

Agro-Technical Education In China

James E. Diamond
Interim Dean for Agricultural and Environmental Sciences
Delaware Valley College
Doylestown, PA

Abstract

The Government of China and United Nations Development Program in December, 1997 ended a five-year project titled "Strengthening Agriculture Education in Northwest China." The project was designed to go to grassroots units to help people strengthen agriculture, solve problems, promote rapid, steady, and balanced growth by making use of foreign funds in the hinterlands, and focusing on farmers education. Officials from the Ministry of Agriculture announced that all 365 agro-technical schools in China will implement these new teaching reforms. This paper describes agro-technical schools in China and the approach used to introduce teaching reforms.

Introduction

China's expanded agricultural industry and rapid economic growth has contributed much to supplying sufficient food and fiber for the people of China. President Jiang Zemin (1995) said "A...that supplying sufficient food and clothing for more than 1.2 billion people continues to be the most important issue facing the country...China has to rely on its own efforts in tackling the food issue...it is essential to fully trust and rely on farmers while focusing on their education at the same time." For this goal to more openly evolve, it is essential that sustainable provisions for modern economic agricultural training facilities be available for preparing students to qualify for careers in both public and private agricultural sectors. This paper describes agro-technical schools in China and the project approach.

Methods

The author visited and collected data from six project agro-technical schools in Northwest China in 1995, 1996 and 1997. At each school, principals or acting principals were considered official spokespersons and provided the qualitative data that was analyzed and reported by using summaries, consensus, and trends. In addition to the interviews, each school provided a written profile of their respective school and an annual summary report describing their past and present activities.

Limitations

All information collected during the mission was paraphrased through an interpreter. In most cases the interpretation was from Chinese to English and English to Chinese. At two schools the information

was interpreted from Uyghur or Kaskal to Chinese to English and vice versa. Hence, the information of this paper is based upon the reliability and accuracy of the various interpreters. Any misinterpretations are unintentional and it was believed that the gist of the information collected was reasonably accurate. The findings and discussions reported in this paper are limited to only six project agro-technical schools in China. However, mention will be made of activities made at non-project schools.

Findings and Discussion

Agro-Technical Schools in China

In 1998, there were 365 agro-technical schools throughout all of China having more than 40,000 teachers. These schools included studies in agriculture, animal husbandry and veterinary science, mechanization and electric, aquatic products, agricultural mechanization, and horticulture. Student enrollments at each of these schools were reported to range from 700-1900 students and increased enrollments were forthcoming. The class size observed ranged from 40-70 students per session. The overall educational system was a teacher-centered passive-learning system. Teachers lectured on a raised platform using a chalkboard while students sat, looking up at the professor, and passively listening.

Project Schools

According to the Project Document (1994), "Northwest China was considered one of the poorest areas in China, the annual per capita income in these areas was less than US\$40.00." Poverty stricken was the criteria used by Ministry of Agriculture officials for assigning six schools to the project from 54 agro-

technical schools found in Northwest China (Ingkasuwan, 1994). Table 1 shows the six project schools by address and Province/Region. Three were agricultural schools and three were animal husbandry and veterinary science schools.

Experiential Learning

The six (6) project schools reported that their curriculums included 50% practical and 50% theory. With this notion, students should spend an equal portion of their allocated time “learning by doing.” Experiential learning was reported and observed to be happening in basically three forms. They included laboratory experiments, school farms, and field practice on research stations, government farms, or with herdsman.

Laboratory Experiments: Students were scheduled in laboratory sessions attached to relevant courses to do assigned experiments. Even though the teachers did their noble best to conduct well planned laboratory sessions, the lack of equipment often stifled students from performing and completing their assigned experiments.

School Farms: The objectives of school farms were focused on providing facilities and opportunities for students to learn practical skills and conduct research studies. All students were required to work on the school farm for 12 weeks during their regular specialized training. The farm land observed at the six schools ranged from 9 to 68.3 hectares in area. The geographic locality of the school farms dictated the kind and scope of livestock and/or crops grown. Variables such as soils, temperature, rainfall, topography, water, altitude, customs, traditions, markets, roads, and other variables collectively determined the kinds of livestock and/or crops produced. Consistent reports indicated that school budget constraints prevented principals from having the financial capability of purchasing appropriate inputs, equipment, and repairs to properly operate the farms. Because of constrained budgets, even though there were exceptions, most of the farm buildings needed refurbishing or replaced. The farm operations as a whole, especially the livestock facilities, do not typify desired examples for progressive training. They were operating on an austerity budget, primarily for minimal student learning activities.

Field Practice: All students were required to work 14 weeks just prior to graduation on a research station, extension station, government farm, or with herdsman. This scheme offered students an excellent

opportunity to apply their knowledge and skills learned in their formal programs. Provided that proper coordination and supervision of student activities in the field and evaluation of their performances were adequate, this component of the total educational program at the project schools is a characteristic “capstone” for an effective competency-based education program.

Competency-Based Education

Competency-based education is an educational system whereby students learn to be competent in performing relevant skills and tasks for specific occupations. Skills for various occupations are identified, verified, prioritized and taught using the competency-based teaching approach (learn-by-doing). Performance of skills is evaluated using criterion-referenced measures (Diamond, 1981). The conceptual framework of an altered competency-based education system was essentially in place at all six (6) project schools. Generally, appropriate skills and tasks had been identified and were to some extent documented in the course plan. Some facilities were available to enable students to “learn by doing,” and 50% of the curriculum time was allocated for experiential learning. With some guidance, a bona fide competency-based education program could easily be implemented.

The constraints were all related to insufficient budgets. It was observed that insufficient printed instructional materials, tools, livestock, supplies, and equipment restricted the ability of students to have adequate opportunities to practice all the skills described within respective course plans. Hence, even though experiential learning is emphasized in the curriculum, the quality and depth of experiential learning programs has not yet reached its fullest potential. Financial constraints placed limitations on experiential programs and deprived students of adequate opportunities to learn and perform skills.

Need for Reforms

Many agricultural education leaders in the Ministry of Agriculture had visited vocational schools in many nations around the world and they collectively concluded that educational reforms were needed for China’s agro-technical schools; reforms that would not only ameliorate the quality of education offered to students, but would contribute towards achieving President Jiang Zemin’s goal of supplying sufficient food and fiber for more than 1.2 billion people while focusing on education at the same time.

Table 1

Project schools by Address, Province/Region, and 1997 Enrollment

School	Address	Province/Region	Enrollment (1997)
Ili Animal Husbandry and Veterinary School	Ylning City 835000	Xinjiang Uygur Autonomous Region	976
Gansu Animal Husbandry and Veterinary School	Huangyang Town Wuwei City 733006	Gansu Province	1,025
Huangyuan Animal Husbandry and Veterinary School	Huangyuan County Qinghai 812100	Qinghai Province	1,200
Ningxia Agriculture School	Yinchuan City 750001	Ningxia Huizu Autonomous Region	1,608
Kashi Agriculture School	Kashi City 844002	Xinjiang Uygur Autonomous Region	1,019
Shaanxi Agriculture School	Yangling Town 722100	Shaanxi Province	1,996

Project Brief

Officials from the Ministry of Agriculture submitted a project proposal to the United Nations Development Program (UNDP) for assistance to introduce reforms into agro-technical schools located in Northwest China=s poverty stricken regions. The proposed project was endorsed and funded by UNDP and Government of China. The Food and Agriculture Organization of the United Nations was contracted to carry out a five-year project titled “Strengthening Agriculture Education in Northwest China.” The project=s mission was to create six (6) model schools to reform their modus operandi from a “teacher-centered passive-learning system” to a “student-centered active-learning system.” There were two immediate project objectives. The first was to upgrade and strengthen six project schools to enable them to serve as model schools, raise the quality of training, make more effective use of standard curricula, and give regular training courses in teaching methods to staff from non-project schools. The second objective was to disseminate technical achievements of other UNDP projects with a focus on integrated farming systems, agro-ecology and sustainable agriculture,

operation and maintenance of small machinery, and fruit tree production.

Post-Project School Traits

Table 2 shows examples of pre and post-project traits of the six project schools in Northwest China. The highlights of the project impact on project schools are amelioration of teaching methods, implementation of competency-based and modular teaching approaches, increased technical training for teachers, addition of new specialties, adult education programs for females, and increased recognition for outstanding performances.

Reforms Implementation Scheme

To implement reforms into a patrimonial educational system still influenced by tenets of Confucius, it was necessary to agree upon a scheme acceptable to decision makers within the system. A scheme can be defined as a planned program of work with an organized framework. The scheme used to implement educational reforms into China’s agro-technical schools included an interaction of six “prongs.” They

were study tour, fellowships, teaching methods courses, Agro-Technical Training “Outside” Schools, Agro-Technical Training “In” Schools, and Teacher-Teaching-Teachers (Diamond, 1987).

Study Tours: The purposes of overseas study tours were to enable administrators and decision makers to observe how agro-technical schools in other countries functioned and were administered. A total of nine delegations composed of 51 (4 females, 7.8%; 47 males, 92.2%) administrators and Ministry of Agriculture officials visited ten different countries (Diamond, 1997). These study tours enabled participants to experience first hand how students learn and how teachers and administrators functioned in other educational systems abroad. It enabled the participants to look at the “big picture” and put their own situation into perspective. They were able to discuss ideas, techniques, methods and concepts with professionals in other countries that could perhaps be infused into their own educational system. These experiences greatly influenced officials to make the

decision to implement competency-based education and modular teaching approaches first, into the six project schools, secondly, into 54 non-project schools in Northwest China, then into all 365 agro-technical schools in China.

Fellowships: The purpose of overseas fellowship training and study tours was to give teachers (Fellows) an opportunity to study and update their areas of expertise from a different perspective in another country. A total of 24 Fellows (9, 38% females; 15, 62% males) from project schools successfully completed their respective studies at 15 universities in 10 countries (Diamond, 1997). Fellows were able to experience first hand state-of-the-art classes and work with some of the best professors in their respective fields of study. Collectively, the knowledge gained by all Fellows greatly contributed to improving the integrity, character, and quality of education now offered to students

Table 2

Examples of Pre and Post-Project Traits of Six Project Schools in Northwest China

Pre-Project Traits	Post-Project Traits
Teaching by lecture or reading	Teachers write lesson Plans that include practical, demonstrations, video cassettes, slides, field trips, group discussions, charts, and guest speakers.
No competency-based or modular teaching	Agro-technical schools are implementing teaching competency-based and modular teaching approaches throughout China.
Teaching quality mediocre	Teaching quality, work habits, and management greatly improved.
Little or no teaching methods instruction	Ample instruction
Student enrollment falling short of need	Student enrollments greatly increased.
Little or no technical update for teachers	Technical update offered to teachers regularly
Course contents antiquated	Course contents updated.
Specialties of study limited	Number of specialties of study increased at all agro-technical project schools
No female farmer classes offered	Classes offered to hundreds of female farmers
No opportunity for teacher study abroad	Some teachers traveled abroad to study
No teaching awards	Project schools have received provincial and national distinguished achievement awards.

and farmers in China. Upon their return, Fellows updated their courses, developed instructional materials, and made teaching models (i.e. irrigation schemes made of plaster, mounted plant specimens, soil profiles, re-constructed animal skeletons, preserved animal parts) to offer students and farmers state-of-the-art information.

Teaching Methods Course: For agro-technical schools to align their programs with the new teaching reforms of shifting from a teacher-centered passive-learning system to a student-centered active-learning system, teachers and administrators needed opportunities to study the concepts and how to implement such reforms. Those who successfully completed the “Teaching Methodology Courses” were able to accurately implement competency-based education concepts using modules into their respective programs (Bruening, 1996). A total of 20 two-week teaching methods courses were offered to 521 (166, 32% females; 355, 68% males) teachers by three international expert consultants respectively from two countries (Diamond, 1997). An additional 91 people audited portions of the courses. The topics focused on introducing competency-based education and modular teaching approaches stressing “hands-on” learning experiences. A cadre of innovative teachers who quickly grasped and understood competency-based education concepts were identified and given the task to carry on teaching methods courses long after the project was phased down.

Agro-Technical Training “Outside” Project Schools: Because of rapid technological developments, teachers had been out of college and teaching for five or more years, their technical knowledge became somewhat “stagnant.” The purpose of agro-technical training “outside” project schools was to provide opportunities for teachers to enroll in courses to update their technical knowledge so that latest available information could be offered to students and farmers using the “hands-on” teaching approach. A total of 183 teachers and administrators enrolled in 32 courses at 17 Chinese institutions during 1995-1997 (Diamond, 1997). Depending upon the intensity and nature of the course subject, the duration ranged from four days to one year. Examples of course topics include Animal Husbandry Management, Veterinary Science, Processing Agriculture Products, Marketing and Management, Computer Maintenance, Cotton Research Results, Animal Hygiene and Product Quarantine, Soil Science, and many other topics.

Agro-Technical Training “In” Project Schools: The

purpose of agro-technical training “in” project schools was to provide opportunities for more teachers to enroll in courses to update their technical knowledge using the “hands-on” teaching approach at a lower cost. Expert Chinese Nationals traveled to the Provinces or Regions to offer short courses. A series of 55 courses on 23 topics were offered at project schools for 1123 (308, 27% females; 815, 73% males) teachers, administrators, and staff. Records show that a total of 690 (61%) trainees were from project schools and 433 (39%) were from non-project schools (Diamond, 1997). Depending upon the intensity and nature of the course subject, course duration ranged from two to five weeks. Examples of course topics include Cattle Disease Control, Feeds and Feeding, Milk Processing, Dry land Farming in Ningxia, Chinese Herbs, Fruit Tree Cultivation, Vegetable Production, Fruit Disease Control, Greenhouse Construction, Corn Production, Wheat Breeding, and many other topics. Teachers who successfully completed agro-technical courses either “outside” or “in” the project schools were able to update their course syllabi, become more confident in using “hands-on” teaching skills, exhibited more competency in performing technical skills, and now can effectively teach students and farmers state-of-the-art agricultural technology.

Teacher-Teaching-Teachers: The rationale for “teachers learn from teachers” allows teachers to visit other schools to share newly learned knowledge and skills with peers, see other facilities, equipment, teaching methods, exchange ideas and teaching materials, enabling teachers to learn from one another. Teachers and administrators who successfully participated in a study tour, fellowship, teaching methods course, Agro-Technical Training “Outside” Schools, or Agro-Technical Training “In” Schools were obligated to share their newly learned knowledge and skills with colleagues. A total of 22 documented training activities at 13 schools totaling 51 days were offered to 1747 teachers (Diamond, 1997). However, an abounding number of undocumented teaching activities to promote updated technology and/or competency-based and modular teaching approaches have occurred at non-project schools throughout China.

Summary

The implementation of competency-based and modular teaching approaches into the six project agro-technical schools and surrounding communities impacted their educational systems in these ways: 1)

improved the quality of teaching; 2) updated the knowledge base of teachers; 3) broadened the teachers thinking and understanding of people of other nations; 4) increased teachers enthusiasm towards the teaching profession; 5) improved the students ability to learn new technology and skills; 6) new courses were developed and offered; 7) increased farmer education programs; 8) increased financial support from Provincial and Regional Governments; 9) increased number of in-service education programs for teachers; 10) new specialties have been added to the curriculum at some schools; 11) beginning teachers benefitted from the teacher improvement courses; and 12) academic administration personnel performance was improved.

At the National Agriculture Education Seminar at Shaanxi Agriculture School, Yangling on 28 October 1997, officials from the Ministry of Agriculture announced that all 365 agro-technical schools in China will implement these new teaching reforms. Seminar participants concluded that “There is yet a lot to do to implement the teaching reforms as they relate to teaching methodology, competency-based and modular teaching approaches. It is anticipated that 15-20 years will be needed to fully achieve the teaching reforms.” They also offered these four important recommendations: 1) develop a multipurpose training center for teaching pedagogical skills for teachers, extension workers, and adult trainers; 2) establish state-of-the-art farm facilities to enable students to acquire hands-on experiences; 3) offer both pedagogical and technical agriculture in-service programs; and 4) offer a series of workshops for teachers to expedite the development and writing components of various modules needed for an effective “student-centered active education system” (Lindley, (1997).

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