within a nationally consistent, quality VET system.

Vocational education/training in Australia today is “education and training for work”. It exists to develop and recognise the competencies or skills of learners. Traditionally, it has been viewed as post-secondary, non-university education and training, focusing on apprenticeships. But reforms in the past decade now see vocational education and training programs offered in secondary schools, stronger links with
university study options and six levels of qualifications offered in most industries, including high growth, new economy industries. In 2001 nationally, there were over 4000 registered training organisations, including TAFE institutes, private training and assessment organisations, enterprises, universities, schools and adult education providers. Vocational education and training in Australia is an industry-led system, and Australian federal government, state and territory governments provide the policy and regulatory frameworks for the VET system. Governments implement the National Training Framework (which includes Training Packages and the National Quality Training Framework) to enable consistency, quality and national recognition of provider services. Governments also provide approximately half the funds for the system, the other half being provided by enterprises and learners themselves.
(Website 9.2)

In Australia VET is composed of schools, TAFE and adult and community education institutions. Therefore, when we talk about VET in Australia, it is hard to ignore TAFE (Technical and Further Education). TAFE is a main body of VET in Australia, and the formal education for many careers. Generally speaking, there are three levels of education in TAFE: the first aims at education to obtain certificate 1-4, and specialize in short courses in business, office secretary, industrial design, house care, tourism and health sectors; the second is for professional diplomas, which is both to meet the personal career needs and a qualification to enter university, normally such study takes two years; the third focus is on degrees, specialized in applied science and computers, emphasising on theoretical, rather than practical like the first level. This last level within the TAFE sector is in its infancy. Degrees are typically reserved for universities. However this is changing (Website 9.3).

Discussion:

Primary and secondary education for both systems have similarities in terms of schooling years, government responsibility and significant development in the past twenty years.

China and Australia have approximately equal in land areas, which required both governments to find ways to deliver the education into those big areas. The difference is that in China, especially rural areas, people usually live in a village, but
in Australia, people’s living is very scattered outside the major urban areas. Sometimes it is more difficult to get people together for training and other educational interventions outside the urban areas.

China has for a long time had centralized, well established and very organized government. Education, of course, is a general function of government. Australia is different. The constitution of Australia which includes federal government and state governments in term of education is quite different to China; education in Australia is a state/territory government responsibility, but sometimes, the federal government intervenes and supplies funds for specific education. For example, if the federal government wants to improve scientific laboratories, it then offers money to improve laboratories. If the Territory government is willing to accept the program, then funds are allocated for this purpose. Consequently, the federal government through policy initiatives will supply money and keep actively involved in different education programs. This separation of funding and power is a key difference in education between China and Australia (In 19, 2004).

Even though it started early (about 140 years ago), VTE in China is still in an initial stage, as traditional educational thought has paid less attention to VTE. The most important development period of VTE is very short, only carried out after 1978.

In Hebei, the acceptance of vocational secondary schools was slow, at least initially. The perception lingered that these educational streams were only for those not able to pass in the traditional stream to climb the social ladder through higher education. In rural China a senior-secondary-school graduate is considered as an educated person, although secondary schools are viewed as a training ground for colleges and universities. And, while secondary students are offered the prospect of higher education, they are also confronted with the fact that university admission is limited. After 1978, the serious problem appeared that a large number of secondary school graduates returned back to their villages without any practical skills and could not meet the needs of rural economic development. Therefore, to develop secondary vocational education then became a major policy of the Central Government.

Although the NT has a well-established education system and high level of literacy, people in rural and remote and Indigenous areas still face issues of isolation,
transport links, computer roll out, building supplies, stable staff placements, and the need to marry traditional aboriginal concepts and western thought. The other critical component for the adoption of any educational or training programs concerns the continual poor health status of the traditional inhabitant—the worst in Australia on many counts including eye and hearing problems.

9.2.8 Summary

The previous section has described and compared the general factors of both systems in order to present a whole picture for comparison. The following section concentrates on developing the hypotheses listed earlier (8.3).

9.3 Comparison one: Universities need to play a role in serving rural communities (why is there a need for universities to play a role in serving the needs of rural communities?)

9.3.1 Universities, especially agricultural universities in developing countries have clearly identified that rural development is their main mission. Universities transform their knowledge base from research and apply it into rural areas (Sub-hypothesis, 1A).

Comparison:

It is clear that Chapter five has built up the necessary description of AUH and its rural development service to identify that from the beginning of 1980s, AUH in China has adjusted and reoriented its programs to rural areas as well as played an active and constructive role in rural development. CDU in Australia is a comprehensive university in a developed country. It is in a unique environment. It is the only university in a broader Northern Territory, and the only university outside Victoria with dual sectors (higher education and TAFE). CDU has understood the importance of rural development and it has put into practice rural involvement activities through its research, instruction and consultancy, both in the higher education and TAFE sectors. All such contributions emphasised human resources capacity building and the empowering of local people in rural, remote and Indigenous communities.
Discussion:

AUH is an agricultural university in a developing country. Its experiences and involvement in rural development service has shown that it has a key role to play in ensuring that critical knowledge and skills are imparted into rural communities to build human resources capacity. The impact of its involvement has made a significant contribution to the quality of education, on the improvement of rural life and on sustainable natural resources development. Of course, as an agricultural university, traditionally, its mission focused on crop and animal production. And it is a place for research, teaching and extension/consultancy. But along with the educational reform and opening door policy in the early 1980s in China, AUH has redirected its mission towards the broader aim of supporting rural development. The successful stories of AUH have proved that if a university, especially an agricultural university in a developing country has identified and redirected rural development as its main mission, then the transforming of knowledge base into rural areas and contribution of human resources capacity building in rural areas could be realized. The important issue found from this comparison is that any university (non-agricultural university in developing or developed country) like CDU, if rural development becomes part of its mission or at least consideration, then the new methods, new teaching and learning models and new partnerships could be created so that knowledge transformation into rural communities could be realized.

9.3.2 Different levels of government have committed strongly to support universities to deliver rural development service both financially, institutionally and with relevant strategies and policies (Sub-hypothesis, 1B)

Comparison:

Generally speaking, rural development is often seen as a government responsibility. The university, as an educational provider, has as its main mission, teaching, research and consultancy. Therefore in order to orient the university towards delivering rural development programs that encourage efficient use of the human resources and knowledge, government should have special policies to commit universities towards rural development as one of its services.
In China, government has a strong commitment to AUH to serve rural development programs. For instance, from the initial stage of the Taihang Mountain development project to the follow up and other programs, different levels of government encouraged and supported AUH financially, institutionally and with policies, strategies and government policy documents. All these commitments help to ensure that AUH can successfully deliver its rural development programs and achieve the expected outcomes. It is also clear that China is a developing country which has had a centralized government for a long time; government played a major role in many aspects of project development. Without government support, coordination, management, and commitment, the university itself would find it is very difficult to undertake some rural development programs.

Apart from financial support, the government’s commitment for CDU to undertake rural service programs is mainly built on establishing partnerships or cooperative activities. Government priorities, for example, were given to those programs which concentrated on areas in rural, remote and Indigenous education. The Northern Territory government, for example, supported the amalgamation of the CDU and Centralian College, in which CDU became the largest public providers of TAFE in the Territory, improving its ability to cooperate with secondary schools and also increasing its presence in Central Australia and research in fields of desert knowledge. One of the principles of the Northern Territory government’s partnership with CDU is to set up “particular projects enabling Indigenous social and economic development” (Higher Education Review-Submission to Collaboration Task Force, Office of Territory Development, NT, Sept’03, p. 1) in the Territory.

Discussion:

The government commitment for both universities to serve rural communities has similarities in many aspects, and thus the key difference that emerges is that AUH is an agricultural university in a developing country, focused on agricultural sector, and government in China has played a strong role in rural development activities, whereas, CDU is a university in a developed country, focusing on comprehensive fields, and the government’s intervention for rural development program is far less. Furthermore, AUH in China is mandated by the state to serve the agricultural and rural needs of the province (see Chapter 5), whereas, in CDU, Australia, it is difficult
for the government to do the same thing, as Australia has a democratic government system. (In 22, 2004)

Consequently, it can be concluded that different levels of government involvement is a key role for the successful transforming of research, knowledge, information and skills from universities into rural communities for their development, either in developing countries or in developed countries.

**9.3.3 Communities have paid great attention to the programs carried out by universities for rural, remote and Indigenous areas development** (Sub-hypothesis, 1C)

Comparison:

The successful rural development programs carried out by AUH and CDU depend in part upon the positive participation of the communities in different ways, and thus this is a common requirement in both systems. Concerning participation, people should have enthusiasm, motivation and be interested in and involved with the programs. For instance, some rural development programs achieve their common goal of economic development; some are intended to accomplish social and educational development; some may want to build their own individual personal capacity and empower themselves and some have other initiatives. “Ensuring community participation depends upon factors such as culture, capacity to respond, awareness of the issues and commitment to deal with the problems” (UNESCO, 2001). In AUH, most programs are concerned with agricultural extension since Hebei is an agricultural province. A large rural population and a limited amount of cultivated land require more and more useful techniques and active skills to be put into practice to increase crops and animal production and to improve people’s living standard. People themselves also use education and agricultural extension, as a bridge, to better themselves as governments continue to have a growing emphasis on human capacity development and economic development. Community participation on AUH’s rural development programs results in “mobilizing resources, sharing responsibilities and establishing a sense of ownership to sustain community development activities” (UNESCO, 2001). The very important issue of community participation in rural development must be considered if people are to be mobilized
properly as is highlighted in some of the stories on AUH identified successes (see Chapter 8).

CDU’s emphasis on participation has links with a community development tradition. Communities themselves want to be independent and prefer to engage the people with knowledge and skills in their communities rather than someone from outside. This self help often motivates the community. Aboriginal communities often want the people with knowledge and skills in their communities to maintain their knowledge. The fear is if they come to study in CDU or other universities, the community will lose them when they graduate (In 21, 2004).

Discussion:

It is a basic requirement for development that the community itself is willing to accept and participate in the university’s activities. For universities to serve rural, remote and Indigenous communities all programs to fulfil their objectives must have community participation. In this regard, AUH and CDU have found out that the successful way to maintain community awareness and mobilize the community into action is to have the community participate early in the identification of the aims of the program.

9.3.4 Summary

The hypotheses on three important issues regarding the roles of university for rural development have been discussed and compared. They are: first, the university must redirect its mission and include rural development as a key priority; second, universities’ rural development programs should be undertaken under the coordination, leadership, support and commitment of government at different levels; third, the expected outcomes and successful implementation of universities’ rural development programs can not be realized without community participation.
9.4 Comparison two: Certain criteria are needed for an effective model to transform knowledge, technology, information and skills from the universities to the rural communities (What activities should be used by universities to carry out rural development programs?)

There is no doubt that a university can make a positive and effective contribution to rural development through its knowledge, information and skills transformation. The considerations that need to be analysed in the sector are how to realize the transformation? What models are used by universities to do so?

9.4.1 Universities establish demonstration communities (Sub-hypothesis 2A)

Comparison:

As an agricultural university, AUH believed that specific demonstration is an effective way to transform knowledge, technology and skills from its research into rural communities. Consequently, AUH has set up many technology and actual skill demonstration bases in different countries, townships and villages. In some cases even a few demonstration households in one village have been set up to show the people in such surroundings the importance and benefits of technologies and skills. Many successful cases in previous chapters indicate that this is an effective way to transform knowledge, technologies and skills efficiently into rural communities.

Generally, there are three stages for AUH: first, at the beginning, farmers used to refuse to accept new techniques due to their low educational level, low awareness of the importance of techniques and low ability to bear the risk of changing traditional methods since they were not sure whether or not they would be any benefits. In this case, the staff from AUH introduced very simple, easy to learn techniques with less investment and more yields. These demonstrations showed that the farmer could get out of poverty sooner. This helped increase motivation to learn techniques and skills.

Second: model households were set up as the effective method used by AUH. Farmers in poverty-stricken areas usually respond to new techniques overcautiously and take a “wait and see” attitude. They will refuse to adopt techniques without visible evidence. To them “seeing is believing”. They want to know if a new idea or technique works or not. Due to this reality, staff usually focused on better-educated
farmers, and some key persons, especially members of the village committee. When other farmers saw the successful results, which had helped these pilot-farmers out of poverty, they immediately changed their attitude. Thus often an attitudinal change is necessary to get rural communities to accept innovation.

Third: Establishment of demonstration communities. After initial success of the demonstrations, the project is expanded further, focused on enlarging the demonstration area in a certain selected community, where many new techniques and research findings suitable to local environment could be examined and demonstrated. Farmers can make their own choices after comparing. Before and after demonstration trials, the university staff could also conduct applied research to solve new problems that appeared in agricultural production while the community adopted the transforming techniques. The demonstration bases serve as technology-dissemination centres. They could also serve as on-site instruction farms where university students could come into contact with farming practices and find out the actual needs of farmers. Therefore, these “integrated teaching, research and agricultural extension” into demonstration communities hold the key to the successful intervention in the Taihang Mountain Development Model of AUH (FI8, 2004)

This is no evidence to show that this approach happened in rural NT, or that a similar method was used by CDU through this study. However the NT government through its various Departments has, like the rest of Australian States, a well developed system of demonstration, trial field, crop experimentation, rural programs,

Discussion:

AUH is an agricultural university in a developing country. Extension is one of its main missions. And also in Taihang Mountain areas and other poor areas in rural Hebei, farmers’ educational level is very low. “The demonstration is a particularly powerful method to use with farmers who do not read easily” (Oakley and Garforth, 1985, p. 49). Therefore, the agricultural technology demonstration carried out by AUH has given farmers the opportunity to observe the difference between a recommended new technique and a traditional one; between poor seeds and recommended seeds. Some other innovative methods have also been used by AUH. Within the NT, the milieu is different. There is less agricultural activity in a broad
Northern Territory, less population living in rural NT area and a limited use of
demonstration as a policy although there is some evidence that visiting teams of
academics use the techniques as a teaching tool. The government typically fills this
gap through their Department.

9.4.2 University professors and other staff are willing to go out of the campus
and spend time and live in the rural community (Sub-hypothesis 2B).

Comparison:

It is clear that an effective way to transform knowledge and skills from university to
rural areas is that university staff (lecturers, professors) go out of the main campus
into the communities, living with community members, finding out what are the real
needs of rural people and communities, and, as a consequence helping them to build
up appropriate knowledge and skills. In AUH, as an agricultural university, rural
development and agricultural extension are the main public mission statements.
University staff’s daily work through their teaching and research activities thus focus
on such mission. In this case, professors and other staff often visit rural communities
and spend time with rural people. This is normal practice in an agricultural university.
The key difference between AUH and other agricultural universities is that AUH has
made rural development its priority. There is a long-term target for comprehensive
development in rural Hebei through continuous integration of teaching, research and
agricultural extension, as well as the combining of agriculture, science and education
and the integration of literacy education and technological extension with
agricultural production.

More than twenty years of practice has shown that staff, especially professors, from
AUH have paid their individual visits to villages. They carry out face to face training
and demonstrations in rural areas and they are more acceptable to the community,
because some rural farmers trust professors. The farmers are more likely to listen to
the instruction and advice given by them and they will be more grateful for this
individual attention. Oakley and Garforth (1985) also shared the same opinion:
“Personal influence of the extension worker can be a critical factor in helping a
farmer through difficult decisions, and can also be instrumental in getting the farmer
to participate in extension activities.”
Professors and staff of CDU, who visited research sites and rural communities maintain that such visits to rural Indigenous communities are a most effective method of getting information across. However this is an instructional technique for CDU rather than a mandated mission statement.

Discussion:

It can be concluded that both universities send professors and staff to rural communities to carry out development programs, but it seems that AUH has paid more attention in this in terms of numbers of visiting staff, visiting times and spending periods in rural areas because of its specific situation as an agricultural university.

9.4.3 The university has set up a network and built up a partnership with relevant institutions and organizations to share resources so as to transform knowledge, technologies and skills into rural communities (Sub-hypothesis 2C).

Comparison:

AUH is the only agricultural university in Hebei province. It has limited human and financial resources, so it can only offer limited direct support and service to rural communities. But the research achievements on crop production and animal husbandry as well as in other fields related to rural development have remained at high levels. In order to use research results fully, and resources of the university and transform them for the benefit of the rural communities, network and partnership building became important.

In Hebei province, there are 139 counties (or cities). Each of them has a vocational and technical centre. Furthermore, in each county, city, and township, adult school, and farmers’ night school have existed. Most of these are located in rural areas or somewhere close to the rural areas with agriculture and related science and practice as their disciplines. Most of the students are from rural areas and looking for the practical skills necessary for the development of the rural economy instead of textbook knowledge. Since such educational resources are located in every county/city, and cover most of the local conditions, AUH set up a network throughout these areas and built partnerships with those centres and schools to
enlarge its rural service capacity (Appendix 2). AHU helped such centres in teacher training, curriculum development, school management, program guidance and consultancy.

Apart from CDU’s campuses at Darwin, Palmerston and Alice Springs (in the heart of the Australian desert (see map 7.1)), there are centres located at Katherine (NT Rural College) and regional study centres located at Jabiru, Nhulunbuy, Katherine and Tennant Creek. These locations allow the Charles Darwin University to have a spread of educational resources and facilities across the breadth of the Territory with exposure to tropical and desert environments as well as the rich indigenous culture of Australia. Each Regional Centre acts as CDU’s link to regional and remote Northern Territory, making courses and training accessible to more Territorians. This network system seems to be work well in serving the isolated areas, local conditions, population distribution, and cultural diversity.

Discussion:

As universities, both CDU and AUH have limited resources in terms of human and finance. They thus can provide only some support to rural, remote and Indigenous communities. It is difficult to cover broad areas in rural Hebei and rural NT. The practices from both universities of network establishing and partnership building has become an effective way for their intervention in rural communities. As an agricultural university and serving a considerable population in rural Hebei, the network of AUH appears more complete, creative, efficient and considerably larger in numbers, whereas, in CDU the network is small in number, but the function of enlarging its service to a broad area and people, and meeting the people’s learning needs in different environment and different conditions has been realized.

9.4.4 The university’s training, research and extension programs have been closely linked with the local needs and the university has considered any specific conditions and situations in the program target areas (Sub-hypothesis 2D).

Comparison:

AUH’s rural development programs including training, teaching and extension have close links with local communities, taking consideration of local conditions. These
two principles (local community and local conditions) have been included in the program design and implementation. For example, from the beginning of 1980’s when the Taihang Mountain Development program was carried out, local conditions and local needs were two important issues for the projects to be considered before the implementation. From that time on, professors and other staff spent a long time in this mountainous area and made comprehensive system surveys and an analysis of the existing problems and potentialities. Finally, the “Resources Investigation Report in Taihang Mountain Area”, which included 15 specialized areas, was developed as a resource for future work. All this first hand data and information are used later by project implementators during development.

Other case studies have also shown that local conditions and local needs both for communities and for farmers have been considered. These include the development of new seed varieties and animal breeds in practical ongoing courses and research investigation of students and staff.

Paying continual attention to the real needs of rural, remote and Indigenous communities is also a consideration at CDU. The examples are found in the teaching, research and extension activities of CDU Rural College, Tropical Savannas CRC and the Centre for Indigenous Natural and Cultural Recourses Management. The university also has been active in developing rural and urban infrastructures in Fiji, Solomon Islands and Timor by invitation from the appropriate governments. The projects involve setting up new school systems, and rebuilding programs of health and education. Specific courses of teacher education, health and nursing education have also been developed to cater to the needs of rural areas overseas.

Discussion:

Both universities attach importance to the rural development programs, which focused on their training, research and extension activities with close link to the local needs and the local conditions. These kinds of development programs for AUH include training, research and extension, whereas, CDU has much more concentration on training and research, although TAFE extension programs are developed and implemented for overseas programs as well as Indigenous populations.
9.4.5 Apart from the university’s contribution for rural development, the university itself has also grown while it serves rural development (Sub-hypothesis 2E).

Comparison:

The responsibility of community development in developing countries such as China often falls to the university, especially agricultural universities. AUH has made various efforts to do this for more than 20 years. During these rural practice and rural service, AUH itself has also been promoted and upgraded in the following respects:

The university scale enlarged and student enrolment numbers increased. Since 1979, the construction of AUH has been carried out faster. In 1995, a new Agricultural University of Hebei emerged from the merging of AUH with the Hebei Forestry College. The size of AUH has been increased in terms of faculties, departments and number of staff and students. For example, in 1980, AUH operated 7 departments and 10 specialties. Now, (in 2001) AUH covered 25 colleges, and offering a total of 51 bachelor degree courses, 24 Masters Degree courses and 4 doctorate degree courses. The total student enrolment is more than 20,000, with more than 800 postgraduates for master and doctorate degrees. The teachers and staff members’ population is still 2000, the same as that of previous years (University Information Handbook 2001).

The specialties were adjusted and developed along with the adjustment of production requirement. Productivity has developed constantly and the structure of agriculture also changed. These changes called for the corresponding change of specialization offering of agricultural universities because the specialization framework and structure radically reflects the level of social economy and technology support. In order to fit in with the changes of rural industry structure, especially to meet the urgent need of rural commodity production and market economy development, AUH broke away from the traditional concept of agricultural production when setting up course specializations. The different fields of specialization were adjusted in accordance with the development of comprehensive and general agriculture. The social demand changes quickly, especially under the market economy condition. AUH took the view of being practical and realistic when putting up fields of
specialization. Present needs were considered as well as long-term viability so that the university gained a stable and healthy development.

Research deepened and developed further and integrated with teaching/training and extension. A number of research programs had come in after the research project on developing the Taihang Mountain in 1979. Some of these projects had gained attention on the provincial and national levels. Some international institutions like UNDP have recognized some research outputs by the university. Currently several research linkages have been fostered with other universities around the world. Research programs, research equipment and instruments increased, and funds sources for research and extension broadened.

Students’ awareness of science and culture improved, as did their capabilities. Students can not only improve their practical techniques, perceptual knowledge, and understanding of the society to enhance their comprehensive quality, but shorten their time for adaptation and strengthen their competitive power in employment after graduation. By launching the social practice activities (The student social practice activity referred to the fact that during school holidays, students organized by university visit factories, villages, communities, hospitals and other areas in order to understand them as well as make the contribution to them by their knowledge), the students’ spirit for the love of the land and to be of service and become involved in the development process is enhanced. Giving them first hand experience, helped to develop talent, allowing more creativity to surface and enhancing more innovative approaches. From theory to practice and from practice more concepts can be derived, creating possibilities for the development of new theories.

Similarly, CDU emerged out of DIT (Darwin Institute of Technology), and NTU (Northern Territory University). In 2004 NTU (former name of CDU) has merged with Alice Springs’ Centralian College joined with NTU to become Charles Darwin University to ensure that it was a University for all Territorians, no matter where they lived (Website 9.4). CDU grew from a community college, largely funded by federal, and Territory government, to a full dual purpose (Higher Education and TAFE) university funded under the national university system. This enlargement has given CDU an opportunity for more people to be educated and trained as well as to be
more involved in rural community services. Northern Territory Employment, Education and Training Minister Syd Stirling said that:

One of the main aims with the creation of Charles Darwin was to ensure that it was a University for all Territorians, no matter where they lived. This investment in Central Australia will help to achieve that vision. Importantly, it means more Central Australian students will be able to pursue their studies locally, rather than having to move to Darwin or interstate and staying there. (Website 9.5)

National priorities concentrating research on special niche markets have led to the development of a number of National Research Centres centred at CDU.

Discussion:

The practices of both systems have shown that universities can also be promoted and developed and make benefits for themselves while they serve rural development. This could become a critical issue in deciding if the university will choose to become involved in rural reconstruction.

9.4.6 Summary:

This section has examined the two sites and compared them with the structure of the second hypotheses, namely, Certain criteria are needed for an effective model to transform knowledge, technology, information and skills from the universities to the rural communities.

9.5 Comparison three: Universities must adopt a variety of approaches in their multiple roles (how are these models realized in practice?)

9.5.1 Digital technology, Internet access and other simple and effective media have been used by the universities for their rural education and agricultural extension, and digital infrastructure has been extended from urban to rural areas (Sub-hypothesis 3A)

Comparison:

The simple and effective media used by AUH to deliver information to farmers referred to broadcast and TV. And in some areas, for example, plant protection, a
hotline telephone was used by professors in relevant areas. Some weaknesses existed in rural Hebei with regard to this infrastructure. Agricultural information sometimes is inaccessible to the users at the grass roots level; incomplete coverage of agricultural information distribution often occurred at the grass roots level, which constrains information transmission. Only recently have Internet access and other digital services become available for agricultural information and rural development service. With the rapid development and application of information technology, geographic information systems, the system of remote sensing information, the system of global positioning, the expert system in agriculture, horticulture and animal sciences, as well as the agricultural analogue, techniques have become available for research, training, and rural development practice.

In CDU, digital technology and Internet access have been widely used for external learning and training workshops in rural, remote and Indigenous communities. The relevant infrastructure and many facilities necessary for distance training and learning are also available. Connections between campuses, and regional centres have been established. All those digital media have made the rural development training and other activities more efficient, less costly and more time saving. The modern technologies of geographic information systems, remote sensing information, global positioning system and other High-Tech media played important roles in rural research and development programs at CDU. Besides, audio-conference, video-conference and telecentres make on-line conversation and on-line learning available off campus. For this to be totally effective rural areas must be able to access it. (In 23, 2004).

Discussion:

Today new media tend to merge together to transmit information and deliver knowledge. CDU has made full use of modern media for its interventions with rural, remote and Indigenous communities, which has shown to be more effective and efficient than the previous print only courses. In AUH, the situation is different. Even though some modern technologies are available, the traditional media still lie in a mainstream of knowledge transforming, since a considerable amount of the rural population, has less development in IT infrastructure in rural areas and people’s awareness to use them.
9.5.2 Community members are organized into various technical or learning societies, associations or other NGOs under the guidance of university staff (Sub-hypothesis 3B)

Comparison:

When farmers’ knowledge level and their ability to accept science and technology and their enthusiasm to learn new techniques and skills has been stimulated, can they possess the ability to develop themselves. Using the motto: “to deal with ignorance before developing mountains”, AUH helped to establish various farmers’ technical associations using the principle of, “Experts taking a leading position, with local government coordination and model households selected as the core; farmers will join in the Associations by themselves adopting agricultural practical techniques as the top priority” (AUH, 1996). This approach results in the process of farmers’ positive learning instead of being trained passively.

Based on this principle, AUH has successfully organized more than 10 different farmers’ technical Associations, which have brought about obvious social and economic benefits. For instance, “Mushroom Association” in Tangxian County, “Chicken Association” in Laiyuan County, “Red Fuji Apple Development Association”, “Watermelon Association” and “Peach Association” in Shunping County, and the similar organizations of apple, vegetable and maize in Wuyi and Zanhuang Counties. Currently, the Association’s functions are composed of training, research, extension, production and marketing. This approach allows for the Association to become a learning, research and production society (see Chapter 5).

These Associations have played a very important role in promoting the development of rural education and production. They are helpful for farmers to learn techniques and skills and apply them positively. Such Associations also allow for the acceleration and extension of scientific research findings into rural areas to improve the farmers’ awareness of science and technologies. An example of this approach is found in the Red Fuji Apple Development Association of Beicheng Town in Shunping County set up by Mr. Huangpu Zhongsi, an associate professor in the Horticulture Department of AUH in November 1990. This Association has brought about considerable economical and social benefits. It not only provides technical
training courses, but also instructional services as well as farm inputs and marketing of products. The Association is mainly composed of model households while Mr. Huangpu Zhongsi acts as the technical consultant. Every year, Professor Huangpu goes often to the rural areas to hold technical training classes. Each will last 1-3 days according to the farmers’ practical needs in production. The curriculum include: the management of orchards, the prevention and control of apple tree diseases and elimination of pests, management of water and fertilizer, the storage and post-harvest handling of fruits, management of seedlings, as well as the establishment of orchards and so on. Each time over 1,000 farmers are trained. In 2001, the Association has been extended to more than 10,000 memberships, having Shunping County as the centre, including 110 villages in 6 counties nearby. The area of total orchards is up to more than 2,000 hectares. The apple output produced by the association members has been up to 37,500 kilograms per hectare, with the total output of 30 million kilograms. Some production has even exceeded that of Japan, the original place of Red Fuji, in terms of the yield and quality of apples. The Red Fuji apple production in Shunping County has become a primary industry in Taihang Mountainous Region in Hebei Province (see Chapter 5).

Similar societies in Australia and NT from farmers themselves and government initiatives could be found, like Dairy farmer cooperative, Goat Breeding Society, Pasture Protection Boards, Water Resources Commission, and etc. There is also a great deal of experimentation in the NT in agricultural output, especially with regard to rice and mango production and other tropical produce. Much of this analysis is driven by local entrepreneurs and the government department of Agriculture and Forestry. The university, via Katherine Rural College, also contributes training and research to this output. Many functions of these associations are done in Northern Territory by various Government Boards, eg. Pasture Protection Board, or Farmer Associations and Cooperation set up by farmers themselves. Part of CDU’s contribution in this area was to set up and expand the e-learning society. The innovative e-learning project was set up in Katherine and Alice Springs, which aimed “to enhance learning and teaching outcomes in remote areas” (Website 9.6). Participants use satellite as a media and IDL as a technology to transmit knowledge delivered by lecturers such as showing video footage, live demonstrations of materials and other electronic content like PowerPoint files, which students can view
on the computer screen. “The IDL sessions allow time for the students to gain valuable knowledge by interacting directly with the lecturer and discussing their studies.” (Website 9.7)

The innovative way is to involve students from remote areas into a similar teaching and learning classroom as inside CDU campus, and to create “the opportunity to talk face-to-face, demonstrate learning concepts and receive direct feedback from students is so important to the learning experience. There is real potential in the application to training, particularly for students who are isolated.” (Website 9.8)

Discussion:

It is apparent that learners’ or farmers’ associations can overcome some of the weaknesses of learning in rural areas with a broader rural coverage, and insufficient teaching resources. It has also been shown that training core farmers, organizing associations in the rural communities, and farmers learning by themselves under the necessary and effective guidance of associations are acceptable and most welcome by some farmers and that this approach can make substantial contribution to rural communities. It is also clear that AUH has done a lot in this area. Compared to AUH, in the NT, many of these functions are farmer driven, as opposed to university driven. As an aside, however, the University of New England, located in New South Wales is an agriculturally based university that performs many of the same functions associated with the agricultural universities in China, USA and Canada.

9.5.3 The university-community partnership has been established by using package contract approaches and establishing joint ventures (Sub-hypothesis 3C).

Comparison:

AUH initiated this package contract extension service in a range of counties. This approach brought a change of the delivery pattern of technology from only a special department towards an over-all operation pattern by mobilizing many departments like administration, material, supply, financial and monetary, bringing service closer to the needs of rural economic development. The operation of this particular approach is that the service provider, e.g. AUH, signs a contract package of technical service. The provider charges some fees for the overall service. AUH and Ding Xing
County, for example, formally signed a contract for an agricultural comprehensive technological package service in January 1989.

AUH established more joint ventures of teaching, scientific research and social practice with many others. By signing contracts with these bases AUH gradually changed the extension service mode from totally free to the combination of free and charged services. This new approach is aimed to benefit both sides, to mobilize the initiatives of both providers and recipients and to further enhance the enthusiasm of providers. Through many years of practice, AUH and the local partners of joint ventures have expanded the practice to a bigger scale. The service range was enlarged from science and engineering to art and soft science, from introduction to the expansion of extension service from techniques of increasing production to post-harvest processing technology, and from economic development to the combination of economic and education reforms. AUH formed such joint ventures with Shunping, Fuping and Xiongxian Counties from 1982 (see Chapter 5).

The university-community partnership has also been considered by CDU as a meaningful measure to deliver its knowledge into communities. For example, in July 2003 CDU signed a Partnership Agreement with Northern Territory Government on Internet-based education for remote communities and a virtual DNA facility. CDU former Vice-Chancellor Professor Ken McKinnon said the partnership agreement signalled a new level of interaction between the University and its community. “As a University for the Territory, it is critical that our intellectual resources, in collaboration with those of the Government, are brought to bear on the issues of most importance to the Territory,” and “This Agreement includes 25 schedules based around four themes, which are: Increasing resident professional capacity to address Territory opportunities; Meeting Government needs; Reorganizing the University to better meet Territory needs; Enabling Indigenous social and economic development. The main activities focused on remote communities with the specific needs of the Territory, like community development, conservation biology, natural resource management and tropical environmental science, health and diagnostics as well as Indigenous social and economic development” (Website 9.9). CDU also initiated a project at Alice Springs and Katherine for e-learning in collaboration with the Northern Territory Department of Education, Employment and Training who
provided funding to CDU. The new practices in flexible learning programs with a focus on interactive distance learning (IDL) technology “allow the lecturer to be viewed by the students as well as showing video footage, live demonstrations of materials and other electronic content like PowerPoint file” (Website 9.10) in remote areas.

Discussion:

It can be concluded that in order to use the resources of AUH, and to have these resources utilized for the mutual benefits of the university and communities, AUH initiated the university and community linkage and partnership in a broad area. Whilst the earlier approach in the NT was through farmers’ organization themselves and government sponsorship, recent policy shifts at government level and CDU management are refocusing CDU towards government initiatives and community development.

9.5.4 University student are encouraged volunteers, especially agricultural university students, to launch social practice work and other practical courses in rural areas (Sub-hypothesis 3D)

Comparison:

It is general practice for the Chinese universities to organize students to participate in social practice and other practical activities. In some cases, it is also part of a course requirement. AUH encouraged senior students to launch social practical work at the agricultural interface, and to serve the farmers. They use a one to one method, which means one student assists one farmer, and one group is assigned in one village. Activities used were broadcasting, blackboard, bulletin board announcements, and farmers’ night school learning. The course content for farmers includes promoting new high quality products, disseminating new technologies, offering training courses for local agricultural technicians, and delivering technical consultancy and on-site instruction. The activities can be undertaken, sometimes in vacation time and students are volunteers; sometimes its programs are carried out during school time as part of course requirement. During this practice, the students not only make a contribution to rural communities, but also experience the value of their knowledge
and find out the real needs of farmers. All of these activities are more helpful for their own career development in the future.

Surely there are many universities who facilitate different kinds of practice placements in Australia. The Student Union provides (through university funding) advice and a range of facilities for students. The university does provide placements for its trainees, e.g. teaching and child care, nursing and to a limited extend farming enterprises often such placements can be undertaken in remote Indigenous communities. This focus on rural development, however, was not a priority. However, with the appointment of a professor in rural education with a brief for community development and participation and a professor for Indigenous studies, this is likely to change. In some courses, like engineering, students need to find their own way to look for the practical sites. But in many cases, especially at TAFE, the opportunities for practice are arranged by CDU.

Discussion:

Students participating in practice to serve the communities has a mutual benefit for students themselves and for the communities. AUH has promoted this kind of activities. This has been less evident in CDU in this regard, but changes are happening as CDU repositions itself with regard to the community.

**9.5.5 Rural, regional or night training and consulting centres are established**
(Sub-hypothesis 3E)

Comparison:

Rural learners or farmers are adults. Therefore, the establishment of various kinds of schools for them to meet their learning needs are often during their spare time from agricultural production or at night. AUH used this method for its rural adult training and extension intervention. For example, AUH helped establish adult schools in Shuping County. In these schools, there is one infrastructure with multi-purposes, which means, there are combined functions of night school, library, information station, plant and animal clinic, agricultural technology extension service station, development of and new agricultural varieties, machines and fertilizers, chemicals sales are all combined into one place to serve the local communities so as to realize
the statement of “diverting science and technology water; through the education channel; to irrigate agricultural farm” (Li, 2000). Professors and staff from AUH are involved in the activities of these adult comprehensive schools in various ways showing a guidance, consultancy and even direct services.

In Australia many of these functions are absorbed by government Departments. For example, the DEET Casuarina Secondary College building becomes Casuarina Evening College during after school hours where a range of interesting and formally accredited courses are run by qualified staff from all areas of education, business and government. Secondly, many of one-stop-shop functions are catered for in Agricultural shows in regional communities. In the NT the Freds Pass, Darwin, Katherine and Alice Springs shows are often one-stop shops, but this response is limited to once a year. The Business School at CDU has a Crocodile Firm as a virtual business. However, university involvement as a policy issue in adult rural training is minimal compared to AUH. With the appointment of a Professor in rural education with briefs for community development and participation and a professor in Indigenous studies, this is likely to change.

Discussion:

In developing countries like China, rural problems appear in the areas, such as, a big rural population, much reliance on agriculture, low educational level, less resources both in basic school infrastructure and human resources and less economic development. The development of those kinds of comprehensive schools in rural communities has proved to be very effective in carrying out and managing, acceptable rural education in rural communities. Such approaches are most welcome by rural people. Some efforts have been made by CDU through its practical Crocodile Firm, and a new professorship appointed.

9.5.6 A large group of community members are trained and encouraged to become backbone members of an extension work force (Sub-hypothesis 3F)

Comparison:

Chinese farmers are very conservative people living in a closed system. Often they resist change and they are unwilling to adopt new techniques or new methods easily
without any concrete results. Apart from this, the common feature of farming production confirms that any technical result requires a long time for implementation. The farmers in the extension areas slowly adopt new techniques. The AUH technical team established fixed bases, selected a few community members. Normally they are educated people, some community leaders or some people who are willing to participate and have the ability to do so.

Apart from training local key members in the communities, AUH cooperates with government to deliver a program, called “program of one village, one graduate student from AUH”. The government provides scholarships and signs contracts with individual students from rural communities to make sure after they graduate from AHU, they will return to their home town. This practice shows that those graduates who have obtained advanced knowledge and are also familiar with local communities’ environments have soon become key members in their own communities.

All these key members in the communities actively involve themselves in agricultural extension work and demonstration practice. After they have achieved economic benefit, they will become the ‘models’ and be followed by other farmers.

There is a similar issue in the NT where Indigenous students are selected from and by the community to be trained, but, on receiving training, they may not wish to return to the community. There is a Tertiary Institution in the NT called Batchelor Institute of Indigenous Tertiary Education that trains community members for Indigenous communities. There are two ways they deliver training courses, but also make sure when the trainers finish their training courses. One is to carry out the training courses inside the communities; the other is to select key persons or backbone selected from the communities to carry the innovation. In this way there is an attempt to keep the participants in the communities to spread the knowledge gained (In 24, 2004).

Discussion:

Role Modelling in rural communities both in Australian and in Chinese context has proved to be an effective way to disseminate knowledge to rural communities suitable to specific rural conditions. This kind of practice has also been considered as
one of the innovative methods used by AUH and the Batchelor Institute of Indigenous Tertiary Education to transform knowledge and technology into rural communities.

9.5.7 Summary:

There are other innovative methods universities can use to serve the rural communities. The third hypothesis includes only six sub-hypotheses in terms of innovative approaches undertaken by the university for rural development, which have been examined and compared.

9.6 Conclusion

This chapter has examined and compared the two systems, Hebei China and NT Australia as well as AHU and CDU. From this chapter’s discussion and analysis, it is clear that the study has analysed different issues related to both sites and universities on three hypotheses, that is:

1. Universities need to play a role in serving rural communities (why is there a need for universities to play a role in serving the needs of rural communities?);

2. Certain criteria are needed for an effective model to transform knowledge, technology, information and skills from the universities to the rural communities (what activities should be used by universities to carry out rural development programs?);

3. Universities must adopt a variety of approaches in the multiple roles (how are these models realized in practice?).

In the comparison of this chapter, ‘Balanced comparison’ method (Beraday, 1964) was used to identify and determine whether or not above hypotheses held. The main findings will be presented in next chapter, Chapter 10, Conclusion.
Chapter 10 Conclusion

10.1 Introduction

Two case studies on the roles of university in rural development have been developed in the previous chapters. A comparative analysis and discussion of the two cases has also been undertaken to comply with Comparative Education Methodology. Some critical issues relating to the study should now be identified and summarized in this chapter, as well as the main findings and conclusion.

10.2 Overviews of the study

Generally speaking, the study is intended to find out in depth the relationships if any between: the university and rural development through the university’s knowledge’s dissemination processes. Therefore, ‘development through education’ becomes an important issue woven through the study. How to transform the knowledge base from universities into rural, remote, and Indigenous communities to make benefits for the people and the communities becomes a major focus of the ‘development’.

10.3 Development and rural development

1. Development and rural development: prospective future for the people in rural, remote and Indigenous areas

Development and rural development can be realized through economic growth, which can effectively reduce poverty and improve people’s living standard. But economic growth is not only a reflection of development and can not be realized without the consideration of human potential development in terms of its material, spiritual, individual and social dimensions. Attention has been drawn to the factors, which affect human development. “Human development is a process of enlarging people’s choices. Three essential areas are for people to lead a long and healthy life, to acquire knowledge and to have access to resources needed for a decent standard of living.”(Human Development Report, UNDP, 1991)

Rural development: encompasses agriculture, education, infrastructure, health, capacity-building for other than on-farm employment, rural institutions and the needs of vulnerable groups. Rural development aims at improving rural people’s livelihoods in an equitable and sustainable manner, both socially and environmentally, through better access to assets (natural, physical, human, technological, and social capital), and services, and control over productive capital (in its financial or economic and political forms), that enable them to improve their livelihoods on a sustainable and equitable basis. (Atchoarena, David and Gasperini, Lavinia, 2003, p. 21)

Education is a social practice for human resources development and national capacity building. Also, education, as a medium for empowering human being, providing knowledge and information, increasing farm productivity and farmers income, reducing fertility rates, enhancing health and nutritional factors of human beings and other quality of life indicators as well as changing attitudes and values, can make contributions for rural development. To some extent, education can play centre stage of development, and from this point of view, it is as an ethical imperative, that “education is an intrinsic good to be cherished for its own sake and a basic human right” (Ordonez etc., 1998, p. 5).

It is a common understanding that communities cannot be developed without an educated population. And it is clear that educated farmers are willing to accept new knowledge, technology and information and actively participate in the programs for promotion of social, economic and cultural aspects of development. Also, without basic knowledge such as fundamental literacy, numeracy, problem solving and productivity skills, rural excess labour find it difficult to obtain a good wage working outside the farm, whether in rural or urban areas.

Sometimes, education/ training and development, especially economic development, as well as social improvement in rural areas seem to be out of phase.

Businesses, large or small, are unlikely to choose to invest in rural areas if skilled or trainable human resources are unavailable. Similarly, a community can not retain educated people without an attractive economic environment. Many poor rural areas, mostly but not only in developing countries, are trapped in this situation (Atchoarena, David and Gasperini, Lavinia, 2003, p. 28-29)
Education and training are powerful vehicles for human capacity development and for rural or community development. Furthermore, there are many reasons to believe that education contributes positively to improve people’s life styles and living standard. Education contributes also towards increasing a farmer’s technological consciousness and awareness of agricultural knowledge, and information to impart positively on their agricultural productivity and community development as well.

2. Knowledge, technology and information transfer from university to rural communities for development

Universities as higher educational institutions have many advantages in terms of human resources of staff and students, advanced knowledge, information and technologies, and mechanisms to deliver these into rural areas. A university also “has a responsibility to provide teaching and learning opportunities for those who seek careers in the management of the rural development process or who will, at various levels, implement rural development activities and processes” (Atchoarena, et. al, 2003, p. 311).

What can the university bring to knowledge transformation and education for rural development?

It can educate the professional and technical personnel needed to promote sustainable agriculture and take leadership in implementing the process of rural development. It can bring critical agricultural messages to the education system at primary, secondary and adult levels. It can tap into the desire of millions for life long learning. It can be the voice of reason and factual information in emotional debates about real or apparent food quality and food safety issues. It can equip teachers of the education system with the knowledge and skills required to bring the agriculture message to that system’s enrollees. It can be an invaluable resource for policy-makers. (Atchoarena, et. al, 2003, p. 332).

It is clear that the practices of CDU and AUH, discussed in previous chapters, have shown this transformation successfully. The followings are summaries of their stories.

In AUH, the rural development services have been in the areas, such as guiding the counties, townships and villages to formulate their social and economic development programs; implementing joint development projects of production, teaching and
research; delivering various forms of education and training; and facilitating village leaders and farmers to acquire new ideas and concepts of development. Due to its significant contribution to the development of Taihang Mountain areas, the Chinese government has called its experiences “the Taihang Mountain Road”, which should be followed by others (see Chapter 5).

The key features of AUH involvement in rural development programs are: integration of teaching/training, research and production; using multi-disciplinary techniques and knowledge to develop a comprehensive regional development plan; strong leadership, technical and back-up services; influencing farmers through model households; and student volunteers’ intervention (see Chapter 5).

In CDU, the knowledge transformation and rural development programs focused on empowering the local people with knowledge, technologies and information in rural, remote and Indigenous communities. The intervention includes: education/training, health, Indigenous education, research and consultancy as well as agricultural/horticultural extension (see Chapter 7).

3. More concerns on rural development

There are many factors that effect rural development. Education alone cannot be responsible for rural development. There are still some factors, for example, the economic underpinnings, economy, culture, tradition, social stability and security, resources, natural conditions and so on, that affect the development of a rural community. Education is one of the important issues to empower the rural people for development.

Empowerment is the process of increasing the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes. Central to this process are actions which both build individual and collective assets, and improve the efficiency and fairness of the organizational and institutional context which govern the use of these assets (Website 10.1).

Empowerment is an important issue. It can aid self determination. Empowerment can change the environment in which poor people live, helping them build and capitalize on their own attributes. Educational activities which empower poor people are
expected to increase development opportunities, enhance development outcomes and improve people's quality of life.

Therefore, empowerment of the poor can become a main issue for rural development, and education is a key measure to empower the poor. In terms of empowering farmers and improving their literacy level through education and training, 75% (12 out of 16) interview results show that direct on site teaching and training is the best way. This feeling is best summarized by the following extract.

Farm forums or farm discussions where experts/panelists go to the sites and have dialogue with farmers about their farm problems. I have been actively involved with these for years working in the applied communication office where we have the so called agri-caravan where for a quarter of a year we moved from one place to another to hold a fiesta-like activity showcasing the best produce by farmers, a contest linked with the technology hands-on demo where farmers who could perform the techniques very well have the chance to win the prize at stake. The prize maybe in the form of fertilizers, farm chemicals or live animals such as piglets or goats depends on what our donor provides. Then a panelist of local leaders from the mayor or governors office together with technical experts will conduct a dialogue among local people raising technical issues and other related ones. (SS 7, 2002) (The actual surveys can be found in Appendix 4. Charles Darwin University Ethics Committee approval was obtained for the approach. Where the permission was not given, their names have been deleted.)

The results of interviews have shown that the demonstration is very important for the farmers in China (77.8%, 7 out of 9), since:

[The] most effective way to extend new varieties and new skills for farming is to show the results of new varieties by carrying out experiment in rural areas. As farmers in China cultivate their land individually, they only use new varieties and new skills for farming if they see personally the practical results. (SS 2, 2002)

Of course, “extension activities, but in a new approach” should also be a concern for rural economic development. (SS 12, 2002) and (SS 7, 2002) Furthermore, other activities related to rural development should:

Actually relate to the needs of the people living in these communities (now and future); to improve lives of rural people, economic, health, social and cultural; to involve the people in planning, and implementation; to empower people; economically, politically, socially. (SS 1, 2002)
Other concerns from surveys in this regard could be summarized as: in terms of educational issues, community members self-consciousness is critical, and a way for people in the community to “understand their real situation and take informed action to make changes.” (SS 8, 2003) The community members may request appropriation workshops, training courses, such as “building construction training” and demonstration activities (SS 8, 2003), (SS 10, 2001), (SS 11, 2002). And also: “Bringing in rural community leaders, with whom they can relate, is a way of exposing new ideas to a given community, without them feeling that the educational institution is imposing new ideas on them without regard to their actual needs.” (SS 3, 2002)

In terms of rural transformation activities, most (81.3%, 13 out of 16 of the interviewees) agree that it is a long-term changing process and education plays a vital role. The surveys show that these activities should be something to “help people develop human capacity, hence improve community capacity to achieve social and economical gains” (SS 5, 2002)

Some other surveys highlight that:

Changes are not going to happen immediately. There is a lag period. It takes some time. It depends on the total attitude of the community. Some resist change. Some welcome change. But normally there are groups of people (often they are key persons) who will have great influence on the changes that will happen. If the attitude is lukewarm, the development worker should pay more attention to this key people to convince them by letting them understand the project. If they resist – take your time but persist—they are observing you carefully. If their attitude is positive—make full use of them by making them fully participate—making them key implementers of the changes and give credit to them. (SS 7, 2002)

And:

This can have positive as well as negative effects. I am worried about negative rural transformation, where rural communities are transformed into poorer and further disadvantaged communities, where social and cultural values and language are lost and where family structures break down. Positive rural transformation is the opposite. It is about building the quality of life in rural communities without losing the good qualities of rural
communities. Rural transformation involves changes in attitudes, and practices. Education plays a vital role. (SS 1, 2002)

Many surveys address the important issue for rural transformation activities to be successful that they must be sustained when the project implementers leave the project sites. There should be “a program in place which gives great emphasis to follow-up communication and feedback. ‘Show-and tell’ and ‘hand-on’ are best” (SS 6, 2003), “training local people as team leaders or project coordinators to carry on some of the activities” (SS 5, 2002) and “should be a policy of government rather than an individual action” (SS 2, 2002)

Further extracts identify policies and experiences that should be used, for instance:

Before leaving the sites, capability training is a must, which means a set of rural community leaders must oversee the project to sustain its success level. I have been involved in one assessment of the “Save the Children Foundation” project site. SC Foundation after implementing the project has properly trained key leaders to continue managing the cooperative that has been running successfully for years under their guidance.

In my own experience I think regular visits to call on the key leaders and some home families will make them feel they are remembered. This can be coupled by attending their activities once in a while. I have been invited to many social functions in communities where I worked before. I always find time to attend this. They also appreciate that because they feel they have acquired sustainable links to my organization.

But in my own theory what is more important is to link rural transformation to the economic activities of the people in the community. If these changes will provide them opportunities to continually better their lives – the changes that have been initiated will take care of themselves and the transformation process will continue. In principle that means rural industrialization is the best sustainable approach –by leaving a significant industry (in the form of enterprises run by the people) to provide jobs and improve the economic life of the residents. Economic development will enhance social transformation and will better the health system as well as the environment of the communities. (SS 7, 2002)

Concerning what kinds of technical support, knowledge, skills and other approaches need to be used to increase farmers’ (or rural workers’) scientific knowledge and capabilities, the answers are quite different due to their personal feelings, experiences
and knowledge bases. For example, some survey respondents believe that a series of methods could be used, such as:

1. Actual demonstration followed by hands-on training; 2. Video tapes of techniques, which the farmer can see over and over again; 3. Farmer scientist approach – a farmer who has original ideas has been helped to package his technology with the help of the technical personnel. (The farmer teaches the technical personnel; he in return understands the technology and packages it scientifically for further dissemination); and 4. Demonstration sites – where proven techniques were used in the farmer fields and he is guided how to use the technology. Later he will become the core source of techniques that will radiate in the whole community. (SS 7, 2002)

On-site training, showing and demonstration should be a more useful approach, which shows farmers how to do it and explains the importance and economic benefits of such practice. Because, “It is just like selling a product. You sell the product not because you want their money but you try to provide the benefits the product could offer to them. In sharing technology it is like selling –you should make the people feel that you only want to help them make their lives better with the technology”. (SS 7, 2002); others argue that easy understanding manuals or reading materials with simple language, using local experts or local farmers to help explain things, formal training courses, demonstration and exhibits and agricultural shows would be useful. (SS 6, 2003), (SS 16, 2003) and (SS 1, 2002)

10.4 The roles of university for rural development

10.4.1 Why universities?

Universities are higher educational institutions. The World Conference on Higher Education in the Twenty-first Century: Vision and Action, was held in UNESCO Headquarters in Paris, from 5-9 October 1998. The conference report pointed out that: “the core missions of higher education - to educate, to train, to undertake research and to provide services to the community - must be preserved, reinforced and further expanded.” The conference also stressed that “higher education institutions must seek to educate qualified graduates who are responsible citizens and to provide opportunities for higher learning throughout life.” (Website 10.2)

The main purposes of Australian higher education are to:
• Inspire and enable individuals to develop their capabilities to the highest potential throughout their lives (for personal growth and fulfilment, for effective participation in the workforce and for constructive contributions to society);

• Advance knowledge and understanding;

• Aid the application of knowledge and understanding to the benefit of the economy and the society;

• Enable individuals to adapt and learn, consistent with the needs of an adaptable knowledge-based economy at local, regional and national levels; and

• Enable individuals to contribute to a democratic, civilised society and promote the tolerance and debate that underpins it.” (Higher Education Report for the 2001 to 2003 Triennium, 2001, Australia Department of Education, Training and Youth Affairs, Australia, p. 3)

The significant task of higher education in China is to foster highly skilled personnel with the spirit of creativeness and the ability of practice, to develop science, technology and culture, and to promote modernization drive. (UNESCO PROAP, 1998). It includes education for academic qualifications and education for non-academic qualifications, and also takes the forms of full-time schooling and non-full-time schooling. (The Laws on Education of the People’s Republic of China, 1999)

10.4.2 What is the Higher Education Function?

Generally speaking, three main functions need to be fulfilled by the university: teaching/training, research, and extension/consultancy. However, these functions can be expanded to include specifically social and economic development. The Asia and Pacific Regional Conference on Higher education National Strategies and Regional Co-operation for the 21st Century held in Tokyo, Japan (8-10 July 1997) made the Declaration about Higher Education in Asia and the Pacific, that is:

we reaffirm that the aims of higher education can be summarized as following: to educate responsible and committed citizens, to provide highly trained professionals to meet the needs of industry, government and the professions; to provide expertise to assist in economic and social development, and in scientific and technological research; to help conserve and disseminate national and regional cultures, drawing on the contributions from each generation; to help protect values by addressing moral and ethical issues; and to provide critical and detached perspectives to assist
in the discussion of strategic options and to contribute to humanistic renewal.

10.4.3 The roles of university to serve the local economy, especially rural, remote and Indigenous communities, and transformation models

In terms of the ways in which the universities can serve the rural communities, some arguments emerged from surveys and interviews. For example, one survey mentioned that:

There are three ways for universities and higher education institutions to serve rural development. The first is to develop new varieties and new skills for farmer according to the practical needs. It has proved that technology constitutes the key to development of modern agriculture. And new varieties and new skills for farming cannot be born among farmers-universities and research institutions of agriculture should undertake this task. The second is that universities and higher education institutions should help with setting up network of higher and secondary educational and technical institutions to extend new varieties and new skills for farming. The third is to send professors in agriculture to rural areas to help solve the problems farmers encountered. Though it is not possible for professors to spend much time working in rural area, but being present in fields with farmers will have an exemplary role for other farmers (SS 2, 2002).

The other respondents mention some ideas following the role of university, for instance, “The university’s role is to bring new ideas, better practices, and recent discoveries to rural communities in order to improve the level of production and rural living standard.” (SS 6, 2003) Another concern is that “extension service” should be the best way to serve the rural communities, which includes extending technology or promoting technological literacy among the rural folks. Furthermore, capability building by making farmers literate enough to make choices and wise decisions also needs to be concern, which could provide farmers survival skills (emergency and health knowledge e.g. first aid), functional skills (e.g. some skills to get a job – technical skills), etc (SS 7 2002) and (SS 13, 2002). Some people believe that collaborative work should be used to meet rural people’s educational, research and consulting needs. Rural development should be long term and should have a “better match between what the educational institute provides and the real needs of the rural community.” (SS 3, 2002)
Others emphasize that universities have a role in serving their community, which is a responsibility for the universities located in regional or rural areas to all people in their location. Universities located in a rural community should be a main vehicle to help support the community and local development and community survival, which is an issue for rural transformation (SS 15, 2003) and a “concern where communities are getting smaller and urban centres” (SS 1, 2002). The surveys data revealed that the universities’ rural development or service programs should be “regular, on-going, on-site and face-to-face contact with all providers and students”; “a community based workshop” (SS 5, 2002) should be used to “provide specific advice and assistance in the development”; (SS 8, 2003) “introducing new techniques” (SS 4, 2003).

In terms of the strategies in which the universities can use to translate technical knowledge from the universities to rural communities face to face showing and demonstration is critical since “I think that when people see success they are more inclined to want to try something rather than just hearing the story of something… This is particularly the case in poor areas”. (SS 1, 2002) Living in a rural community and participating in their activities have proved to be effective strategies (SS 7, 2002).

This was a very risky experience especially when I once lived in an area frequented by rebels because I am being watched and also my activities. But my dedication paid off. I was not only able to change the old beliefs of people in their farming practices but I also gained their sympathy and they empowered themselves. I have a face-to-face talk with some sympathizers of the rebels and the rebels themselves. I don’t know how I win over them but I have prevailed. (I just told them that we maybe have similar aim to liberate the poor; the only difference is the way to achieve it --- I shiver with fear when I remember this encounter).

When I went home this January – I made a visit to that place and saw some changes – I don’t claim such changes for my effort but what I am happy about is that I have been part of the early development of that community. (SS 7, 2002)

“Any activities which will help the farmer improve production levels and therefore family income, as well as a higher standard of living for the rural community” (SS 6, 2003) could be considered as useful for universities. Most of surveys show that almost all of the following are useful: training workshops, reading materials, demonstration and exhibition, on-the-job training, project-based learning,
apprenticeship, study tour, interest group, hobby group and radio, TV, posters, manuals and other media.

Table 10.1 Statistical data on helpful activities for universities for rural development

<table>
<thead>
<tr>
<th>Activity</th>
<th>not helpful</th>
<th>Not very helpful</th>
<th>helpful</th>
<th>quite helpful</th>
<th>very helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Training workshop</td>
<td>2(12.5%)</td>
<td>3(18.7%)</td>
<td>10(62.5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Reading materials</td>
<td>2(12.5%)</td>
<td>4(25%)</td>
<td>1(6.3%)</td>
<td>6(37.5%)</td>
<td></td>
</tr>
<tr>
<td>3. Demonstration and exhibition</td>
<td>2(12.5%)</td>
<td>2(12.5%)</td>
<td>12(75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. On-the-job training</td>
<td>1(6.3%)</td>
<td>2(12.5%)</td>
<td>12(75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Project-based learning</td>
<td>1(6.3%)</td>
<td>3(18.7%)</td>
<td>2(12.5%)</td>
<td>9(56.3%)</td>
<td></td>
</tr>
<tr>
<td>6. Apprenticeship</td>
<td>1(6.3%)</td>
<td>7(43.7%)</td>
<td>4(25%)</td>
<td>3(18.7%)</td>
<td></td>
</tr>
<tr>
<td>7. Study tour</td>
<td>3(18.7%)</td>
<td>7(43.7%)</td>
<td>5(31.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Interest group</td>
<td>3(18.7%)</td>
<td>5(31.3%)</td>
<td>5(31.3%)</td>
<td>2(12.5%)</td>
<td></td>
</tr>
<tr>
<td>9. Hobby group</td>
<td>8(50%)</td>
<td>3(18.7%)</td>
<td>2(12.5%)</td>
<td>2(12.5%)</td>
<td></td>
</tr>
<tr>
<td>10. Radio, TV, posters, manuals and other media</td>
<td>2(12.5%)</td>
<td>11(68.7%)</td>
<td>2(12.5%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above table shows that, according to surveys of all respondents, all activities named here are helpful, four items are particularly helpful with percentage scores of 56.3% or above, that is, training workshop (62.5%), demonstration (75%), on-the-job training (75%), and project-based learning (56.3).

Concerning the strategy to be ranked as the number 1 in importance in getting university knowledge and research into rural communities, most of the Chinese surveys agreed that it was project-based learning. Demonstration and extension are also very important in this regard, and:

Generally speaking, agriculture universities in every country know that their work should serve agricultural development in each country. However, they are thinking of more in human resource development, less in extending the findings to rural areas. There is a traditional concept that university people should do research, extending should be done by others. Therefore, that the extending of findings should constitute part of work for university has not been solved in many developing countries. This is in theory. What is more, that it is more difficult to find practical ways that is acceptable to all agriculture universities as to effectively extend the findings. The most important strategy, therefore, is to have an agriculture university in a country to do pioneering work in this respect. Its success story in extending the findings of university
would encourage other universities to follow its example. (SS 2, 2002)

In terms of essential factors for successful translation of university findings into usable rural information, my interviews with key informants from China suggest that agricultural universities should be set up in rural areas in order to make better use of human resources, and better services for rural communities. At very least some areas should be closely linked with rural communities or campuses set up in rural areas. Other arguments highlight areas, such as, simple extension programs, face to face talking by university professors and staff, as well as training workshops and other courses.

Responses from key informants in Australia are quite interesting. Many of them think that the information or findings should be closely related with the need of local area and must be relevant to the farmers, (SS 2, 2002) & (SS 6, 2003), there should be “provision of information on the application of the research in a manner that non scientific people can understand”. (SS 4, 2003), “making information accessible to people with low levels of formal education”, (SS 8, 2002) and “written in language that is appropriate to the implementators of change. Much university research is written for a university audience and follows an academic format that isolates rural people. Universities are still caught up on this elitist model of higher knowledge that is power” (SS 1, 2002). Other concentrated opinion emphasizes: that farmers’ perspectives are included and research actually closely relates with the need of rural people; work with or involve rural people; work as equal partner or having joint ownership in a research project; and that research should have practical application to real projects.

From previous discussions and information from previous chapters, apart from teaching/training and research, the university reveals that a key function, which is a significant factor for the university to transform knowledge to rural communities for their development, is that of extension training. Evidence that work in human resources development and human capacity building in co-operation with different government departments and agencies for local economy and rural development is an emerging interest.
Three important issues relate to the successful transformation of the knowledge base from universities to rural communities. That is: universities themselves need to clearly identify that they wish to make a contribution for rural development; governments in different levels need to commit to support universities’ rural service programs; and communities need to participate positively in universities’ rural development programs.

From the comparison and juxtaposition, several different models of university transformation practices emerge. These models are seen as neither complementary nor posited as alternatives. From the analysis, several models can be developed that identify the aspects necessary for successful university intervention in rural development.

Model one: The important model for the roles of university for rural development is to establish a lifelong partnership with rural communities. Individuals then have an opportunity for lifelong learning. These options should be flexible, including formal and informal training. Training courses in rural areas could be many one-day courses. Universities should become “skills banks” for each individual in which the students banks their skills and knowledge over a long period of time allowing universities to develop flexible qualification certification requirements. Universities need to establish a long term learning community in rural areas. “Clearly there is much to be gained from such a partnership, including a strong focus of university resources and expertise on social, cultural and economic issues regarded as important by the Territory Government, and the opportunity to strengthen the university in areas critical to the future of the Territory”. Professor Ron Mckay, former Vice Chancellor of CDU, said: “Of course, there is nothing particularly new about the idea of working together for mutually beneficial outcomes. There are many examples of successful joint projects involving the university, government departments and others across a range of areas in education, training and research.” (On Campus, page 2, Vol. 4, No. 5, March 2002). This model requires continual reinforcement to be successful.

Model two: to combine theory with practice to make benefits for the students and local communities members. For instance, the CDU practice firm, Crocodile World, sponsored by Crocodile Park, a private company, is a fine example. Professor Ron Mckay, addressing on the 2002 Top End International Trade Fair for practice firms
or virtual enterprises had the following comments (On Campus, Vol. 4 No. 12, 4 July 2002). The idea is that: “practice firms have simulated workplaces in which students learn about business by doing it in a safe environment, allowing skills and abilities to be tested and developed”. Some other cases from CDU and AUH in this context have also indicated that it is possible and desirable to combine theory with practice to be an efficient and effective way not only for the university, but also to the rural community.

Model three: government commitment, financially and administratively, has proven to be a very important ingredient for the university to be successfully involved in rural and regional development programs. For instance, the Northern Territory Government announced on 30 April 2004 that it would put an AU$2.5 million commitment to Charles Darwin University's Alice Springs Campus, which will enable the immediate establishment of a Higher Education Centre on this campus and make higher education in Alice Springs a reality. As a result of this initiative, better facilities and improved higher education opportunities for Central Australians will be possible. Besides, a further $500,000 will also go towards integrating IT systems, stationery, the website and other system changes.

From the CDU website (10.3), the following paragraphs explain the dimension of this model.

"One of the main aims with the creation of Charles Darwin University was to ensure that it was a University for all Territorians, no matter where they lived. This investment in Central Australia will help to achieve that vision. Importantly, it means more Central Australian students will be able to pursue their studies locally, rather than having to move to Darwin or interstate and staying there."

"It demonstrates a commitment to build local capacity in higher education and research, particularly in desert knowledge, to underpin the region's social and economic development."

Importantly, a wider range of lecturers and course programs will be offered through an integrated e-learning component allowing students to simultaneously participate in classes delivered from the Casuarina (Darwin) campus, 1500 kilometres to the north.
As well as enhancing the delivery of programs to 'on campus' students, the Centre will provide a resource base from which educators can deliver programs to rural communities. (Website 10.3)

Model four: has its focus on community participation. This is another key issue to ensure that rural development programs reach their expected goals. For instance, during AUH implementation of the project of Revitalizing Villages through Science and Education, a professor came to a village and lived with the farmers to deliver the innovative techniques. The first time when this professor conducted the technical training class, no one participated even though the village leaders announced several times. After further motivation by the leaders from door to door encouragement and promising to pay those who attend the training course, finally, 8 villagers came in. After training, these 8 villagers realized the importance of technology in their agricultural production. Soon they began to encourage others to attend the training class voluntarily. Gradually more and more farmers came to classes, even those farmers from the nearby villages participated in this activity (INRULED, 2000).

10.4.4 The future perspectives to enlarge the university’s rural development programs and to create benefits for rural people

Besides the traditional measures for universities to transform their knowledge bases to rural, remote and Indigenous communities, modern information technology and digital media such as E-education/training, E-commerce and tele-communication increase the possibilities for universities to enlarge their rural development service and programs. These innovations will provide considerable promise to enhance teaching and learning for both on campus and distance education and training. The approach will help to establish networks of institutions and scholars, to serve larger groups and to facilitate communications among researchers and teachers. Of course, at the same time, harnessing this technology will require considerable investment in both hardware and staff development. (Declaration about Higher Education in Asia and the Pacific, Higher education National Strategies and Regional Co-operation for the 21st Century held in Tokyo, Japan, 8-10 July 1997).

Both the case study universities, AUH and CDU, have further considered and used this digital opportunity to serve the rural population. Through innovation and
partnership building with government agents, relevant organizations and communities, the universities have been able to transform their research knowledge for rural development.

10.4.5 What are main similarities and differences of the activities carried out by CDU and AUH in rural development

In the view of traditional activities to serve rural communities for rural development, the two universities, AUH and CDU, have used similar interventions, such as teaching, training, research, consultancy and extension, as discussed in previous chapters. Comparatively speaking, some weaknesses and strengths appear in different areas for each university’s rural service programs, only because the priorities focused on by two educational institutions and conditions for both countries are different.

Other similarities, for example, establishing a partnership with government is the way to help facilitate universities in supporting the development of the rural communities. Community participation may ensure the program obtained the expected outcomes.

The different approaches adopted by the two universities are a product of different environments, conditions and different service bodies in the rural areas. For example, as an agricultural university, AUH has concentrated more in agricultural technique extension. At the same time, as a developing country with a majority of its population living in rural areas, urgent educational needs of rural Hebei required AUH to focus its activities on agricultural and related areas; income generation for the rural population; technology illiteracy alleviation; promotion of rural people’s life and so on. All of these approaches are much more urgent and important issues to be considered by AUH. Furthermore, the traditional media are still a main channel for AUH’s rural development programs, but its digital services and information technology are in an initial stage to be used for rural development programs.

CDU is different. As the biggest Indigenous population in Australia lives in the NT, CDU has made considerable contribution to Indigenous education and training as well as Indigenous Community development. Another difference is that most programs of CDU delivered in rural areas are aimed at human capacity building in
education, health, environment, finance and etc. The third difference is Information Technology and digital media. This has been broadly used by CDU for its rural, remote and Indigenous education, training, extension and so on.

**10.4.6 Summary**

It can be concluded from the research data that the effective development model for the knowledge transformation from universities to rural communities can be summarized as following.

Universities can provide information, knowledge bases, facilities and talented staff; governments have responsibilities for financial, administrative supports and relevant strategies and policy making; communities need to have a positive attitude to ensure the motivation of their members and their participation, and the provision of local services. Modern digital communication and information technology is an important contributor for knowledge transformation and technology dissemination. All these efforts aim at the establishment of a learning society to empower populations in rural, remote, and Indigenous communities for development.

**10.5 Main findings and conclusion**

**10.5.1 Main findings**

There are five important aspects for knowledge transforming activities identified within AUH and CDU.

First, the university itself. There is an urgent demand for AUH and CDU to concentrate their activities for rural communities in terms of technological extension, training, and local people’s capacity building. This is necessary in order to improve their communities’ living standard and well being, and to benefit the university itself.

Thus these kinds of programs enable the university’s teaching, research and other academic activities to be used for the mutual benefit of the universities and local communities. Besides teaching, learning and research, university’s staff and students should be involved in extension programs, taking the university knowledge base to the community.
Second, rural community participation is another important aspect of rural development. The rural development programs carried out by the universities (or other agencies) must be attractive to the people both psychologically and economically to make the programs more acceptable for the local people in the community.

Third, government commitment and actual involvement in the programs enable some of the weaknesses of universities to be overcome.

Fourth, modern information technology and digital media give universities a great potential and prospective opportunities to be involved in rural development program effectively and efficiently.

Finally, the program implemented in the rural community itself, should be more sustainable to make sure that it could be still active after the program implementer has left the program site.

There is no doubt that some universities have a mission, function or role to serve rural communities. Do professors, staff and students themselves, have such a function?

1. Program needs:

Some programs (research, training and extension program) need to be carried out in rural areas, especially agricultural university programs. Therefore, serving a rural community is an integral part of the program objectives.

2. Administration needs:

Exemption from some restrictions for promotion. For example, in a Chinese university, everyone needs to have a English exam before promotion can be gained. It is compulsory policy, but in some cases, if the staff serve in a rural area for two years, this exam is waived. This maybe a problematic issue considering important of English in the global economy:

3. Student needs:
University students in some areas, especially agricultural university students, need to have a period of time, at least six months, for practice to meet the degree requirement.

4. University needs:

Universities also need to have their extension bases developed so that new varieties can be tested, new research areas can be found, and also new research can be carried out.

This study has shown that the university’s extension advice and service meets some of the needs of farmers and rural communities. This particularly applied to such simple practices and skills as the use of improved varieties, improved planting practices, correct fertilizer application, and so on.

10.5.2 Conclusion

In the end of chapter 8, three main hypotheses and sub-hypotheses were listed based on the information and data juxtaposition of two case studies. Below these hypotheses and sub-hypotheses are listed again for convenience.

1. Universities need to play a role in serving rural communities (why is there a need for universities to play a role in serving the needs of rural communities)

If

1A. Universities, especially agricultural universities in developing countries have clearly identified that rural development is their main mission. Universities transform their knowledge base from research and apply it into rural areas.

Then

1a. University has a key role to play in rural development.

If

1B. Different levels of government have committed strongly to support universities to deliver rural development service both financially, institutionally and with relevant strategies and policies.
Then

1b. University can not play such a role if there is no policy support or financial aid from governments.

If

1C. Communities have paid great attention to the programs carried out by university for rural, remote and Indigenous areas development.

Then

1c. A university’s rural development program can not achieve the expected outcomes if it fails to work with other institutions concerned to form a network serving rural development.

2. Certain criteria is needed for an effective model to transform knowledge, technology, information and skills from the universities to the rural communities (what activities should be used by universities to carry out rural development programs).

If

2A. Universities establish demonstration communities.

Then

2a. The university’s rural development program can be more successful, effective, active and efficient.

If

2B. University’s professors and staff are willing to go out of the campus and spend time and live in rural community.

Then

2b. Local community members are more interested in participating in the program.
2C. University has set up a network and build up a partnership with relevant institutions and organizations to share resources so as to transform knowledge, technologies and skills into rural communities.

Then

2c. Expected outcomes can be reached.

If

2D. University’s training, research and extension programs have been closely linked with the local needs and university has considered any specific conditions and situation in the program target areas.

Then

2d. More benefits can be achieved by rural communities.

If

2E. Apart from the university’s contribution for rural development, the university itself has also grown while it serves rural development.

Then

2e. The universities themselves can be promoted, developed and make benefits for themselves.

3. Universities must adopt a variety of approaches in their multiple roles (how are these models realized in practice).

If

3A. Digital technology, Internet access and other simple and effective media have been used by the university for its rural education and agricultural extension, and digital infrastructure has been extended from urban to rural areas.

Then
3a. New findings and new skills according to practice needs can be put into the communities for their development. And efficiency in terms of cost, staff’s time and learner’s achievement will be much more increased.

If

3B. Community members are organized into various technical or learning societies, associations or other NGOs under the guidance of university staff.

Then

3b. A learning society could be created ensuring that all efforts are applicable, appropriate and necessary for rural communities.

If

3C. The university-community partnership has been established by using package contract approaches and establishing joint ventures.

Then

3c. Community members’ ability and capacity can be empowered as well as a learning society can be created so that long term benefits can be achieved.

If

3D. University student are encouraged volunteers, especially agricultural university students, to launch social practice work and other practical courses in rural areas.

Then

3d. The rural development projects can be more sustainable when the project implementators leave the project sites.

If

3E. Rural, regional or night training and consulting centres are established.

Then
3e. Apart from serving the rural development, university itself can also be developed; university staff and students can learn from farmers and get benefits from implementing the programs.

If

3F. A large group of community members are trained and encouraged to become backbone members of an extension work force.

Then

3f. The rural development programs will be more easy to carry out and more benefit will be made for the communities.

This study has shown that universities, especially agriculture oriented universities, can and do make positive and active contributions for rural development. It was also noted that universities themselves can not fulfill this comprehensive and complex task alone due to some weaknesses that exist administratively, institutionally, financially, and with lack of government and/or private resources. Therefore, apart from universities adjusting their missions and concentrating on rural service and rural development through teaching, research and extension/consultancy programs, governments in different levels should also rethink their own objectives and working areas to support the university’s rural development programs. Furthermore, communities must have a positive attitude toward co-operation with the university rural development programs and make the best use of them to serve the communities. Apart from those efforts, modern information technology and digital media give more opportunities to enhance the university’s rural development services. The model developed within the thesis attempted to develop a linear relationship between various cause and effect situations (IF-THEN). It was noted, that whilst it is appearing to draw specific cause and effect (IF-THEN) relationships, the linkages within the model can only be tentatively expressed pending further research. It was suggested that whilst the model is effective in identifying such connections and explaining potential scenarios further development of the models’ complex relationships should be carried out. As data is identified, this should enable the model to be expanded systematically to closely approximate the real world.
It is recommended that:

1. A similar comparative study should be undertaken to ascertain the potential for university involvement in alleviation of poverty traps within rural communities, as poverty in its many manifestations hinders rural development.

2. The simple model developed as model 1 in this study be expanded by using model 2 and model 3 (p. 217) as templates for a comparative study.
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Website 9.10:

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Website 10.3:

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Appendices
Note:

The thesis is in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

The candidature included field work, surveys, interviews and literature reviews as part of the research.

I have also included 4 papers in the appendices that were presented at various venues in China and Australia during the course of my candidature.
Appendix 3: Interview schedule

These interviews are referred to in the text by their appropriate number. For example, Interview 2 will be referred to as In 2.

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<th>Position</th>
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<td>Aug. 2001</td>
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<td>Mr. Antoine Barnaart</td>
<td>Pro-Vice Chancellor TAFE</td>
<td>June 2003</td>
<td>Darwin Australia</td>
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<tr>
<td>In16</td>
<td>Dr. Greg Hill</td>
<td>Dean, Faculty of Education, Health and Science, CDU</td>
<td>June 2003</td>
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<tr>
<td>In17</td>
<td>Dr. Allan Arnott</td>
<td>Senior lecturer of CDU</td>
<td>June 2003</td>
<td>Darwin Australia</td>
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<tr>
<td>In18</td>
<td>Dr. Ian Falk</td>
<td>Professor of CDU</td>
<td>June 2003</td>
<td>Darwin Australia</td>
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<tr>
<td>In19</td>
<td>Dr. Brian Devlin</td>
<td>Associate Professor of CDU</td>
<td>Feb 2004</td>
<td>Darwin Australia</td>
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<tr>
<td>In20</td>
<td>Dr. Suzanne Parry</td>
<td>Senior lecturer of CDU</td>
<td>Feb 2004</td>
<td>Darwin Australia</td>
</tr>
<tr>
<td>In21</td>
<td>Dr. Greg Hill (re-interview)</td>
<td>Dean, Faculty of Education, Health and Science, CDU</td>
<td>March 2004</td>
<td>Darwin Australia</td>
</tr>
<tr>
<td>In 22</td>
<td>Dr. Peter Wignell</td>
<td>Senior Lecturer, CDU</td>
<td>September 2004</td>
<td>Darwin Australia</td>
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<tr>
<td>In 23</td>
<td>Dr. Greg Shaw</td>
<td>Senior Lecturer, CDU</td>
<td>September 2004</td>
<td>Darwin Australia</td>
</tr>
<tr>
<td>In 24</td>
<td>Mr. Prue King and Ms. Jaclyn Miller</td>
<td>Remote Area Librarian and Head Librarian, Batchelor Institute</td>
<td>September 2004</td>
<td>Batchelor Australia</td>
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<tr>
<td>In 25</td>
<td>NT government</td>
<td>September 2004</td>
<td>Darwin Australia</td>
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## Appendix 4: Survey Schedule

These surveys are referred to in the text by their appropriate number. For example, Survey 2 will be referred to as SS 2.

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<tr>
<th>Code</th>
<th>Name</th>
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<th>Time</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS 1</td>
<td>Greg Shaw</td>
<td>Senior Lecturer, CDU</td>
<td>September 2002</td>
<td>By email, English</td>
</tr>
<tr>
<td>SS 2</td>
<td>Yu Fuzeng</td>
<td>Former Secretary General, Chinese National Commission for UNESCO</td>
<td>September 2002</td>
<td>By email, English</td>
</tr>
<tr>
<td>SS 3</td>
<td>Glyn Rimmentgton</td>
<td>Professor, Uni of Wichita, USA</td>
<td>September 2002</td>
<td>By email, English</td>
</tr>
<tr>
<td>SS 4</td>
<td>Peter Jolly</td>
<td>NT government</td>
<td>March 2003</td>
<td>By email, English</td>
</tr>
<tr>
<td>SS 5</td>
<td>Jane Zhang</td>
<td>Lecturer, Bachelor Institute</td>
<td>March 2003</td>
<td>By email, English</td>
</tr>
<tr>
<td>SS 6</td>
<td>Ray Cleary</td>
<td>Associate Professor, Uni. of Wollongong</td>
<td>Jan. 2003</td>
<td>By email, English</td>
</tr>
<tr>
<td>SS 7</td>
<td>Helen Genandoy</td>
<td>PhD student, AUH</td>
<td>September 2002</td>
<td>By email, English</td>
</tr>
<tr>
<td>SS 8</td>
<td></td>
<td>Staff, CDU</td>
<td>September 2002</td>
<td>By email, English</td>
</tr>
<tr>
<td>SS 9</td>
<td></td>
<td>Staff, CDU</td>
<td>September 2002</td>
<td>By email, English</td>
</tr>
<tr>
<td>SS10</td>
<td>Zhang Tiedao</td>
<td>Beijing Academy of Educational Research, Beijing</td>
<td>September 2001</td>
<td>By email, Chinese</td>
</tr>
<tr>
<td>SS12</td>
<td>Tao Peijun</td>
<td>Staff, AUH</td>
<td>September 2002</td>
<td>By email, Chinese</td>
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<tr>
<td>SS13</td>
<td>Zhou Jizhu</td>
<td>Staff, AUH</td>
<td>September 2002</td>
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<td>SS14</td>
<td>Zhang Zhihua</td>
<td>Staff, AUH</td>
<td>March 2003</td>
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<td>SS15</td>
<td>Zhou Damai</td>
<td>Staff, AUH</td>
<td>March 2003</td>
<td>By email, Chinese</td>
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<td>SS16</td>
<td>Zhang Jianguang</td>
<td>Staff, AUH</td>
<td>July 2003</td>
<td>By email, Chinese</td>
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## Appendix 5: Field Visit and Investigation Schedule

These Field Visits and Investigations are referred to in the text by their appropriate number. For example, Field Visit and Investigation 2 will be referred to as FI 2.

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<th>Code</th>
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<th>Note</th>
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<tr>
<td>FI1</td>
<td>Baoding and ChaiChang, Hebei China</td>
<td>September 2001</td>
<td>Spend 10 days</td>
</tr>
<tr>
<td>FI 2</td>
<td>Qiannanyu, Hebei China</td>
<td>September 2001</td>
<td>Spend one week</td>
</tr>
<tr>
<td>FI 3</td>
<td>Anguo, Hebei China</td>
<td>Jan. 2002</td>
<td>Spend two weeks</td>
</tr>
<tr>
<td>FI 4</td>
<td>Shijiazhuang, Hebei China</td>
<td>Jan. 2002</td>
<td>Spend two weeks</td>
</tr>
<tr>
<td>FI 5</td>
<td>Baoding, Hebei China</td>
<td>December 2002</td>
<td>Spend one month</td>
</tr>
<tr>
<td>FI 6</td>
<td>Beijing, China</td>
<td>December 2003</td>
<td>Spend ten days</td>
</tr>
<tr>
<td>FI 7</td>
<td>Baoding, Hebei China</td>
<td>Jan 2004</td>
<td>Spend one month</td>
</tr>
<tr>
<td>FI 8</td>
<td>Baoding, Hebei China</td>
<td>June 2004</td>
<td>Spend one month</td>
</tr>
<tr>
<td>FI 9</td>
<td>Katherin, NT, Australia</td>
<td>November 2001</td>
<td>Spend one day</td>
</tr>
<tr>
<td>FI 10</td>
<td>Darwin, Australia</td>
<td>June 2001-August 2001</td>
<td>During my staying in CDU</td>
</tr>
<tr>
<td>FI 11</td>
<td>Darwin, Australia</td>
<td>Nov. 2001-Jan 2002</td>
<td>During my staying in CDU</td>
</tr>
<tr>
<td>FI 11</td>
<td>Darwin, Australia</td>
<td>March 2002-December 2002</td>
<td>During my staying in CDU</td>
</tr>
<tr>
<td>FI 12</td>
<td>Darwin, Australia</td>
<td>Feb. 2003-November 2003</td>
<td>During my staying in CDU</td>
</tr>
<tr>
<td>FI 13</td>
<td>Darwin, Australia</td>
<td>Feb 2003-June 2003</td>
<td>During my staying in CDU</td>
</tr>
</tbody>
</table>
Appendix 6: Surveys

14 Dec. 2002

Dear ____________

My name is Wang Li. I am currently undertaking research for my PhD studies at Northern Territory University, my supervisor is Dr. Darol Cavanagh, Associate Professor, Faculty of Science Information Technology and Education. I would like to invite you to participate in my research.

My research interest is in the area of rural education and development, particularly in the role of university in participating in rural education and development.

I am seeking assistance from people who have already taken part in programs for rural education and development. Information collected from you will be kept in strict confidence at all time. You will not be identified in anyway that is within the written text of the research paper. Your email will be treated in a confidential manner. The same care will be taken with the names or characteristics of anyone you mention. In the manner, information regarding your participation will be kept confidential.

Attached please find questionnaire. This surveying will give me a broad knowledge base for my research. However, I will need to randomly select some participants for follow-up interviews. If you are particularly interested, please contact me. I would also appreciate it very much if you could give me a reply by 15 Jan. 2003.

Whatever your decision on this matter, thank you for attention and consideration.

Yours sincerely,

Wang Li
PhD candidate
Faculty of SITE, NTU

I can be contacted by:
Email: wangli666@hotmail.com
Questionnaire

(This information will be kept strictly confidential)

Part A: Personal Details (Please fill in or √)

ID Code (Leave blank)______________________________

Age:  Less than 19 □  20-40 □  41-50 □  51-60 □  60+ □

Gender: Male □  Female □

Years of formal school: K-year 6 □  year 7-12 □

Post school: Certificate □  University degree □  Postgraduate degree □

Current work: ________________________________

Full time or part time:  Part time □  Full Time □

Nature of work: (please describe what you do)__________________________________________

____________________________________________________________________________________

Other work (please √), administrative, research, training, teaching, adult education or agricultural extension education and others:

Please describe any other related work ________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

Length of dealing with rural communities ______ Years ______ Months
Part B

Please think about these questions. If you don’t have enough space you can use additional papers. Thank you.

**Question 1**

What are the main activities that you do in relation to rural communities? In thinking about these you might like to comment on your past experiences for the following subjects, successes or failures.

1. In which way do you think the university or any higher educational institutes can serve the rural communities?

2. Which activities do you think are effective in promoting the development in rural areas?

3. What strategies have you used to translate technical knowledge from university into rural areas?

4. What do you understand by rural transformation activities?
5. What do you think are the best ways for rural transformation activities to be sustained when the project implementers leave the project sites?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

6. What is the best way to increase the farmers’ literacy levels through education and training? (please √ one or more)

________________________________________________________________________

(1) Direct on site teaching/training ☐ (2) manual mail out ☐

(3) Off site workshop ☐ (4) TV/Video ☐

(5) Newspaper or articles ☐ (6) others, please explain ☐

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

7. What kinds of technical support have you used to increase farmers’ scientific knowledge and capabilities?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

8. What kinds of technical knowledge and skills have you used to increase farmers’ scientific knowledge and capabilities?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

9. What others methods or ways have you used to increase farmers (rural workers) knowledge?

________________________________________________________________________
10. Others, please explain.

**Question 2**
Which of the following aspects were most helpful in the activities for rural development according to your own experiences? (please √ and give examples, you can √ more than one example)

1. not helpful  2. not very helpful 3. helpful 4. quite helpful 5. very helpful

<table>
<thead>
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<td>1. Training workshop</td>
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<tr>
<td>2. Reading materials</td>
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<tr>
<td>3. Demonstration and exhibition</td>
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<td>4. On-the –job training</td>
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<tr>
<td>5. Project-based learning</td>
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<tr>
<td>6. Apprenticeship</td>
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<td>7. Study tour</td>
<td></td>
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<td>8. Interest group</td>
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<td>9. Hobby group</td>
<td></td>
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<td></td>
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<tr>
<td>10. Radio, TV, posters, manuals and other media</td>
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</table>
Others, please explain

Question 3

What are the research guides and information for the various activities for rural development you were, are and will be doing? How have these helped you? What specific aspects of the materials have helped you and in what way have they been helpful? Give examples.

Question 4

If you were to identify 4 essential factors for successful translation of university findings into usable rural information, what would they be, please give examples.

1.

2.
3.

4.

Question 5

In reflection what comments would you offer to university academics who are trying to develop training packages for rural workers?

Question 6

Which strategy do you rank as the number 1 in importance in getting university research into rural communities?

Question 7

What other agencies have been helpful in your educational or training work in rural communities. Please explain how they have been helpful.
Optional General Comment

You may make a general comment about your working experiences in rural areas. For example, you might have discovered a particular approach working well for you that you would like to share or you may have particular concerns about your experiences that you are trying to deal with.
Appendix 7: Interview questions

1. Q: What are NTU’s missions and roles in term of knowledge demonstration, or extension, or serving for rural communities?

2. Q: What factors motivate the farmers to start a business? What roles does education play in NTU?

3. Q: What factors influence the sustainability of development in rural NT?

4. Q: What roles will education and information technology play in the extension of rural development?

5. Q: How can farmers be motivated to learn skills through adult education/learning?

6. Q: In which ways do you think NTU can serve the rural community?

7. Q: What strategies have NTU used to translate (transform) technical knowledge from university to rural areas?

8. What kinds of training materials and methods have you used to deliver appropriate knowledge to rural communities?

9. Q: What kind of technical support has NTU used to increase farmers’ scientific knowledge and capacities?

10. Q: What do you think are the best ways for rural transformation activities to be sustained when project implementers leave the project sites?

11. Q: What activities do you think are effective in promoting development in rural areas?

12. Q: What are the aims, functions and activities of the Centre for Aboriginal and Torres Strait Islander Studies?
Appendix 8: Second circle interviews

1 September 2004

Dear Colleagues:

This is an outline of my second circle of interviews, aimed at collection of data on CDU and other organizations in NT and Australia. I wish to know about their activities in developing rural development programs and the transformation of their knowledge base to rural areas. In order to develop a comparative view, (CDU & AUH) I need to ask a number of questions listed below. I have knowledge of the Agricultural University of Hebei but I need to have answers for, CDU and other institutions if CDU does not carry out these similar functions.

Could you please kindly provide information about CDU and other institutions, organizations or government agencies, such as Gas Industry, Rail Line Authority, Trade Development Zone, CSIRO, Cooperative Research Centres, Government Departments and private entrepreneurs that you are familiar with if these are appropriate to answering the question.

I will give you a brief question/statement about the Agricultural University of Hebei in China and I wish you to respond to this general information question by relating each question to CDU and or other Institutions you are familiar with. The aim of the exercise is for me to gain knowledge about the CDU and or other institutions, government departments, non-government institutions, and private providers within an NT context for comparison.

Thank you very much

Best regards,

Yours sincerely,

Wang Li

PhD Candidate, CDU
I. Question: Agricultural University of Hebei, China (AUH) has the following approaches to delivering knowledge from universities to rural communities, experts visit farming locations, establish demonstration and experimental bases, establish extension and training system, leadership building, networking, Farmers Associations, and etc. Does CDU or other institutions, organizations or government agencies in NT conduct similar activities and if so what are they?

II. Question: In AUH’s case, Farmers Associations organized by AUH are successful stories for bringing farmers into a learning society and in using science and technology. Does CDU or other institutions, organizations or government agencies in NT do similar things through cooperatives and if so what are some of the success stories?

III. Question: In terms of fees, in the initial stage, AUH served rural communities free; the money for programs came from university’s funds, staff personal research funds, government funds and etc. Later, there was some change, on the basis of self-willingness and mutual benefit. AUH established more joint ventures of teaching, scientific research, social practice bases. By signing contracts with the bases (since the bases were operated independently) AUH gradually changed the extension service mode from totally free to the combination of free and charged services. How does CDU or other institutions, organizations or government agencies in NT operate within this arena?

IV. Question: AUH set up Science and Technology Consulting Centres (in 1984). These centres offer various special and technical training courses for rural people. Can you identify similar centres at CDU or other institutions, organizations or government agencies and what did they develop and how do they disperse their knowledge?

V. Question: Concerning the innovative teaching methods, AUH’s students spend some time for social work in factories, farms and mines instead of in classrooms to know what the real situation of society is and also to help local people to carry out their tasks on farms and in factories etc. Can
you identify innovative teaching methods at CDU or other institutions, organizations or government agencies in NT? Can you list them for me?

VI. Question: AUH deployed homecoming practice teams. This initiative followed on with that of social practice, and it resulted in 1,500 teams being developed by AUH, who submitted 18,000 investigation reports and technical consultations. Does CDU or other institutions, organizations or government agencies in NT have a similar placement strategy? What about for Indigenous peoples?

VII. Question: AUH helps develop local enterprises to absorb surplus labour force from the farm in Hebei China. Are their similar work practices at CDU or other institutions, organizations or government agencies in NT and what are they?

VIII. Question: AUH has established and opened up the main production and development of mainstay industries in each county: for example, Red Fuji Apple in Shunping County, Chinese Cabbage Seed Production in Gaoyi County, Strawberries in Mancheng County, Marmot Rabbits Production in Linzhang County. Dates, persimmons, walnuts and maize are among are most products in Taihang Mountainous areas. What Institutions carry out this activity in the NT? Does CDU have a role?

IX. Question: AUH has improved workforce quality through training. The capability of farmers has greatly been improved. For example, farmers became expert seed breeders of Chinese Cabbage seeds, the county agricultural and farming machinery schools have trained tens of thousands of people. What workforce training does CDU or other institutions, organizations or government agencies carry out in NT?

X. Question: Historically AUH’s scale has grown. Since 1979, with the opening door policy, educational reform and participating in rural development programs, AUH has grown. In 1995, a new Agricultural University of Hebei emerged from the merging of AUH with the Hebei Forestry College. What was the situation at CDU (or other appropriate) institutions?
XI. Question: Several approaches for the implementation of empowering strategies in villages through education, science and technology has been used in AUH, for example, an expert from AUH is assigned by AUH to live in the village (year-round) to provide technical service to the farmer residents. The selection of the person is based on a relevant program and other specific incentives, for example, spending one year in a rural area will enable the participant in the program to have a free of English exam before being promoted to a higher academic level. Are their similar incentive schemes at CDU or other institutions, organizations or government agencies in NT for both indigenous and non-indigenous peoples?

XII. Question: AUH helps the local farmer promote new high quality products. It helps disseminate new technologies by offering training courses for local agricultural technicians, by delivering technical consultation and on-the-site instructions, to improve the production of fruit trees etc. It develops new varieties and production techniques and other technologies; sheep and cattle are grazed in fenced areas, and bases are set up for vegetables or fruits, for example, strawberry production base. How does CDU or other institutions, organizations or government agencies in NT help local farmers?

XIII. Question: In AUH, besides higher education, there is also an Institute of Adult and Vocational Education that enrols students from the county level Vocational and Technical Education Centres. It also delivers courses for the farmers from a few days to a year. The students were trained at AUH and most of them go back to their own counties. Does CDU or other institutions, organizations or government agencies in NT offer similar placements for Aborigines, and non-aborigines?

XIV. Question: The town and village leaders, mainly studied at AUH in the various technologies in agriculture, administrative management, basic laws, economic laws and the management of town and village enterprises, etc. to help them lead the masses in income generating activities. Does CDU or other institutions, organizations or government agencies in NT offer such programs and if so what are they?
 XV. Question: The agricultural universities in China are mandated by the state to serve the agricultural and rural needs of the province. How are CDU and other institutions set up in this regards?
Appendix 9: Published Paper 1

Presented in the Teaching and Learning Conference 2001
10-12 July 2001, Northern Territory University, Darwin, NT, Australia

Rural Education

Prof. Wang Li, Deputy Director
UNESCO INRULED
Baoding, Hebei China

Abstract
While the problems faced by urban communities are not to be underestimated, it must be nevertheless recognized that it is in the rural areas that the greatest disparities in human development are to be found. In this paper I will focus on the context of rural education in the least developed and developing countries. Industrialized countries clearly also have problems in the provision of education in rural areas. However, it is in the later that problems are critical. Some basic concepts and understanding must be established prior to implementation of rural education and some new perspectives about rural education must be also adopted. Although, we wanted to include the majority we have to understand that we often have limited resources, thus we need to have priorities to cater to a limited but chosen few. Programs and their scope must be in line with the target group’s need to maximize the use of limited resources, and to suit the social, economic and cultural conditions. This calls for innovative strategies and approaches in rural education. Furthermore, a follow up activity or Programs must be well-in place when needed. A definition of rural education is sought. Based on the cases I am presenting here, a definition is used however, it is subject to debate by experts and a more elaborate definition is much welcomed. Also included are practical examples of a delivery system in the form of illustrative cases of operative modalities.

Introduction

While the problems faced by urban communities are not to be underestimated, it must be nevertheless recognized that it is in the rural areas that the greatest disparities in human development are to be found. In the succeeding presentation I would like to discuss more on the context of rural education in the least-developed and developing countries. Not neglecting that although an industrial country is progressive, it too, have a certain degree of and has it own problems concerning its

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1 A thought-provoking concept about Rural Education is presented to the experts by the author. This paper aims to provoke more thinking by the experts about what rural education should be. However, in this paper the author would like to limit in the context of least-develop and developing country. It was believed that including the developed country would make rural education more complicated due to the development divide that separate the former two from the latter.

2 Prof. Wang Li is also a PhD candidate in the Faculty of Science, Information Technology and Education, NTU, Darwin, NT, Australia and a Professor of Water Resources Department, Agricultural University of Hebei, Baoding, Hebei, China
rural population, however, this problem may not be as urgent as those facing the former two. Some basic concepts and understanding must be grounded prior to implementation of rural education. Some new perspectives about rural education must be also understood. Although, we wanted to include the majority we have to understand that we have limited resources, thus prioritisation is needed to have more focus and greater impact in our endeavour to cater to a limited but chosen few. Programs and its scope must be in line with the target group need to maximize use of limited resources, suit the social, economic and cultural conditions. These call for more innovative strategies and approaches in rural education. Furthermore, a follow up activity or program must be well-in place when needed. A definition of rural education is sought, for better comprehension. Basing on the grounds I am presenting here, a definition was tried however, it is subject to debate by experts and a more elaborate definition is much welcome. Also included are practical examples of delivery system in the form of illustrative cases of operative modalities.

**Rural education defined**

To construct a framework of rural education, I would like to borrow the definition made by Chinese authors as stated below:

In a broad sense, rural education is defined as the education of rural population in the service of rural economy and social developments in order to constantly raise agricultural productivity and promote urbanization of rural areas. For many developing countries, rural education can be defined as education for rural people to obtain knowledge and working skills, awareness of modern citizenship and entrepreneurial skills at the transitional phase from an agricultural to industrial civilization when rural and urban areas co-exist and farmers are under disadvantaged conditions.\(^3\)

**The urgency for rural education in developing countries**

Rural education in developing countries in particular is of greatest importance. Most of the deprived and vulnerable millions living in the world today are to be found in rural areas. Rural population makes up 58 per cent of the world’s total, where in the least-develop countries the rural population is 82 per cent of the total and in developing countries it is 67 per cent. While in industrial countries it only constitutes 28 percent of the total.\(^4\) It must be also recognized that greatest disparities in human development and major problems of human development are to be found in the rural areas of the world. To mention only a few such as: (1.) The literacy rate in the least-develop country is 37 percent, in developing countries it is 60 per cent and in industrial countries it is 98 percent; (2.) School drop out rates are 60 percent in the least-develop countries and 39 percent in developing ones, while in industrial countries the rate is only 11 percent; (3.) There are more than 1 billion people live in absolute poverty, and (4.) Nearly 950 million adults are illiterate.\(^5\) Limiting these people access to education means the denial of a basic human right, which is the right to education. If vast numbers of the world’s population continue to be denied

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3 UNESCO-INRULED Training Materials on Rural Education. *Introduction to Rural Education*


this right, then human development and social and economic progress will inevitably remain out of their reach. We have to remember that the formation and development of a community is a progressive product of human civilization, characteristic of its own economic and social pattern. Community education or rural education varies with its different phase of development. Generally speaking, the more developed the economy of a community is, the more prominent its educational character; this is a regularity common to all. The opposite is also true, that is, highly developed community education functions powerfully to drive the local economy.

Theoretical/Ideological anchor of rural education

Rural education was primarily anchored on a Confucian theory. Confucius was a believer in moral action and in what we today call human development, and he advocated the establishment of harmony within the social order. It is of interest to recall that Confucius was largely self-taught but that did not prevent him from becoming the most learned man of his day. It should be also emphasized that for Confucius learning was not removed from the businesses of daily life. His experience brought him in touch with human problems and gave him an insight into the political and social conditions of his age. He was greatly disturbed by what he saw and in consequence he became a reformer and his teaching took on a social and moral tone. Confucius is thus a particularly appropriate guide for implementing rural education. For rural education must be practical as well as theoretical and must, above all take into account and harmonize both the needs of the individual and the requirements of the community.

Basic concepts and understanding of rural education

Some pivotal thoughts and considerations must be grounded prior to implementation rural education Programmes. It should be made clear and fully understood that education is becoming one of the basic needs in life and thus it will also be a basic responsibility of the national government to provide its population especially the deprived rural population access to it. Five concepts are highlighted here:

1. In implementing rural education, one should reflect on the nature, aims, and objectives of education and the means by which it can be extended to a certain target group without discrimination or other considerations.

2. In implementing rural education, we have to understand what is rural. Is it the distance from the city, or the condition of the place that it is being deprived of amenities found in the city, etc.

3. In choosing the client, since resources are limited, we have to cater to a selected few. Prioritisation becomes a necessity.

4. The right to education is a basic human right.

5. It should be aim at and become one of the basic responsibilities of national government to develop education (esp. rural education) to become as a “public good” as it economically progresses.

New perspectives of rural education

Rural education should be viewed in these new concepts:

1. Rural education as an integrated system composed of functional literacy, basic education, technical/vocational education and adult education

2. Rural education as a comprehensive change agent and an integral part of rural socio-economic development

3. Rural education as a package of academic knowledge and practical skills

4. Prime emphasis on basic education and functional literacy both as a right and a duty for all in rural areas.

5. Rural school as a cultural centre of local community and village/county and the prime focus of development

6. Rural education as a common endeavour demanding coordinated inter-departmental/cross-sectoral cooperation viz. education, labour, agriculture, extension, health, population, welfare, trade, etc.

Programmes /scope or coverage of rural education

Programmes of rural education will include agricultural extension services relating to sciences/ information packages such as regarding functional education, health, nutrition, population and 3 R’s are more acceptable. It covers from basic education of children to adult continuing education, from formal in-school education to non-formal education and technical-vocational education providing livelihood skills to rural dwellers.

Follow up Programs

In order to sustain a well-planned initiated and promising reforms in rural education in a community, a well organized follow-up activities must be well in-place to further accelerate these initial reforms, whenever necessary.

Innovative strategies in rural education

In implementing rural education there are more rooms for innovations, to mention a few: such as fund-sourcing, curriculum integration, etc. These innovative strategies are therefore being done to adjust to needs of target group and the community situation for the reason stated earlier that community education or rural education varies with its different phase of development.

Target groups of rural education

Target groups will include the disadvantaged groups including people in remote areas, backward ethnic communities, economically poor people, women and girls, school drop-outs, long-time adult school-leavers, out-of school youth, etc. These

target groups can be re-classified and categorized based on the urgency of the need for education, re-education, assistance, re-orientation, skills training, etc. Furthermore, prioritising a group will depend on the limited resources and manpower and objectives of the education Programme/package that will be implemented.

**New disciplines in rural education**

As the country economically developed, from an agricultural based economy to an industrialized one, a new emerging discipline in rural education must be recognized. These disciplines will be adjusted to different strata of client or target groups as development progress. Hence rural education is a dynamic force that will sustain human development in every aspect. It continues to grow and adjust to the changing needs of society and economy. For example, one case worth mentioning here, is entrepreneur education. At the International Symposium on Education Towards 21st Century held in Beijing, last 1989. “Learning to care” was suggested as a call to the reform of education where UNESCO Assistant Director General Mr. Colin N. Power pointed out the issue of entrepreneur education. From which, in mid December 1999 a meeting was held in UNESCO (Bangkok office) to conceptualise and formulate a framework to improve entrepreneurial skills of children and the youth, and strategies to develop their skills. A regional framework for action was materialized. China, India, Indonesia, the Philippines, Papua New Guinea, Sri Lanka and Thailand were selected to pilot the project.8

**Practical examples of delivery system including the illustrative cases of operative modalities**

Some practical examples for bringing education to deprived rural communities are presented below. These Programmes indicate the actions to be taken that give careful consideration to the constraints that will be faced: social, economic, cultural, etc. Although rural education is a task with many hurdles to be overcome, it was shown by many countries that made considerable progress in expanding educational services despite the obstacles with which they confronted.

**Case 1. Tilonia Barefoot Institute**

Tilonia, a common village (in India) with a population of 20,000 runs a volunteer institution named Social Work and Research Centre that has continued to work locally since 1972. It is popularly known locally as the “Barefoot Institute”. The main purpose of the centre is to satisfy the needs of children who are busy in tending sheep in the daytime. Using volunteer teachers, the centre starts to hold 150 night schools. More than 3,000 children are enrolled coming both from nearby and distant places. Volunteer teachers in night schools include local citizens who have received training in projects such as environmental education, and use of herbal medicines. This kind of activity has attracted more staff to join as volunteers to support rural education in its faculty to teach literacy integrated with other issues – environmental, social, etc.

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8 Mao Jiarui, Peng Gang and Chen Jingpu. Some issues in entrepreneur Education. From Education Research, No. 1 1992
**Case 2  Mobile Teachers Training in Lesotho.**

Lesotho government takes the measure of mobile teachers training because the cost for a small number of teachers trainees to move from one place to another is comparatively lower than for a great number of teacher trainees to go to a very far training centre. Besides, mobile training may help teachers adjust the training direction and emphasis in the light of their own situations and problems. It’s certain that in fact fewer countries can manifest a complete structure of mobile trainees or pay the transport expenses. Lesotho is an exception. It successfully created an “on-the-job” teachers’ training plan (LIET) that adopted correspondence combined with personal instruction.

**Case 3. Ordinary Normal Schools in Japan**

Before World War I, primary school teachers were fostered in secondary normal education institutes in Japan. During Meiji Dynasty, Command of Normal School was issued to establish normal education system and divide normal schools into secondary and higher normal schools. In each county and prefecture one ordinary school was set up and funded on local tax, which enrolled graduates from upper primary schools to foster headmaster and teachers of primary schools. Students should study under unified regulations according to the nation’s need. They enjoyed public expense in school and had to teach at the designated place after graduation. Most of the students came from rural areas and returned there to become teachers after graduation.

**A brief of some practical experiences under the Chinese conditions**

China, in particular, is an example of a country where the question of providing education for rural populations has been a major preoccupation for many years. Where much effort has been exerted to try to find solutions to the problems encountered when attempting to extend educational opportunities to areas and peoples that have formerly been denied them. With the largest population and situations China have been, it is worth noting how the country was able to overcome many problems and educate a great number of rural peasants. China has a vast experience --- in conducting literacy campaigns, in introducing skills training of both simple and intermediate technologies to rural communities, in adapting curricula to meet rural priorities and needs, in the development of appropriate reading materials, and in adopting innovative approaches to education are well known. Three experiences are presented below:

**Raising Rural Education funds through various Channels**

In 1983, Hebei Province in China took the lead in reforming the rural education management system. It advocated vigorously the idea of “Education upon People”
and “Education for People”, transferring the right and responsibility of developing elementary education and secondary education to a lower level the government of the county and countryside and village committee. This innovation has greatly aroused enthusiasm for starting schools in rural grass-roots for the rural people. For example, since 1983, funds for schools raised throughout the province have added up to 3.1 billion RMB. In 1990, the sum raised by rural people for improving the conditions of running schools was 0.44 billion RMB, 54.3% of the provincial investment in this project.

Establishment of Vocational Education Centres has motivated the integration of ASE

Under the government’s over-all planning, and cooperation of different departments, respective counties of Hebei Province set up a comprehensive vocational education centres based in counties, and agriculture-science and education (ASE) centres located in towns and townships. Integrating ASE is the only way or could be the best way for farmers to get rid of poverty and to enable them to live a comparatively comfortable life. Vocational education centres established a network of qualified personnel in production, scientific study and technology popularisation. The focus of which is towards vocational and technical education. The network has a school-run mechanism of (1.) “top-level support” which means that it has a strong support from universities and scientific research institutions; (2.) “parallel linkages” which means that it cooperates closely with related departments and enterprises; and (3.) “radiating downwards” which means that it radiates its technique and service to rural households, villages and towns. Besides that, the network is also connected: (1) with farmers’ technical schools in villages and towns; (2) with the “three plus one” education in towns’ junior middle schools; and (3) with the re-cultivation of young people. Technical education is carried out in close connection with reality, in this way a centrally supported integrated ASE on county level was initially manifested. This kind of support was later solidified and thus promoted and motivated the integration of ASE and has resulted to a comparatively good economic returns and social benefits.

State Project of Compulsory Education in Poverty Stricken Areas

The State Education Commission and Ministry of Finance, under the solicitude of the Party Central Committee and the State Council, decided to jointly carry out the “State Project of Compulsory Education in Poverty Stricken Areas” (hereby referred to as the “project”). The project has two main purposes: (1) to implement the strategy of “invigorating the nation with science and technology” which was put forward by the Party Central Committee and the State Council; and (2) to help the poverty-stricken areas accelerate the popularisation of compulsory education, as well as to promote the emancipation of people from poverty and allow them to live a better life.

The budget allocation of the Project is mainly applied to: (1) remove the dangerous buildings of primary and junior middle schools; (2) allocate teaching apparatus and equipment, books and reference materials as well as desks and chairs according to the standard fixed by the State; (3) train teachers and principals, etc. The majority of the Central special fund of the project goes to the poverty stricken counties defined in “State 87 Plan of aid-the-poor and storm-the-fortified”, and part of it goes to these provincial poverty stricken counties who do have economic difficulty and weak foundation for developing an elementary education, while the priority is given to old liberated areas and minority nationality areas. The principle of utilizing the “Central special fund” is: (1) muster input, (2) breach key sectors, and (3) make exploitation in chain districts; (4) guarantee the profits and ensure that the school will become functional on its establishment; and (5) implement junior middle school education on the basis of having truly popularised compulsory primary school education.

The implementation of the project will work out a rather solid basis for the popularisation of compulsory education in poverty-stricken areas. By the year 2000 when the project is completed, all the present dangerous buildings of the primary and junior middle schools in the project counties will be removed, and the places will look better than they are before; moreover project schools’ buildings, teaching apparatus and equipment and books and reference materials as well as the yield of teachers’ academic certification will all reach the required standard established by the State. Most of the project counties will realize the popularisation of compulsory primary school education, and part of them would basically attain the goal of nine-year compulsory education.

**Issues, Constraints and Challenges**

After organizing some thoughts about rural education, an understanding about the concepts was materialized. However, this also leads to looking beyond that characteristics, which bring me into realizing the issues, constraints and challenges in carrying out rural education. I would like to point out some of them here.

**Issues**

In tackling rural education, there other issues too, that we may wish to consider. These include the effects of urbanization on rural life, with the resulting over-population in towns and the sprouting of slums and bidonvilles accompanied by increased crime, lower standard of public health and growing demands upon what are already over-burdened social services. In rural areas this migration to urban centres can lead to the closure of the few schools to be found there and this in turn causes even further neglect and deprivation.

**Constraints**

It must be remembered that rural education faces a number of constraints – social, economic, cultural, etc. Thus, careful considerations of these constraints are needed. Among the problems are those linked to organization, scheduling and content of curricula and Programmes, the publication of relevant reading materials and the production of appropriate educational aids, the development of technical and

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vocational training and the use of more cost-effective approaches such as distance education.

**Challenges**

Education in rural areas presents a particular challenge, for it is here that traditions and modernity must be reconciled, here the time-honoured values must be preserved, while innovations in life and work are pursued. Rural development in the first place calls for profound social, economic and technological transformations. Achieving these will depend, in very large measure, upon the mobilization and education of the entire population and, in particular, on improving the education of girls and women, who are, at once, the most educational deprived part of the population and that with the greatest unexploited potential and talent.\(^\text{16}\)

Appendix 10: Published Paper 2
Keynote speaker in the International Association of Hydrogeologists
Groundwater Conference “Balancing the Groundwater Budget”
12-17 May 2002 Darwin, NT, Australia

UNDERGROUND WATER RESOURCES AND WATER ENVIRONMENTAL EDUCATION IN RURAL HEBEI, CHINA

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ABSTRACT

Water resources are the base for subsistence and the development of agriculture. With the rapid increase of population, the fast development of economy and quickstep of urbanization, the contradictions between the supply of and the demand for water resources in the rural area must be paid more attention.

The distribution of water resources is not evenly spread across China. The water resources of the southern and eastern areas are much larger than the northern and western areas of the country. Eighty percent of water resources occur in the south, which occupies only 36% of the total area.

Hebei plain is one of the northern areas of China with the greatest shortages of water resources according to both the water resources per person and per unit of farmland. The total water resource of Hebei province is only about 1% (0.86%) of the nation’s water resources, but the population of 68 million is 5.3 % of China’s total.

In order to maintain the development of the economy and society, the utilization factor of water resources is nearly 90%. The amount of water resources available for ecology is nearly zero. The annual groundwater overdraft has reached 3 to 6 billion cubic metres in the Hebei Plain in recent years. Obviously, this is not sustainable and a series of environmental and ecological problems have emerged.

The rural population makes up nearly 80% of the total population in Hebei province. The total area of Hebei province is 187,600 km²; the total farmland area is 67,500 km². Eighty four percent of water used is for agricultural production.

Groundwater has been greatly overdrawn for a long time. This trend of water environment deterioration in Hebei Plain has not yet been brought under control, and poses a serious threat to the subsistence and development of the Chinese people. Understanding and solving water environmental problems has become an important mission that cannot be delayed further.

17 Prof. Wang Li is also a Deputy Director of UNESCO International Research and Training Centre for Rural Education and a PhD student in the Faculty of Science, Information Technology and Education, NTU, Darwin, NT, Australia
This paper addresses the environmental education in rural Hebei based on systematic investigation and study. The paper also outlines ways of changing the thinking of rural people and their behaviour regarding the use of water and the environment around them.

1 The location of Hebei plain and its water resources

1.1 The location of Hebei plain

The Hebei plain is located in the eastern and southern part of Hebei province, and surrounds both Tianjin and Beijing Municipalities, with a total area of $7.31 \times 10^4$ km$^2$ which takes the two fifth of this province total area. The surface landscape of the plain is higher altitude in the western part, and becomes more and more lower towards southeastern. In its western part is the Taihangshan Mt. Region, and in the north the Yanshan Mt. Region. The plain is a part of the North China Plain, from west to east it is consisted of three parts: the upper part piedmont plain, the lower part plain, and the littoral plain (Fig. 1, Fig. 2).

![Fig. 1 The location of Hebei Province](image)
1.2 The surface water resources of Hebei plain

The annual average rate of precipitation is about 540 mm, and the annual mean rate of evaporation is about 1500 mm in Hebei plain. So far the most parts of the Hebei plain are of semiarid climate, and its precipitation rates and amounts of runoff vary annually and seasonally.

The surface water resources of Hebei province are composed of two parts: the run-off, which is yielded by the precipitation in its own area, and the surface run-off flowed into Hebei province from surrounding provinces. The annual mean value of precipitation is $101.5 \times 10^9$ m$^3$ in the period of 1956~1984, and the annual average of run-off is $15.15 \times 10^9$ m$^3$ which is equivalent to 81 mm depth of run-off in the whole province area; and the annual mean run-off flowed into from surrounding provinces is $70.17 \times 10^8$ m$^3$. In Hebei plain the annual average of run-off correlated to is precipitation is $31.6 \times 10^8$ m$^3$ which makes up 21% of the total amount of the whole
province. As the changes of climate, the increase of water consumption, and the effects of human being activities, the water amount flowed into the area from upper reaches of the provinces and the run-off yielded from precipitation are decreasing annually, in the period of 1985~1995, the annual mean run-off of the whole province decreased to $12.25 \times 10^9$ m$^3$ and the annual average of water amount flowed into the area decreased to $25.5 \times 10^8$ m$^3$. In order to ensure the water supply for Beijing and Tianjin, the water amount flowed out increases in recent years, the amount of 1965~1984 is about $17.4 \times 10^8$ m$^3$, and increased to $22.5 \times 10^8$ m$^3$ in 1985~1991. The annual mean water amount entered the sea is about $17.0 \times 10^9$ m$^3$ before 1970, and decreased to $24.6 \times 10^8$ m$^3$ after 1970.

Since 1960, a great number of reservoirs have been built, the water amount flowed into the plain from the Mt. area decreased rapidly, the annual mean water amount flowed into from Taihangshan Mt. is $65.9 \times 10^8$ m$^3$ in 1956~1969, $40.4 \times 10^8$ m$^3$ in 1970~1979, and $22.9 \times 10^8$ m$^3$ in 1980~1991, respectively. On the other hand, the water flowed into plain has been controlled by the reservoirs built in the mountainous area, and the water is consumed mainly by irrigation and water supply for municipalities. The depth of run-off of Hebei plain is less than 25 mm. In order to use this part of water efficiently, 236 medium and big sluices have been built in the main channels and rivers in the plain up to 1989, the storage capacities reached $4.6 \times 10^8$ m$^3$ which is equivalent to 22% of the surface runoff of 50% frequency.

1.3 The groundwater resources conditions of Hebei plain

The groundwater is the major water resource in Hebei province, until 1995, the exploitation amount of water resources is $21.0 \times 10^9$ m$^3$ in which the groundwater makes up $16.0 \times 10^9$ m$^3$. The unique characteristics of topography, strata and tectonics are the main factors controlling the formation and regional distribution of groundwater resources, the groundwater bearing system can be grouped to phreatic aquifer family and confined water family, in other words shallow groundwater and deep groundwater, Tertiary and Quaternary aquifers and loose sediments are main water content in the plain.

The volume storage of groundwater of Hebei is $887.34 \times 10^9$ m$^3$, of which $13.6 \times 10^9$ m$^3$ is in the karst water family, $11.24 \times 10^9$ m$^3$ in the intermountain basins, and $862.5 \times 10^9$ m$^3$ in the plain. The exploitable volume storage of fresh water is $114.18 \times 10^9$ m$^3$ in the plain, the elastic storage of deeper layered water is $18.08 \times 10^9$ m$^3$, and the exploitable elastic storage is about $9.36 \times 10^9$ m$^3$. The replenishment resource of groundwater is $20.16 \times 10^9$ m$^3$/a, of which $12.6 \times 10^9$ m$^3$/a in the plain region. There is $14.69 \times 10^9$ m$^3$/a of exploitable storage in Hebei, of which $10.7 \times 10^9$ m$^3$/a in the plain, the exploitable storage of deeper fresh water is $9.8 \times 10^8$ m$^3$/a in the salt water regions of Hebei plain with a calculated area of $3.94 \times 10^4$ km$^2$, and the total exploitable storage of deeper fresh water in Hebei plain is recently estimated to be about $1.47 \times 10^9$ m$^3$/a.

The amount of groundwater resources is dependent on its recharge capacities. In Hebei plain the groundwater recharges can be classified into five groups. The first is the recharge of rainfall; the amount is dependent upon the precipitation, the intensity of rainfall, the characteristics of aeration zone, the depth of groundwater table, and
the surface vegetation. The annual average of recharge to groundwater from rainfall makes up 68.14% of total recharges amount. The second is the side flow recharge from upper reaches, this part is 9.41% of total recharges amount. The third is the recharge of river infiltration, this part holds 3.17% of total recharges amount. The fourth is recharge from irrigation water infiltration; the water efficiency of irrigation is less than 0.4 in surface water irrigation area, which takes 7.34% of the total amount. The fifth is recharge from wells irrigation water, since the late 1960s, groundwater has been exploited greatly by using wells in the plain; this part constitutes 11.93% of the total amount.

According to the survey report of groundwater resources of Hebei, the shallow groundwater resources in the plain is shown below in table 1.

Table 1 The amount of shallow groundwater resources in Hebei plain

<table>
<thead>
<tr>
<th>Recharge (100 million m³)</th>
<th>From Rainfall</th>
<th>From side flow</th>
<th>From Surface Water</th>
<th>From well irrigation</th>
<th>Comprehensive</th>
<th>Groundwater Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>69.98</td>
<td>9.25</td>
<td>11.22</td>
<td>12.25</td>
<td>102.7</td>
<td>90.45</td>
</tr>
</tbody>
</table>

The shallow groundwater resources mainly refers to the shallow fresh water which mineral content is less than 2g/l. Different mineral degrees of shallow groundwater have the different distributive areas and resources amounts, the data is shown in table 2.

Table 2 The distributive areas and amounts of different mineral levels of shallow groundwater

<table>
<thead>
<tr>
<th>Mineral content (g/l)</th>
<th>The distributive area (10⁴km²)</th>
<th>The amount of water resources (10⁹m³)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2</td>
<td>4.95</td>
<td>10.27</td>
<td>Fresh water</td>
</tr>
<tr>
<td>2~3</td>
<td>1.41</td>
<td>2.25</td>
<td>Light-salt water</td>
</tr>
<tr>
<td>3~5</td>
<td>0.52</td>
<td>0.82</td>
<td>Semi-salt water</td>
</tr>
<tr>
<td>&gt;5</td>
<td>0.43</td>
<td>0.74</td>
<td>Salt water</td>
</tr>
</tbody>
</table>

The migration of groundwater forms a recharge-run-off-discharge system, in which groundwater discharges into the sea. The region of mountainous land and the middle-upper part of piedmont plain are the recharge region, and the lower part plain and the littoral plain are the runoff and discharge regions, respectively. Before 1960, the groundwater resources had not been exploited extensively, and the flow fields of groundwater had been natural status, and the deep groundwater levels were all above the sea level, which was 20~25m in piedmont plain, about 10m in middle plain, and less than 10m in littoral plain. Figure 3 shows the shallow groundwater field status before 1960. After 1960, the groundwater has been overdrawn greatly, the groundwater level depresses violently, and a series of groundwater depression cone have been formed in Hebei plain, figures 4 and 5 show the status of groundwater flow field of 1992, respectively.
Fig. 3 Chart of Shallow Underground Water Flow in Hebei Plain (1959) (source: Hebei Provincial
Fig. 4 Chart of Shallow Underground Water Flow in Hebei Plain (1992) (source: Hebei Provincial Water Resources Burean)
Fig. 5 Chart of Deep Underground Water Flow in Hebei Plain (1992) (source: Hebei Provincial Water Resources Bureau)
2 The water resources utilization and water environment in Hebei plain

In order to have a whole picture of the water resources utilization in Hebei province, table 3 shows the amounts of water resources used by different sections in Hebei province in different typical years during 1980-1991. From the table, we can know clearly that the irrigation water makes up 83.5% of total water consumption, the surface water utilized makes up 33.1%, the groundwater 66.9%, and the total consumption has exceeded the available water resources amount.

Table 3 The statistics of water resources utilization in different typical years

<table>
<thead>
<tr>
<th>Typical Years</th>
<th>Farmland irrigation</th>
<th>Industries</th>
<th>City &amp; Town Domestic</th>
<th>Groundwater sources</th>
<th>Surface Water</th>
<th>Groundwater resources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mt. Area</td>
<td>Plain Fresh</td>
<td>Deep Fresh</td>
<td>Shallow Fresh</td>
<td>Light Salt</td>
<td>Total</td>
</tr>
<tr>
<td>High</td>
<td>145.9</td>
<td>24.33</td>
<td>8.20</td>
<td>61.52</td>
<td>16.84</td>
<td>73.02</td>
</tr>
<tr>
<td>Normal</td>
<td>160.2</td>
<td>24.0</td>
<td>8.99</td>
<td>65.07</td>
<td>18.14</td>
<td>80.20</td>
</tr>
<tr>
<td>Low</td>
<td>174.7</td>
<td>22.46</td>
<td>6.98</td>
<td>64.23</td>
<td>17.34</td>
<td>91.26</td>
</tr>
<tr>
<td>Average</td>
<td>160.3</td>
<td>23.63</td>
<td>8.02</td>
<td>63.60</td>
<td>17.47</td>
<td>81.45</td>
</tr>
</tbody>
</table>

2.1 The utilization of surface water resources and water environment problems

In Hebei plain, the surface water resources comes from two sources: the first is the surface runoff regulated by the reservoirs built in the mountainous pass areas, the second is the local surface run-off regulated by the ponds, lakes, and sluices built on rivers and canals.

The large-typed reservoirs built in the mountain pass areas, such as Miyun, Guanting, Yuqiao, Gangnan, Huangbizhuang, Xidayang, Wangkuai, Yuecheng etc., have controlled more than 80% of the river basins in the mountain area, and more than 60% of the annual mean runoff in their upper basins, and water stored in these reservoirs irrigates 0.87 million hectares of farmland in the piedmont plain, and undertake the tasks of flood control and urban water supply for Beijing, Tianjin, Shijiazhuang, Baoding, Handan, etc. With the increase of water consumption in the upper reaches, the water amount flowed into reservoirs decreased sharply, the ratio of storage (the real water storage / the design water storage) and the ratio of water supply (the water supply/the water demand) decrease annually, for example, they were 0.68 and 0.98 in 1960s, 0.6 and 0.67 in 1970s, 0.4 and 0.24 in 1980s in Yuecheng reservoir, respectively. As the soil and water losses in upper reaches areas are very serious, reservoir sedimentation volumes increase, for instance, up to 1998, Guanting reservoir has been silted to $6.46 \times 10^8$ m$^3$ and the flood protection and water supply for Beijing has been affected seriously. With the economy development in the upper basin, the water pollution has been aggravated in recent years, according to the water quality report of Hebei province, the total water storage of 21 large and medium reservoirs in Hebei are only $15.3 \times 10^8$ m$^3$, and the nine of them, the water quality does suit for domestic and cultivation use.

In Hebei province, the effective irrigation areas using surface water are 1.071 million hectares, but because of water quantity decreasing, canal structures aging, and
management problems, the real irrigation areas are decreasing year after year, and the benefits of conservancy project are reducing, for example, the biggest irrigation area in Hebei province, Shijing irrigation area has 0.167 million hectares of design area, the real irrigation area is 0.143 million hectares in 1970s, 0.117 million hectares in 1980s, and 0.087 million hectares in 1990s; in Taihangshan mountain piedmont plain, seven large irrigation areas had been built before 1960, the total design area is 0.53 million hectares, because of water deficit, the total irrigation reduced to 0.283 million hectares by 1990, and the real annual irrigation area is only 0.15 million hectares.

Because the exploitation and utilization of water resources in Hebei plain have exceeded its bearing capacity, the process of hydrologic cycle has changed, for example, the conditions of run-off yield have deteriorated. The surface runoff began to be yielded when the rainfall came to 250 mm in 1960s, 500mm in 1970s, and the run-off depth only has 3.5mm when rainfall attained 832 mm in 1988, in the piedmont plain of Hebei plain. The groundwater table depletes year after year, surface soil of plain area becomes dry and hardened, the infiltration of river courses increases and the water amount flowing into the plain from Mt. area decreases, and a lot of waterways dry up. All surface water coming from Mt. area has been consumed by seepage, evaporation and irrigation, the water amount during 1997 to 1999 has been shown below in table 4.

Table 4  The water amount flowing into plain area from mountains

<table>
<thead>
<tr>
<th>Years</th>
<th>February</th>
<th>April</th>
<th>June</th>
<th>August</th>
<th>October</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>2.80</td>
<td>6.05</td>
<td>6.76</td>
<td>6.45</td>
<td>2.10</td>
<td>1.56</td>
</tr>
<tr>
<td>1998</td>
<td>2.10</td>
<td>4.48</td>
<td>3.26</td>
<td>10.03</td>
<td>6.37</td>
<td>1.26</td>
</tr>
<tr>
<td>1999</td>
<td>0.87</td>
<td>1.70</td>
<td>4.44</td>
<td>1.58</td>
<td>4.48</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Because of the decreases of local surface run-off and the water amount flowed into the plain, and the increases of the evaporation and the infiltration, the water and ecological environment deteriorate. According to investigation of 17 main rivers in Hebei plain, from 1980 to 1997, there were annual mean 335 days per year when the rivers had dried up. In 1960s, there were more than 20 lakes in Hebei plain, their total water area was 1.1 million hectares, but the present water area is less than 0.067million hectares, 94% of them have decreased, such as the Baiyang lake, which had been described as ‘the North China Pear’, since 1960, there were 15 years that the lake were dried up, especially from 1983 to 1987 the lake kept dry for 5 years. The observed data from 1997 to 1999 show that the annual mean water storage of Baiyang lake was 160.2 million cubic meters, the water had been polluted seriously, and it could not be used by any sections, so the Baiyang lake has become into a sewage reservoir. As the deterioration of the water environment becomes severe many aquatic plants and animals have exhausted, even the frog whose adaptability is very strong is difficult to be seen in most area of Hebei plain.

After the rivers flow into Hebei plain from Mt. area, their discharges decrease rapidly on the way, and they deposit large quantities sediment in the rivers courses in the piedmont plain. According to the survey of river systems of Daqing river, Ziya river, and Yongding river, the river sedimentation depth reach 1 to 3 meters, and river sedimentation volume 1.24 million meters, the flood discharge capacity decrease by 40~50%. Because the rivers almost keep dry all the year round, desertification
appears and develops in and around the river courses, and how to prevent the trend has become an important work. On the other hand, owing to the decrease of discharge flowing into the sea, the water and ecological environment begin to deteriorate in the littoral area, for example, amount of sediment deposit, and aquatic ecosystem has change in the estuarine areas.

Since 1985, the amount of sewage discharge has increased by 80 million tons every year, by 1996, the total amount reached 2.5 billion tons per year, about 1.5 billion tons sewage that has not been treated drain into natural rivers per year. The dilution ratio is too high and the pollutant has been far beyond the water environmental capacity. The huge amount of polluted water in the rivers in the plain can’t be used and also has polluted the groundwater badly. According to recent investigation, nearly 70% shallow groundwater isn’t up to the standard of drinking water, 30% can’t fit the standard of irrigation water, for example, the polluted area of groundwater has attained 123 km² in Baoding city where it is equivalent to 98% of the municipal area. A lot of problems have been caused by polluted water, for example, the residents of Jiejatun village, Xingtai city suffered from eye diseases suddenly, in which 27 people optic nerves became atrophied and 8 became blind due to drinking groundwater polluted by sewage.

There are 52 sewage irrigation areas in Hebei plain, their area reach 0.47 million hectares, but because the environmental awareness of rural residents is not strong enough, and the technical management is lacking, the sewage makes the farmland crust, and the heavy metal content in the farm products surpass the related standards, and the accidents related with water pollution increase greatly, for example, because of diverting polluted water from Fuyanghe river to irrigate in 1990, 4333 hectares wheat were out of harvest, the economic losses due to this accident were 15.62 million yuan (RMB).

2.2 The utilization of shallow groundwater resources and water related environment problems

The groundwater resources mainly refer to the shallow groundwater resources in Hebei plain. The overdraft of groundwater means the amount of exploitation is greater than its recharge, and causes the groundwater environment to deteriorate. The light overdraft refer to the depletion rate of groundwater table less than 0.7 m per year, and medium overdraft between 0.7 m to 1.5 m per year, strong overdraft surpass 1.5 m per year.

The area of groundwater overdraft in the plain is total 34.8 thousand km² by 1993, and take 47.6% of total area of Hebei plain, in which light area is 17.1 thousand km², medium area 16.0 thousand km², heavy area 1717km².

The exploitable shallow groundwater is about 2.707 billion cubic meters in the area of light overdraft, but the annual mean exploitation amount attained 3.485 billion cubic meters between 1984 to 1994, the overdraft amount reached 0.776 billion cubic meters, the practical data has been shown in table 5.
Table 5 The situation of shallow groundwater overdraft in Hebei plain (1984--1994)

<table>
<thead>
<tr>
<th>Cities</th>
<th>Medium (km²)</th>
<th>Heavy (km²)</th>
<th>Total area (km²)</th>
<th>Average (10,000 tons)</th>
<th>Exploitable (10,000 tons)</th>
<th>Overdraft (10,000 tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangshan</td>
<td>769</td>
<td>240</td>
<td>1009</td>
<td>30491</td>
<td>22826</td>
<td>7665</td>
</tr>
<tr>
<td>Qinhuangdao</td>
<td>27</td>
<td>0</td>
<td>27</td>
<td>1306</td>
<td>808</td>
<td>498</td>
</tr>
<tr>
<td>Langfang</td>
<td>2101</td>
<td>0</td>
<td>2101</td>
<td>38488</td>
<td>35107</td>
<td>3381</td>
</tr>
<tr>
<td>Baoding</td>
<td>2326</td>
<td>410</td>
<td>2736</td>
<td>71572</td>
<td>55349</td>
<td>16223</td>
</tr>
<tr>
<td>Shijiazhuang</td>
<td>5475</td>
<td>97</td>
<td>5572</td>
<td>252473</td>
<td>148926</td>
<td>103547</td>
</tr>
<tr>
<td>Cangzhou</td>
<td>0</td>
<td>525</td>
<td>525</td>
<td>10115</td>
<td>5809</td>
<td>4306</td>
</tr>
<tr>
<td>Hengshui</td>
<td>815</td>
<td>0</td>
<td>815</td>
<td>12237</td>
<td>9555</td>
<td>2682</td>
</tr>
<tr>
<td>Xingtai</td>
<td>3081</td>
<td>428</td>
<td>3509</td>
<td>65688</td>
<td>54205</td>
<td>11483</td>
</tr>
<tr>
<td>Handan</td>
<td>1341</td>
<td>17</td>
<td>1358</td>
<td>30043</td>
<td>19940</td>
<td>10103</td>
</tr>
<tr>
<td>Total</td>
<td>15935</td>
<td>1717</td>
<td>17652</td>
<td>512412</td>
<td>352525</td>
<td>159887</td>
</tr>
</tbody>
</table>

From the above calculation, the overdraft amount of shallow groundwater attains 2.338 billion cubic meters per year, up to 1998, and the total overdraft amount of shallow groundwater is more than 30.0 billion cubic meters, and a lot of water environmental problems appear in the Hebei plain.

The shallow groundwater table depletes in a large area, according to the statistics of June, 1996, the average buried depth of shallow groundwater table were 9.55 m in 105 counties of Hebei province, 15.14 m in the Taihang Mountain piedmont plain, 5.07 m in the medium plain where salt water layers exists, and less than 2m in the littoral plain. A lot of groundwater depletion cones caused by industries and agriculture water consumption have formed, for example, the biggest twelve of them are found in Handan, Shijiazhuang, and Baoding cities, the centre water table are below 30 m under ground.

Groundwater in Hebei plain is polluted in some cases with regard to the state standard for ammonia, nitrate and nitrite (3N). Groundwater in the urban region is seriously polluted, which is marked by increasing of hardness, mineralization, and variation of hydrochemical types of ground waters. Groundwater in 11 urban areas would be increasingly polluted with 3N and phenol, cynogen, arsonium, chromium and mercury (5-poisons). The environmental quality of groundwater would deteriorate further if the situation of exploitation quantity, overall arrangement of development and the regulation measurements for water pollution remained to continue in the coming 5~10 years. For the regional exploitation of groundwater, the distributive area of shallow water in the salty water region would become smaller and smaller, the bottom of salty water more quickly descend, and the rate of detectable pollution in deep waters increase by 10%~20%.

Because the shallow aquifers have been drained intensively, the content water in the surface soil loses greatly, and soil disintegrates. Since 1960, more than 200 ground splits have been found in 65 towns, the longest is more than several thousand meters, the widest one reaches 2 m, the deepest one is more than 10 m. The splits in the
ground have brought great harms to the urban and rural construction, transportation and flood protection, for example, the Qianlidi dam which used to protect Tianjin, North China oil field and other important areas, a split stretched to 189.7 km had been found in 1986.

Because of overdraft of shallow water in the littoral plain near the Qinhuangdao city, the sea water intrudes into fresh water aquifer, and causes the salinization of the shallow groundwater. Their areas have increased from 18 km$^2$ in 1984 to 60 km$^2$ in present, and the intrusion distance is 16~22 m per year, the increase area per year attains 2.57 km$^2$.

2.3 The utilization of deep groundwater resources and water environment problems

Since 1970, the deep groundwater has been exploited intensively, according to statistics; the medium overdraft area reaches 120 thousand km$^2$, the heavy overdraft area 311 thousand km$^2$.

Table 6 The situations of deep groundwater overdraft in Hebei plain (1984--1994)

<table>
<thead>
<tr>
<th>Cities</th>
<th>Medium (km$^2$)</th>
<th>Heavy (km$^2$)</th>
<th>Total area (km$^2$)</th>
<th>Average (10,000 tons)</th>
<th>Exploitable (10,000 tons)</th>
<th>Overdraft (10,000 tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangshan</td>
<td>1664.2</td>
<td>833</td>
<td>2497.2</td>
<td>15062</td>
<td>10610</td>
<td>4452</td>
</tr>
<tr>
<td>Langfang</td>
<td>3342</td>
<td>448</td>
<td>3790</td>
<td>23590</td>
<td>14269</td>
<td>9321</td>
</tr>
<tr>
<td>Baoding</td>
<td>0</td>
<td>1655</td>
<td>1655</td>
<td>5858</td>
<td>2522</td>
<td>3336</td>
</tr>
<tr>
<td>Shijiazhuang</td>
<td>1734</td>
<td>0</td>
<td>1734</td>
<td>10237</td>
<td>8570</td>
<td>1667</td>
</tr>
<tr>
<td>Cangzhou</td>
<td>0</td>
<td>14055</td>
<td>14056</td>
<td>49194</td>
<td>28384</td>
<td>20810</td>
</tr>
<tr>
<td>Hengshui</td>
<td>1329.7</td>
<td>4165</td>
<td>5495</td>
<td>23839</td>
<td>6255</td>
<td>17584</td>
</tr>
<tr>
<td>Xingtai</td>
<td>3940.8</td>
<td>1244</td>
<td>5185</td>
<td>19022</td>
<td>8336</td>
<td>10686</td>
</tr>
<tr>
<td>Total</td>
<td>12010.7</td>
<td>31216</td>
<td>43227</td>
<td>194222</td>
<td>103258</td>
<td>90964</td>
</tr>
</tbody>
</table>

From the above calculation, the overdraft amount of deep groundwater attains 0.91 billion cubic meters per year, up to 1998, and the total overdraft amount of shallow groundwater is more than 20.0 billion cubic meters, and a lot of water environmental problems appear in Hebei plain.

It is difficult to recharge deep groundwater, and it is more easy to cause the deep groundwater level depress contrast with shallow groundwater. Since 1970, the deep groundwater level decreases violently in Hebei plain, the average depression range in Hebei plain is 10~40m, in which water level reduced as much as 20~40m in a region of 22,127 km$^2$ around Cangzhou, Hengshui, and Handan cities. There are 16 deep groundwater depression cones in Hebei plain, and most of the cones have connected together, such as Cangzhou, Qingxian, Renqiu, Dacheng are as have formed compound cones. By 1994 the centre water level of Cangzhou cone came to 94.04 m and annual mean depression got to 2.86 m. The area of Ji-Zao-Heng cone had already come to 7287 km$^2$ in 1995 from 3588 km$^2$ in 1980, and the water level of the cone centre got to 76m under ground surface.
A series of disasters of the surface deformation occurred. The surface descended annually about 15~20 mm in Hebei plain in the last twenty years, and up to 50~60 mm in the cone region. The area that ground surface decreased integrally larger than 200 mm is more than 42,120 km$^2$, and the area decreasing larger than 500 mm is more than 6,340 km$^2$, larger than 1,000 mm is more than 755 km$^2$. The surface descends 1.69 m in the urban of Camphor, and the annual mean descending volume reaches more than 1 billion cubic meters. In recent years, the descending rate become more rapid, in Cangzhou region the annual mean rate is 96.8 mm/a, Renqiou region 78 mm/a, Bazhou 56.8 mm/a, Dacheng 64.4 mm/a, Hengshui 25.5 mm/a, Baoding 39.2 mm/a.

The dynamic characteristics of ground water were changed. The head of artesian water has increased with increasing depth before the large-scale exploitation of ground water, but decreased with increasing depth in the last twenty years. Therefore, the shallow ground waters seep downwards. The amount of leakage from shallow aquifer to deep aquifer is about $1.2 \times 10^9$ m$^3$ annually, which is an important factor that causes descending of the shallow salty-water bottom, and salinization of deep fresh water, for example, the mineralization grade of deep groundwater had been up to 838.3 mg/L in 1997 from 675.6 mg/L in 15 counties in Cangzhou Prefecture.

The concentration of idiom in ground water is more than 0.2 mg/L in the middle part of Hebei plain and littoral plain, which causes hyperthyroidism because of drinking the ground water for a long time. The concentrations of fluoride in ground water are higher than 1 mg/L in most parts of Hebei plain, which results in local disease of fluoride poisoning for drinking the high-fluoride groundwater. For example, the concentrations of fluoride is 5~8 mg/L in Cangzhou region, 400 million peoples are drinking the water that fluoride contents are 3~5 times of state standard, in which more than 200 million peoples suffer from fluorosis.

3 Situation of water environment and environmental education in rural Hebei

The geo-environmental conditions are more complicated in Hebei plain, the quality of primary environment is not strong, and environmental capacity is very confined. The exploiting amount of surface and ground waters have surpassed their bearing capacities, and the water environment is becoming deteriorated, and causing a lot of ecological environmental problems. This situation has a great threatening effect to the industrial and agricultural productions as well as people’s lives in Hebei plain. The rural water consumption takes up 84% of total water consumption and the rural population constitutes 78.92% of the province’s total number, so, the water and ecological environments have much to do with the awareness of environment of rural residents in Hebei plain.

Rural environmental education can be defined as the education of rural population in the service of rural environment protection and conservancy in order to maintain economic sustainable development and the wise utilization of resources. Through education, the rural people can obtain environmental knowledge and awareness of environmental protection, and know how to protect the environment in the processes of life and productions.
The objectives of rural environment education are: raising the rural residents environmental awareness level; making them understand the unfavourable effects on environment caused by their present water using ways, and its long-term negative influences on further rural development caused by the deterioration of water environment; coordinating with the government to prevent the deterioration of water and ecological environment, and realizing the effective public participation of policy decision. The purposes of environmental education are many: First, disseminating the basic knowledge of environmental protection in rural area, the knowledge may guide rational behaviours of the rural population, and prevent behaviours like destroying the rural natural environment; second, improving the consciousness of protecting the natural ecological environment. We should make rural people know the nature of the mutual relationship between all human activities and environment. Public sensitivity will be strengthened to the problem of environment and development, participate in the solution of problems, and foster personal environmental responsibility; third, training rural people’s skills for environmental protection, rural people’s mastery of practical technology and skills, such as the rational development and utilization of various resources (including water resources), the development of ecological stereoscopic agriculture, the improvement and protection of the rural ecological environment, and will to a large degree promote the protection of the rural natural environment.

3.1 Water consumption and water environments in rural Hebei: case analysis

In order to form real pictures of rural water utilization and rural water environment, we selected Dongcun Township, Wenan County in the low medium Hebei plain as an investigation sites. The investigations were via surveys on the spot, individual and group interviews, and panel discussion with the members of village committee, villagers and students, or through the use of questionnaire. The contents of investigations focus on the types and structures of water utilization, the changes of manners of water using and water resources during recent 30 years, and the alterations of water environment and ecosystems correlated with water environment.

There are no natural rivers in Dongcun township region, but there are artificial canals used for drainage and irrigation and they connect with natural rivers out of the township. The annual average rate of precipitation is about 510 mm, but in recent two decades, the precipitation decreased year by year. The annual rate of precipitation changed between 300 mm to 430 mm, and it mainly concentrated in June to August. Because the ground altitude above sea level is low (about 5 meters) and water logging caused by excessive rainfall was difficult to drain out of the region, before 1970, the flood and waterlog disasters were very frequent. This area had been called ‘nine waterlog years out of ten years’. Before 1980, there was abundant surface water resources in this area, the water in the canals existed all year and could have been used for irrigation, but after 1980, as the climate changed and the water consumption increased rapidly, the available surface water resources decreased year after year, especially after 1990. The canals and ponds in this area are keeping drying up in most time of years. Almost all farmlands lose the conditions of irrigation by surface water.
Before 1970, the ground water levels were high, the buried depths were less than 2 meters, and about one third farmland were saline-alkali land. The accumulation of salt in soil was very serious. In the 10 meters below the surface ground is fresh water which the mineralization grades are less than 2 mg/L in most area of the township, and 10~50 meters are salt water aquifers where the mineralization grades are more than 2 mg/L, and >50 meters are deep confined fresh water aquifers. Before 1970, the ground water that had been exploited was shallow ground water and it mainly was used for domestic water supply. After 1970, the deep ground water had been developed on a large scale, and has been not only used to domestic water supply but also used to farmland irrigation. In recent two decades, the rainfall has been decreased and the ground water amount exploited has been increased enormously. The 10 meters fresh water aquifer near the surface ground has been drained, the deep ground water level has depressed by more than 20 meters, and the pumps that used to intake ground water had been altered two generations (from centrifugal pumps to submersible or deep well pumps, from low water lift pumps to high water lift pumps). The ensured probability of irrigation water has decreased, and the probability of drought happened have increased.

The water consumption in the rural area is composed of three parts: the irrigation water consumption, the village and town enterprises water consumption, the domestic water consumption. The primary investigation shows that the ratio of the three parts is about 70:10:20, and the water comes from deep ground water. The per capita farmland area in this township is about 0.14 hectares, in which about one half can be irrigated. The types of farmland irrigation are mainly border irrigation or flood irrigation. The water transportation is by surface irrigation canals. The mean irrigation quota on each occasion is about 1,050 m³ per hectares and the irrigation quota is about 3,300 m³ per hectare. In recent years, the water saving irrigation area has increased and the irrigation quota has decreased to some degree. The rural enterprises are not prosperous in this township. Its water consumption is not very large, and the discharge sewage is limited, the water pollution by industrial sewage is not serious. The domestic water consumption is constituted by drinking water, garden environmental water, washing water, bathing water, and other water, the ratios are about 35:15:30:5:5, the per capita domestic water consumption is about 80L/d. Since 1990, the domestic water has been transported to every family by pipeline networks. Up to now, the drainage systems have not been built in village. When it is raining, there is a whale of mud on the road after the rain in the villages. The domestic garbage can not be disposed properly. They have littered street sides or village sides, the water in ponds around the villages has been polluted in rain season.

In recent three decades, with the surface water decreasing and the ground water exploitation amount increasing, a series of environment problems have emerged. The canals and ponds are dry almost all round year, the aquatic plants and animals distributed in this area in past have nearly died out. The ecological environment degrades, and the pests harmful to crops have increased and pesticides use has also increased. The deep ground water has been overdrawn enormously. The water level descends year by year, as the salt shallow water above the deep confined water recharges the deep fresh water; the salinity of deep ground water has increased. The fluorine content of deep ground water surpassed the standard of potable water, about 85% of the whole children have suffered from fluorosis in this area.
In the rural area of Hebei plain, environmental education has three parts: the farmers accept the environmental education have three: the normal education which often refer to the nine years education in schools for children from 8 years old to 17 years old; the short-term training course which refer to the courses for adults in order to obtain certain technology or carry out some activities organized by government; the other form education which refer to the education through listening to radios, watching TV programs, and reading newspapers. Some times the three types are combined together.

The nine-year compulsory education takes the most important position in rural education in Dongcun township. The enrolment rate of school age children is 100%, but the proportion of children left school during the primary school stage is about 30%, and the proportion reaches 60% during the lower secondary school stage, more than 90% during the senior school stage. The proportion of population attending various short-term training classes is less than 1%, and the proportion of people that subscribe to newspapers and magazines is less than 0.1%, but the proportion of families that have television sets reaches 95%, more than 10 channels can be received and every county, metropolis, and province have its own TV channels. The TV programs already become the main means that received various information. The classes or courses that aim to carry out environment education have never been held in Dongcun township, but many people have understood the deterioration of the environment, such as the shortage of water resources, the water and ecological environment degradation and so on, but they don’t know how to change this situation, for example, in 1995, in order to fight drought, they ask to divert water from Baiyang lake to irrigate farmland, but not only the water amount was very limited but also the water had been polluted seriously, the water colour was dark and gave out unfavourable odour.

We have investigated the contents about environment education in various education forms. There are no special teaching materials about environment in various levels formal or informal in schools, and in primary students textbook the content about water and ecological environment are not enough to make the students pay attention to the environmental problems. The importance of environmental education has not received the teachers and students focus. From the second grade of junior middle school, the contents about environment protection, sustainable utilization of natural resources, and the sustainable development of society and so on have been taught in classes, but the proportion of teaching time for this contents is very small, and the students have never been organized outside class activities about environment protection. In recent years the programs about environmental protection on provincial and national TV stations have increased, but because this kind of programs had lack of interest and practical use, the audience rating was very low, the programs about environment were very few on county TV station.

Environmental issues have become increasingly important in our society over the last three decades or so. In early years, it was the general opinion that environmental problems could be easily solved by the application of the proper environmental
technology. Today, it has been acknowledged that environmental considerations have relations to many aspects of our everyday life and that we cannot solve the environmental problems without the use of a wide spectrum of initiatives. It is an absolute necessity that everybody participate actively, if the elimination of the environmental problems is going to be successful. The attitude of everybody to the protection and conservation of nature, to the application of possible re-circulation and to the selection of “green” products in the markets are crucial for solutions to the environmental crisis. Therefore, all inhabitants should understand the environmental policy, and they should take the right environmental decisions in their everyday involvement in environmental issues. This will obviously require a very profound understanding of the environmental problems and call for an environmental education on all levels from kindergarten to university education. This is to say the inhabitants’ awareness of environment is essential to environment protection.

The awareness of environment includes two aspects, first is the level of knowledge which concern with understanding the natural environment, second is the consciousness of taking part in the activities of environment protection. The awareness of environment of inhabitants in the rural area is the bases of unfolding environment protection works, and it determines if the environment protection will be successful or fails.

In order to evaluate the environment awareness of inhabitants of Dongcun township, and in the light of four aspects of environment awareness, we designed seventeen question items to form a questionnaire. The awareness of environment has been described in four parts: the knowledge and the comprehension to the status and regulation of environment protection (1~5 items), the basic value conception of environment (6~8 items), the attitudes of taking part in environment protection (9~11 items), and the activities of environment protection (12~17 items). During October 2001, 324 sheets was delivered and received 320 valid sheets, the questionnaire is as follows.

Name________ Age________ Educational Level

1. Do you know what is environment protection?
   A: yes               B: no

2. Do you know what are water resources?
   A: yes               B: no

3. In what degrees do you understand the rules and policies about environment protection of our country?
   A: yes, very well    B: yes, but a little    C: no, just listen to

4. Do you agree that water is inexhaustible in supply and always available for use?
   A: don’t agree      B: don’t agree but it is right in some degree  C: basically agrees D: agree

5. Do you agree the statement that water shortage will influence the development of agriculture and industries and the raise of life standard?
   A: agrees          B: don’t agree

6. Do you agree that the people are the most important in the natural world, and the nature serves people?
   A: don’t agree      B: don’t agree but it is right in some degree  C: basically agrees D: agree

7. Which statements are you agree in the following two statements? “We should give priority to develop economy, and then consider the environment protection, so that we could raise our life standards more quickly.” “The environment protection is very
important, we shouldn’t destroy the environment, would rather slow the developing
step of the economy.”
A: I agree the first one B: I agree the second one
8. There were a paper making factory in your area, it had a good benefit, and the main
income of local residents come from this factory, but the sewage from the factory
inflow the near rivers, and polluted the surface and ground waters, now the government
would close up the factory. Do you agree the measure that the government would take?
A: agrees B: don’t agree
9. Do you agree the statement that water saving is governmental affairs and has not any
relation with individual personnel?
A: don’t agree B: don’t agree but it is right in some degree C: basically agrees D:
agree
10. Do you agree to pay the water resources fee if the government decides to collect it
from the units and individuals who use water?
A: agrees B: don’t agree
11. If you found the activity of doing harm to environment, will you prevent it?
A: yes, I will B: no.
12. In recent years have you watched the programs on TV or from films that are related
with environment protection?
A: yes, I pay an attention to the programs. B: yes, but incidentally C: no
13. In recent years have you read the books or magazines that are related to environment
protection?
A: yes, I pay an attention to the programs. B: yes, but incidentally C: no
14. In recent years have you heard any things that had caused some bad effects on life or
development of agriculture and industries by the water shortage or by water pollution?
A: know a lot B: have heard from others C: don’t know
15. In recent years have you taken part in any exams or courses that relate to water saving?
A: yes B: no
16. In recent years have you carried out any public welfare labours or activities?
A: yes B: no
17. In recent years have you taken part in or supported the appeal or sue that asked for
solving the problems of environment pollution?
A: yes B: no

The highest point of each items is 1.0, the lowest is 0, so, the highest point of 1~5
items is 5.0 points, 6~8 items 3 points, 9~11 3 points, 12~17 items 6 points, and the
weights of the knowledge (1~5 items), the basic value conception (6~8 items), the
attitudes (9~11 items), and the activities (12~17 items) are three, five, seven, and
eight respectively, so, after multiply the points by the weights respectively, the
highest point of total four parts is 99.0 point and the lowest will be 0.

The investigation results are as following table 7 shown:
Table 7 The statistics of the investigation:
the different mean points of different people groups

<table>
<thead>
<tr>
<th></th>
<th>Primary school students</th>
<th>Junior secondary school students</th>
<th>Illiteracy or semi-illiterates</th>
<th>Literates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean points</td>
<td>43</td>
<td>67</td>
<td>53</td>
<td>64</td>
</tr>
</tbody>
</table>

4 Rural environmental education and the rational use of water resources

4.1 The rational forms of rural environmental education

Through this investigation in Hebei plain, we can know that to improve the rural environmental quality and recover the good ecological environment in Hebei plain the levels of rural inhabitants’ environmental awareness must be raised greatly by unfolding rural environmental education. Through the environmental education the rural inhabitants could know fully the status and the different harms of environment deterioration, master more knowledge of environmental protection, and know how to improve the rural environmental quality by themselves’ activities. Combining the practice situation of the Hebei plain, we consider that the following measures may be adopted to unfold the environmental education.

1. The primary and middle school teachers are the key elements of carrying out environmental education in rural area. The middle or short-term training courses on environment protection should be held among them, and the knowledge of environmental protection should combine with the textbook contents properly. While mastering the knowledge of context, the students can raise their environmental awareness, and take part in enthusiastically the activities of environment protection.

2. To organize various action groups about environmental protection in primary and middle schools. In the groups the students can learn knowledge and rules about environmental protection, and carry out a variety of activities of environmental protection, and through their action the knowledge of environmental protection could be publicized in rural area, and the environmental awareness of people could be raised to a high level.

3. To organize different types of publicity activities of environmental protection in rural area. For example, established a propaganda column with pictures and figures beside the street walls, give the farmers free propaganda materials about environmental protection, and so on.

4. Increasing the programs on environmental protection on TV, the interesting and practicality and participatory of the programs must be improved.

5. Combining the environmental education with the farmers technological quality raising, while carrying out environmental education, the farmers can increase their capabilities of building up a family fortune, so that, through environmental education not only the rural ecological environment can be upgrade but also the economical incomes of farmers can be raised.
4.2 The rational contents and methods of rural environmental education

The fundamental objective of education is to raise the level of human qualities, according to Sven Erik Jørgensen\textsuperscript{18}, the environmental education contents and methods in the future may be listed as the following points:

1. Change of attitude of rural people. Environmental education should change the attitude towards the environment and nature, from indifferent to very concerned.

2. Insight into how nature works. Environmental education should give a certain insight into how nature is functioning, why nature can absorb some pollutants but not all. Why nature at the same time is very robust but also very vulnerable.

3. Present basic natural principles. Environmental education should and could present the basic natural principles which we must adapt, if we want a sustainable development:
   a. The role and importance of recycling, because of conservation principles
   b. The role of the chemical composition for all living components,
   c. That all components are tied up in a network, which explain their interdependence,
   d. That all natural systems must be open (or rather non-isolated) because they are dependent on an energy source and a heat sink, and so on.

4. Stress the nature of complex systems. Environmental education should underline the nature of complex systems and how predications on the reactions of complex systems require a very profound knowledge on many aspects at the same time.

5. Contain holistic elements. Environmental education should have at least some holistic elements. It is important to use what could be called a macroscopic –see the whole and not the details– several times in the course of environmental education.

6. Draw on several disciplines simultaneously. Environmental education should at least have some multi- and interdisciplinary elements to illustrate the importance of drawing on several disciplines simultaneously to solve real life problems.

7. Be problem-oriented. Environmental education should be problem-oriented, as the practical application of the education would focus on problems. The problems should be well defined, quantified and the possible solutions to the problems discussed with viewpoints from several angles.

8. Use practical projects. Environmental education should to a high extent be in the form of projects, preferably very concrete projects, in order to bring the education “down to earth”.

9. Present our dependence of nature. Environmental education should reveal our complete dependence on nature, and the vulnerability of our modern society to any changes in the basic properties of our environment. In this relation our dependence of access to recreational areas and a wide spectrum of natural resources should also be mentioned. The relation between our health and the environment is also significant in

\textsuperscript{18} Sven Erik Jørgensen, 1998, A Focus on Lake/Rivers in Environmental Education, Environment Agency, Government of Japan & International Lake Environment Committee
this context, for instance the importance of high quality drinking water we are indeed dependent on nature, while nature particularly on a long term basis is independent of mankind. We can influence nature, but we can’t change the fundamental laws of nature.

10. Include the role of environment as a social-economic factor. Environmental education should also consider the role of our environment in the society as a social-economic factor. It should reveal how many social-economic problems can be explained as environmental decisions can create social-economic problems.

4.3 Rational use rural water resources and improving rural water environment

The directive cause of water and ecological environment deterioration is the overdraft of water resources, in order to improve the water and ecological environment; the key factor is to use water resources rationally.

1. Saving water in the processes of productions and domesticity. For example, to enhance the management of the rural water supply pipelines networks, to reduces the ineffective losses; and to enhance the capital construction of farmland water conservancy, extend water-saving irrigation technologies and new water-saving species during the farm productions, so as to raise the water production efficiency.

2. To change the cropping pattern, decrease the cropping area of high water consumption plants or low water production efficiency plants. To extend water-fitting cropping technology, cut down the cropping area of non-corresponding between the rain season and growing season, such as wheat.

3. To develop the technologies of rainwater harvest and utilization, increase the using efficiency of rainfall; for example, in the area of short of potable water the rainwater can be collected for domestic usage.

4. To combining the two technologies of irrigation and non-irrigation crops plant.

5. To increase the water amount of environmental use, decrease the surface water loses in Mt. area, increase the water amount of entering the plain, and improve the ecological environment around the river courses.

6. To control the transfer of sewage from urban area to rural area, decrease the happening of water pollution.

7. To study the technologies of the mix of fresh water and salt water and use them in irrigating farmland in the Hebei plain.

References
3. Investigation and Questionnaire on Water Environment by Mr. Wang Li (in Chinese)
Appendix 11: Published Paper 3
Paper presented in the International Symposium on Rural Education
Baoding, China 20-23 January 2003

The Contribution of Higher Education in the Development of Rural Areas

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Dr. Darol Cavanagh Associate Professor
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Abstract

This paper discusses the role of higher education in the development of rural areas under the Chinese context. One agricultural university in Hebei province (i.e. AUH) had been involved in the advocacy of an education model “Combining Theory with Practice”. This model has proven to be suitable for the urgent needs of rural China. The education model is the key strategy in implementing “The Taihang Mountain Model (TMM): a Road to Prosperity, which is a development model that integrates education, science and technology in constructing the rural economy and reclaiming the ecological environment of mountainous areas.

Keywords: Rural education, technological literacy and development

I. Introduction

The fundamental way for the transformation from the practice of traditional agriculture to the modern agriculture depends on the development of the agricultural technology and the farmers’ vocational and technical education. Hebei Province is a big agricultural province, with the rural population taking up nearly 80% of its total population. At the beginning of the 1990s, the population with elementary education ranked 11th in the country, with the illiteracy rate the 13th (according to the statistics of the fourth census). Indeed, there exists a huge population of “technological illiterates” with only low-level elementary education. They lack technological knowledge on the use and application of agricultural technology.

It can be seen, from our 20 years’ experience of the comprehensive transformation of the Taihang Mountain area, that emphasizing rural technological literacy plays an irreplaceable role in regional economic development.

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Below is a brief discussion of the experiences of how Technological Literacy promoted economic development for this area as manifested by the changes to farming practices of the majority of farmers.

II. The principle behind, approach taken, and the significance of the farmers’ technological literacy

Hebei Province is in the northern part of the North China Plain, to the north of the lower Yellow River and to the west of Bohai Sea with a coastline of about 500 km long. It is between longitude 113° 27' E. ~119° 50' E. and latitude 36° 3’ N. ~42° 4’ N., bordering on Liaoning, Inner Mongolia, Shanxi, Henan, and Shandong provinces. The Chinese name for “Hebei” means “to the north of the river”, because the province, with Beijing, the capital of China in the centre, lies to the north of the lower Yellow River. (Fig. 1)

Fig. 1 Location of Hebei Province

Since 1979, the Agricultural University of Hebei (AUH) has been undertaking a prosperity development model that affected a comprehensive transformation of the Taihang Mountain area, which was highly commended by the government and was
praised as the “Taihang Mountain Road” - a road to prosperity. The main aim of this model is to spread the technology into the mountain villages, to revitalize the poor mountainous areas and to help the farmers get out of poverty and become prosperous.

In practice however, it is discovered that the education level in the mountainous area is quite backward, the technological consciousness is unresponsive and most of the work-force population has low-educational level. The majority obtained only elementary and only a few have got secondary education while almost no one has acquired the vocational and technological education.

The above situation made the task of implementing “technological literacy” on the farmers more difficult than thought it would be. We, therefore, duly put forward the technological education principle ---“Getting rid of poverty before transforming the mountain, eliminating ignorance before getting rid of poverty, educating people before eliminating ignorance, and educating adults ahead of the whole population”. By strictly adhering to this principle, the rural technological literacy is strengthened and the technological and cultural quality of the rural work force is improved.

From our learning through experience----under this principle, we adopted some measures to widely develop the technological literacy of the population through strengthening the rural vocational and technological education, thus raising the technological consciousness and quality of the farmers, and injecting vitality to the regional economic development. The approaches we have taken are detailed below as follows:

1. First, we propagated the connection of “transforming the mountain” and “eliminating ignorance” and raised the technological consciousness of the farmers. It is believed that as far as the regional economy is concerned, low-level elementary education is the basic reason for the poverty and backwardness in the mountainous areas. This is exacerbated by poor technological consciousness and technology illiteracy of the farmers. Therefore, our experts and professors carry out the different technological enlightenment education. Through some substantial practice, we let the farmers understand why we put “eliminating ignorance” ahead of “transforming the mountain”.

The main reason why the farmers were very conservative-minded and high levels of illiterates and especially technological illiterates reached almost innumerable levels is because the rural mountainous areas remained sealed from the outside and impenetrable for a long time. In our earlier interactions with them, it was a common case for farmers to stick to the traditional methods and refuse to change to scientific farming practices. For example, at the beginning of the founding of the Taihang Mountain Road, when the teachers were to prune the fruit trees, the farmers said, “in that case where will the fruits grow?” The well-bred maize given out to the farmers for planting in their fields were instead privately fed to chickens, etc.

With farmers’ show of resistance and unresponsive behavior to change resulting mainly from ignorance, our teachers had to conduct experiments on the abandoned fruit trees and farms. The villagers were not sincerely convinced until they saw the harvested persimmons on the pruned persimmon trees and the well-bred maize production was doubled twice.
Given this experience and with the knowledge of the professors and experts and witnessing the development fact, the farmers understood the power of technology and the reality of “eliminating ignorance” ahead of “transforming the mountain”. They were convinced that only if they had a strong technological consciousness, they could truly advocate scientific ways. From such consciousness only they could build the ideological foundation for technological literacy.

The connection between “transforming the mountain” and “eliminating ignorance” was firmly set and the technological consciousness of the farmers were raised, the villagers sought more willingly than before for more technical help from the teachers and students from AUH who were highly respected now and regarded as “Plutus”.

2. The second approach - we carried out concentrated training and applied technical training to improve the farmers’ technical skill. The comprehensive transformation and development of the Taihang Mountain area required numbers of technological personnel, highly educated privileged few and qualified cadres. But the mountainous areas lacked the technical personnel. So it was necessary to take various measures to carry out the technical training for the grass-roots cadres and masses. The concentrated training involved main lectures in school that carried out formal training and awarded the diploma and green certificate. The applied technique to training, primarily organized training according to regional characteristics, which play a boosting role in guiding the regional scale-oriented production. Such techniques are suitable and relevant to the reality of Regional Development Plan. On the basis of thorough research, AUH takes “short, safe and quick”— applied technique training as the breakthrough point for farmers to master the modernized practical techniques. The experts universalize the techniques which helps to alleviate poverty.

An analysis of statistical data revealed that each year the university sends out technological session teams constituting of more than 100 experts and professors and over 400 students of various majors. They immerse themselves into the countryside and through practical experience and technical guidance and service carry out technical consultation and training activities. Every year AUH holds over 400 training seminars attended by more than 50,000 immediate trainees. It also distributes more than 10,000 copies of practical technology materials and technical reference books. This is so that the low-level elementary education populace could acquire the necessary technical knowledge and skill and rapidly master one applied technique. Thus AUH accordingly trains many technical personnel.

3. In our third approach, through our vocational school and vocational teaching centre we trained qualified reserve personnel. AUH in the mountainous areas discovered that by merely helping rural people out of poverty with science and technology and imparting the applied skill that this only temporarily settles the problems. Thus while improving the quality of the population with low-level elementary education, the farmers, can completely do away with such backwardness in the regional economy.

The make up of the rural population shows that every year a large quantity of elementary, secondary and high school students join in the labour army of the farmers. These people, however, cannot adapt to the reality of the rural development
due to their single-faceted knowledge structure and lack of agricultural production knowledge and practical experiences. At the same time, a lot of women remain illiterates and neo-illiterates. In order to develop the vocational and technical education of the rural area and raise its overall quality we must depend on the vocational teaching centre and agricultural vocational school that can directly train the qualified personnel for the front line of the agricultural production.

For a long time, AUH has been helping the counties of the mountain area set up vocational teaching centres and assisting in the vocational teaching center. It also helps the agricultural vocational school carry out teaching activities with the vocational technical institute as the centre. For example, in 1996, it helped Shunping County: establish the advanced agricultural vocational school, and according to the needs of Shunping County, set up specialization, made teaching plans; trained teachers for the agricultural vocational school; found the practical teaching bases and consultation service station; trained the teachers to teach and guide in the agricultural vocational school; donated a great number of technological books, some teaching equipment and facilities for the agricultural vocational school of that county. It trained a group of high-qualified applied talents for the agricultural production in Shunping County and brought vitality for the technical exploitation of the mountain area.

4. In our fourth approach – we locally impart knowledge and meet the urgent technological needs of farmers. Aiming at the characteristic of the low-level basic education, the experts and professors immersed into the rural areas and farms to demonstrate techniques for the farmers and taught applied technical knowledge. This was universally and favorably received by the farmers and had significant achievements. Through circuit guidance, present demonstration and field operation etc, they taught the farmers the perceptible, practical and effective techniques that brought in immediate benefit.

5. With our fifth approach we initiated the refresher institute and trained higher-level qualified technical personnel. To solve the difficulty of “recruiting and keeping the qualified people”, with the support of the provincial government in Hebei Province, AUH in 1992 set up “the Refresher Institute of Construction in the Mountain and Old-aged Region in Hebei Province”. It adhered to the principles “to assign the graduates back to their hometown, be lenient at the enrollment of the students and strict at the graduation of the graduates, stressing quality”. Experienced teachers who had knowledge of the mountain development conditions were employed. For the recent several years, AUH has provided technical personnel from junior college who have become the fresh reformers for the technical education in mountainous areas. Under their leadership, the farmers with low-level elementary education can receive the technical guidance at any time and be transformed from the technological illiterates to the technological “master-hand” in farms.

6. Finally in our sixth action, we disseminated the technology through the college students’ social practice during their vacation. The agricultural university, AUH integrates the college students’ social practice with rural technological literacy and technical education of the farmers. Every year AUH organizes over 40 technological sessions and over 300 back-home sessions in rural and mountainous areas. Through
technology dissemination, technical consultation, short-term training and field guidance, etc, we were able to transfer technology and technical skill to farmers. It has improved farmers’ technology literacy and consciousness and enabled them to apply or make use of technology in their farming practices.

Social practice on the one hand has given agricultural students actual exposure during their courses that inculcates love for the land and service for the farmers. On the other hand it has facilitated the spread of technological consciousness among farmers in mountainous countryside which improved their technological literacy.

Summing up these 6 major approaches showed the persistence and tenacity in implementing the Taihang Mountain Road (a development model) for 20 years taken by AUH. It is evident that it has made its due contribution to extricate the farmers from the shackles of poverty and lead them to prosperity. From the practice experienced by us we have observed that technological literacy aimed at population with low-degree elementary education showed to be the main way to empower the poor with technology. In addition, AUH experience suggests that this kind of “literacy” is the key to the improvement of human labor quality and the determining factor for the manufacture of various kinds of processed products. Only when every rural laborer shakes off “technological illiteracy”, the influence will be profound and total, because farm productivity cannot be actually raised until the farmers’ technological consciousness and knowledge skills are upgraded and or duly improved.

III. The reflection of creating the 21st century technological literacy model

The upcoming 21st century is technologically driven and characterized by intense market competition of products including farm produce. Therefore, we should fully realize the significance and effect of the implementation of technological literacy to the farmers. According to the demands of the regional economic development, we should create the technological literacy model in conformity with the rural reality to face the challenges posed by the 21st century. Below are illustrations of the model, and what still needs to be done.

1. To foster more the integration of agriculture, technology and education and perfect the network of technological literacy, technical training and extension.

To change the status of the inattentive technological consciousness and lack of knowledge of the rural population with low-degree elementary education, the agricultural universities have done a lot of fruitful work. However, it is far from enough to depend only on the teachers’ training and person to person teaching. The victory of the integration of the agriculture, technology and education must be consolidated and enlarged and the network system of technological literacy, technical training and agriculture extension must be perfected to better provide the intellectual support for the regional economic development.

The integration of agriculture, technology and education is the major measure to implement the strategy “to prosper agriculture with technology and education”. The ultimate way for education to serve agricultural and rural modernization agricultural is through universities taking an important role.
In order to propel rural education reform, each year AUH assigns teachers with vocational education experience to teach in the pilot counties to help develop vocational education for technological literacy. With the support of the Provincial Education Commission, AUH established “the Coordination Centre of Agriculture and Forestry Education System for Prospering Agriculture with Technology and Education”.

Towards the 21st century, we should further deepen the integration of agriculture, technology and education, and establish and perfect the network for vocational and technological education. To this end a training network needs to be established with the agricultural universities as the head, the middle technical schools as the subhead, the farmer technicians as the backbone. Thus, we make full use of the agricultural universities in undertaking technological literacy and improving the quality of the rural laborers with low-level elementary education.

2. Creating and perfecting the farmers’ specialization and technical association and give impetus to the deep development of technological literacy.

Besides imparting technique and carrying out training and extending new technique, it is worthy to motivate the masses and form an active self-teaching and self-improvement environment. During its process of propagating the technology into the mountain and implementing “prospering agriculture with technology and education”, AUH, with the market as the orientation, technique as the core and service as the tenet/doctrine/principle, initiated various kinds of Agricultural and Technical Associations, such as “the Development Association for Red Fuji Apple”, “the Liaison Station for Preventing and Curing the Fruit Tree Disease”, “the Association for Local Mushrooms Producers”, “the Association of Chicken Raisers”, “the Watermelon Farmers Association” and so on.

Facing the 21st century, we should further better and gradually standardize and enliven these special technical associations and turn them into farmers’ technical extension and strategic organizations. These associations should also be networked with the graduates from the agricultural universities. This will enable graduates to combine technical and theoretical with practical knowledge, and furthermore, independently settle these technical problems and accordingly become the internal force to enhance the rural technical development. The function that these associations will exert in the future is considerably extraordinary.

3. Establish the triple integration base of teaching, research and production entrusted by the agricultural universities and transact the tri-dimensional and chiasma type vocational and technical education.

Technological literacy is a longstanding task; the three-dimensional function as foundation of agricultural universities also adheres to and extends the basic principle of the “Taihang Mountain Road” development model. The establishment of the integrated bases (teaching, research and production) should be unified with the implementation of technological literacy to the farmers to bring more noteworthy beneficial service by agricultural universities for agriculture.

During its deepening “Taihang Mountain Road” development model, has constantly
innovated the service for agriculture, village and farmers. AUH has set up over 70 relatively stable “integration of the three” bases and liaison branches in 98 counties and municipalities in Hebei Province and integrates research, teaching and production to expand the university’s technological radiation area to cover 78% of the whole province.

In order to meet the demands of the government at every level, and to maximize the utility of “Taihang Mountain Road” model, we should expand the widespread integrated bases into the whole mountainous regions and from the former tri-dimensional bases move to a more complex chiasma type integrated vocational and technical bases.

The “tri-dimensional and chiasma type” refers to the generalization of the function of the base. The base exists for some specialization, but also as the “radiating point” for various items of technology. Students can go ther and do their experiments and practice the theory they learn from school. The farmers can also observe and study the agricultural technology along with the students. By this, the school can accomplish the research for the major items that the government has approved. Through the combination of the integrated bases with vocational education, we expand the implementation of the technological literacy to the farmers and improve the approach to their over-all quality.

For instance, the first pilot village to implement the plan “to revitalize the village with technology and education” by the Chinese National Agronomy Commission, (the Chaichang Village in Yi County in Hebei Province), is entrusted technologically by AUH with an undertaking to broaden the former “triple integration” base. Under the guidance of the experts from AUH, with the technological education and literacy as the premise, the Chaichang Village aroused the villagers’ enthusiasm over technology. They took greenhouse production and fruit tree management as the breakthrough point and achieved a success in growing the greenhouse vegetables and also got their persimmon production doubled. The villagers who benefited from these early successes invested to build the Technology Evening Schools that have trained over 3000 farmers for two years and the steady poverty alleviation was realized within a short period of one year only.

As for the future of technological literacy, we can sum up experiences from the practice of revitalizing the villages with technology and education, and combine some perfect and more sound integrated bases with technological literacy to make an effort to train “new-type” farmers to match with the 21st century.

Conclusion

Finally, we recommend that technological literacy for the population with low-level elementary education is an undertaking that benefits both the nation and the people and which the government should strengthen and give due financial support. At the same time, the service of agricultural universities should be enhanced to bring the technological literacy closer to the rural reality and to promote the effect of education to ascend one storey higher, which is the prime obligation and ultimate target of the rural education undertakers.
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Appendix 12: Published Paper 4
Keynote speaker in the International Conference on Transforming Digital Divide into Digital Opportunities for Rural Populations in Conjunction with the 10th Anniversary of INRULED
Baoding, China 17-19 October 2004

Comparative Study on the Roles of Agricultural University for Rural Development
Prof. Wang Li

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Abstract
Agricultural universities have a potential role for rural development particularly through the dissemination of new technologies for income-generation and other activities, delivering short courses and of expertise for promotion of quality of rural life. Experience shows that universities have a strong technical expertise to enable them to become a major vehicle in promoting development in rural areas.

Implementing development changes also prove to be very tedious and a costly endeavor for universities as they are limited by both human and financial resources. However, there are many experiences and cases, successful and unsuccessful, gathered by some universities that are already engaged in rural development.

In this context, some university’s experiences have been selected as concerning the role for rural development, particularly concentrated on Agricultural University of Hebei (AUH) China, and Charles Darwin University, Australia. AUH has been providing remarkable extension services to rural farmers since the late 1970s. University professors, on the basis of their scientific research and laboratory experiments, have been providing farmers with practical advice and suggestions on improving crop production, developing skills in upgrading animal husbandry, planning high yield fruit trees, etc. Charles Darwin University (CDU), Australia has also been involved with education/training, research and services for rural, remote and Indigenous communities and made a contribution for their development. Other agricultural universities in China and abroad are actively involved in similar activities aimed at rural development.

This paper focused on the needs of agricultural university for rural and agricultural development and the role of agricultural universities for rural development, particularly in developing countries.

1. Introduction and scope of the study

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Universities are higher educational institutions. “The core missions of higher education - to educate, to train, to undertake research and to provide services to the community - must be preserved, reinforced and further expanded.” The conference also stressed that “higher education institutions must seek to educate qualified graduates who are responsible citizens and to provide opportunities for higher learning throughout life.” (The World Conference on Higher Education in the Twenty-first Century: Vision and Action, Website 1)

The world wide experiences and practices have proved that universities, especially agricultural universities, have played a very important and a key role in helping rural population becoming literacy, upgrading farmers’ living quality and accelerating rural economic development. Meanwhile, universities are becoming the main forces for transforming knowledge and technology into the agricultural productivity. Since the teaching targets and research work of the agricultural universities are closely related to the real production demand in rural area, all kinds of introduction of new-technology, high technology and training programs are welcome by the farmers and agricultural college students.

Generally speaking, the activities of agricultural universities carried out for rural development could be identified in many aspects, such as: new breeds producing; new techniques providing; demonstration areas establishing; rural development planning; university professors and staff directly serving in rural communities (e.g. contacting with rural farmers, some professional associations, training activities and so on); etc. The followings will have more discussion on those issues.

This study and the paper presentation will be on the occasion of INRULED 10-year anniversary; therefore, the study is going to have a summary based on myself and INRULED previous research outcomes of and country papers presented. The scope of the study encompasses the following areas as focused on the roles of universities for rural development in China and Australia and some other countries in Asia and the Pacific, such as India, The Philippines, Malaysia, and Thailand, and also some cases will also be selected according to the data availability.

2. Agriculture and high agricultural education

2.1 General description on agriculture in China and Australia

Since the economic reforms were initiated in 1978, China’s economy has grown substantially. For example, the annual growth rate of GDP was 8.5 percent in 1979-84 and 9.7 percent in 1985-95. (NSBC 2001)

<table>
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<td>Value</td>
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<td>1989</td>
<td>16909.2</td>
<td>38.6</td>
<td>6534.73</td>
<td>669.46</td>
</tr>
<tr>
<td>1990</td>
<td>18547.9</td>
<td>41.3</td>
<td>7662.1</td>
<td>1127.37</td>
</tr>
<tr>
<td>1991</td>
<td>21617.8</td>
<td>37.7</td>
<td>8157.0</td>
<td>494.90</td>
</tr>
<tr>
<td>1992</td>
<td>26638.1</td>
<td>34.1</td>
<td>9084.7</td>
<td>927.70</td>
</tr>
<tr>
<td>1993</td>
<td>34634.4</td>
<td>31.7</td>
<td>10995.5</td>
<td>1910.80</td>
</tr>
<tr>
<td>1994</td>
<td>46759.4</td>
<td>33.7</td>
<td>15750.5</td>
<td>4755.00</td>
</tr>
<tr>
<td>1995</td>
<td>58478.1</td>
<td>34.8</td>
<td>20340.9</td>
<td>4590.40</td>
</tr>
<tr>
<td>1996</td>
<td>67884.6</td>
<td>32.9</td>
<td>22353.7</td>
<td>2012.80</td>
</tr>
<tr>
<td>1997</td>
<td>74462.6</td>
<td>31.9</td>
<td>23788.4</td>
<td>1434.70</td>
</tr>
<tr>
<td>1998</td>
<td>78345.2</td>
<td>31.3</td>
<td>24541.9</td>
<td>753.50</td>
</tr>
<tr>
<td>1999</td>
<td>82067.5</td>
<td>29.9</td>
<td>24519.1</td>
<td>-22.8</td>
</tr>
<tr>
<td>2000</td>
<td>89442.2</td>
<td>27.9</td>
<td>24915.8</td>
<td>396.7</td>
</tr>
<tr>
<td>2001</td>
<td>95933.3</td>
<td>27.3</td>
<td>26179.6</td>
<td>1263.80</td>
</tr>
</tbody>
</table>

Source: 2002 China Agricultural Statistics Year Book

Above data shows that with the Chinese national GDP development and the share of agriculture decrease for the past twenty years, the agricultural products have increased increasingly, the reason is that agricultural productivity has been increased dramatically, and science and technology have become the vital factor to ensure this movement. For this reason, agricultural universities as higher educational institutes play a significant role to carry out agricultural training, research and extension/services, which are very important and un-replaced for rural and economical development.

With the sustainable development in agriculture and related areas, agricultural education and technology development have been regarded as the primary engine for economic development in rural areas and the major factor for poverty alleviation. China has a strong agricultural training and research system that have generated technologies adopted by millions of farmers to meet the increasing demand of food and agricultural products in the most populous country in the world. All previous studies consistently show that training and research-led technological change are the key issue of agricultural growth. Technology produced by China’s agricultural education and research institutes accounts for most of the rise in the total factor productivity of the cropping sector between 1980 and the late-1990s. (Website 3)

According to the Year Book Australia 1990, the rural population of Australia approximated to 15% of the total population, or up to 30% if the definition of rural includes the inhabitants of large towns (for instance, centres up to 100,000 people) (DEET Report of the Review of Agricultural and related Education, 1991, p. 23).
In Australia, agriculture and related areas used to be the main factors for Australia economy. However, from the middle of 1950’s the contributions of agriculture to productivity, employment, and export have declined rapidly. See table 2.

Table 2. Share of Agricultural factors in Australia

<table>
<thead>
<tr>
<th></th>
<th>GDP</th>
<th>Employment</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956-1957</td>
<td>14</td>
<td>10.8</td>
<td>80</td>
</tr>
<tr>
<td>1966-1967</td>
<td>10</td>
<td>8.3</td>
<td>68</td>
</tr>
<tr>
<td>1976-1977</td>
<td>5</td>
<td>6.2</td>
<td>46</td>
</tr>
<tr>
<td>1985-1986</td>
<td>4</td>
<td>5.8</td>
<td>35</td>
</tr>
<tr>
<td>1989-1990</td>
<td>4</td>
<td>5.0</td>
<td>24</td>
</tr>
</tbody>
</table>


Table 3 Agricultural commodities produced, Gross value (Current prices) (Aus$m)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops</td>
<td>15,995.8</td>
<td>15,308.2</td>
<td>16,226.3</td>
<td>16,923.0</td>
<td>18,534.2</td>
<td>21,402.7</td>
</tr>
<tr>
<td>Livestock slaughtering and other disposals</td>
<td>6,376.3</td>
<td>6,991.9</td>
<td>7,255.8</td>
<td>7,944.2</td>
<td>9,737.8</td>
<td>11,434.5</td>
</tr>
<tr>
<td>Livestock products</td>
<td>5,758.7</td>
<td>5,957.8</td>
<td>5,411.8</td>
<td>5,345.4</td>
<td>5,964.7</td>
<td>6,750.7</td>
</tr>
<tr>
<td>Total value</td>
<td>28,130.8</td>
<td>28,258.0</td>
<td>28,893.9</td>
<td>30,212.0</td>
<td>34,236.7</td>
<td>39,587.9</td>
</tr>
</tbody>
</table>

Source: Agricultural Commodities, Australia (7121.0); Agriculture, Australia (7113.0); ABS data available on request, Australian National Accounts.

Table 4. Total student enrolments, by category and level, average 1986-90 (number)

<table>
<thead>
<tr>
<th>Category</th>
<th>Ass Dip.</th>
<th>3 Y Bach.</th>
<th>4 Y Bach.</th>
<th>Grad Dip.</th>
<th>Masters (Coursework)</th>
<th>PhD</th>
<th>Masters (Research)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>273</td>
<td>804</td>
<td>1471</td>
<td>278</td>
<td>71</td>
<td>331</td>
<td>366</td>
<td>3594</td>
</tr>
<tr>
<td>Horticulture</td>
<td>531</td>
<td>282</td>
<td>55</td>
<td>26</td>
<td>0</td>
<td>2</td>
<td>..</td>
<td>998</td>
</tr>
<tr>
<td>Forestry</td>
<td>11</td>
<td>0</td>
<td>237</td>
<td>17</td>
<td>3</td>
<td>26</td>
<td>13</td>
<td>307</td>
</tr>
<tr>
<td>Natural Resource Mgmt</td>
<td>81</td>
<td>1277</td>
<td>145</td>
<td>160</td>
<td>44</td>
<td>24</td>
<td>20</td>
<td>1751</td>
</tr>
<tr>
<td>Ag</td>
<td>0</td>
<td>0</td>
<td>356</td>
<td>80</td>
<td>48</td>
<td>3</td>
<td>19</td>
<td>506</td>
</tr>
</tbody>
</table>
The interesting thing for above two tables is that even though the share of agriculture and employment in agriculture decreased, the agricultural education has been increased, the agricultural products and the graduate numbers from higher agricultural institutes increased either, which indicates that government pays attention on agriculture and related areas, and the agricultural productivity increases too. All of those require the contribution from higher agricultural education.

Until the late-1950s, agricultural products accounted for more than 80% of the value of Australia's exports. Since then, despite increasing agricultural output, that proportion has declined markedly as the Australian economy has become increasingly diverse. For each year during the five years to June 2002, exports from the agriculture industry averaged just fewer than 9% of the total trade. The quantity and value of production have expanded in the mining, manufacturing and, in recent years, the service industries. The direct contribution of agriculture to Australia's gross domestic product has remained steady at around 3% throughout the last decade. (Website 4) The old saying that Australia "rides on the sheep's back" has long ceased to describe Australia's economy.

The number of people employed in agriculture decreased in 2002 to 376,000 persons. The majority of persons employed in agriculture were male (68%). Around 83% of women employed in agriculture were married, compared with 70% of men. Table 5. shows the average employment in agriculture and services to agriculture for each of the years 1997-2002.
Table 5. Employed persons (a) in agriculture and related services to agriculture (a), Annual averages

<table>
<thead>
<tr>
<th></th>
<th>Males ‘000</th>
<th>Females ‘000</th>
<th>Persons ‘000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>278.2</td>
<td>126.2</td>
<td>404.4</td>
</tr>
<tr>
<td>1998</td>
<td>268.0</td>
<td>124.5</td>
<td>392.5</td>
</tr>
<tr>
<td>1999</td>
<td>278.7</td>
<td>129.1</td>
<td>407.7</td>
</tr>
<tr>
<td>2000</td>
<td>279.7</td>
<td>129.5</td>
<td>409.2</td>
</tr>
<tr>
<td>2001</td>
<td>269.7</td>
<td>132.0</td>
<td>401.7</td>
</tr>
<tr>
<td>2002</td>
<td>256.9</td>
<td>119.1</td>
<td>376.0</td>
</tr>
</tbody>
</table>


The 2001-02 Agricultural Survey provide information on the business operations and management of Australian farm businesses. This includes details relating to knowledge of, and participation in, further training and education programmes. The results indicate that 40% of respondents attended a demonstration site or field day, 25% participated in workshops or short courses, 16% attended a conference and 12% engaged a consultant. While 9% of respondents attended a TAFE course, only 1% attended a university course. Around 32% of respondents reported they did not participate in any courses. Following tables are for the further explanation.

Table 6. Learning activities participated in, percentage of total respondents, 2001-02

<table>
<thead>
<tr>
<th>Activity</th>
<th>NSW %</th>
<th>Vic. %</th>
<th>Qld %</th>
<th>SA %</th>
<th>WA %</th>
<th>Tas. %</th>
<th>NT %</th>
<th>ACT %</th>
<th>Australia %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration sites or field days</td>
<td>42</td>
<td>37</td>
<td>36</td>
<td>47</td>
<td>46</td>
<td>32</td>
<td>35</td>
<td>33</td>
<td>40</td>
</tr>
<tr>
<td>Conferences</td>
<td>16</td>
<td>12</td>
<td>14</td>
<td>23</td>
<td>21</td>
<td>13</td>
<td>29</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>Workshops or short courses</td>
<td>27</td>
<td>19</td>
<td>23</td>
<td>34</td>
<td>27</td>
<td>19</td>
<td>31</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td>TAFE course</td>
<td>11</td>
<td>7</td>
<td>3</td>
<td>18</td>
<td>9</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>University course</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Engaged a consultant</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>17</td>
<td>19</td>
<td>12</td>
<td>7</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Did not participate in any courses</td>
<td>31</td>
<td>34</td>
<td>34</td>
<td>27</td>
<td>27</td>
<td>38</td>
<td>29</td>
<td>42</td>
<td>32</td>
</tr>
</tbody>
</table>
Table 7, Programs participated in, percentage of total respondents, 2001-02

<table>
<thead>
<tr>
<th>Program</th>
<th>NSW %</th>
<th>Vic. %</th>
<th>Qld %</th>
<th>SA %</th>
<th>WA %</th>
<th>Tas. %</th>
<th>NT %</th>
<th>ACT %</th>
<th>Australia %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Busi</td>
<td>23</td>
<td>10</td>
<td>12</td>
<td>32</td>
<td>23</td>
<td>12</td>
<td>32</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Land care</td>
<td>23</td>
<td>26</td>
<td>18</td>
<td>16</td>
<td>27</td>
<td>21</td>
<td>23</td>
<td>40</td>
<td>22</td>
</tr>
<tr>
<td>River care</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>10</td>
<td>2</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Bush care</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Coast care</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Natural Heritage Trust</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>National action plan for salinity &amp; water quality</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>None of the above</td>
<td>42</td>
<td>46</td>
<td>52</td>
<td>41</td>
<td>40</td>
<td>46</td>
<td>38</td>
<td>44</td>
<td>45</td>
</tr>
</tbody>
</table>

Source: Website 5

Like most industries, Australian agriculture has experienced unforeseen gains in productivity and output, through the application of new technology and science over the last 100 years. At the turn of the century, much of the energy used to operate farms came from manual labour, assisted where possible with horse, bullock and steam power. Large scale farming and grazing relied upon the availability of large numbers of unskilled workers. Today farms which employed hundreds of laborers at the turn of the century are operated by a few people with the help of sophisticated machinery and technology. Improvements in disease and weed control, through the use of advanced chemicals, have revolutionized the ways in which farmers prepare their ground and control diseases in crops and livestock. However, adoption of technology, such as extensive use of fertilizers and irrigation, tree clearing and chemical spraying, brings its own challenges to agriculture. Extensive land degradation through increased soil salinity (such as in the Western Australia grain belt and the Murray - Darling Basin), increased soil acidity, chemical residues in agricultural products, and consumer backlash to genetically modified products, are some of these challenges.

The adoption of new technology is now more important than ever as farmers try to maintain levels of profitability in the face of rising costs, worsening terms of trade, and restrictions on land use and farming practices imposed by governments as society becomes more aware of the need to develop sustainable farming practices. Satellite technology has been adopted in a number of ways, such as using satellite imagery when making decisions on land use, satellite ground positioning systems to guide spraying and cultivation equipment, and satellite communication technology for controlling equipment in remote areas, such as pumps and generators. PVC piping is used increasingly to pipe water, previously channeled over great distances through open bore drains in the inland areas, as more efficient use of artesian water becomes necessary. (Website 6)
From above discussion, it is very clear that modern agriculture needs more people with trained at universities and other educational institutions, those kinds of training are significant for Australia agriculture to be sustainable development.

2.2 Higher agricultural education and rural development

The following table shows information on the selected countries. These basic data expresses the backgrounds, situations, and challenges that the higher agricultural universities faced.

Table 8 Comparative background indicators

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Pop. (million) 2001</th>
<th>Pop. in Rural (% of total) 2000</th>
<th>GNP (Billions of dollars) 2001</th>
<th>GDP Per capita 2001</th>
<th>Share of agriculture (%) 2001</th>
<th>Adult illiteracy rate % of people ages 15 and above 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>19</td>
<td>9</td>
<td>383.3</td>
<td>19,770</td>
<td>3</td>
<td>… …</td>
</tr>
<tr>
<td>China</td>
<td>1,272</td>
<td>64</td>
<td>1,131.0</td>
<td>890</td>
<td>15</td>
<td>8 24</td>
</tr>
<tr>
<td>India</td>
<td>1,033</td>
<td>72</td>
<td>474.3</td>
<td>460</td>
<td>24</td>
<td>32 55</td>
</tr>
<tr>
<td>Malaysia</td>
<td>24</td>
<td>43</td>
<td>86.5</td>
<td>3,640</td>
<td>8</td>
<td>9 17</td>
</tr>
<tr>
<td>Philippines</td>
<td>77</td>
<td>41</td>
<td>80.8</td>
<td>1,050</td>
<td>15</td>
<td>5 5</td>
</tr>
<tr>
<td>Thailand</td>
<td>61</td>
<td>80</td>
<td>120.9</td>
<td>1,970</td>
<td>10</td>
<td>3 6</td>
</tr>
</tbody>
</table>

Table 8 (continued). Comparative background indicators

<table>
<thead>
<tr>
<th>Country</th>
<th>Enrolment tertiary education per hundred thousand inhabitants 1996</th>
<th>Percentage of students (and graduates) by field of study 1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>5682</td>
<td>8 (15) 13 (14) 33 (32) 32 (23) 12 (14)</td>
</tr>
<tr>
<td>China</td>
<td>473</td>
<td>16 (28) 6 (8) 9 (22) 53 (35) 9 (6)</td>
</tr>
<tr>
<td>India</td>
<td>638</td>
<td>4 (…) 70 (…) … (…) … (…) 25 (…) 2 (…)</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1048</td>
<td>… (…) … (…) … (…) … (…) … (…) … (…)</td>
</tr>
<tr>
<td>Philippines</td>
<td>2958</td>
<td>… (15) … (6) … (31) … (28) … (19)</td>
</tr>
<tr>
<td>Thailand</td>
<td>2252</td>
<td>9 (7) 4 (7) 60 (56) 21 (18) 6 (11)</td>
</tr>
</tbody>
</table>
In China there are over 60 agricultural universities or colleges (Li, 1998, p. 142). Every province has one or two agriculture related universities or colleges. Many of them established from the beginning to the middle of last century and aimed to train high quality agronomists and technicians for the country’s agriculture, to carry out agricultural researches, and to serve regional economy and social development through extension activities (An, 1998, p. 59). From 1980’s, with the national educational reform, those universities or colleges actively participated in activities to meet the needs of the development of rural economy under the new situation of rural reform (Wang, 1998 p. 113). The measures taken in this reform can be generalized as the integration of education, teaching and research with agricultural production, the participation of professors and students in scientific investigation & research, technology dissemination and training in the rural areas.

Taking Agricultural University of Hebei (AUH) as a case, the Agricultural University of Hebei has made outstanding contribution in this respect, therefore, earned the reputation “The Taihang Mountain Road” entitled by Chinese government. Since 1979, The Agricultural University of Hebei have been actively participating the comprehensive development of Taihang Mountain, where there were a lot of poor farmers remained before. They delivered the science and technology to farmers, converting science and technology into productivity promptly in order to serve the rural economic construction. The feature of “The Taihang Mountain Road” is to integrate agriculture, science and education in rural area; to facilitate the transformation modes of economic increase in countryside; to develop economy by means of the advancement of science and technology, the enhancement of quality of labour. This practice offered a tremendous contribution in changing the poverty and backward spirit in the mountain area.

Higher agricultural education in Australia was started in the beginning of last century. The first agricultural education in the higher education level was the faculty of agriculture opened in 1905 at the University Of Melbourne. After Second World War, the agricultural colleges and universities have been rapidly grown. Lees et al (1982) states:

Post-secondary agricultural education has been a part of the Australia education system for early one hundred years. During that time it has developed from a system based solely on agricultural colleges to one which involves four types of institutions—universities, autonomous colleges of advanced education, State agricultural colleges and technical and further education college-offering education and training for various agricultural occupations and a variety of levels (p. 71).

From 1982, the further changes emerged from agricultural education. In 1988, the Commonwealth Government adjusted higher education structure and merged the agricultural colleges into universities. As a result, most higher education in agriculture and related areas has been conducted in consolidated universities (DEET Report of the Review of Agricultural and related Education, 1991, p. 1).

TAFE (Technical and Further Education) sector also plays a vital role in agricultural and related education.

Lees et al (1982) further argued:
… the 1960’s and 1970’s was a period of rapid growth in post-secondary agricultural education in Australia. … This growth has resulted in a proliferation of programs, all of which purport to train people in the skills and knowledge relevant to at least one area of employment in agriculture. … This growth has occurred with little or no attempt to co-ordinate the programmes being offered, resulting in significant overlap between programmes and considerable inter-institutional competition for resources and students (p. 75-76).

There are 35 campuses of 24 institutions offering the courses in agriculture and related areas (1991). The University of New England is the largest and James Cook University is the smallest in terms of agricultural education and student enrolments (DEET Report of the Review of Agricultural and related Education, 1991, p. 3).

The annually average enrolment is about 9500 students in all categories of agriculture and related areas. This approximates 2% of total higher education enrolments. Table 1 is showing the total student enrolment number during 1986-1990 (DEET Report of the Review of Agricultural and related Education, 1991, p. 8-10). The categories of agriculture and related areas are consisted of Agriculture, Horticulture, Forestry, Natural Resources Management, Agricultural Economics, Agricultural Commerce, Agricultural Engineering, and Food Science and Technology.

Table 9. The total student enrolment number in agriculture and related subjects during 1986-1990

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Diploma</td>
<td>1930</td>
<td>1877</td>
<td>2083</td>
<td>2079</td>
<td>2395</td>
</tr>
<tr>
<td>3 year Bachelor</td>
<td>2654</td>
<td>2777</td>
<td>3012</td>
<td>3391</td>
<td>3882</td>
</tr>
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<td>9908</td>
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There are many dimensions of activities of Australia universities and colleges on extension, and mostly, focused on the contributions to research and providing professional leadership. “They train extension offices for the lecture; and their education and public relations activities in the community at large have a significant impact on the rural people.” (Donald, 1968, p. 112)

Higher agricultural education in India was initiated in the middle of 1950’s. As agriculture oriented country, in order to achieve the primary goal of the country to increase food production and attain self-sufficiency, India had set up several Rural Institutes throughout the country in the 1950s to have more efficient application of science and technology. Though these institutes were located in rural areas and gave an opportunity for the practical rural training of students, it was felt that the required
focus on science and technology was not available in these institutions (Raman, 1998, p. 107). Therefore, the recommendation to establish the Agricultural Universities in the country on the pattern of the American Land-Grand University was proposed during 1955-1959. The first Agricultural University was established in 1960 and had a strong American influence during the initial stages (Takwale, 1998, p. 132).

Since then Twenty-eight more Universities have been added to the complex system of agricultural education in India, which shown that every state has at least one agricultural university, and many have more than one. Currently these Universities offer eleven-degree programs in agriculture and allied sciences and postgraduate program in more than sixty disciplines. Every year more than nine thousand undergraduates and about five thousand postgraduates (Masters Level) graduate from these Universities. Nearly one thousand five hundred Ph.D. are produced (Raman, 1998, p. 107).

India’s experiences shown that in the initial stage, the Acts of the Agricultural Universities specify that one of the primary objectives of the University is “undertaking the extension education of such sciences and technologies especially for the rural people of the State”. Under this objective, the Universities have a mandate of research and training that will help the rural population from overcoming many of the problems of their overall development including income increasing agricultural production, enhancement and drudgery removal. Besides, Agricultural Universities which are education, scientific research and service institution can also perform a vital role in planning and monitoring of several on going activities of the rural development plan, both on the basis of expertise and from penetrating insights and experiences it has acquired. It is axiomatic that sensitizing the rural population and evoking their conscience, coupled with their organization is the basic requirement for the success of any rural development plan. Universities have a vital role to play in addressing issues and problems relating to techno-economic and socio-cultural problems of the rural community.

About a decade and a half after the establishment of these Universities, their performance and impact on the rural community, was reviewed and evaluated by a High Level Committee headed by Dr. M.S. Randhawa. The Committee, which submitted its report in 1978, noted that despite their rural location and orientation, the Universities tended to produce elite graduates and lacked the necessary appreciation of the socio-cultural and techno-economic conditions of the farmers and their practical problems. They recommended that to achieve these objectives, the curriculum should ensure an appropriate exposure to the problems of the rural poor and work experience programmes, specifically designed to learn from the farmers and benefit from their traditional wisdom, should form a part of the curriculum. Most Agricultural Universities now have programme of Rural Agricultural Work Experience (RAWE), usually of one Semester duration, during the penultimate Semester of graduation. The objectives of this programme are as under:

India agricultural universities were established on the pattern of American land-grant universities, and had a strong American influence during the initial stages (Takwale, 1998, p. 132). The activities related to agricultural extension could be summarized as follow:

♦ To offer educational programmes at lower levels (certificate/diploma) to those who have either passed or failed in completing school education.

♦ To offer entrepreneurial education so that they offer to farmers agriculture services
and expertise.

♦ To work closely with the Government extensions developments and train their field workers regularly in latest techniques/varieties developed by agriculture university scientists.

♦ To promote, inform and encourage farmers to adopt new high yielding varieties by organizing group meetings/conferences and also by closely working with those who are ready to experiment.

♦ By having a part of student curricular work, during the last year of the degree programmes, to be done in a village just like internship for medical students.

In Philippines, some universities located in rural communities directly contribute to developing human resources in these communities through the various degree programs and short courses they offer. Those that are on subject areas of concern in the community have more immediate and visible impact on the development of the community, such as those related to agriculture, health and various aspects of community life. For instance, the programs offered by the University of the Los Banos illustrates what many other universities located in rural areas have engaged as far as course offerings are concerned. This university has eight degree granting units which focus on basic and specialized sciences, and thirty - three research and training centres / institutes for science and technology studies. Its College of Agriculture is recognized as a national centre for agricultural and rural development. One of the major responsibilities of the university is to serve the people living in the area, mostly small-scale farmers on poor land. Among its objectives is to train and develop the manpower requirements for agriculture and rural development of the country (Cabanatan, P.G., 1989, p. 63).

Most Malaysian universities are engaged in studies on various aspects of rural development. For example, the University Pertanian Malaysia (UPM) or Malaysian Agricultural University is situated 25 km south of the capital city of Kuala Lumpur.

Having agriculture and the related fields like fishery, the veterinary and animal husbandry as its major components in teaching and research, UPM has an additional and unique function of providing extension services to the community. With the Centre for Extension and Continuing Education as the secretariat, each faculty has an extension committee, which coordinated all extension activities having a direct linkage with the relevant government agencies at the national and district level. Its aim, among others, is to produce and disseminate new ideas, practices and innovations to the people for immediate assessment.

The university has a direct linkage with the village which functions as a laboratory, and serves as a channel for feedback from the rural population. This enables the researchers to carry out research that is oriented towards problem solving. One of the activities and programmes in an effort to disseminate the knowledge generated within the University and for the promotion and utilization of the skills possessed by the academic staff is through its Village Adoption Scheme. Through this scheme, the university’s staffs associate themselves directly with their clients in a real-life situation. For the past twenty-five years, there are a hundred villages has been involved in this scheme.

In the village adoption scheme, students are directly involved as the project forms as part of their practical works which are being assessed. The students are provided not just with technical knowledge but also made to understand the people, their culture,
as well as their problems and the motivating factors that allow for adoption or rejection of new ideas, practices and innovations. The main purpose is for this village to serve as an arena where the students are given the practical experience to plan, implement and evaluate innovative programmes using the learning experience and theoretical knowledge acquired at the University. With this exposure, the students are expected to be able to manage development programmes for the rural community on graduating from the University (Teh, Wan Hashim Wan, 1998, p. 152-154).

In the past, Thailand rural economy was based on the concept of the subsistence economy. The agriculture and related products were grown for use in their own family and community. Some surpluses will distribute to the markets for exchange. After the Second World War, since 1961 to be exact, Thailand has implemented the National Economic and Social Development Plans. The social condition emphasized the new direction of development that tremendously gave importance to the industrial system. The role of agriculture in the country was reduced and the agricultural development was pushed into the system of industrial agriculture. The country people work the labourers to grow crops for big companies, receive wages and buy their food. The decrease in the significance of the agricultural sector can be seen from the table below.


<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture</th>
<th>Industry</th>
<th>Hospitality</th>
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<tr>
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<td>23.9</td>
<td>27.0</td>
<td>49.1</td>
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<td></td>
<td>78.9</td>
<td>5.7</td>
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<td>18.7</td>
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<td>1986</td>
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<td>34.2</td>
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<tr>
<td></td>
<td>67.1</td>
<td>10.5</td>
<td>22.4</td>
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</table>

Source: Sophin Thongpan and others, 1989

In the early time, universities referred as the incomplete tool for the development. For instance, when Chulalongkorn University was firstly established in 1916, it had no definite goal in the rural development except for the production of the graduates to do the government service probably in the rural areas, but that was not quite clear. The role of the university in supporting the rural areas was therefore indirect. The particular interest in the rural areas was not clearly talked about. Until 1961, the National Development Plan came into existence, so the interest in the rural areas, the locality and the poverty was regarded as a special case. (Paitoon Sinlarat, 1973)

It can be said that the universities’ interest in the rural development became clearer in the period after the Second World War, particularly when three universities
namely Chiang Mai University, Khon Kaen University and Prince of Songkhla University were simultaneously established in the regions with the goal that the regional universities will take part in developing the rural areas and in promoting the learning in those areas. (Ministry of University Affairs, 1992) The universities’ role in the community service was more apparent. The well-established university like Kasetsart University also extensively promoted the development of the agricultural products. Until now it can be said that almost all universities have played significant roles in rural development. Thus the three tasks concerning rural development have been emerged as 1. Production of graduates; 2. Research; and 3. Academic services (Sinlarat, 1998 p. 51-58).

The further discussion on the roles of higher agricultural institutions for rural development could be summarized by Atchoarena, and Gasperini (2003), that the higher agricultural institutes:

Can educate the professional and technical personnel needed to promote sustainable agriculture and take leadership in implementing the process of rural development. It can bring critical agriculture messages to the education system at primary, secondary and adult levels. It can tap into the desire of millions for life long learning. It can be the voice of reason and factual information in emotional debates about real or apparent food quality and food safety issues. It can equip teachers of the education system with the knowledge and skills required to bring the agriculture message to that system’s enrollees. It can be an invaluable resource for policy-makers. (P. 332)

2.3 Summary

In many countries, agriculture and related areas have played an important role for national economy; therefore, rural development has become a significant issue and priority of the national development strategy, especially in developing countries. Rural development has also become more and more reliable to qualified human resources, which clearly identified that “Higher agricultural education has a key role to play in ensuring that critical knowledge and skills are imparted to teachers and students; that other rural development actors appreciate the role of agriculture and sustainable natural resources management and the synergies involved in working together to build human resource capacity.” (Atchoarena, and Gasperini, 2003, p. 312).

3. University, especially agricultural university in developing country should clearly identify and redirect that rural development is its main mission and push the transformation of its knowledge base into rural areas

AUH and its rural development service to identify that from the beginning of 1980’s, AUH in China has adjusted and reoriented its programs to rural areas as well as played an active and constructive role in rural development. CDU in Australia is a comprehensive university in a developed country. It is in a unique environment. It is the only university in a broader Northern Territory, and only university outside Victoria with dual sectors (higher education and TAFE). CDU has understood the importance of rural development and it has put into practice rural involvement activities through its research, instruction and consultancy, both in higher education sector and in TAFE side. All such contributions emphasised on human resources capacity building and empowering of local people in rural, remote and Indigenous communities.
AUH is an agricultural university in developing country. Its experiences and involvement in rural development service has shown that it has a key role to play in ensuring that critical knowledge and skills are imparted into rural communities to build human resources capacity. The impact of their involvement has made a significant contribution to the quality of education, on the improvement of rural life and on the sustainable natural resources development. Of course, as an agricultural university, traditionally, its mission focused on crop and animal production. And it is a place for research, teaching and extension/consultancy. But along with the educational reform and opening door policy in the early 1980’s in China, AUH has redirected its mission towards the broader aim of supporting rural development. The successful stories of AUH have proved that if a university, especially an agricultural university in developing country has identified and redirected rural development as its main mission, then the transforming of knowledge base into rural areas and contribution of human resources capacity building in rural areas could be realized. The important issue found from this comparison is that any university (non-agricultural university in developing country) like CDU, if rural development becomes part of its mission or at least consideration, then the new methods, new teaching and learning models and new partnerships could be created so that knowledge transformation into rural communities could be realized.

3.1 Establishing demonstration communities

The practices of agricultural universities in China have shown that demonstration both in villages and farmer’s households are the effective tools for the knowledge and technology transformation. For example, as an agricultural university, AUH believed that specific demonstration is an effective way to transform knowledge, technology and skills from its research into rural communities. Consequently, AUH has set up many technology and actual skill demonstration bases in different countries, townships and villages. In some cases even a few demonstration households in one village have been set up to show the people in such surroundings the importance and benefits of technologies and skills. Many successful cases in previous chapters indicate that this is an effective way to efficiently transform knowledge, technologies and skills into rural communities. Generally, there are three stages for AUH to do so: first, at the beginning, farmers used to refuse to accept new techniques due to their low educational level, low awareness of the importance of techniques and low ability to bear the risk of changing traditional methods since they were not sure whether or not they would be any benefits. In this case, the staff from AUH introduced very simple, easy to learn techniques with less investment and more yields. These demonstrations show that the farmer could get out of poverty sooner. This helped increase more motivation to learn techniques and skills.

Second: model households were set up as the effective method used by AUH. Farmers in poverty-stricken areas usually respond to new techniques overcautiously and take a “wait and see” attitude. They would refuse to adopt techniques without visible evidences. To them “seeing is believing”. They want to know if a new idea or technique works or not. Due to this reality, staff usually focused on better-educated farmers, and some key persons, especially members of the village committee. When other farmers saw the successful results, which had helped these pilot-farmers out of poverty, they immediately changed their attitude. Thus often an attitudinal change is necessary to get rural communities to accept innovation.
Third: Establishment of demonstration communities. After initial success of the demonstrations, the project is expanded further, focused on enlarging demonstration area in a certain selected community, where many new techniques and research findings suitable to local environment could be examined and demonstrated. Farmers can make their own choices after comparing. Before and after demonstration trials, the university staff could also conduct applied research to solve new problems that appeared in agricultural production while the community adopted the transforming techniques. The demonstration bases serve as technology-dissemination centre. They could also serve as on-site instruction farms where university students could come into contact with farming practices and find out actual needs of farmers. Therefore, these “integrated teaching, research and agricultural extension” into demonstration communities hold the key to the successful intervention in the Taihang Mountain Development Model of AUH.

AUH is an agricultural university in a developing country. Extension is one of its main missions. And also in Taihang Mountain areas and other poor areas in rural Hebei, farmers’ educational level is very low. “The demonstration is a particularly powerful method to use with farmers who do not read easily” (Oakley and Garforth, 1985, p. 49). Therefore, the agricultural technology demonstration carried out by AUH has given farmers the opportunity to observe the difference between a recommended new technique and traditional one; between poor seeds and recommended seeds. Some other innovative methods have also been used by AUH. Within Northern Territory, Australia, the milieu is different. There is less agricultural activities in a broad Northern Territory, less population living in rural Northern Territory area and a limited use of demonstration as a policy although there is some evidence that visiting teams of academic the techniques as a teaching tool.

3.2 University’s professors, staff should be willing to go out of the campus, spend time and live in rural community

One of the innovative and effective approaches of AUH’s transforming knowledge and technology to rural areas is the university’s professors and staff went out of campus, and spending time with farmers in rural areas. They believe that as the professors of agricultural university, they cannot “sit aloof in the ivory tower separated from the actual environment.” (Noguchi, 1998 p. 42) The professors and staff of the university have provided very useful and practical advice and suggestions to the farmers: how to grow strawberries in simple locally made green houses, how to better grow persimmon trees in mountainous areas, how to better raise rabbits, how to improve crops production, etc. Thanks to these services from professors of the university, many farmers have greatly improved their productivity and increased income generation.

It is clear that a good and effective way to transform knowledge and skills from university to rural areas is that university staffs (lecturers, professors) go out of the main campus into the communities, living with community members, finding out what are the real needs of rural people and communities, and as a consequence to help them to build up those knowledge and skills. In AUH, as an agricultural university, rural development and agricultural extension are the main public mission statements. University staff’s daily work through their teaching and research activities thus focus on such mission. In this case, professor and staff often visited rural communities and spent time with rural people. This is normal practice of any agricultural university. The key difference between AUH and other agricultural
universities is that AUH has put rural development as its priority of running school. There is a long-term target for comprehensive development in rural Hebei through continuous integration of teaching, research and agricultural extension, as well as, the combining of agriculture, science and education and the integration of literacy education and technological extension with agricultural production.

More than twenty years of practice has shown that staffs, especially professors, from AUH have paid their individual visits to villages. They carry out face to face training and demonstration in rural areas and they are more acceptable to the community, because rural farmers often trust professors. The farmers are more likely to listen to the instruction and advice given by them and they will be more grateful for this individual attention. Oakley and Garforth (1985) also shared the same opinion: “Personal influence of the extension worker can be a critical factor in helping a farmer through difficult decision, and can also be instrumental in getting the farmer to participate in extension activities.”

Professors and staff of CDU, who visited research sites and rural community maintain that such visits to rural Indigenous communities are a most effective method of getting information across.

3.3 University should set up a network and build up a partnership with relevant institutions and organizations to share resources so as to transform knowledge, technologies and skills into rural communities

AUH is the only agricultural university in Hebei province. It has limited human and financial resources available, so it can only offer a limited direct support and service to rural communities. But the research achievements on crops production and animal husbandry as well as in other fields related to rural development have remained at high levels. In order to fully use research results and resources of the university and transform them for the benefit of the rural communities, network and partnership building became important.

In Hebei province, there are 139 counties (or cities), each of them has a vocational and technical centre, furthermore, in each county, city, or township, adult school and farmers’ night school have existed. Most of these are located in rural areas or somewhere close to the rural areas with agriculture and related science and practice as their disciplines. Most of students are from rural areas and looking for the practical skills necessary for the development of the rural economy instead of textbook knowledge. Since such educational recourses are located in every county/city, and cover most of the local conditions, AUH set up a network throughout these areas and built partnerships with those centres and schools to enlarge its rural service capacity. AHU helped such centres in teacher training, curriculum development, school management, program guidance and consultancy and so on.

Apart from CDU’s campuses at Darwin, Palmerston and Alice Springs (in the heart of the Australian desert), there are centres located at Katherine (NT Rural College) and a few regional study centres located at Jabiru, Nhulunbuy, Katherine and Tennant Creek. These locations allow the Charles Darwin University to have a spread of educational resources and facilities across the breadth of the Territory with exposure to tropical and desert environments as well as the rich indigenous culture of Australia. Each Regional Centre acts as CDU’s link to regional and remote Northern Territory, making courses and training accessible to more Territorians. This network
system seems to be reasonable in terms of the serving areas, local conditions, distribution, population and cultural diversity.

As universities, both CDU and AUH have limited resources in terms of human and finance. They thus can provide some support to rural, remote and Indigenous communities. It is difficult to cover broad areas in rural Hebei and rural NT. The practices from both universities of network establishing and partnership building become an effective way for their intervention in rural communities. As an agricultural university and serving a considerable population in rural Hebei, the network of AUH appears more complete, creative, efficient and considerably larger in numbers, whereas, in CDU even the network is small in number, but the function of enlarging its service to a broad areas and people, and meeting the people’s learning needs in different environment and different conditions has been realized. To this end, the hypothesis has been satisfied.

### 3.4 University’s training, research and extension programs should be close linked with the local practice and local areas and university should consider any specific conditions and situation in the program target areas

AUH’s rural development programs including training, teaching and extension have close links with local communities taking consideration of local conditions. These two principles (local community and local conditions) have been included in the program design and implementation. For example, from the beginning of 1980’s when the Taihang Mountain Development program was carried out, local conditions and local needs were two important issues for the projects to be considered before the implementation. From that time on, professors and staff spent a long time in this mountainous areas and made comprehensive system surveys and analysis on the existing problems and potentialities. Finally, “Resources Investigation Report in Taihang Mountain Area”, which included 15 specialized areas was developed as a resource for future work. All this first hand data and information was used later by project implementators during development.

Other case studies have also shown that local conditions and local needs both for communities and for farmers have been considered. These include the development of new seeds varieties and animal breeds in practical ongoing courses and research investigation of students and staff.

Paying continual attention to the real needs of rural, remote and Indigenous communities is also the considerations of CDU. The examples are found in the teaching, research and extension activities of CDU Rural College, Tropical Savannas CRC and Centre for Indigenous Natural and Cultural Recourses Management.

Both universities have the same consideration on the rural development programs, which focused on their training, research and extension activities with close link to the local needs and the local conditions. Those kinds of development programs for AUH include training, research and extension, whereas, CDU has much more concentration on training and research, although TAFE extension programs are developed and implemented.

### 3.5 Apart from university contribution for rural development, university itself has also been promoted during the program implementation

The responsibility of community development in developing countries such as China often falls to the university, especially agricultural universities. AUH has made
various efforts to do this for more than 20 years. During these rural practice and rural service, AUH itself has also been promoted and upgraded in the following aspects:

The university scale enlarged and student enrolment numbers increased. Since 1979, the construction of AUH has been carried out faster. In 1995, a new Agricultural University of Hebei emerged from the merging of AUH with the Hebei Forestry College. The size of AUH has been increased in terms of faculties, departments and number of staff and students. For example, in 1980, AUH operated 7 departments and 10 specialties. In 2001 AUH covered 25 colleges and offering a total of 51 bachelor degree courses, 24 Masters Degree courses and 4 doctorate degree courses. The total number of student enrolment is more than 20,000 where more than 800 postgraduates for master and doctorate degrees. The teachers and staff members’ population is still 2000, the same as that of previous years (AUH Information Handbook 2001, p. 3).

The specialties were adjusted and developed along with the adjustment of production requirement. Productivity has developed constantly and the structure of agriculture also changed. These changes called for the corresponding change of specialization offering of agricultural universities because the specialization framework and structure radically reflects the level of social economy and technology support. In order to fit in with the changes of rural industry structure, especially to meet the urgent need of rural commodity production and market economy development, AUH broke away from the traditional concept of agricultural production when setting up course specializations. The different fields of specialization were adjusted in accordance with the development of comprehensive and general agriculture. The social demand changes quickly, especially under the market economy condition. AUH took the attitude of respecting reality and being practical and realistic when putting up fields of specialization. Present needs were considered as well as long-term viability so that the university gained a stable and healthy development.

Research deepened and developed further and integrated with teaching/training and extension. A number of research programs had come in after the research project on developing the Taihang Mountain in 1979. Some of these projects had gained attention on the provincial and national levels. Some international institutions like UNDP have recognized some research outputs by the university. Currently several research linkages have been fostered with other universities around the world. Research programs, research equipment and instruments increased, and funds sources for research and extension broadened.

Students’ awareness of science and culture improved and their capabilities enhanced. Students can not only improve their practical techniques, perceptual knowledge, and understanding of the society to enhance their comprehensive quality, but shorten their time for adaptation and strengthen their competitive power in employment after graduation. By launching the social practice activities21, the students’ spirit for the love of the land and to be of service and become involve in the development process is enhanced. Giving them first hand experience, helped to develop talent allowing more creativity to surface and enhancing more innovative approaches. From theory to practice and from practice more concepts can be derived creating possibilities for the development of new theories.

21 The student social practice activity is referred to that during school holidays, students organized by school visit factories, villages, communities, hospitals and other areas to have investigation in order to understand them as well as make the contribution to them by their knowledge.
4. Innovative approaches undertaken by university for rural development

4.1 The digital technology, Internet access and other simple and effective media have been used by the university for its rural education and agricultural extension. Digital infrastructure has been extended from urban to rural areas. Then efficiency in terms of cost, staff’s time and learner’s achievement will be much more increased.

The simple and effective media used by AUH to deliver information to farmers referred to broadcast and TV. And in some areas, for example, plant protection, a hotline telephone was used by professors in relevant careers. Some weaknesses existed in rural Hebei with regard to this infrastructure. Agricultural information sometimes is inaccessible to the users at the grass roots level; incomplete coverage of agricultural information distribution often occurred at the grass roots level, which constrains information transmission. Only recently have Internet access and other digital services become available for agricultural information and rural development service. With the rapid development and application of information technology, the geographic information system, the system of remote sensing information, the system of global positioning, the expert system in agriculture, horticulture and animal sciences, as well as the agricultural analogue techniques have become available for research, training, and rural development practice.

In CDU, digital technology and Internet access have been widely used for external learning and training workshops in rural, remote and Indigenous communities. The relevant infrastructure and many facilities necessary for distance training and learning are also available. The connections between campuses, regional centres have been established. All those digital media have made the rural development training and other activities more efficient, less cost and more time saving. The modern technologies of geographic information system, remote sensing information, global positioning system and other High-Tech media played important roles in rural research and development programs at CDU. Besides, audio-conference, video-conference and tele-centres make on-line conversation and on-line learning available off campus. For this to be totally effective rural areas must be able to access it. Currently, government policy (Telstra) continually aims to improve this access.

Today new media tend to merge together to transmit information and deliver knowledge. CDU has made a full use of modern media for its all interventions with rural, remote and Indigenous communities, which has shown to be more effective and efficient than the previous print only courses. In AUH, situation is different. Even though some modern technologies are available, the traditional media still lies in a mainstream of knowledge transforming, since a considerable amount of rural population, has less development in IT infrastructure in rural areas and people’s awareness to use them.

4.2 Organizing community members into various technical or learning societies, associations or other NGOs under the guidance of university’ staff. Then a learning society could be created

It is a common understanding that only when farmers’ knowledge level and their ability to accept science and technology and their enthusiasm to learn new techniques and skills has been stimulated, can they possess the ability to develop themselves. Using the motto: “to deal with ignorance before developing mountains”, AUH helped to establish various farmers’ technical associations using the principle of, “Experts taking a leading position, with local government coordination and model
households selected as the core; farmers will join in the Associations by themselves adopting agricultural practical techniques as the top priority”. This approach resulted in the process of farmers’ positive learning instead of being trained passively.

Based on this principle, AUH has successfully organized more than 10 different farmers’ technical Associations, which have brought about obvious social and economic benefits. For instance, “Mushroom Association” in Tangxian County, “Chicken Association” in Laiyuan County, “Red Fuji Apple Development Association”, “Watermelon Association” and “Peach Association” in Shunping County, and the similar organizations of apple, vegetable and maize in Wuyi and Zanhuang Counties. Currently, the Association’s functions are composed of training, research, extension, production and marketing. This approach allows for the Association to become a learning, research and production society.

These Associations have played a very important role in promoting the development of rural education and production. They are helpful for farmers to learn techniques and skills and apply them positively. Such Association also allows for the acceleration and extension of scientific research findings into rural areas to improve the farmers’ awareness of science and technologies. An example of this approach is found in the Red Fuji Apple Development Association of Beicheng Town in Shunping County set up by Mr. Huangpu Zhongsi, an associate professor in the Horticulture Department of AUH in November 1990. This Association has brought about considerable economical social benefits. It not only provides technical training courses, but also instructional services as well as farm inputs and marketing of products. The Association is mainly composed of model households while Mr. Huangpu Zhongsi acts as the technical consultant. Every year, Professor Huangpu goes often to the rural areas to hold technical training classes. Each will last 1-3 days according to the farmers’ practical needs in production. The curriculum include: the management of orchards, the prevention and control of apple trees’ diseases and elimination of pests, management of water and fertilizer, the storage and post-harvest handling of fruits, management of seedlings, as well as the establishment of orchards and so on. Each time over 1,000 farmers are trained. In 2001, the Association has been extended to more than 10,000 memberships, having Shunping County as the centre, including 110 villages in 6 counties nearby. The area of total orchards is up to more than 2,000 hectares. The apple output produced by the association members has been up to 37,500 kilograms per hectare, with the total output of 30 million kilograms. Some production has even exceeded that of Japan, the original place of Red Fuji, in terms of the yield and quality of apples. The Red Fuji apple production in Shunping County has become a primary industry in Taihang Mountainous Region in Hebei Province.

There is a great deal of experimentation in the Northern Territory in agricultural output, especially with regard to rice and mango production and other tropical produce. Much of this analysis is driven by local entrepreneurs and government department of Agriculture and Forestry, etc. The university via Katherine Rural College contributes training and research to this output.

It is apparent that learners’ or farmers’ associations can overcome the weakness of the learning needs in rural areas with a broader rural area, and insufficient of teaching resources. It has also proved that training core farmers, organizing associations in the rural communities, and farmers learning by themselves under the
necessary and effective guidance are acceptable and most welcome by farmers and will make substantial contribution to rural communities.

4.3 The university-community partnership has been established and using package contract approach and establishing joint venture

AUH initiated this new extension service in the range of counties. This approach brought the change of delivery pattern of technology from an only special department towards an over-all operation pattern by mobilizing many departments like administration, material, supply, financial and monetary bringing service closer to the needs of rural economic development. The pre-requisite of this approach is to provide services for farmers. The operation of this particular approach is that the service provider, e.g. AUH signs a contract package of technical service. The provider charges some fees for the overall service as the resource is from technical research. AUH and Ding Xing County formally signed the contract for agriculture comprehensive technological package service in January 1989.

On the basis of self-willingness and mutual benefit, AUH established more joint ventures of teaching, scientific research and social practice with some bases. By signing contract with these bases AUH gradually changed the extension service mode from totally free to the combination of free and charged services. This new approach is aimed to benefit both sides, to mobilize the initiatives of both providers and recipients and to further enhance the enthusiasm of providers. Through many years of practice, AUH and the local partners of joint ventures have expanded the practice to a bigger scale. The service range was enlarged from science and engineering to art and soft science, from introduction to the expansion of extension service from techniques of increasing production to post-harvest processing technology, and from economic development to the combination of economic and education reforms. AUH formed such joint ventures with Shunping, Fuping and Xiongxian Counties from 1982.

The university-community partnership has also been considered by CDU as a meaningful measure to delivering its knowledge into communities in CDU. For example, in July 2003 CDU signed a Partnership Agreement with Northern Territory Government on Internet-based education for remote communities and a virtual DNA facility. CDU Vice-Chancellor Professor Ken McKinnon said the partnership agreement signals a new level of interaction between the University and its community. “As a University for the Territory, it is critical that our intellectual resources, in collaboration with those of the Government, are brought to bear on the issues of most importance to the Territory,” “This Agreement includes 25 schedules based around four themes, which are: Increasing resident professional capacity to address Territory opportunities; Meeting Government needs; Reorganizing the University to better meet Territory needs; Enabling Indigenous social and economic development. The main activities focused on remote communities with the specific needs of the Territory, like community development, conservation biology, natural resource management and tropical environmental science, health and diagnostics as well as Indigenous social and economic development (Website 9).

It can be concluded that in order to use the resources of AUH, and to have these recourses utilize for the mutual benefits of the university and communities, AUH initiated the university and community linkage and partnership in a broad area. Whilst the approach in the NT was through farmers’ organization themselves and government sponsorship recent policy shifts at government level and CDU
management are refocusing CDU towards government initiative and community development.

4.4 Encouraging university student volunteers, especially agricultural university students, to launch social practice work and other practical courses in rural areas

It is general practice for Chinese university to organize students to participate in social practice and other practical activities. In some cases, it is also the part of course requirement. AUH encouraged senior students to launch the social practical work at the agricultural interface, and to serve the farmers. They use one to one method, which means one student assists one farmer, and one group assigned in one village. Activities used were broadcasting, blackboard, bulletin board announcements, farmers’ night school learning. The course content for farmers includes promoting new high quality products, disseminating new technologies, offering training courses for local agricultural technicians, and delivering technical consultancy and on-site instruction. The activities can be undertaken, sometimes in vocation time and students are volunteers; sometimes its programs are carried out during school time as part of course requirement. During this practice, the students not only made a contribution to rural communities, but also experience the value of their knowledge and find out the real needs of farmers. All of these activities are more helpful for their own career development in the future.

Student practical experience is not university’s responsibility or duty in Australia. However, the Student Union provides (through university funding) for advice and a range of facilities for students. The university does provide placements for its trainees, e.g. teaching and child care, nursing and to a limited extend farming enterprises often such placements can be undertaken in remote Indigenous communities. This focus on rural development, however, is not a priority. However, with the appointment of a professor in rural education with a brief for community development and participation and a professor for Indigenous studies, this is lightly to change. In some course, like engineering course, students need to find out their own way to look for the practical sites. But in some cases, like TAFE, the opportunities for practice are also given by CDU.

Student participating in practice to serve the communities has a mutual benefit for students themselves and for the communities. AUH has promoted this kind of activities. This has been less evident in CDU in this regard, but changes are happening as CDU reposition itself with regard to the community.

4.5 Setting up rural, regional or night training and consulting centres

Rural learners or farmers are adult, therefore, the establishment of various kinds of schools for them to meet their learning needs during their spare time from agricultural production or at night is one of methods used by AUH for its rural adult training and extension intervention. For example, AUH helped establish adult schools in Shuping County. In these schools, there is one infrastructure with multi-purposes, which means, there are combined functions of night school, library, information station, plant and animal clinic, agricultural technology extension service station, develop of and new agricultural varieties, machines and fertilizers, chemicals sales are all combined into one place to serve the local communities so as to realize the statement of “diverting science and technology water; through the education channel; to irrigate agricultural farm” (Li, 2000). Professors and staff from
AUH are involved in the activities of those comprehensive schools in various ways showing a guidance, consultancy and even direct services.

In Australia many of these functions are absorbed by Agricultural Shows in regional communities. In the NT the Freds Pass, Darwin, Katherine, Alice Springs shows are often one stop shops, but this response is limited to once a year. The Business Faculty has a Crocodile Form virtual business. However, university involvement as a policy issue in adult rural training is minimal compared to AUH.

In developing countries like China, rural problems appear in the areas, such as, a big rural population, much reliance on agriculture, low educational level, less resources both in basic school infrastructure and human resources and less economic development. The development of those kinds of comprehensive schools in rural communities has proved to be very effective in carrying out and manage acceptable rural education in rural communities. Such approaches are most welcome by rural people. Rural situation in Northern Territory, Australia is different; therefore these ideas might not be useful.

4.6 Training and encouraging a large group of community members to become backbone members of extension work force

Generally speaking, farmers in China are afraid to take risks and lack entrepreneurial skills. They are very conservative people living in a close system. Often they resist change and they are unwilling to adopt the new technique or new methods easily without any concrete results. Apart from this, the common feature of farming production confirms that any technical result requires a long time for implementation. The farmers in the extension areas slowly adopt new techniques. The AUH technical team established fixed bases, selected a few community members, normally they are educated people, some community leaders or some people who are willing to participate and have the ability to do so, and trained them to become the farmer-technicians or so-called ‘well-to-do households’ family.

Apart from training local key members in the communities, AUH cooperation with government to deliver a program, called “program of one village, one graduate student from AUH”, government provides scholarship and signs contracts with individual student from rural communities to make sure after they graduated from AUH, they will return to their home town. This practice showed that those graduates who have obtained advanced knowledge and also familiar with local communities’ environment have soon become the chief members in their own communities.

All those key members in the communities would actively involve themselves in agricultural extension work and demonstration practice. After they achieved economic benefit, they will become the ‘models’ and followed by other farmers.

“Model’ role in rural community in Chinese context has proved to be effective way suitable to specific rural conditions. This kind of practice has also been considered as one of innovative methods used by AUH to transform knowledge and technology into rural communities.

5. Governments at different levels have to commit strongly to support university to deliver rural development service both financially, administratively, institutionally and with relevant strategies and policies

Generally speaking, rural development is often seen as a government responsibility. The university, as an educational provider, has as its main mission, teaching,
research and consultancy, therefore in order to orient the university towards delivering rural development programs that encourage efficient use of the human resources and knowledge, government should have special policies to commit universities towards rural development as one of its service.

In China, government has a strong commitment for AUH to serve the rural development programs. For instance, from the initial stage of Taihang Mountain development project to the follow up and other programs, different levels of government encouraged and supported AUH financially, institutionally and with policies, strategies and government policy documents. All these commitments ensure that AUH can successfully deliver its rural development programs and achieve the expected outcomes. It is also clear that China is a developing country which has had a centralized government for a long time; government played a major role in many aspects of project development, without government support, coordination, management, and commitment, the university itself would find it is very difficulty to undertake some rural development programs.

Apart from financial support, the government’s commitment for CDU to undertake the rural service program is mainly built on establishing partnerships or cooperative activities. Government priorities, for example, were given to those programs which concentrated on areas in rural, remote and Indigenous education.

The government commitment for both universities to serve rural communities has similarities in many aspects, and thus the key difference emerged from that AUH is an agricultural university in developing country, focused on agricultural sector, and government in China has played a strong role in rural development activities, whereas, CDU is a university in a developed country, focused on comprehensive fields, and government’s intervention for rural development program is far less. Consequently, it can be conclude that different levels of government involvement is a key role for the successful transforming of research, knowledge, information and skills from universities into rural communities for their development, either in developing countries or in developed countries.

6. Community participation is a core issue for the programs carried out by university for rural development

The successful rural development programs carried out by AUH and CDU depend in part upon the positive participation of the communities in different ways, and thus this is a common requirement in both systems. Concerning participation, people should have enthusiasm, motivation and be interested in and involved with the programs. For instance, some rural development programs achieve their common goal of economic development; some are intended to accomplish social and educational development; some may want to build their own individual personal capacity and empower themselves and some might has other initiatives. “Ensuring community participation depends upon factors such as culture, capacity to respond, awareness of the issues and commitment to deal with the problems” (UNESCO, 2001). In AUH, most programs are concerned with agricultural extension since Hebei is an agricultural province. A large rural population and a limited amount of cultivated land require more and more useful techniques and active skills to be put into practice to increase crops and animals production and to improve people’s living standard. People themselves also use education and agricultural extension, as a bridge, to better themselves as governments continue to have a growing emphasis on human capacity development and economic development. Community participation
on AUH’s rural development programs results in “mobilizing resources, sharing responsibilities and establishing a sense of ownership to sustain community development activities” (UNESCO, 2001). The very important issue of community participation in rural development is to be considered if people are mobilized properly and is highlighted in some stories on AUH identified successes.

CDU’s emphasis on participation has links with community development tradition. Communities themselves want to be independent and prefer to the people with knowledge and skills in their communities rather than someone from outside. This self help often motivates the community. Aboriginal communities often want to the people with knowledge and skills in their communities to maintain their knowledge. The fear is if they come to study in CDU or other universities, the community loss them when they graduated.

7. Conclusion

This paper discusses the role of universities for rural development in a comparative view. There are five important aspects could be concluded for knowledge transforming activities of universities to be successful.

First, the university itself. There is an urgent demand for the universities, especially agricultural universities in developing countries to concentrate their activities for rural communities in terms of technological extension, training, and local people’s capacity building. This is necessary in order to improve their communities’ living standard and well being, and to benefit the university itself.

Thus these kinds of programs enable the university’s teaching, research and other academic activities to be used for the mutual benefit of the universities and local communities. Besides teaching, learning and research, university’s staff and students should be involved in extension programs, taking the university knowledge base to the community.

Second, rural community participation is another important aspect of rural development. The rural development programs carried out by the universities or other agencies must be attractive to the people both psychologically and economically to make the programs more acceptable for the local people in the community.

Third, government commitment and actual involvement in the programs enable some of the weakness of universities to be overcome, for example, government finding is an essential part of success in community development programs.

Fourth, modern information technology and digital media give universities a great potential and prospective opportunity to be involved in rural development program effectively and efficiently.

Finally, the program implemented in rural community itself should be more sustainable to make sure that it could be still active after the program implementer has left the program site.

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