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Developing Active Teaching and Learning Materials for Egyptian Agricultural Technical Secondary Schools

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Abstract

This paper summarizes activities undertaken by teacher-educators from several U.S. Land Grant Universities to introduce active teaching-learning methods and materials into 53 agricultural technical (secondary) schools (ATSs) in Upper Egypt. The goal of the project was to transform the cognitive and psychomotor skills being taught in these schools from knowledge recall and comprehension to practical skill training utilizing problem solving skills combined with critical thinking and decision making. Each of the seven steps taken to implement this pilot project is summarized and discussed. This project is educationally significant because vocational agriculture education programs have been neglected in most developing countries; also, most international donor agencies allocate the majority of their educational resources to strengthening basic education. As a result, this effort to pilot-test and validate how vocational agricultural education programs in these ATSs can be strengthened has considerable educational significance, not only in outlining a methodology for strengthening the remaining 77 ATSs in Egypt, but also in outlining a strategy and approach that could be used to strengthen vocational agricultural education programs in other developing countries.

Keywords: Egypt, vocational agriculture, teaching methods, lesson plans, instructional materials

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Introduction

There are 130 agricultural technical (secondary) schools (ATSs) in Egypt, with an average enrollment of 2,750 students in each school. These vocational agricultural high schools have about 154 teachers per school, with about 42% of these instructors teaching agricultural courses; the remainder teaches general education courses. The 65 or so "agricultural" instructors in each school are organized into technical departments, including field crop production, livestock production and animal health, horticulture, agricultural economics, agricultural mechanics and food processing.

All ATSs in Egypt are required to follow the same basic curriculum, with each of the 33 agricultural courses being organized around a standard textbook. Teachers are required to prepare students for standardized tests at the end of each school year. In addition, most technical agriculture teachers have had no training in teacher education, including different teaching methods and how to prepare lesson plans. As a result, most teachers lecture or teach for the year-end test and settle for rote learning on the part of students. Therefore, little or no attention is given to developing higher-level cognitive skills, as outlined by Bloom (1956). Most ATS graduates are poorly prepared to utilize the knowledge and skills covered in these ATS courses, whether they work on family or commercial farms or in agribusiness firms upon graduation. The unemployment rate of ATS graduates can run as high as 98% (Megahed, 2001).

In addition to lacking any type of training in effective teaching methods, the only tools available to most agriculture teachers are the course textbook and a chalkboard in the classroom. The exception is in laboratories where a limited amount of equipment is available to demonstrate particular techniques. The overwhelming majority of teachers do not have any audio-visual (AV) equipment, such as overhead projectors (OHP's), illustrative transparencies or supplemental teaching aids.

All ATS schools have a school farm averaging about 25 acres (feddans). However, these school farms are primarily used to generate income for the school and are not actively used to train students in practical skills related to field crops, horticulture and livestock production and related agricultural mechanization skills. Also, most of the work on these school farms is carried out by laborers who want to keep their jobs. Engaging students in practical training activities on the school farms has not been a priority at most schools. Finally, many teachers lack the practical training and experience needed to integrate hands-on or psychomotor skill training into their courses, so most practical training is carried out by the field laborers on the school farm, not by the teachers themselves. This arrangement contributes to an educational disconnect between classroom instruction (cognitive skills) and the minimal levels of practical field training (psychomotor skills) made available to students. Despite this dismal state of affairs, improving the teaching methods and available resources in ATSs is a priority in Egypt.

Purpose

The purpose of this study is to describe a strategy currently being introduced into 53 ATSs in Upper Egypt under the auspices of the Agricultural Export and Rural Income (AERI) Institutional Linkage Project being implemented by the Midwest Universities Consortium for International Development (MUCIA), involving a consortium of six Land Grant Universities, with funding being provided by the U.S. Agency for International Development (USAID). The objective of this project component is to enhance the teaching methods and materials being used by agricultural instructors in these ATSs as the first step in transforming

the teaching-learning process in these schools.

The focus of this paper is on the introduction of active teaching-learning methods (including teaching materials and equipment) needed to enhance the development of higher level cognitive skills among students attending the 53 selected ATSs. Shao and Bruening (2005) shared that:

> Curriculum has been considered an essential element for all schooling. Thus, when attempts are made to initiate reforms of the educational system, changes in curriculum have to be a starting point… without curriculum change; modifications to the structure make little sense. (p.34)

Once it has been empirically documented that the use of active teaching-learning methods and materials will directly improve the cognitive skills of students, then the next step will be to transform the overall curricula to enable students to develop cognitive, psychomotor and leadership skills that are directly related to the agricultural economy, both on farms and in agribusiness firms.

Philosophical Framework

The importance of vocational educational reform in developing countries is undisputed in the literature. "Curriculum planning therefore needs to be a continuous, open, and participative process… Attention needs to be given to strategies for content identification as well as curriculum change" (Shao & Bruening, 2005, p. 35). Copra (1992) noted that (as cited in Shao & Bruening, 2005, p. 35), "Reforms of vocational education appeared to be connected with curriculum development, evaluation and assessment, teaching methods, and teacher training." Shao and Bruening (2005) concluded that the Chinese secondary agricultural educators were "particularly interested in improving their knowledge and skills in the most common practices in teaching and learning" (p.39). This concept has international application as well.

Perez-Dlamini, Mbingo, and Dlamini (2003) observed that:

> Africa needs to increase production of some subsistence crops that could boost overall national production, but also needs to diversify production of export crops to generate much needed national revenues. The agriculture curriculum is one of the best tools and the school is the best place to disseminate the concepts of agriculture production, Schools serve as catalysts for change and can be effectively used to transform the society using relevant curriculum. (p. 43)

The authors (Perez-Dlamini et al.) further postulated, "…curriculum is becoming increasingly unmatched with current national, regional and global trends" (p. 38). To counter this trend, some developing countries have put forth efforts to bolster their vocational education.

In Malaysia, the Ministry of Education reformed their school curriculum "in accord with the aspirations of the general public and the economic development of the country" (Nazri, 2003, p. 61). Similar to Egypt, Malaysia divides their secondary system into academic and vocational streams. Students in Malaysia who studied agriculture at the vocational-technical schools had a farm background (Nazri, 2003).

While few would argue with the philosophy that improving agricultural education in developing countries is important, the tools and resources available to reformers are scarce. For example, the agricultural education literature offers little practical advice for specialists trying to transform Egyptian ATSs. Researchers (Radhakrishna, Connors, Elliot, & Verma, 2001) investigated contents of the first seven years (1994-2000) of the *Journal of*

International Agricultural and Extension Education and found that only 30% of the articles were related to Africa (23%) and the Middle East (7%). Only one article within that timeframe was related directly to Egypt and was Extension focused. Radhakrishna et al. also noted that only 19% of the articles were related to agricultural education (9%), curriculum (8%), and student performance (2%), none of which were related to Egyptian ATSs.

While the agricultural extension education literature provides minimal practical support for reformers in Egyptian ATSs, a review of the education literature results in a wealth of ideas for transforming ATSs into effective learning centers. In particular, the literature on *active learning* is relevant. A summary of this philosophical approach follows. As Chickering and Gamson (1987) stated:

> Learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing prepackaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences, and apply it to their daily lives. They must make what they learn part of themselves. (p. 3)

This statement summarizes the overall educational philosophy that has guided the first phase of our effort to improve the teaching methods being used by over 1,600 agriculture teachers in the 25 selected ATSs. Lesson plans, teaching aids (primarily transparency film) and OHPs are now being installed in every classroom of these 25 ATSs as resources for active learning in the classrooms.

For educators, active learning can be more about understanding/practicing the concept rather than agreeing to a common definition. Often teachers comment learning is inherently active and that students will be actively involved even while listening to formal presentations in the classroom. Chickering and Gamson (1987) suggested that students must do more than just listen. Rather students must be actively engaged in reading, writing and problem solving. Within this context, it is proposed that strategies promoting active learning be defined as instructional activities involving students in doing things and thinking about what they are doing. By understanding Bloom's Taxonomy of Educational Objectives (1956), educators can move from knowledge recall and comprehension toward more advanced cognitive skills, including analysis, synthesis and evaluation of information and knowledge, so they can solve problems and make informed decisions. Simply knowing information is not enough; knowing how to address and solve problems is the desired outcome.

Active learning begins with an interest approach that prepares and connects learners to what they are about to learn. Examples of active learning activities that involve students include: seminars with carousel brainstorming, reviewing case studies, clarification pauses, working with cooperative groups, concept mapping, using the jigsaw procedure, maintaining a daily journal, frequent short quizzes and feedback, learning cycle, muddiest point, presenting one minute papers, moveable magnetic diagrams, field exercise and think/pair/share, etc. The bottom line is that students should be actively engaged in those learning activities that systematically move them toward the desired objectives.

To clarify these educational objectives, Bloom (1956) divided educational objectives into three overlapping domains, the affective, cognitive and psychomotor. The affective domain deals with feeling and emotion, the psychomotor domain addresses motor skills; and the cognitive domain applies to thinking skills. Within the context of agricultural education courses, educational objectives are primarily written in the cognitive and psychomotor domain. The overlapping occurs between the

cognitive and psychomotor domain as students must think through practical, hands-on training exercises to accomplish a task or solve a problem, such as soil testing or tractor maintenance.

Rosenshine and Furst (1971) identified 11 teaching behaviors that effective teachers should display. Of those 11 behaviors, Garton, Miller, and Torres (1992) identified five that could readily improve teacher performance in the classroom. These five teaching behaviors were: 1) being businesslike, 2) being enthusiastic, 3) being clear, 4) providing students with opportunities to learn material, and 5) varying teaching methods to maintain student interest.

Lesson plans guide the actions of teachers and the learning activities they undertake in each class. Lesson plans can incorporate four of these desirable teaching procedures. The enthusiasm demonstrated by the teacher in the classroom comes from within the teacher and cannot be planned out. However, the other four behaviors can be incorporated into each lesson plan. For example, by following the lesson plan and staying on course, teachers can be businesslike. Next, clear directions within each lesson plan will increase the clarity of the subject matter being covered, enhance the teacher's communications with students and enable teachers to assess student understanding before transitioning to the next learning activity. Lesson plans including activities that are closely aligned with desired objectives will directly assist the teacher in being more effective. Finally, lesson plans that outline different teaching methods and learning strategies will help keep students engaged and interested.

When developing lesson plans, the desired outcome must be the guiding force. This outcome is determined by what the students will be expected to do after completing each lesson, unit, course and program that will lead to the improvement of production practices on the student's home farm or in gaining employment in the private sector.

In Egyptian ATSs, the principles of active learning outlined above will be applied in several instances. First, agricultural education courses will help students learn about specific technical knowledge and agricultural applications. Second, students will learn how to solve different types of problems. Practical expertise is the type of educational outcome that effective teachers and schools will seek to carry out. In short, lesson plans are being developed to guide the teachers through the learning process, with a central emphasis on active learning methods and techniques, so that students will be able to achieve the desired educational outcomes upon graduation, i.e., applying these newly acquired skills and knowledge on the job when they enter the workforce.

To conclude the concepts, knowledge, information, and skills that each ATS teacher wants to communicate to students is important. While lecturing is an important method of teaching, it is not the best way of engaging students in the lecturing is but one way to promote the learning process and teaching the higher-level cognitive skills that students will need after graduation. Lecturing can stultify even the best students. Some students are in flying classrooms that roam around the campus so note taking is limited. This does not allow students the time to cogitate on the material presented. As indicated above, the more students become engaged, active learners in the classroom, the more likely they will develop the desired cognitive and psychomotor skills they will need after graduation.

Approach, Activities, and Results

The following section, presented at the 2007 AIAEE Conference in Polson, Montana (Swanson, Cano, Samy, Hynes, & Swan, 2007), describes and analyzes the specific steps taken to transform the teaching methods being used by agriculture

teachers in the selected ATSs as a means of pilot-testing this new approach. If this approach proves successful, the Ministry of Education is interested in applying this method to the remaining 77 ATSs throughout Egypt and, possibly, in transforming the overall curriculum, including updating the textbooks and teaching materials for all 33 courses. The Ministry of Education is also interested in using the ATS school farms to expand practical training. The introduction of leadership training into the ATSs is also being considered, including the establishment of rural youth organizations, such as the FFA or 4-H clubs. The overall goal is to upgrade and strengthen these schools so they can contribute directly to improving the skills and knowledge of rural young people who will model the necessary techniques for the advancement of the agricultural sector in Egypt.

Step 1: Training the ATS Teachers in Active Teaching-Learning Methods. The first step was to train the majority of agriculture teachers in the 53 selected schools on how to utilize active teaching-learning methods and new teaching aids in their respective classrooms. To accomplish this, 45 Egyptian university faculty members from different subject matter areas were trained by two, highly-experienced, teacher-educators from MUCIA partner universities. The focus was on active learning strategies and how to use visual aids to enhance learning. The two MUCIA teacher-educators conducted a 28-hour practical (i.e., learning by doing) workshop on active learning strategies for the Egyptian faculty members who would serve as future trainers. During this workshop, 15 active learning strategies were taught and practiced by the Egyptian faculty members. In order not to overwhelm the trainers and the ATS teachers, the MUCIA team suggested that one active learning strategy be practiced each week, so that these teachers would become fully comfortable and skilled in using each approach.

Next, the most effective Egyptian university teachers who emerged during this "train-the-trainer" workshop were selected to begin conducting similar workshops for ATS teachers. Since the ATS teachers do not speak English, these workshops had to be taught in Arabic. At the beginning of the second, 16-hour workshop, the MUCIA teacher-educators took the lead. But, as the Egyptian faculty members translated the active learning concepts and techniques into Arabic for the ATS teachers, they began to play a central role, and primary responsibility for leading the workshop progressively shifted to the Egyptian faculty members. By the end of the workshop they were leading all of the discussions with the ATS teachers. At the end of each workshop day, the MUCIA teacher-educators and Egyptian workshop leaders met to discuss what went well and which areas needed improvement during the next workshop.

Given the progress made during the second workshop, the MUCIA teacher-educators turned over full responsibility to their Egyptian counterparts during the third workshop, which was conducted for 50 ATS teachers. During this third workshop, the MUCIA teacher-educators provided guidance and support only as needed. The Egyptian and MUCIA teams continued to meet each evening to conduct a qualitative assessment of the workshop activities. At the end of the workshop it was clear that the Egyptian trainers had mastered this approach. They were assigned the task of conducting over 20, two-day workshops over the next nine months, training over 1,600 ATS teachers in active learning methods and techniques.

Step 2: Developing Instructional Materials for Use by ATS Teachers. The second step was to develop and provide ATS teachers with instructional aids for use in the classroom. A four-person, MUCIA instructional materials team worked in

Egypt for approximately two weeks to initiate this second step. In planning this program, it became apparent that most ATS teachers lacked any type of AV equipment or teaching aids. Therefore, the MUCIA team focused on developing low cost transparencies that could be reproduced cheaply and easily and then distributed to ATSs throughout Upper Egypt. Transparencies are useful teaching tools as they can utilize figures, photos and other illustrations to demonstrate the concepts or techniques being discussed. Also, transparencies can be especially beneficial to those agriculture teachers whose backgrounds are not based in farming and production agriculture. These low-cost teaching aids can be easily duplicated and distributed to all ATS schools in Egypt.

Prior to traveling to Egypt, the MUCIA team selected a range of instructional materials developed by the instructional materials centers at the University of Illinois, The Ohio State University, and Texas A&M University. The team brought these materials with them to Egypt. These materials covered all of the major subject matter areas within the ATSs, business management, farm management, livestock production, livestock health, horticulture, and row crops. These instructional materials included teacher's guides, cassette disks of manuals and transparencies, videos and DVDs, as well as textbooks and lab manuals. Upon arrival, the MUCIA team was divided up and paired with Egyptian faculty members in each of the major subject matter areas. These newly-formed teams first reviewed all teaching aids, texts, and videos from the United States; they then reviewed syllabi from the different ATS courses. There was extensive sharing of ideas within and across disciplines to determine the best way to incorporate these new teaching aids and materials into the existing curriculum.

Action plans and outlines were developed for each set of instructional materials. Particular emphasis was put on determining which of the available U.S. instructional materials could be integrated into the ATS curriculum. All teams scanned the U.S. transparencies and other teaching aids to facilitate their modification and eventual translation into Arabic. For example, certain videos were transferred to extract potentially useful clips. Web searches were done to locate additional materials from the U.S. extension services, instructional materials centers and the USDA. Particular attention was given to enhancing the existing curriculum through the use of these visual aids. These visual aids were incorporated into PowerPoint slides, including a range of photos, graphs and other scanned illustrations, so that full color, overhead transparencies could be easily printed on transparency acetates and distributed to all of the 53 selected ATSs.

After the MUCIA team's departure, the format of each transparency was finalized and all the transparencies were translated into Arabic so that the electronic transparencies could be easily duplicated onto transparency acetates. As a result of this joint effort involving both the Egyptian and MUCIA faculty members, about 120 illustrated color transparencies were developed for each of the 33 ATS courses. A total of nearly 4,000 new transparencies were created in electronic format. These transparencies have now been printed on transparency acetates in color with multiple copies being supplied to each school, depending on the number of teachers in each school who teach a particular course. In addition, 1,000 overhead projectors and screens have been purchased and installed in each ATS classroom for use with these new transparencies. All of these teaching aids have been integrated into the newly developed lesson plans for each course as carried out during the third major step of this component.

Step 3: Developing Lesson Plans for Each ATS Course. The third step was to prepare lessons for use by ATS teachers that

both enhanced the use of active teaching-learning methods and were fully integrated with the new teaching aids developed under Step 2 above. It should be noted that none of the ATS teachers had ever seen or used a lesson plan before, so this new addition to their portfolio was expected to be somewhat unfamiliar. First, it was mandatory that these lesson plans followed the basic content of each course, as outlined and presented in each textbook. However, the purpose of these lesson plans was to show and encourage ATS teachers about how they could effectively incorporate active teaching-learning methods and techniques into each chapter of a course to enhance the learning process. These lesson plans will enable teachers to shift their focus from "what to teach" (i.e., the content of each course) to "how to teach." Since these teachers had never seen or prepared a lesson plan before, the impact of these lesson plans was considered to be instrumental in transforming the teaching-learning process. To enable each ATS teacher to understand how to fully utilize these lesson plans, teaching aids and their newly acquired active learning methods, a second round of workshops was planned, as described in Step 6 below.

Step 4: Headmaster Study Tour to the Netherlands. To introduce the headmasters of each ATS to how vocational agricultural programs can be more effectively linked to the private sector, all ATS headmasters and selected Ministry of Education ATS administrators were sent to the Netherlands for a one-week study tour. The ATS administrators were introduced to the Dutch vocational agriculture system and afforded them the opportunity to investigate some new and innovative ideas that might be adopted by the Egyptian ATS system. This was in keeping with the philosophy as outlined by Shao and Bruening (2005) that the teachers have been identified as needing pedagogical knowledge and instructional methodology to improve their instruction.

For example, they visited an Innovation and Practical Training Center specializing in on-the-job training for students who are interested in specialized areas of expertise. Another agricultural school they visited offers a range of courses in agribusiness, rural development, animal production and management, horticulture and arable crop production, while another visit included a school farm that was entirely managed and operated by students. Finally, the group visited a company that provides "accredited agribusiness training" for students. This exposure to the Dutch vocational agricultural education system was a very new and eye-opening experience for all of the ATS headmasters. They could see immediately how this evolving Dutch educational system was tied directly to development in the Dutch agricultural economy, especially in producing a range of crops and products for export.

Step 5: Refocusing ATS School Farms and Utilizing Them for Practical Skill Training. As noted earlier, the ATS school farms are primarily utilized to generate operating funds for the school, rather than concentrating on providing practical skill training for students. Since many of the agriculture teachers have limited or no practical work experience in the agricultural sector, it makes it more difficult for them to integrate classroom instruction with practical field training. The crops grown on these school farms are traditional field crops, rather than the more labor intensive, high-value export crops. Since a major goal of the AERI project is to increase agricultural exports to increase farm income and rural employment, there is an increasing gap between the crops grown on these school farms and the direction the agricultural economy is moving in Upper Egypt. As a result, MUCIA sent the manager of a U.S. university school farm to Egypt to develop a work plan that will both change the focus of these school farms toward the production of high-income,

labor-intensive export crops and re-orient these school farms to give more emphasis to hands-on, practical training for students. The primary goal is to provide practical training and experience (that is, opportunities for *active learning*) for all agricultural students. This program is still in the early implementation stage, but the goal is for many of these new innovations to become operational by the beginning of the 2007–2008 school year.

Step 6: Training ATS Teachers in Using Lesson Plans and Instructional Materials. As noted earlier, prior to this project, most ATS teachers or headmasters had no knowledge of or experience in writing or using lesson plans or in using an OHP, transparencies or other teaching aids. To assist these ATS teachers in utilizing the new teaching tools, a second round of teacher workshops was planned and organized. The same procedures outlined in Step 1 above were followed, since both the lesson plans and instructional materials advanced the use of active learning methods in classrooms. The same Egyptian trainers who had implemented the first set of workshops (Step 1) were asked to conduct the second round of ATS teacher workshops. Since the Egyptian trainers had already mastered the use of active-learning methods and had been directly involved in the preparation of the instructional materials (Step 2) and lesson plans (Step 3), this final step in implementing the first phase of the project was straightforward. The MUCIA team leader for Steps 1 and 3 returned to Egypt to conduct a two-day "train-the-trainer" course for the participating Egyptian faculty members. Then, the Egyptian faculty members conducted a 2-day workshop in Arabic for ATS teachers to refine the workshop procedures and to make modifications as needed. Then the Egyptian trainers conducted two-day workshops at each ATS so that all ATS teachers were properly trained in using these tools and methods. A second goal was to build a common philosophy and commitment among all ATS agriculture instructors about the value of active learning methods and practical skill training.

Step 7: Assessing Progress and Refining the Lesson Plans and Instructional Materials. The next step of this current project is to perform an assessment of the value and impact of the different innovations in improving the teaching-learning process at these 53 ATSs. After reaching a consensus as to what was especially useful and where changes are needed, the final step would require modifications of the lesson plans and/or instructional materials as needed, based on the first hand experience of teachers and students in each subject matter area. In effect, these ATS teachers and students had been engaged in a pilot project during the 2006–07 school year field testing these new methods and tools. It was fully anticipated that some modifications were needed to fine-tune lesson plans and instructional materials that were not fully understood by either the teachers and/or the students. At the conclusion of this assessment, the joint MUCIA-Egyptian team will modify the selected lesson plans and transparencies so that both sets of teaching aids can be reproduced for use during the 2007–2008 school year. The Ministry of Education has expressed interest in having the lesson plans and transparency sets (120/course) for each of the 33 courses reproduced and made available to teachers in all of the other 77 ATSs throughout Egypt. Since the Egyptian trainers have mastered the active-learning methods and have been instrumental in developing these teaching aids, they are fully qualified and prepared to implement workshops for all agriculture instructors in Egypt. These additional workshops emphasize active teaching-learning methods, including how to utilize the lesson plans and instructional materials to fully implement this innovative vocational agricultural education strategy.

Educational Importance, Implications, and Applications

Vocational agricultural education has been neglected in most developing countries as governments and donor agencies have concentrated on expanding primary education. In Egypt, the government had invested in vocational agriculture schools but, until the 2006–2007 school year, ATS teachers concentrated on rote learning and teaching to the test at the end of each school year. These schools were poorly equipped to provide practical training for students and most courses and curricula had not been updated for two decades or longer. As a result, the focus of these ATSs was no longer relevant to the changing employment demands of the agricultural sector, in general, or to the current technical and managerial needs of commercial farms and agribusiness firms in Upper Egypt. As a result of this intervention, teachers are now helping to improve the cognitive skills of the students by enabling them to analyze and solve problems. This relatively low-cost approach to transforming the teaching-learning process is directly applicable to the other ATSs in Egypt and to vocational agricultural programs throughout the developing world.

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