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NACTA Journal

the professional journal advancing the scholarship of teaching and learning in agricultural, environmental, natural, and life sciences

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The Elements of Two-Year Equine Degree Programs in the Mid-Western U.S.: A Delphi Study

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Abstract

Horses are becoming an increasingly significant sector of the animal industry resulting in an increased need in post-secondary equine degree programs; yet there is little research describing what elements these academic programs should contain. This Delphi study was conducted to determine the objectives, courses, resources, and curriculum necessary for a successful two-year equine degree program. Results of the study show the three most important program objectives were to prepare students to successfully compete for employment in the equine industry, develop skills needed by utilizing hands-on experiences and applied study, and produce students who have a working knowledge of all facets of equine management. Regarding coursework, respondents unanimously supported a course on equine health, while an internship and a course on equine conformation earned high levels of agreement, along with equine nutrition, equine anatomy, equine business management, and horseshoeing and farrier science. Additional components for an equine program were recruiting materials along with external support. The most popular curriculum resources were specific equine textbooks and handouts from breed and horse associations as well as teaching technology and video equipment. Although this research is limited in scope, it can serve as a foundation for future research in this area.

Introduction

In the U.S., horses' contribution to the human race is quality of life. “Most livestock feed our bodies; the horse feeds our being” (Damron, 2009, p. 518). This characteristic creates an industry unique to all other livestock species in that the horse industry has one foot (or should we say a hoof) in agriculture and another in sports, recreation, and entertainment (Damron, 2009). This distinctive characteristic creates an industry that is positively correlated with equine curriculums being offered in U.S. colleges and universities (Rudolph, 1979). The horse population in the U.S. peaked in the 1910s at around 26.5 million, with the most popular horses being draft horses used for agricultural production and some light breeds used for transportation (Damron, 2009; Parker, 2008). At this point in time equine instruction consisted mainly of classes focusing on judging animals and raising quality work horses as a part of animal science or agriculture programs. Later, with the replacement of the horse by machinery coupled with the Great Depression and World War II, horse numbers were severely reduced; by the late 1950s the population had declined to around three million (Damron, 2009; Kentucky Equine Research, Inc., 2007; Washburn, 1958) and many colleges and universities eliminated horse classes entirely (Rudolph, 1979). With an improving post-war economy and an increase in leisure time, there was a surge in the popularity of the horse (Damron, 2009; Parmenter, 1978); however, instead of the focus being on draft horses used for farm work, it was now on light breeds used in recreational and performance activities (Parker, 2008; Rudolph, 1979).

In a 1966 conference on undergraduate teaching in the animal sciences Cowan (1967) noted the growing popularity of horses and emphasized the need to consider equine when developing animal science curricula. Throughout the 1970s animal science programs were placing an increased emphasis on horses (Taylor and Kauffman, 1983) and as time passed, specific equine curriculums began appearing in college and university course offerings (Rudolph, 1979).

While the number of equine programs throughout the nation was increasing, some institutions were slow to develop and reestablish equine programs (Borton as cited by Rudolph, 1979). As these programs became established and grew, there was much variation in the coursework offered at colleges. Despite this variation in curriculum, a number of programs faced similar challenges which limited their ability to include an equine program (Parmenter, 1978) such as a lack of administrative and faculty interest and support, the high start-up and maintenance costs associated with equine programs, or the perception that horses should not be part of animal science programs because they are not food animals (Cunha, 1978).

Today the equine industry has many employment opportunities, especially for people that hold an

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equine degree. Currently, there are 9.2 million horses in the U.S. which create over 1.4 million FTE jobs. Of those jobs, only 453,000 FTE are directly working with horses while about 957,000 FTE are indirectly involved with horses (American Horse Council, 2005). These numbers imply approximately two-thirds of jobs in the horse industry have little or no contact with horses, but still require knowledge of horses and their industry.

Hollis (as cited by Matte, 1994) made the observation that more and more horse farms and related businesses were seeking employees with equine knowledge in addition to other skills needed to perform a wide range of duties. Jim Heird, the Director of Teaching and Outreach for Colorado State University's Equine Sciences Program, stated in an interview that a few jobs have gone away within the horse industry, while new and better ones are opening in different avenues such as sales, finance, and banking (as cited in Nyland, 2007). Public relations, graphic designers, accountants, and office managers are all prospective careers that have little contact with horses, but employers in these areas consider horse knowledge a bonus (Burgess, 2007). Within these career areas there is a need for employees with equine knowledge. Institutions can help fill this educational need with equine programs that not only train students to work with horses, but also introduce them to the depth and breadth of the industry.

The horse industry is becoming an increasingly significant sector of the animal industry (Cunningham et al., 2005). As a result, educational horse programs are needed in many areas, yet there is little research that describes what elements these academic programs should contain. By examining the industry and current programs, academic administrators can improve existing programs as well as establish new programs which can appeal to a variety of audiences (Finch and Crunkilton, 1999). With that in mind, this current study was conducted to determine the objectives, curriculum, and resources necessary for a successful two-year equine degree program.

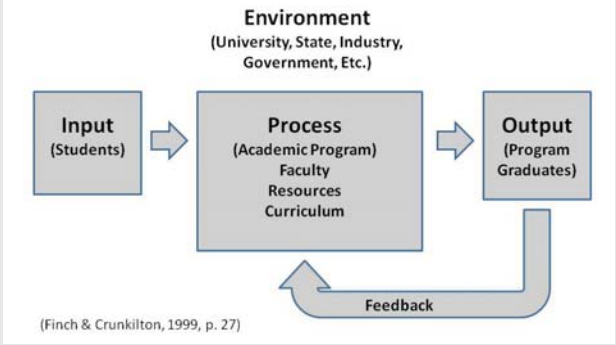

Figure 1. Curriculum systems program model (Finch and Crunkilton, 1999).

Conceptual Framework

Periodically, it is beneficial to review curriculum to determine if it is meeting the needs of graduates (Doerfert and Miller, 2006). To accomplish this, the systems program model proposed by Finch and Crunkilton (1999) was utilized in this research (Figure 1).

Based on the model, feedback is received from the graduates to influence the program, yet ultimately the academic program is changed by the faculty. The model also includes other factors that influence curriculum: university/college, industry, government, and resources.

For this study, equine faculty at two-year colleges were sought out as experts for curriculum change, who are the recipients of feedback from graduates and other stakeholders. Furthermore, Sell and Lounsberry (1997) posited that faculty should be included in the curriculum improvement process to insure support for curriculum changes; therefore, it is important to have a greater understanding of their perspectives on curriculum. In addition, previous studies have consulted faculty to determine curriculum needs (Morgan et al., 2004; Simon et al., 2005; Sprecker and Rudd, 1997). Indeed, Flatt (1991) thought it wise to include faculty input in curriculum development as did Kupperschmidt and Burns (1997), who felt that curriculum was an "…extension of the faculty's psychological self…" (p. 90). In this study, faculty from several colleges were sought out to provide their expert opinion and establish credibility among similar equine educators (Brink, 1994; Lewis et al., 1999; Patterson et al., 2001). The results of this research may provide a baseline to help better understand academia's adoption of graduate and stakeholder suggestions.

Purpose

The purpose of this study was to determine the curriculum and resources necessary for an effective two-year equine degree program. With this information two-year institutions may have a framework to use when implementing new programs or evaluating existing programs. Specifically, the following questions were addressed to current academic practitioners: (1) What should be the objectives of a successful two-year equine degree program? (2) What courses, labs, and student experiences should be included in a successful two-year equine degree program? (3) What additional components should be included in a successful two-year equine program (e.g. facilities, faculty, students owning their own equipment, etc.)? (4) What textbooks and other curriculum resources do you currently use or would you like to use in a two-year equine program?

Methods and Procedures

To address the study questions the Delphi method was chosen, which is useful for obtaining

consensus among a purposively selected group of experts (Dalkey, 1969; Linstone and Turoff, 2002; Stufflebeam, et al., 1985). The Delphi method consists of assembling a panel of experts to answer a question and then contacting these experts through a series of iterations to elicit expert opinions and draw them to consensus. Linstone and Turoff (2002) stated the Delphi method is appropriate for "…planning university campus and curriculum development" (p. 4) and has been useful for curriculum evaluation in past studies (Morgan et al., 2004; Akers et al., 2001).

The expert panel was selected from faculty at two-year public institutions offering either an Associate of Science or an Associate of Applied Science in an equine specific area (e.g., Equine Science, Equine Management, Equine Business Management, Horsemanship, etc.) that were located in either Zone 7 or 8 of the Intercollegiate Horse Show Association (ISHA, n.d.). The researchers believe colleges within these geographical regions will provide a representative sample of equine programs in the western United States. For this study directors or instructors of the equine degree programs were asked to participate because they are the people implementing these programs on a day to day basis and should have suggestions for improving or building upon equine programs. A total of 21 faculty were mailed a letter inviting them to participate in this study and explaining the procedure to be followed. Each participant was randomly assigned a Participant Identification Number (PIN) from 1 to 21. The study consisted of three rounds and all participants were invited to participate in each round, regardless of past participation, in an effort to gain representative input from all institutions. At the beginning of each round an e-mail with a link to the online survey was sent to participants, followed by two e-mail reminders during the following two weeks. Round one had five respondents and as did round two, with the same participants responding in both rounds, for a response rate of 24%. Round three had a 29% response rate with the same participants from the previous rounds, plus one additional individual completing the survey.

Although the response rate does appear to be low, this is higher than what is expected in many disciplines. Response rates in education, marketing, and applied health typically range from 1% to 31% (Fox et al., 1998), while business marketing survey research rates are usually below 15% (Wilson, 1999). At the same time, response rates from healthcare organizations range from 8.2% to 24.8% (Hikmet and Chen, 2003). Even more dramatic are the response rates found in direct mail, which are typically 1% to 10% (Response Rates, 2000; Souccar, 2000; Teichgraeber, 2001). Based on this information, the response rate of the current study is reasonable for this population, and above the expectations of some disciplines.

In round one, participants were asked to answer four open-ended questions. The responses were then grouped using content analysis to produce statements for the subsequent questionnaires. Round two listed the statements for each question and then, utilizing a one-to-five point Likert-type scale, participants rated each statement on their level of agreement (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). In addition to the statements, text boxes were placed at the bottom of each Web page to capture any additional comments participants may have had regarding the questions or statements. The third and final round consisted of statements from round two that achieved an 80% level of agreement, presented by their level of agreement, highest to lowest. A one-to-five point Likert-type scale used by the respondents indicated their level of agreement (Moreno-Casbas et al., 2001; Morgan et al., 2004; Simon et al., 2005; Stitt-Gohdes and Crews, 2004).

Findings and Discussion

The first question asked "What should be the objectives of a two-year equine program." In round one, seven statements emerged in response to this question and while in subsequent rounds none of these statements received unanimous support, only one earned a level of agreement less than 80% (Table 1). When developing a curriculum, it is important to first determine the ultimate goal of the program (Coffey, 1915) in the form of objectives which are the foundation of curriculum (Cole and Johnson, 1981). The objectives receiving the highest level of agreement were "prepare students to successfully compete for employment in the equine industry" (96%) along with "develop skills needed by utilizing hands-on experiences and applied study" (96%). Similarly, Rudolph (1979) found that providing students with a fundamental background in horse management was the highest ranked objective and providing training for students entering horse related careers and to enhance students' personal enjoyment was the next highest ranked objective.

The statement to "produce students who have a working knowledge of all facets of equine management" had a high level of agreement as well (92%). However, one respondent stated that it might be difficult to develop knowledge in all facets of the equine industry within a two-year time period. As this statement is most likely true, it emphasizes the notion that formal education should prepare students for life-long learning, as the needs, knowledge, and technology in most career fields will continue to change.

The objective with the lowest level of agreement was that of preparing students to successfully transfer to a four year institution (68%). Rudolph (1979) also found that the lowest ranked objective was to prepare students to continue in advanced study toward a higher degree. However, several comments were made by participants stating that although students may not have intentions to pursue further

formal education, they should be provided an education that can help them be successful at a four-year institution or in the workforce. One respondent stated, *"I feel this [a well-rounded education to include general education and elective courses] is important because for the most part the customers served within the equine industry are non-agriculture people"* (Participant 2). Moreover, Heird (as cited in Nyland, 2007) indicated that employers are looking for workers who can effectively communicate, in both written and oral form, and possess management skills (e.g., leadership, personnel and financial management, teamwork, etc.). Similarly, Smith (1989) defined an "educated" animal science graduate as someone who can think critically, communicate effectively, and be a leader. As gleaned from this discussion, many of the skills necessary for successful employment are valuable for success at a four-year institution as well.

Table 1. Objectives of a Two-Year Equine Degree Program

Statement	Level of Agreement	Mean[A]	SD
Prepare students to successfully compete for employment in the equine industry.	96%	4.8	0.45
Develop skills needed in the equine industry by utilizing hands-on experiences and applied study.	96%	4.8	0.45
Produce students who have a working knowledge of all facets of equine management (including basic care and management, health and nutrition, anatomy and conformation, etc.).	92%	4.6	0.55
Students should be aware of and develop a working knowledge of all facets of the equine industry (including business and economics, reproduction, nutrition, advertising and marketing, etc.).	88%	4.4	0.55
Produce students who have a working knowledge of basic training and horsemanship.	84%	4.2	0.84
Offer students a well-rounded education beyond equine (including general education courses and electives outside of the equine program).	84%	4.2	0.45
Prepare students to successfully transfer to a four-year institution.	68%	3.4	1.34

[A]- 1=Strongly Disagree, 5=Strongly Agree

Table 2. Courses, Labs and Student Experiences that should be Included in a Successful Two-Year Equine Degree Program

Course, Lab, or Experience	Level of Agreement	Mean[A]	SD
Equine Health (vaccinations, deworming, wound care, etc.)	100%	5.0	0.00
Equine Conformation (selection and evaluation, form to function, etc.)	96%	4.8	0.45
Internship	96%	4.8	0.45
Introduction to Equine Science (history, breeds and general information)	92%	4.6	0.55
Equine Breeding and Reproduction (management of stallion, mare, and foal; reproductive anatomy, hormones, etc.)	92%	4.6	0.55
Equine Nutrition (feeding, digestion, etc.)	92%	4.6	0.55
Equine Anatomy (Internal, skeletal, external, etc.)	88%	4.4	1.34
Equine Business Management (to include advertising and marketing, record keeping accounting, economically sound decisions, etc.)	88%	4.4	0.55
Horseshoeing and Farrier Science	84%	4.2	0.45

[A]- 1=Strongly Disagree, 5=Strongly Agree

The second question of this study asked "What courses, laboratories, and student experiences should be included in a successful two-year equine degree program." All of the respondents agreed a course on equine health was important (100%, Table 2). In addition, participants indicated a 96% level of agreement for an internship, along with a course devoted to equine conformation. The following coursework also found favor: Equine nutrition (92%), equine anatomy (88%), equine business management (88%), and horseshoeing and farrier science (84%). Some respondents further stated that many of these curriculum areas could either be optional (i.e. electives) or incorporated into other courses. For example, equine business management may not need to be a semester long course but should at least be introduced in other courses because it is a very important aspect of the equine industry, yet is often overlooked.

Participant comments suggested that the actual courses taught were not as important as the material learned and the hands on experience to back up classroom theories.

"Hands on is very important. So many times I see students who can give you the text book definition of a procedure, but have never had the opportunity to perform the procedure themselves. Applied study is also an important assessment tool to see if students truly [understand] the concepts that [they] have learned" (Participant 13).

Respondents also stated hands-on experiences benefit students who arrive on campus without a significant experience base. *"A large percent of my students come from a non-horse background and lack in hands-on experiences. Some of the ones that have some experiences have many bad and unsafe habits around all horses"* (Participant 2).

This comment supports Howell (1932): "The student must actually perform the experiment and

see with his own eyes the manner of the reaction. In the same way the animal husbandry student needs a certain refinement of his techniques, familiarization with his working tools and actually see and do many of the so-called practical and empirical tests in the handling of animals (Howell, 1932, p. 103)."

Question three asked "What additional components should be included in a successful two-year equine program (ex. Facilities, faculty, students owing their own equipment, etc.)?" (Table 3). All respondents agreed that for equine programs to succeed, support is needed which includes administrative and financial support along with support from faculty, staff, and other offices on campus (100%). These findings are similar to those of Parmenter (1978) who discovered that community and student interest were some of the deciding factors in establishing a riding program. Conversely, Rudolph (1979) found that when compared to student support, administration and industry support ranked low. In the current study, support from the students was not articulated; however, participants did find agreement in the recruitment of and support for quality students (80%).

Participants also provided unanimous agreement that qualified faculty were needed for a program. If faculty are not knowledgeable about equine and dedicated to the program, students will recognize this, which may lead to low enrollment and a phasing out of the program. Taylor and Kauffman (1983) identified that "...teachers must be knowledgeable, interested, enthusiastic and capable of challenging students to think as well as to memorize..." (p. 172).

Recruiting material garnered 96% level of agreement with respondents, though none stated what specific type of materials to utilize or activities that are successful. Literature on the topic of recruitment shows a varied picture. Fanno and Cole (1999) determined that recruitment efforts need to convey information about academic majors and the required knowledge base needed to be successful. Graham (as cited in Dyer and Breja, 2003) noted that quality of academic programs, academic reputation, the atmosphere/appearance of campus, and the quality of faculty were positive influences on prospective students. Strauss (as cited in Poock, 2001) found that the majority of high school students now use the Internet for their college search process, which is supported by research from The Arts and Science Group, LLC (2003). Based on this information, it appears that individual college programs need to be on the web and be accessible for students and advisors.

External support from the horse industry received a high level of agreement as well (92%). Horse owners want information on how to better care for and enjoy their horses and are seeking information and pursuing educational opportunities (Damron, 2009). Horse owners are more likely to attend evening seminars and read short publications to obtain that information (Martinson et al., 2006). By involving local horse owners through short courses or weekend seminars, an institution can generate

Table 3. Additional Components that should be Included in a Successful Two-Year Equine Program

Component	Level of Agreement	Mean[A]	SD
Program needs support from administration, faculty, staff, and offices on campus	100%	5.0	0.00
Qualified faculty	100%	5.0	0.00
Financial	100%	5.0	0.00
Recruiting materials (brochures, flyers, website, etc.)	96%	4.8	0.45
Support from horse industry	92%	4.6	0.55
Daily used equipment (stall pickers, wheelbarrows, brooms, etc.)	92%	4.6	0.89
Arena equipment	92%	4.6	0.55
Transportation equipment (vehicles, tractors, etc.)	92%	4.6	0.55
Program must be able to recruit and support quality students	88%	4.4	1.34
Introductions to professionals in the industry to see what the industry is really like (guest speakers, judges for events, etc.)	88%	4.4	0.55
Stall barn(s)	88%	4.4	0.89
Working pens (round and square pens)	88%	4.4	0.89
Basis for recruitment	88%	4.4	0.89
Support from general community	88%	4.4	0.55
Indoor arena	84%	4.2	0.84
Breeding lab with modern equipment	84%	4.2	0.84
Access to quality horses	84%	4.2	0.84
Storage space	84%	4.2	0.84
Outdoor arena	80%	4.0	0.71
Pastures and Paddocks	80%	4.0	1.00
Pleasing overall appearance	80%	4.0	1.22
Students should own their own equipment	80%	4.0	1.22

[A]- 1=Strongly Disagree, 5=Strongly Agree

funds for the program as well as gain recognition for offering quality programs. These short courses offer a different avenue for institutions to tap into the horse industry. By offering continuing education programs, an institution can generate additional funding for the program and promote (publicize) the program to students who would not otherwise be exposed to equine education.

The final question asked was "What textbooks and other curriculum resources do you currently use or would you like to use in a two-year equine program?" As part of the courses offered, students need to be given resources and supplemental material to support learning. In addition, the program needs to have access to a variety of materials to make learning more efficient. To supplement courses, specific equine textbooks and handouts from breed and horse publications received a high level of agreement (92%, see Table 4). One respondent stated that breed and horse publication handouts were great resources for current information versus textbooks which do not get updated as frequently. There was a high level of agreement among respondents to increase the use of technology (92%) which includes using LCD projectors, visual presenters (e.g., ELMOs), and PowerPoint class notes. Videos recorded of students performing various riding maneuvers for self-evaluation also received agreement from participants (88%).

Table 4. Textbooks and Other Curriculum Resources Currently Used or Desired to be Used in a Two-Year Equine Degree Program

Curriculum Resource	Level of Agreement	Mean[A]	SD
Specific textbooks on equine	92%	4.6	0.55
Handouts and articles from breed and horse publications (e.g. AQHA Journal)	92%	4.6	0.55
Increase in use of technology (computer programs, projectors, ELMOS, etc.)	92%	4.6	0.55
PowerPoint class notes	92%	4.6	0.55
Videos from the industry (training videos for example)	88%	4.4	0.55
Videos of students for self evaluation	88%	4.4	0.55
Computer animations for visuals	80%	4.0	0.71

[A]- 1=Strongly Disagree, 5=Strongly Agree

Conclusions and Recommendations

The findings of this study included a broad array of objectives, courses, components, and curriculum upon which an expert faculty panel came to consensus. The study revealed that the objectives of a two-year equine program should be focused on preparing students to successfully enter the equine industry through the use of hands-on experiences so students can apply classroom knowledge in a career context. This conclusion concurs with other researchers who found hands-on teaching methods were significantly more academically beneficial to students than non-hands-on methods (Folsom-Meek et al., 1999; Stohr-Hunt, 1996).

In addition, the results suggest students should graduate with a broad knowledge of *"all facets of equine management"* and have a *"working knowledge of all facets of the equine industry"* (Participant 13). While this seems an impossible feat given the vast amount of knowledge housed under the umbrella of equine science, with a sufficiently rigorous curriculum it does seem plausible that students could gain a cursory knowledge base, and perhaps deeper in the specific areas which emerged from this study: basic care and management, health and nutrition, anatomy and conformation, breeding and reproduction, business, economics, and marketing.

Furthermore, participants felt students need a *"well-rounded education"* that is developing a knowledge base that goes *"beyond equine"* (Participant 2). These academic skills beyond a specific technical expertise are found in most programs of study and are commonly referred to as "core" or "general education" courses (Kranz, 1995). These baseline educational components are expected of most higher education graduates and were intended to provide "knowledge and skills necessary for responsible citizenship in a free society" (Kranz, 1995, p. 48). Further studies should be conducted to determine what academic skills are essential for a "well-rounded" student and to determine if these skills differ from those expected at a four-year institution.

Specific courses that emerged provided additional focus for faculty desiring to establish new or evaluate existing programs. Of highest importance is equine health, upon which all participants came to consensus. The courses with the next highest level of agreement were equine conformation and the internship. Both of these academic endeavors require the application of knowledge, which parallels previous findings regarding the desire for students to have hands-on experiences. Other courses which garnered agreement included an introductory course, breeding and reproduction, nutrition, and anatomy. Additional research should be conducted to determine what specific objectives and suggested activities should be included in each of these courses.

Additional components for a program were many and varied, beginning with support from the local institution and extending to include recruitment materials, facilities, and a suggestion that students should purchase their own equipment in the program. Several themes emerged from this list of requirements. First is that support for the program is

important, not only from the administration, but also from the faculty and staff. Beyond institutional support, encouragement from the professionals in the equine industry is important as well, along with the blessings of the local community. For programs located in suburban or urban areas this support may be of greater importance due to the odors generated by the livestock required for hands-on learning experiences. These necessities seem obvious and are a good reminder of the importance of nurturing positive relationships with constituents both internal and external to the college. It may be useful to investigate how these relationships are established and maintained, and perhaps develop a list of best practices which could be implemented by other institutions.

Facilities were the second theme that emerged. Although required facilities will differ depending on the program's overall focus, barns, arenas (outdoor and/or indoor, depending on location), working pens, storage space, and pastures were all determined to be required elements for an equine program by the participants. To establish these facilities significant resources will have to be dedicated to their construction and maintenance.

Finally, equipment emerged as a third theme and, similar to the facilities, the equipment needed will be different for each program based on the overall focus of that program. Equipment for a breeding lab may include items such as microscopes, equine densimeter, foaling kits, equitainers, AV kits, and other basic lab supplies (syringes, sleeves, pipettes, etc.). In addition, daily used equipment would be needed to maintain the stalls, arenas, and paddocks. This list might include rakes, shovels, wheelbarrows, pitchforks, hoses, fencing supplies, and a tractor. If students do not supply their own tack and equipment, then various tack supplies will need to be provided. Feeders, waterers, hitching posts, and basic veterinary supplies may also be important. To round out this list, a truck and associated trailers may be needed as well. The equipment associated with an equine program is another reminder of the financial resources required to effectively prepare students for entry into the equine industry and reinforces the need for institutional and community support.

The participant curriculum recommendations that emerged from this study were somewhat general in nature, with none of the participants recommending specific textbooks or curriculum being used. However, they were in agreement that breed associations and industry publications are good sources of supplemental materials, which may be indicative of the dynamic nature of the industry.

Beyond standard curriculum materials, the use of technology was emphasized by participants. Computer programs, training videos, presentation software, digital presentation tools, and student video recordings of their riding demonstrations were popular among the expert panel. Research studies should be conducted to determine if the use of these technologies improves student learning and how they may be best incorporated into the learning environment.

By inquiring of programs already in existence as was done in this study, an institution can establish guidelines to help in development and improvement of programs. Additional research is needed for identifying any regional or discipline differences.

The authors are grateful to the participants of this study who provided this information. Although this research is limited in scope, it can serve as a foundation for future studies in this area, as no prior research was found that addressed what elements are necessary for a two-year equine program.. The results of this study may also prove useful to faculty and administrators desiring to establish an equine program at their two-year institution. Likewise, these findings may be beneficial to existing programs by providing them a “framework” or “benchmark” to which they can compare their current curriculum.

Literature Cited

Akers, C., P.R. Vaughn, and J.D. Lockaby. 2001. High school agricultural communications competencies: A national Delphi study. Jour. of Southern Agr.. Education Research 51(1): 124-137.

American Horse Council. 2005. The economic impact of the horse industry on the United States. (http://www.horsecouncil.org). American Horse Council. (February 21, 2008).

Art and Science Group, LLC. 2003. Technology update: The use of technologies in college choice. Student Poll 5(3). (http://www.artsci.com). Art and Science Group. (October 15, 2007).

Brink, D.R. 1994. A case description: A process for animal science curriculum development. NACTA Jour. 38(2): 4-7.

Burgess, S. 2007. A labor of love? Equus 363: 44-49.

Coffey, W.C. 1915. The curriculum. Jour. of Animal Science 1917: 82-93.

Cole, B.R. and G.R. Johnson. 1981. Curriculum development in community/junior colleges: The state of the art as viewed by the academic affairs officer. Community/Junior College Quarterly 6: 67-81.

Cowan, W.A. 1967. Trends in animal agriculture and the future of undergraduate training in the animal sciences. In: Proc. of the Conference on Undergraduate Teaching in the Animal Sciences, Washington, D.C., 20-21 May.

Cunha, T.J. 1978. University horse programs-pros and cons. Feed Management 29(12): 38-40.

Cunningham, M., M.A. Latour, and D. Acker. 2005. Animal science and industry. 7th ed. Upper Saddle River, NJ: Pearson Prentice Hall.

Dalkey, N.C. 1969. The Delphi method: An experimental study of group opinion. Santa Monica, CA: The Rand Corporation.

Damron, W.S. 2009. Introduction to animal science: Global, biological, social, and industry perspec-

tives. 4th ed. Upper Saddle River, NJ: Pearson Prentice Hall.

Doerfert, D.L. and R.P. Miller. 2006. What are agricultural industry professionals trying to tell us? Implications for university-level agricultural communications curricula. Jour. of Applied Communications 90(3): 17-31.

Dyer, J.E. and L.M. Breja. 2003. Problems in recruiting students into agricultural education programs: A Delphi study of agriculture teacher perceptions. Jour. of Agr. Education 44(2): 75-85.

Fanno, W. and R.L. Cole. 1999. Survey of early leavers: Implications for recruitment and retention. In: Proc. 26th Annu. National Agr. Education Research Conference, Orlando, Florida, 26: 27-34.

Finch, C.R. and J.R. Crunkilton. 1999. Curriculum development in vocational and technical education: Planning, content, and implementation. 5th ed. Needham Heights, MA: Allyn and Bacon.

Flatt, C.E. 1991. Agricultural communication graduates' perceptions of curriculum, preparation, and degree title. M.A. Thesis, Washington State Univ., PO Box 641227, Pullman WA 99164.

Folsom-Meek, S.L., R.J. Nearing, W. Groteluschen, and H. Krampf. 1999. Effects of academic major, gender, and hands-on experience on attitudes of pre-service professionals. Adapted Physical Activity Quarterly 16(4): 389-402.

Fox, C.M., K.L. Robinson, and D. Boardley. 1998. Cost-effectiveness of follow-up strategies in improving the response rate of mail surveys. Industrial Marketing Management (27): 127-133.

Hikmet, N. and S.K.Chen. 2003. An investigation into low mail survey response rates of information technology users in health care organizations. International Jour. of Medical Informatics 72(1): 29-24.

Howell, C.E. 1932. The objectives of undergraduate education in animal husbandry. Jour. of Animal Science 1932: 101-104.

Intercollegiate Horse Show Association (IHSA). n.d. Hall of teams. (http://www.ihsainc.com/CurrentTeams/ListSchools.aspx). IHSA. (January 5, 2007).

Kentucky Equine Research, Inc. 2007. Changes in the horse industry. Equine Review HW 37.

Kranz, R.G. 1995. Determining the components of a program of general education. In: Lunde, J.P. (ed.). Reshaping curricula: Revitalization programs at three land grant universities. Bolton, MA: Anker Publishing.

Kupperschmidt, B.R. and P. Burns. 1997. Curriculum revision isn't just change: It's transition! Jour. of Professional Nursing 13(2): 90-98.

Kveno, K. 2008. Equine college programs grow across the state. (http://www.thelandonline.com/l_equine/local_story_102111539.html). The Land Online. (August 6, 2009).

Lewis, D.K., T. Kuzmic, and E.L. Miller. 1999. Integration of ethics into a forestry curriculum. NACTA Jour. 43(2): 33-36.

Linstone, H.A. and M. Turoff. 2002. The Delphi method: Techniques and applications. Reading, MA: Addison-Wesley.

Martinson, K., M. Hathaway, J.H. Wilson, B. Gilkerson, P.R. Peterson, and R.D. Vecchio. 2006. University of Minnesota horse owner survey: Building an equine extension program [Electronic Version]. Jour. of Extension 44(6). (http://www.joe.org/joe/2006december/rb4.php). Extension Jour., Inc. (December 18, 2007).

Matte, G.E. 1994. Characteristics of the equine degree department: Budgeting and the department chairperson. M.A. Thesis, Salem-Teikyo Univ., 223 W Main Street, Salem, WV 26426.

McGrath, D. and M.B. Spear. 1991. The academic crisis of the community college. Albany, NY: State Univ. of New York Press.

Moreno-Casbas, T., C. Martin-Arribas, I. Orts-Cortes, and P. Coment-Cortes. 2001. Identification of priorities for nursing research in Spain: A Delphi study. Jour. of Advanced Nursing 35(6): 857-863.

Morgan, A.C., R.D. Rudd, and E.K. Kaufmann. 2004. Elements of an undergraduate agricultural leadership program: A Delphi study. Paper presented at the Association of Leadership Educators, Memphis, TN.

Nyland, H. 2007. Become a horse industry pro. Western Horseman 72: 42-49.

Parker, R. 2008. Equine Science. 3rd ed. Clifton Park, NY: Thomson Delmar Learning.

Parmenter, C.L.W. 1978. Equine education programs and related studies as found in colleges and universities in the United States. M.S. Thesis, Girls Physical Education Dept., California State University, 18111 Nordhoff Street, Northridge, CA 91330.

Patterson, T.F., J.G. Leonard, and W.S. Harper. 2001. Developing a core curriculum for the 21st century. NACTA Jour. 45(4): 13-20.

Poock, M.C. and D. Lefond. 2001. How college-bound prospects perceive university web sites: Findings, implications, and turning browsers into applicants. College and University 77(1): 15-21.

Response rates to howl about. 2000. Brandweek Marketing January 17.

Rudolph, J.A. 1979. Selected characteristics of equine education programs at colleges and universities. Ed.D. Diss., Oklahoma State University, Stillwater, OK 74078.

Sell, G.R. and B. Lounsberry. 1997. Supporting curriculum development. In: Handbook of the undergraduate curriculum: A comprehensive guide to purposes, structures, practices, and change. San Francisco, CA: Jossey-Bass.

Simon, L., J. Haygood, C. Akers, D. Doerfert, and C. Davis. 2005. Master's level agricultural commu-

nications curriculum: A national Delphi study. Jour. of Agr. Education 46(3): 56-69.

Smith, G.C. 1989. Developing critical thinking, communication skills, and leadership in animal science students. Jour. of Animal Science 67: 601. (Abstr.)

Souccar, M.K. 2000. Mass-mailing misfires still bedeviling card issuers despite technical advances. American Banker 165.

Sprecker, K.J. and R.D. Rudd. 1997. Opinions of instructors, practitioners, and alumni concerning curricular requirements of agricultural communication students at the University of Florida. Jour. of Agr. Education 38(1): 6-13.

Stitt-Gohdes, W.L. and T.B. Crews. 2004. The Delphi technique: A research strategy for career and technical education. Jour. of Career and Technical Education 20(2): 55-67.

Stohr-Hunt, P.M. 1996. An analysis of frequency of hands-on experience and science achievement. Jour. of Research in Science Teaching 33(1): 101-109.

Stufflebeam, D.L., C.H. McCormick, R.O. Brinkerhoff, and C.O. Nelson. 1985. Conducting educational needs assessments. Boston, MA: Kluwer-Nijhoff.

Taylor, R.E. and R.G. Kauffman. 1983. Teaching animal science: Changes and challenges. Jour. of Animal Science 57: 171-196.

Teichgraeber, T. 2001. Tech profile: Hotwire Interactive Inc., marketing firm boosts response rate with technology. Business Journal 21(50): 19.

Washburn, L.E. 1958. Fifty years of progress in teaching animal science. Jour. of Animal Science 17: 1101-1118.

West, C. 2003. International conference in equine exercise physiology. (http://www.thehorse.com/ViewArticle.aspx?ID=4033). TheHorse.com. (August 6, 2009).

Wilson, E.J. 1999. Research practice in business marketing. Industrial Marketing Management 28: 257-260.

Student Perceptions of Tablet Computers in a Cooperative Learning Environment

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Abstract

Agriculture and biology faculty utilized tablet personal computers in eight different classes as part of developing a cooperative learning environment. After using the tablet personal computers to complete cooperative learning exercises, students in five classes rated how the tablet personal computers impacted their perception of the learning environment. Students in four classes rated how the tablet personal computers affected their ability to interact with other students and their instructor during cooperative learning exercises. A majority of students in the learning environment survey group agreed that using the tablet computers had a favorable impact on their learning environment. Similarly, a majority of students in the interactivity survey group agreed that using the tablet computers had a favorable impact on their ability to interact with each other and their instructor. Based on student assessment results and classroom experience we conclude that the use of tablet personal computers had a positive impact on student perception of their learning environment, thus providing an improved cooperative learning experience. Enhancing wireless access, developing improved cooperative learning exercises, and gaining further experience with the technical aspects of the tablet personal computers will enable us to further enhance the cooperative learning environment in our classes.

Introduction

Today's college instructors are being challenged to develop and implement teaching techniques that promote cooperative learning as a useful alternative to the traditional lecture. Cooperative learning, involving small groups of students working together on a well defined task, has been touted as providing a number of positive benefits to students, including increased generation of new ideas, enhanced self esteem, better communication with other students, and greater motivation to learn (Johnson and Johnson 1989; Slavin 1990, 1995). Hwang et al. (2005) provide evidence that accounting students taught using a cooperative learning model outperformed students taught with a traditional lecture format. Effective cooperative learning requires more than simply having students work together in groups. It involves setting up a well designed, intellectually challenging problem solving activity that includes clear expectations, positive interdependence, group decision making, and individual accountability (Kagan, 1990).

Wireless enabled personal computers, used judiciously, can help instructors provide an effective cooperative learning environment where students are engaged in higher level thinking activities such as problem solving and discussion of complex ideas (Barak et al., 2006; Mackinnon and Vibert, 2002). Effective use of computers to enhance the learning

Table 1. Number and Percent of Learning Environment Survey Group by Class Standing, Age, Major, Prior Tablet Computer Experience, Computer Skill Level, and Attitude Toward Educational Technology (n=107)

Variable	Criteria	n	%
Class Standing	Freshman	21	20
	Sophomore	33	31
	Junior	24	22
	Senior	27	25
	Unclassified	2	2
Age	18-22	85	79
	>22	22	21
Gender	Female	61	57
	Male	46	43
Major	Agriculture	17	16
	Biology	37	34
	Other	53	50
Prior Experience with Tablet Computers	None	65	61
	Low	22	20
	Moderate	17	16
	High	3	3
Self Rating of Computer Skill Level	Low	8	7
	Moderate	69	65
	High	30	28
Do you believe that the appropriate use of computers in the classroom or laboratory can enhance your education?	Yes	96	90
	No	1	1
	Undecided	10	9

Table 2. Number and Percent of Interactivity Survey Group by Class Standing, Age, Major, Prior Tablet Computer Experience, Computer Skill Level, and Attitude Toward Educational Technology (n=90)

Variable	Criteria	n	%
Class Standing	Freshman	15	17
	Sophomore	20	22
	Junior	20	22
	Senior	33	37
	Unclassified	2	2
Age	18-22	62	69
	>22	28	31
Gender	Female	44	49
	Male	46	51
Major	Agriculture	8	9
	Biology	9	10
	Other	73	81
Prior Experience with Tablet Computers	None	50	56
	Low	22	24
	Moderate	14	16
	High	4	4
Self Rating of Computer Skill Level	Low	9	10
	Moderate	44	49
	High	37	41
Do you believe that the appropriate use of computers in the classroom or laboratory can enhance your education?	Yes	79	88
	No	2	2
	Undecided	9	10

environment is related to students' perceptions of their benefits (Fraser, 1998; Walberg, 1984). Student perception of the usefulness of educational technology is also influenced by demographic variables such as age, computer skills, and prior experience with technology (Vankatesh et al., 2003). The objective of this study was to assess student perceptions of the efficacy of tablet personal computers in a cooperative learning environment across a diverse student population encompassing eight agriculture and biology classes.

Methods

Wireless enabled tablet personal computers were provided to undergraduate students in eight courses: Introduction to Animal Science, Introduction to Cellular and Molecular Biology, Introduction to Medicinal Crops, Forage Production and Management, Soils and Soil Fertility, Food Systems of Production, Genetics, and Agricultural Issues in Society. Before using the computers, students in each class completed surveys that asked them to identify themselves by class standing, age, gender, major, prior experience with tablet personal computers, self rating of computer skill level, and attitude toward educational technology (Tables 1 and 2).

Instructors provided opportunities for students to learn how to use the tablet computer and the wireless network before engaging in computer based cooperative learning activities. Each instructor involved in the project modified their traditional lecture format to include several tablet personal computer based cooperative learning activities suitable for their course. Specific cooperative learning activities were of three general types: 1) Internet based student enhanced lectures, 2) Group problem solving activities, and 3) Discussions of ethical issues relevant to the class.

Internet based student enhanced lectures incorporated real time student contributions to the instructors lecture. Students used tablet personal computers to conduct Internet research at selected times during lecture. The instructor's tablet personal computer was connected to a computer projection system and used as an electronic blackboard accessible by students and the instructor. Forage Production and Management students, for example, used the tablet personal computers to research major characteristics of diploid and tetraploid ryegrasses on the Internet. Students subsequently summarized results of their Internet research on the instructor's tablet computer screen so the entire class could view each student contribution and add it to the lecture notes for that class period. To encourage positive interdependency in the activity, students were informed that their contributions were a valued addition to the course content and that their contributions would be included in forthcoming exams.

Group problem solving activities encompassed varied exercises that required students to make management recommendations, to propose resolutions for case studies, or to draw concept maps of fundamental subject matter topics. Introduction to Animal Science students, for example, used the screen-drawing feature of the tablet personal computers to create concept maps of milk components (Figure 1). Concept maps are visual learning tools in the form of diagrams that organize knowledge about a specific topic. Pedagogically, they are used to identify current knowledge, to encourage students to use effective learning patterns, and to determine valid or invalid ideas held by students (Novak and Canas, 2006). The ability to draw on the tablet computer screen and save drawings for grading is an especially useful feature with regard to concept mapping and for providing individual accountability.

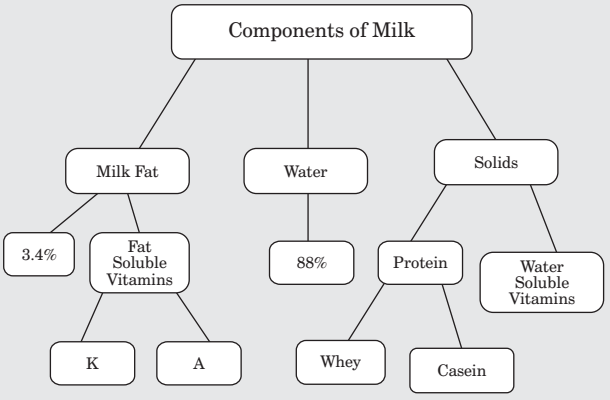

Figure 1. Example of student concept map of milk components.

Electronic mediated discussion of ethical issues utilized shared network drives and email to provide a way for students to post comments on controversial ethical issues relevant to the course. Introduction to Range Management students, for example, viewed a video presentation on the advantages and disadvantages of leasing public land for livestock grazing. Following the video presentation, students used the tablet personal computers to download a series of value laden questions from a shared network drive, e.g. "Is allowing livestock grazing on public rangeland an ethical and effective use of public resources?" Students used tablet personal computers to email responses to the instructor, who posted responses anonymously on a shared network drive. Subsequently, the instructor shared selected student comments anonymously with the class to illustrate differing perspectives of this and other controversial ethical issues related to range management. Near the end of each class, 107 students in five classes were surveyed regarding their perception of the usefulness of the tablet computers in enhancing their learning environment; this group is hereafter referred to as the learning environment survey group or population. Sixty-two students in four classes were surveyed with regard to their perception of how the tablet personal computers affected their ability to interact with other students and their instructor; this group is hereafter referred to as the interactivity survey group or population. Mode and median values were computed for each Likert item to characterize the predominant response to each survey question for both test populations. Test population compositions were analyzed by comparing demographics (class standing, age, gender, major) with responses to computer use questions (prior experience with tablet computers, self rating of computer skill level).

Results and Discussion

Data is reported for two student survey populations. One student survey population was asked to respond to questions about their perception of the classroom-learning environment, and is hereafter referred to as the learning environment survey group or population. The second student survey population was asked to respond to questions about their ability to interact with each other and their instructor, and is hereafter referred to as the interactivity survey group or population. Both student survey populations were diverse with regard to class standing, age, major, gender, prior experience with tablet computers, and self-rating of computer skill level (Tables 1 and 2), distinguishing our study from earlier studies that involved more selective student populations (Barak et al., 2006). Sophomore students and females were a slight majority of both survey populations. There were approximately equal numbers of agriculture/biology majors and non- agriculture/biology majors. Non-traditional students, who have a generally observed tendency to describe themselves as less computer savvy than their younger peers, made up 21% of the learning environment survey and 31% of the interactivity survey group. Eighty-one percent of the learning environment survey group and 80% of the interactivity survey group had little to no prior experience with tablet personal computers. Students in both survey populations overwhelmingly indicated that the "appropriate use of computers" (Tables 1 and 2) could enhance their education. The interpretation of "appropriate use" will vary among students, just as it does among teachers; nevertheless we believe that the majority agreement with the statement indicates both survey populations were favorably inclined toward using of computers in their college classes. Despite this apparent favorable inclination toward using computers in the classroom, only 28% and 41% of the learning environment survey group and interactivity survey group, respectively, rated themselves as highly skilled computer users.

In the learning environment survey group, freshman indicated the greatest confidence in their computer skills (Table 5), lending credence to the supposition that they may be more comfortable and accepting of using computers in cooperative learning exercises. Similarly, 30% of traditional students (age 18-22) rated their computer skill level as high, versus 18% of non-traditional (age >22) students. In addition, 78% of senior students indicated no prior experience with tablet computers, versus 52% of freshman. Collectively, these observations suggest that future college students may come more prepared and more accepting of computer use in cooperative learning exercises. Demographic analysis of the interactivity survey group reveals an older student population with a higher proportion of upperclassman (Table 6). In contrast to the learning environment survey group, 48% of senior students rated their computer skills as high, versus 20% of freshman students. As a whole, demographic data collected in the study validated that we met one of the key objectives of this study, i.e. to sample a diverse college student population.

A majority of students in the learning environment survey group, as indicated by percent agreement, median, and mode, signified a positive percep-

tion of the effectiveness of the tablet personal computers in improving their learning environment (Table 3). Seventy-five percent of surveyed students agreed or strongly agreed that using the tablet computers enhanced their ability to understand key concepts. Seventy-eight percent of surveyed students agreed or strongly agreed that the tablet computers added interest to the class, suggesting that the cooperative learning opportunities provided by the tablet personal computers generated additional student motivation, a key element of effective learning (Lynch, 2008). Sixty-one percent of surveyed students agreed or strongly agreed that the tablet personal computer helped them develop well-formulated responses to discussion questions, supporting the usefulness of the tablet personal computers in facilitating creditable student accountability, a key parameter of successful cooperative learning. Similarly, 61% of students surveyed agreed or strongly agreed that the tablet personal computers had a positive influence on their ability to learn. Median and mode values for all questions, an indication of the most common survey population response, confirmed that the majority response was agreement with positive statements about the use of the tablet personal computers (Table 3). Survey results from the learning environment survey group reveal a consistent pattern of favorable student perceptions that validate the value of the tablet personal computer based exercises in fostering productive cooperative learning.

Table 3. Student Response to Statements Regarding the Effect of the Tablet Personal Computer on their Perception of the Learning Environment (n=107)

	Median	Mode	Strongly Disagree		Disagree		No Opinion		Agree		Strongly Agree	
			n	%	n	%	n	%	n	%	n	%
Integrating the tablet personal computer into lecture enhanced my ability to understand key concepts.	4	4	0	0	6	5	21	20	67	63	13	12
Using the tablet personal computer added interest to the class.	4	4	0	0	2	2	21	20	55	51	29	27
Using the tablet personal computer in a group helped the group develop well formulated responses to discussion questions	4	4	0	0	4	4	37	35	56	52	10	9
Using the tablet personal computer had a positive influence on my ability to learn	4	4	0	0	10	9	32	30	51	48	14	13

Median, mode calculated as: Strongly Disagree =1.0, Disagree=2.0, No Opinion=3.0, Agree=4.0, Strongly Agree=5.0

A majority of students in the interactivity survey group, as indicated by percent agreement, median, and mode, signified a positive perception of the effectiveness of the tablet personal computers in improving their ability to interact with each other and with their instructor (Table 4). Sixty-six percent of the survey population agreed or strongly agreed that using the tablet computers helped them interact more effectively with their fellow students. Similarly, 69% of the survey population agreed or strongly agreed that using the tablet computers helped them interact more effectively with their instructor. Median and mode values for all questions confirmed that the majority response was agreement with positive statements about the effectiveness of the tablet personal computers in improving their ability to interact with each other and their instructor (Table 4). Effective interaction among students and instructors has been identified as one of the five critical factors needed for successful cooperative learning (Nagel, 2008). Interactivity survey results provide convincing support for the value of the tablet computers in enhancing cooperative learning.

Although a majority of students indicated a positive perception of tablet computer effectiveness, a noteworthy portion of the learning environment survey populations indicated "no-opinion" in their perception of the effectiveness of the tablet personal computers in enhancing the learning environment. Thirty percent of surveyed students, for example, had no opinion with regard to the statement: "Using the tablet personal computer had a positive influence on my ability to learn." This response may reflect the inexperience of both students and instructors with the technology. Only one instructor involved in the project had substantial prior experience with the tablet personal computer, and 80% or more of the students had no prior tablet personal computer experience. Technical difficulties such as the inability to log on to the wireless network were a regular occurrence in the early use of the tablet computers, and there was notable frustration among both faculty and students in the initial stages of the project. Frustration notably declined as students and instructors became more proficient in the use of the tablet computers. It is plausible to postulate that some of the no-opinion response is due to the frustration of using limited class time to deal with technical difficulties instead of completing the cooperative learning exercises in an efficient fashion. The considerably sized no-opinion group offers an important cautionary reminder to instructors who integrate computer technology into the classroom, i.e. significant time and effort will be required to develop well organized and executed exercises.

Table 4. Student Response to Statements Regarding the Effect of the Tablet Personal Computer on their Ability to Interact with their Fellow Students and their Instructor (n=62)

	Median	Mode	Strongly Disagree		Disagree		No Opinion		Agree		Strongly Agree	
			n	%	n	%	n	%	n	%	n	%
Using the tablet personal computer to participate in electronic discussions helped me to articulate my thoughts about ethical issues more effectively than in oral discussions.	4	4	0	0	5	8	19	30	27	44	11	18
Using the tablet personal computer helped me interact more effectively with other students	4	4	0	0	7	11	13	21	32	52	10	16
Using the tablet personal computer helped me interact more effectively with my instructor	4	4	0	0	9	15	10	16	34	54	9	15
Using the tablet PC to make contributions to the class discussion was more comfortable for me than contributing orally in front of the class.	4	4	1	2	7	11	13	21	26	42	15	24

Median, mode calculated as: Strongly Disagree =1.0, Disagree=2.0, No Opinion=3.0, Agree=4.0, Strongly Agree=5.0

Table 5. Demographic Analysis of Learning Environment Survey Group

	Prior Experience with Tablet Computers				Self Rating of Computer Skill Level		
	None	Low	Moderate	High	Low	Moderate	High
----------% (n) Selected Group Population----------							
Class Standing							
Freshman 20 (21)	52 (11)	29 (6)	19 (4)	0 (0)	1 (1)	54 (11)	45 (9)
Sophomore 31 (33)	61 (20)	12 (4)	18 (6)	9 (3)	9 (3)	73 (24)	18 (6)
Junior 23 (24)	46 (11)	38 (9)	16 (4)	0 (0)	1 (1)	68 (16)	31 (7)
Senior 26 (27)	78 (21)	11 (3)	11 (3)	0 (0)	7 (2)	67 (18)	26 (7)
Age							
18-22 79 (85)	59 (50)	24 (20)	15 (13)	2 (2)	6 (5)	64 (54)	30 (26)
>22 21 (22)	68 (15)	9 (2)	18 (4)	5 (1)	14 (3)	68 (15)	18 (4)
Gender							
Male 43 (46)	62 (28)	26 (12)	11 (5)	1 (1)	11 (5)	61 (28)	28 (13)
Female 57 (61)	61 (37)	16 (10)	20 (12)	3 (2)	5 (3)	67 (41)	28 (17)
Major							
Agriculture 16 (17)	36 (6)	29 (5)	29 (5)	6 (1)	6 (1)	65 (11)	29 (5)
Biology 36 (38)	71 (27)	13 (5)	16 (6)	0 (0)	8 (3)	71 (27)	21 (8)
Other 48 (50)	62 (31)	22 (11)	12 (6)	4 (2)	6 (3)	62 (31)	32 (16)

Numerous studies indicate that well planned and executed computer based learning activities are essential to effective student learning (Bassoppo-Moyo, 2008). Our results suggest that a student population that was highly favorable to computer use in the classroom (Tables 1 and 2) in general was not always as favorable in their perception of the usefulness of the tablet computers.

Ideally, college instructors desire that all students contribute to class discussions, while appreciating the reality that this rarely occurs, especially in larger groups of students. Students that feel uncomfortable contributing in open class discussions are one reason for the lack of universal participation. In the Introduction to Range Management class, we conducted the cooperative learning activity to determine if the use of the tablet personal computers to post contributions anonymously

Table 6. Demographic Analysis of Interactivity Survey Group

	Prior Experience with Tablet Computers				Self Rating of Computer Skill Level		
	None	Low	Moderate	High	Low	Moderate	High
----------% (n) Selected Group Population----------							
Class Standing							
Freshman 17 (15)	60 (9)	33 (5)	7 (1)	0 (0)	13 (2)	67 (10)	20 (3)
Sophomore 23 (20)	60 (12)	15 (3)	20 (4)	5 (1)	15 (3)	45 (9)	40 (8)
Junior 23 (20)	50 (10)	25 (5)	20 (4)	5 (1)	15 (3)	45 (9)	40 (8)
Senior 37 (33)	55 (18)	27 (9)	15 (5)	3 (1)	4 (1)	48 (16)	48 (16)
Age							
18-22 69 (62)	56 (35)	23 (14)	16 (10)	5 (3)	10 (6)	48 (30)	42 (26)
>22 31 (28)	54 (15)	28 (8)	14 (4)	4 (1)	11 (3)	50 (14)	39 (11)
Gender							
Male 51 (46)	50 (23)	26 (12)	17 (8)	7 (3)	13 (6)	54 (25)	33 (15)
Female 49 (44)	61 (27)	23 (10)	14 (6)	2 (1)	7 (3)	43 (19)	50 (22)
Major							
Agriculture 7 (6)	50 (3)	33 (2)	17 (1)	0 (0)	0 (0)	67 (4)	33 (2)
Biology 10 (9)	33 (3)	23 (2)	33 (3)	11 (1)	0 (0)	56 (5)	44 (4)
Other 83 (75)	59 (44)	24 (18)	13 (10)	4 (3)	12 (9)	47 (35)	41 (31)

could improve class participation with regard to a controversial topic. Anecdotally, the course instructor noted that the quality and extent of class participation was the highest he had observed in over ten years of classes. In accordance with this observation, 66% surveyed agreed or strongly agreed that the tablet computer provided them with a more comfortable way to contribute to class discussions as compared to an oral contribution. A small, but notable portion of the survey population, ranging from 21% to 30%, expressed no opinion as to the usefulness of the tablet computers in their classroom interactivity or their ability to articulate responses to ethical issues. A similar trend was observed in the learning environment survey group. As indicated earlier, we attribute some of this to the lack of experience with the technology by students and instructors. Overall, the survey results, in terms of student agreement, median values, and mode values, provide convincing evidence that the tablet personal computer can play a helpful role in cooperative learning by encouraging and enabling more students to contribute to class discussions.

Summary

A growing number of college instructors are investing considerable time and effort into developing computer based cooperative learning components into their courses. In a related trend, it is commonly observed by instructors that more college students are coming to campus with computers and with the expectation that their computer skills will become a significant part of their educational experience. Notebook computer use by college students increased from 52.8% in 2005 to 75.8% in 2007 (Salaway and Caruso, 2007). Instructors are attempting to meet this expectation by developing and implementing computer-based cooperative learning exercises that provide tangible benefits to the learning process. The results of our study demonstrate that the judicious use of tablet personal computers can enhance cooperative learning in a diverse student population. As students gradually become part of the cooperative group process of sharing knowledge and experiences, they may be more likely to make connections that will help them excel in their studies, gain confidence in their ability to contribute to class discussions, and persevere in their studies through graduation.

Literature Cited

Barak, M., A. Lipson, and S. Lerman. 2006. Wireless laptops as means for promoting active learning in large lecture halls. Jour. of Research on Technology in Education 38(3): 245-261.

Bassoppo-Moyo, T.C. 2008. Applying needs assessment and strategic planning techniques in developing e-learning. Intl. Jour. of Instructional Media 35:373-380.

Cooper, J.L., J. MacGregor, K. Smith, and P. Robinson. 2000. Implementing small-group instruction: Insights from successful practitioners. New Directions for Teaching and Learning 81:63-76.

Cooper, J.L. and P. Robinson. 2000. The argument for making large classes seem small. New Directions for Teaching and Learning 81:5-16.

Fraser, B.J. 1998. Science learning environments: Assessment, effects and determinants. In Fraser, B.J and K.G. Tobin (eds.) The International Handbook of Science Education. Dordrecht, The Netherlands: Kluwer.

Hwang, N., G. Lui, and M. Tong. 2005. An empirical test of cooperative learning in a passive learning environment. Issues in Accounting Education 20(5): 151-165.

Johnson, D.W. and R.T. Johnson. 1989. Cooperation and competition: Theory and research. Edina, MN: Interaction Book Company.

Kagan, S. 1990. The structural approach to cooperative learning. Educational Leadership 47(4): 12-15.

Lynch, D.J. 2008. Confronting challenges: Motivational beliefs and learning strategies in difficult college courses. The College Student Jour. 42: 416-421.

Mackinnon, G.R. and C. Vibert. 2002. Judging the constructive impacts of communication technologies: A business education study. Education and Information Technologies 7(2): 127-135.

Nagel, P. 2008. Moving beyond lecture: Cooperative learning and the secondary social studies classroom. Education 128: 363-368.

Novak, J.D. and A.J. Canas. 2006. The theory underlying concept maps and how to construct them. Technical Report IHMC CmapTools 2006-01, Florida Institute for Human and Machine Cognition.

Salaway, G. and J. Caruso. 2007. The ECAR study of undergraduate students and information technology. EDUCAUSE, Boulder, CO.

Slavin, R.E. 1990. Cooperative learning. Upper Saddle River, NJ: Prentice-Hall.

Slavin, R.E. 1995. Cooperative learning: Theory, research, and practice. 2nd edition. Boston, MA: Allyn and Bacon.

Tilestone, D.W. 2000. Ten best teaching practices: How brain research, learning styles, and standards define teaching competencies. Thousand Oaks, CA: Corwin Press.

Vankatesh, V., M. Morris, G. Davis, and F. Davis. 2003. User acceptance of information technology: Toward a unified view. MIS Quarterly 27(3): 425-478.

Walberg, H.J. 1984. Improving the productivity of America's schools. Educational Leadership 41:19-27.

The Student Success Leader Program: College-Level Service Enhances Learning outside the Classroom

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Abstract

The Student Success Leader program focuses on informal education of a select group of agriculture students through service to the College of Agricultural Sciences and Natural Resources at Oklahoma State University. The Student Success Leaders are a student peer leadership program comprised of three units: Ambassadors, Career Liaisons, and Student Academic Mentors. Student Success Leaders participate in recruitment and career development activities and serve as peer mentors to students throughout the college. The purpose of this article is to share program details and results to date with educators. Specifically, the authors explore informal education through active participation in college-level service-activities. Results to date have shown that participation in the Student Success Leader program has impacted the personal development and growth of student participants and influenced student interest in future leadership and service roles.

Introduction

Studies have shown that engagement with college resources has a significant influence on the differential blueprint of student learning and growth (Pace, 1980; Pascarella and Terenzini, 2005; Smart et al., 2000; Thompson, 2001, 2003). The College of Agricultural Sciences and Natural Resources' Student Success Leader Program at Oklahoma State University fosters student learning and growth through active student participation in college-wide service activities. Research suggests that students with leadership experiences, involving holding an office, responsibility of a position, or active membership within extracurricular organizations, are all directly proportional to the richness and magnitude of learning experiences, as well as to their personal development during college years (Astin, 1985).

The development of students as leaders is and will remain a common goal for institutions of higher education (Pennington, 2005). Numerous researchers have examined student involvement within leadership programs built on formal structure. These researchers found significant growth in participants across leadership skills and several leadership-related measures including civic responsibility, multicultural awareness, understanding of leadership theory, and personal and societal values (Cress et al., 2001). Pascarella and Terenzini (2005) indicated that students can and do increase their leadership skills throughout their college years. That increase can be attributed at least in part to collegiate involvement (Astin, 1993). The College of Agricultural Sciences and Natural Resources at Oklahoma State University seeks to develop students as leaders not only through the formal classroom (Pennington and Weeks, 2006) but also through learning environments outside the classroom such as the Student Success Leader Program. This paper describes the Student Success Leader Program. Program details are shared as well as results to date and the impact of active participation in college-level service activities on student growth and development.

The Student Success Leader Program

The Student Success Leader (SSL) Program is comprised of agriculture students that serve as an extension of the staff and faculty of the College of Agricultural Sciences and Natural Resources at Oklahoma State University. The goal of the Student Success Leader program is two-fold: (1) provide an educational opportunity beyond the classroom for select students in the college to develop as student leaders and (2) serve the college's broader student population through service activities.

Approximately 30 undergraduate Student Success Leaders (SSLs) are selected annually to serve the college's approximately 2000 students. The pre-selection process in which prospective SSLs participate includes: three training sessions, an application, and a networking reception. If students complete the pre-selection process they are then eligible to be considered for a personal interview. The interview serves as the final selection criteria for a Student Success Leader position.

Agriculture students participating in the SSL Program serve in one of three different roles: Student Ambassador, Career Liaison or Student Academic Mentor. The three branches of service work in connection with one another but also have independent goals. These goals include helping recruit prospective students to the college, working to assist

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current students with future career related plans, and aiding current students with the adjustment from high school to college, respectively. Each of the three branches of the Student Success Leader program is advised by a full-time coordinator and a graduate assistant employed by the college. The coordinators report to the Associate Dean of Instruction for the college (Figure 1).

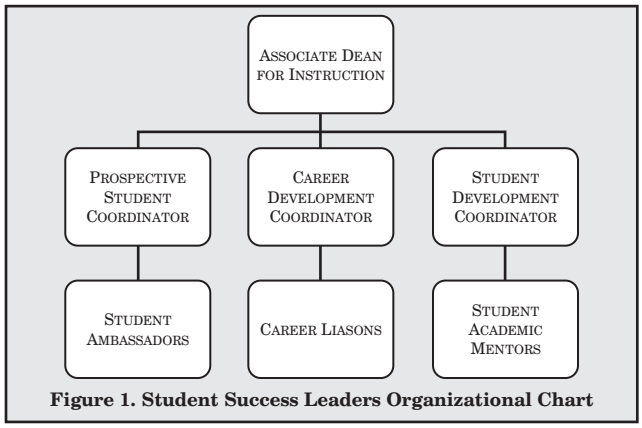

Figure 1. Student Success Leaders Organizational Chart

Ambassadors

The Ambassadors role for the college centers on recruiting new students to the college. These students assist high school and junior college students when contemplating future degree programs and academic and extracurricular activities. They serve as an extension of the Prospective Student Coordinator. Typically, this group consists of 12 to 15 student leaders each year. The primary function of students in this role is to promote the college and university.

Ambassadors meet with prospective students and their families. They answer questions about the college and university, provide information about potential majors and options, give campus tours and act as a student point of contact for prospective students. Ambassadors are also responsible for planning and implementing college-level recruiting events including Fall Conference and Call Night. Fall Conference is a weekend leadership conference hosting approximately 50 prospective high school students and Call Night is an event in which the Ambassadors make personal phone calls to prospective students.

Career Liaisons

The Career Liaison serves as an extension of the Career Development Coordinator of the college. This group generally consists of six to eight student leaders each year. These student leaders assist freshmen to seniors, as well as alumni, as they explore career related opportunities and options. Career Liaisons also aid students in their search for internships and career related jobs. This group also promotes the college and university at different career events.

Specific activities of student Career Liaisons include: (a) assisting with the fall and spring college-level career fair through preparation work, event set-up, employer and fellow student support; (b) aiding other students with career related materials including resume critiques, cover letter writing, internship and job searches; and, (c) presenting workshops to clubs and organizations about interviewing, writing resumes and cover letters, professional dress, and dining etiquette.

Student Academic Mentors

The Student Academic Mentors (SAMs) play a vital role for the Student Development Coordinator. The SAMs typically consists of five student leaders. These particular students live with incoming freshmen in the colleges' living-learning environment acting as mentors for a year. They offer an additional support system, beyond the assigned residential advisors, for those freshmen while they adjust from high school to college. These students are on duty for their peers at all times. They promote the resources and activities that the college and university have to offer.

Major activities of SAMs include: (a) daily interaction with freshmen as a living-learning mentor; (b) providing college and university resource information to the freshmen class; and, (c) acting as role models specifically working to get the freshmen actively involved in campus student leadership opportunities.

Results to Date and Discussion

The Student Success Leader program has grown and evolved in the last ten years. The Ambassador program was created first and the overall goal of recruitment has remained since its inception. The SAMs program was established in 2000 and the Career Liaison program was established the following year. The most notable change in the last few years has been the merging of the three programs into one body, The Student Success Leaders (SSLs). Although the three groups continue to maintain independent goals, as a whole the SSLs share the larger common goal of service to all agriculture students in the college. Additionally, the goal of developing students as leaders is consistent across the three groups.

Creating an umbrella organization has served the three groups positively in several ways. First, it allows for a more efficient use of resources, not only related to finances but time. For example, rather than conducting training sessions for three separate groups, a single leadership retreat can serve the entire group. Second, the groups are collaborative in nature. The group as a whole participates in campus-wide events such as Ag Week and Homecoming Week as well as community service activities. And finally, organizational stability is impacted positively as

students progress from one group to the next from year to year.

To provide objective feedback regarding the SSL program and the specific impact of the program on the students participating as SSLs, a formal evaluation was conducted during the spring semester of 2009. An online survey was used to gather anonymous information from current and past SSLs. Specifically; the Student Success Leaders from 2007 to 2008 and 2008 to 2009 academic years were emailed a request to fill out a survey addressing the overall Student Success Leader program.

In general, the Student Success Leader program had a positive impact on the students completing the survey. When asked what areas of the program were most positive, students reported the following: (1) networking with employers, faculty and staff, (2) the opportunity to assist their peers through service activities, and (3) experiencing a leadership role. When asking students what areas of the program could be improved there were a few comments that addressed relationship challenges and frustrations specifically describing a need for improved relations between advisors and student participants.

The majority of the students that responded to the survey reported that being involved with the Student Success Leaders had a major impact on their leadership, service and personal growth. Eighty percent of respondents stated that involvement in service activities for their peers had a moderate to major impact on them as a Student Success Leader. Three quarters of the students stated that their involvement with the Student Success Leader program had at least moderately impacted their future leadership and service roles or involvement.

Summary

Bringing together students who have common service and leadership goals serves as a productive way to extend college services to the student population while enhancing learning opportunities for student participants. Not only do these students provide time, service and leadership to the college and their peers, they also gain on a personal level. Student participants report that they are continually exposed to a high number of quality interactions with faculty, staff, alumni, employers, and other individuals. Student participants also agree that participation in the Student Success Leader Program has positively impacted their personal growth and development as a student leader, as well as their interest in future leadership positions and service to others.

Literature Cited

Astin, A.W. 1985. Achieving academic excellence: A critical assessment of priorities and practices in higher education. San Francisco, CA: Jossey-Bass.

Astin, A.W. 1993. What matters in college: Four critical years revisited. San Francisco, CA: Jossey-Bass.

Cress, C.M., H.S. Astin, K. Zimmerman-Oster, and J.C. Burkhardt. 2001. Developmental outcomes of college students' involvement in leadership activities. Jour. of College Student Development 42: 15-27.

Pace, C.R. 1980. Measuring the quality of student effort. Current Issues in Higher Education 2: 10-16.

Pascarella, E.T. and P.T. Terenzini. 2005. How college affects students: Findings and insights from twenty years of research. San Francisco, CA: Jossey-Bass.

Pennington, P. 2005. The leadership pie: Grab your piece before it's gone. Jour. of Leadership Education 4(1): 75-78.

Pennington, P. and W.G. Weeks. 2006. Agricultural leadership: Oklahoma State University's new major for undergraduate students. NACTA Jour. 50(4): 42-46.

Smart, J.C., K.A. Feldman, and C.A. Ethington. 2000. Academic disciplines: Holland's theory and the study of college students and faculty. Nashville, TN: Vanderbilt University Press.

Thompson, M.D. 2001. Informal student-faculty interaction: Its relationship to educational gains in science and mathematics among community college students. Community College Review 29: 35-55.

Thompson, M.D. 2003. Disparate academic environments: An emergent framework of socialization. The Qualitative Report 8: 408-434.

Second Time is a Charm: The Impact of Correcting Missed Exam Questions on Student Learning

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Abstract

This study determined the learning benefit of correcting missed exam questions. The results show that in addition to exams being an assessment tool, they can also be used as a tool for student learning. The availability of this information will provide help considering design, development, and improvement of traditional assessment methods for student learning.

Introduction and Objectives

One of the missions of the university is to guide students in learning specific fundamental principles to enhance life-long learning. Assessment methods, such as exams, should test the student's understanding of the material and provide feedback to students and professors (McKeachie, 2002). However, given that exams provide an impetus for students to quickly study the class material right before the assessment date, exams often only evaluate the student's knowledge at the time the exam is given and regrettably, often fail to be a learning tool. The typical lifecycle of an exam ends after it has been corrected by the professor and returned to the student. Risley (2007) observed an exam lifecycle similar to our own teaching experiences: 1) students take exam, 2) professor grades exams, 3) professor returns graded exams, 4) students look at their grade, see what they missed, check to make sure the points were added correctly, 5) students place the graded exam in their notebooks, maybe never to be looked at again until it is time to study for the final exam, if the final exam is comprehensive. Few students may take the time to determine what they missed on a certain question and to re-work the problem or even correct their mistakes on the exam. Factors such as student procrastination, social activities, part-time employment, and busy exam schedules frequently lead to last-minute studying behavior, which may jeopardize the efficacy of exams as a tool to help students learn course material. Thus, there is a need to explore whether student learning could be enhanced by modifying the traditional lifecycle of exams.

Alternative teaching methods may provide some benefits to students' learning. Haskett (2001) explored many alternative teaching methods, such as reducing the number of lectures throughout the quarter, face to face evaluations rather than conventional testing, resubmission of work until a desired grade is received, and oral presentations with literature reviews instead of term papers. Students' response to resubmitting their work was mostly positive, which suggests that this approach could be a successful teaching method. Light (1990) interviewed thousands of students to determine the qualities of the best courses they had taken at the university. In his study, students expressed that one of the characteristics of the highest ranked courses includes "the opportunity to revise and improve their work before it receives a final grade, thereby learning from their mistakes in the process" (Light, 1990, pp. 8-9). This finding is supported by Bain (2004) who suggests it is important to give students multiple chances to demonstrate their comprehension when administering an exam.

Many studies have examined the usefulness of retaking exams, homework assignments, and quizzes to enhance learning (e.g. Bacon and Beyrouty, 1988; Haskett, 2001; Nickels and Uddin, 2003; Brye et al., 2005; Risley, 2007). Results of these studies generally show that students do better on the makeup exams regardless of whether the date of the makeup is announced, they work in groups, or they can use their notes. These studies also demonstrated some physiological benefit for the students who reported greater inter-student cooperation. Bacon and Beyrouty (1988) reported increased interest in the course while

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others observed increased communication between student and professor (Longer et al., 1987), decreased anxiety (Brye et al., 2005), and perceived, enhanced learning (Bacon and Beyrouty, 1988; Longer et al., 1987; Brye et al., 2005).

Though many studies have documented the effects of student learning through student self evaluation with questionnaires and results on makeup exams, few studies have looked at the long term effect on student learning.

Allowing students to look at material twice and to receive feedback regarding the material that has been submitted allows for a better quality work to be turned in later in the semester/quarter. Students are interested in knowing their mistakes and, if given the opportunity, almost three-fourths of students will resubmit better work (Haskett, 2001). Students often perform better in a class where they have a better perspective of the outcome and a better attitude regarding their grade (Risley, 2007).

One alternative to the traditional exam lifecycle would be to allow the student to review the graded exam material, correct their missed exam questions, and return them to the professor for regrading. Although some studies have addressed the usefulness of correcting missed exam questions (Risley, 2007), to our knowledge, no study has assessed the learning benefits of this alternative exam lifecycle as determined by final exam grades.

The objectives of this study were to (1) identify student perceptions of correcting missed exam questions, (2) compare the learning benefits of this alternative method to the traditional exam lifecycle that ends with the professor returning the exam, and to (3) evaluate benefits vs. cost to the instructor with regard to allowing students to correct missed exam questions. The availability of this study's information will be useful in considering design, development and improvement of traditional assessment methods for student learning.

Materials and Methods

Study Design

Given that the overall population of this study was college students, the sample consisted of students enrolled in classes taught by the two investigators. Specifically, the classes were agricultural science and marketing classes at Arkansas State University in Jonesboro, Arkansas and California Polytechnic State University, San Luis Obispo, California. In this study, a written survey was distributed that consisted of questions regarding demographics, perceptions about the opportunity to correct missed exam questions, and perceptions about personal learning achievements. All students were given the option to complete the survey without any incentive to participate. Table 1 provides an overview of the time of the data collection and the course distribution. Overall, data was collected in 13 courses over two years. The data collection began in the spring of 2006 at Arkansas State University and in the fall of 2007 at California Polytechnic State University and it continued through the spring of 2008 at both universities.

Table 1. Course Distribution and Time of Data Collection

Class	Time of data collection	Non-Regrading Group (n=128)		Regrading Group (n=190)	
		Respondents	Total class enrollment	Respondents	Total class enrollment
Agricultural Economics	Fall 2007	-	-	34	41
Agricultural Marketing	Spring 2007	-	-	11	12
Agricultural Statistics	Spring 2006	21	22	-	-
	Fall 2006	-	-	29	35
	Spring 2007	-	-	25	35
Global Agricultural Marketing	Fall 2007	-	-	34	44
	Spring 2008	33	34	-	-
Soil Fertility	Spring 2006	-	-	18	21
	Spring 2008	20	27	-	-
Soil Science	Fall 2006	31	40	-	-
	Spring 2007	-	-	13	14
	Fall 2007	-	-	26	28
	Spring 2008	23	23	-	-
Total number of students		128	146	190	230
Response rate		*88%*		*83%*	

To carry out a complete investigation of the issue, this study was administered with two different student samples, each containing a different version of the survey. The two versions of the survey were not modified over time, in order to preserve a constant environment for the data collection. In addition, all students were exposed to the same course materials and each sample was provided with similar semester/quarter exams. Lastly, to the extent possible, the instructors tried to minimize any alteration in their teaching styles. These measures were implemented to control for any variability in external factors over time and to allow a cross-comparison of the survey

questions between both samples. To our knowledge, no previous study has collected data on this issue with a comparative control sample.

The two samples consisted of 190 students enrolled in the regrading sample, and 128 students in the non-regrading sample (control group). A 'regrading survey' was distributed to all students enrolled in the sample classes at the end of the semester/quarter after they had completed the class, and had the option to correct their graded semester/quarter exams for additional points. Similarly, a 'non-regrading survey' was also distributed to students in the non-regrading sample asking similar questions as the regrading sample. Students in the non-regrading sample were not offered the regrading option and were not told anything about resubmission for additional points. On the regrading survey, students were asked to rate the effectiveness of correcting missed exam questions on their learning, whereas the non-regrading survey explored the students' opinions of whether they learned from their mistakes on exams. All students were asked about their study habits to determine whether they had used their semester/quarter exam as a learning tool to study for the final exam. Student learning was measured subjectively by assessing students' perceptions about their learning of the material.

Some students in the non-regrading sample would ask about the regrading option because word traveled from previous quarters/semesters, but they were still not given the option. Risley (2007) observed the same "word-of-mouth-effect."

Overall, the response rate shown in Table 1 shows the distribution of the students across the different courses over time. The number of students in each class and the response rate is included in the table to show that a high response rate was received from each sample and that the student enrollment was similar across groups.

In addition to student feedback, professors participating in this regrading option provided reflections of their experiences. These reflections were completely open and were not guided by any specific questions.

Data Collection

Students were placed into the regrading or non-regrading groups based on the class in which they were enrolled and the semester/quarter that they were taking the class. An entire class for the semester/quarter was either a regrading or non-regrading sub-sample.

Students who were enrolled in the regrading sample were told at the beginning of the quarter/semester that they would be offered the option to correct their semester/quarter exams and submit them for regrading. This procedure was not offered for the final exams due to time constraints. These students wrote their semester/quarter exam, received back the graded exam, and then had the opportunity to resubmit the missed questions. The incentive for making corrections was that students could earn up to half of the points missed on the exam, based on the correctness of their re-submitted answers. All participants in the regrading sample were informed that the exam solutions would be discussed in class once the regraded exams were returned, but that until then, no answers would be posted. It was up to each student to decide upon which and how many answers they would choose to rework. Students were not allowed to mark their graded exam copies and had to submit their reworked answers on separate sheets of paper stapled to the original exam. Students were required to resubmit their exams by the next class period; late exams were not accepted. The instructors then regraded the submitted answers, where a correct reworked solution obtained full credit, i.e. half of the original points of that exam question, while incomplete answers could earn some partial credit. For example, if a student completely missed an exam question that was worth 10 points on the original exam, but would resubmit the correct solution to the missed exam question during the regrading period, he/she could earn up to an additional five points. Incorrect answers did not get any points, but a student could not lose any of the points from the original exam. They also could not earn additional points for already correctly solved answers from their original exams. All of the reworked points were summed and added to the students' original exam score. After the regrading period, the exams were returned to the students and all of the answers were discussed in class or posted. At the end of the semester/quarter, all exams and regraded answers were collected.

Risley (2007) offers his students identical conditions for reworking exams, while Nickels and Uddin (2003) awarded 80% of the points lost. Instructors may choose to alter details such as amount of additional points offered or resubmission time frame according to their needs.

The non-regrading sample served as the control group since their semester/quarter exams were based on the traditional lifecycle of an exam. The survey questions for the non-regrading sample consisted of hypothetical questions regarding the option to resubmit their exams for additional points. The questions on each survey were similar to allow for comparison between the two groups, i.e. the non-regrading and regrading group, respectively.

Data Analysis

This study employed six types of variable groups: 1) demographics and study habits, 2) method of correcting missed exam questions, 3) motivation for correcting missed exam questions, 4) test anxiety, 5) post-exam learning, 6) benefits and cost to the instructor with regard to allowing students to correct missed exam questions.

All students who attended classes that utilized the regrading treatment were combined as the "regrading sample," while the other students were

treated as the control group. We analyzed the data by comparing the survey responses between the treatment and the control group. Descriptive statistics were compared with regard to the questions about demographics and study habits. For all other questions, independent t-tests were used to determine the difference between the groups' answers.

Regarding demographics, several variables may impact student learning such as age, gender, marital and employment status, year in school, and the university attended. In addition, the survey assessed school responsibilities such as number of hours worked per week, credit hours/ units enrolled, and how far from campus the student lived. In order to assess the general study habits of the students, questions about the number of hours studied for the course in which the survey was given, were included.

Questions about major, age, and year in school may allow for comparisons regarding maturity and knowledge level. State of residence and proximity of the students' residence to their particular school were evaluated to allow for comparison between Arkansas State University students and California Polytechnic State University students.

The survey also included questions about whether the students took advantage of the opportunity to correct missed exam questions. We assessed the methods of correction by asking the students whether they corrected the exam questions by working with other students, visiting the professor during office hours, or using books and/or notes. Students were allowed to select more than one method of correction in their answers. We combined the answer categories "fully agree" and "agree" in this question, as these were indicative of students who employed this method.

In addition, the data analysis assessed whether the opportunity for regrading eased test anxiety or altered the students' study efforts for the exam. A comparison was made to determine the change in the anxiety levels of students who were allowed to correct their exams compared to the anxiety levels of the control group. When students are less anxious about taking an exam, a more relaxed and positive learning environment is established.

We also collected subjective learning measures, such as their perceptions regarding the extent of what they learned from the mistakes they made on the exams. Both surveys included questions about students' ability to retain the class material after the exam in order to assess the benefits of the alternative exam lifecycle for student learning.

Lastly, the non-regrading group was asked whether they would take the opportunity to correct mistakes if they thought it would enhance their learning of the material. The regrading survey employed a similar situation and asked if they received no points for making corrections on their exam, would they still have taken the time to make corrections to their exam. All students had the opportunity to make corrections to learn from their mistakes, but only the students in the regrading treatment had the extra incentive of turning back their exam to be regraded and gain back points missed on the semester/quarter exams.

Results and Discussions

Demographics and Study Habits

A comparison of demographics and study habits is shown in Table 2. First, we compare demographics, such as age, gender, standing, and residence during the semester/quarter, between both groups. The table shows that the average age was very similar in the regrading and the non-regrading groups, with 22 years in the regrading group and 23 years in the non-regrading group. The breakdown by age shows that both the regrading group and non-regrading group consisted of mostly older students with the majority of students in both groups being 21 years and older. Gender distribution was skewed towards the male population, with 76% of the non-regrading group and 68% of the regrading group being male. The majority

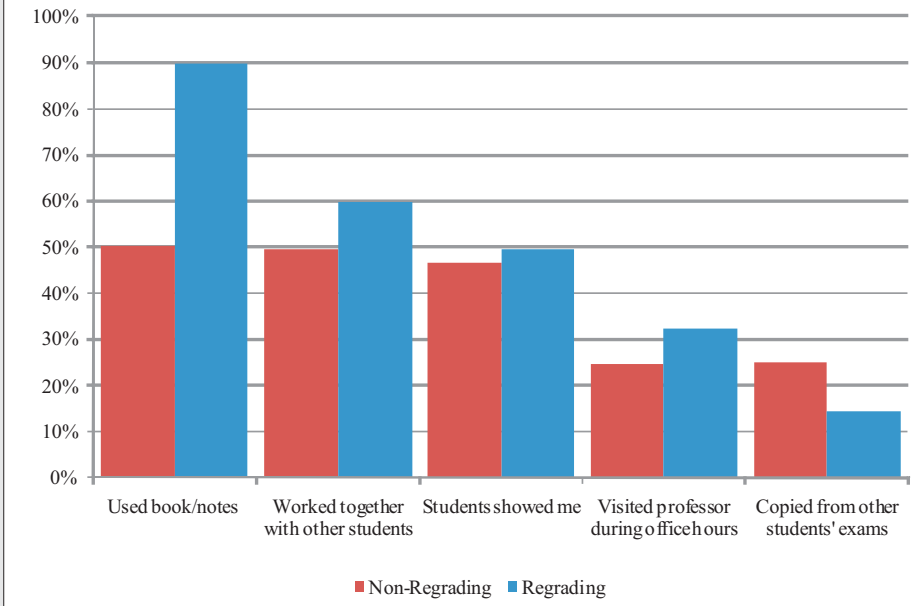
Table 2. Demographics and Study Habits of the Non-Regrading and Regrading Groups

Variable	Categories	Non-Regrading Group (n=128)	Regrading Group (n=190)
Demographics			
Age	18	1%	3%
	19	6%	7%
	20	12%	17%
	21	27%	24%
	22	22%	21%
	23+	23%	28%
	Average	23	22
Gender	Male	76%	68%
	Female	24%	32%
Standing	Freshmen	2%	9%
	Sophomore	17%	9%
	Junior	37%	37%
	Senior	41%	42%
	Graduate	3%	1%
Average distance to School		19 Miles	15 Miles
Study habits			
Number of credit hours during the semester/ quarter		14	15
Average number of hours worked per week		26.5	21.6
Number of hours studied per week		2.6	2.9
Typically do assigned readings		39%	42%
Class required for major		89%	90%

of students in both groups were upper classmen with the number of freshman students being below 10% for both groups. This distribution of academic standing is similar to the sample in Nickels and Uddin (2003), which focused their data collection on sophomore and junior/senior level classes.

Regarding the student's residence during the semester/quarter, most students indicated that they do not live on campus, as the average commuting distance to campus was 19 miles in the non-regrading group and 15 miles in the regrading group.

In order to assess the general study habits of the students, questions about the number of credit hours during the semester/ quarter, number of hours worked, and number of hours studied were included. In addition, the survey asked whether the student typically reads the assigned class material and whether the class is required for their major. Table 2 shows that respectively, the average number of credit hours per semester/ quarter was similar in both groups, with 14 and 15 credit hours per semester/ quarter. The number of hours worked was comparable between both groups, with a mean of 26 hours worked per week in the non-regrading group and a mean of 22 hours worked per week in the regrading group. Results showed that the minority of students did the required readings in the class, with 39% of the students in the non-regrading group and 42% of the students in the regrading sample reportedly doing the required reading. The majority of students in both samples stated that the class they were enrolled in was required for their major, with 89% in the non-regrading sample and 90% in the regrading sample. This is similar to the sample by Nickels and Uddin (2003), where 83% of the students stated that the class was required for their major.



Method of Correction	Non-Regrading Group	Regrading Group	Independent *t*-test
Used book/notes	*M*=3.27, *SD*=1.81	*M*=4.41, *SD*=2.10	$t_{(207)}$=6.96***, p<4.464[11]
Worked together with other students	*M*=3.16, *SD*=1.63	*M*=3.59, *SD*=1.56	$t_{(255)}$=2.31***, p<0.022
Students showed me	*M*=3.09, *SD*=1.56	*M*=3.27, *SD*=1.54	*NS*, $t_{(261)}$=0.99, p<0.323
Visited professor during office hours	*M*=2.24, *SD*=1.59	*M*=2.40, *SD*=1.55	*NS*, $t_{(274)}$=0.88, p<0.382
Copied from other students' exams	*M*=2.25, *SD*=1.51	*M*=1.81, *SD*=1.38	$t_{(246)}$=2.59***, p<0.010

Strongly Agree=5, Agree=4, Somewhat agree/disagree=3, Disagree=2, Strongly disagree=1, No opinion=0
M= Mean, *SD*=Standard Deviation

Figure 1 a and b: Non-Regrading Group vs. Regrading Group: Distribution of Methods of Correcting Missed Exam Questions (a, top) and Descriptive Statistics of Methods of Correction (b, bottom); Students were allowed to select more than one response.

Method of Correcting Missed Exam Questions

The survey included questions about how students corrected their missed exam questions, such as working with other students, visiting the professor during office hours, or using the book/ notes. A combination of these techniques was possible as well and the students were able to indicate all the methods that they used. Both the regrading group and the non-regrading group assessed their methods of correcting missed exam questions. Figure 1 shows the various methods employed by the non-regrading and the regrading groups and the percentage of students who used each of these methods. For the 'another student showed me' and 'I visited the professor for assistance' options, there was no significant difference between the two groups in the percentage of students who used these methods for correcting missed exam questions. For the other methods, the t-tests showed a significant difference between the non-regrading and the regrading group.

In the non-regrading group, 50% used the book/notes, whereas in the regrading group, 90% of students utilized this method to correct their missed exam questions ($t_{(207)}$ =6.96***, p<4.464-11). In the non-regrading group, 49% of the students stated that they worked together with other students to figure out what they solved incorrectly on the exam, while this percentage was 59% in the regrading group ($t_{(255)}$ =2.31***, p<0.022). In addition, in the non-regrading group, 47% asked other students to show them how to correct what they solved incorrectly on

the exam, while there were 49% who employed this method in the regrading group (NS, $t_{(261)} = 0.99$, $p < 0.323$).

Of all students in the non-regrading sample, 25% visited the professor during office hours, while 32% took advantage of this opportunity in the regrading group (NS, $t_{(274)} = 0.88$, $p < 0.382$). While overall the traffic during office hours significantly increased during a "regrading" semester/quarter, it was not required to meet with the instructor. This differs from Haskett (2001) who required his students to meet with the instructor to review their mistakes between resubmissions of their work. Given the diversity in learning styles, students in our study were free to choose which method of correction best suited themselves.

Interestingly, a greater percentage of students in the non-regrading group than in the regrading group stated that they copied the correct solutions from other students, with about 25% vs. 14%, respectively ($t_{(246)} = 2.59$***, $p < 0.010$).

Thus, our survey suggests that the regrading activity supports active and collaborative learning, since the majority of the students used book/notes and worked together to solve the questions they missed on the exams. Bacon and Beyrouty (1988) put a twist on this concept by having students retake exams in groups of two or three, thus allowing the students to learn from each other. According to Light (2001), it is vital to organize interactive relationships around the academic work in order to be a successful college student. Teamwork is something that is valuable in a working environment and employers look for employees who are willing to work together and use resources such as books or notes to solve problems.

Motivation for Correcting Missed Exam Questions

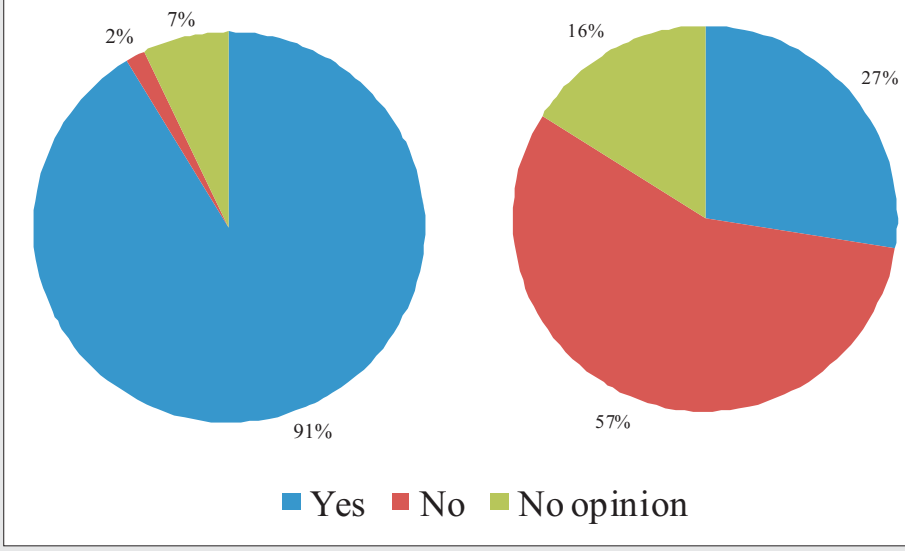
Figures 2a and 2b show the students' motivation for correcting missed exam questions in the non-regrading and regrading groups, respectively. Students tended to be idealistic in what would motivate them to make test corrections, yet realistically, they appear to be more concerned about their grades than they are about learning.

The independent t-test revealed a significance difference ($t_{(298)} = 10.80$***, $p < 3.567\text{-}23$) in the average motivation between the non-regrading and the regrading group, with the regrading group being significantly opposed to correcting missed exam questions if points were not given for making these corrections. Thus, the incentive to obtain more points through regrading was an important motivator. More students in the regrading sample took the time to correct missed exam questions when they were rewarded with additional points for doing so, as opposed to the students in the non-regrading sample who were not rewarded directly with points. Of the students in the regrading group, only 27% said that they would have corrected their exams if no points were awarded. When asked the similar question, 91% of the non-regrading group said that they would correct a missed exam question if they felt it would enhance their learning of the material. There was no mention of extra points with this question given to the non-regrading group.

Our findings show that it is important to provide additional points as a reward for correcting missed exam questions, especially given the short turn-around time, in order to increase participation and reap the learning benefits. Nickel and Uddin (2003) awarded up to 80% of the points lost. In their study, some students still felt that there was not enough incentive when their original scores were high or, similarly, when reworking was too time-consuming.

Test Anxiety

Both student samples had positive perceptions about having the opportunity to correct missed exam questions and felt it would put them more at ease during the exam. Figures 3a and 3b show that 71% of

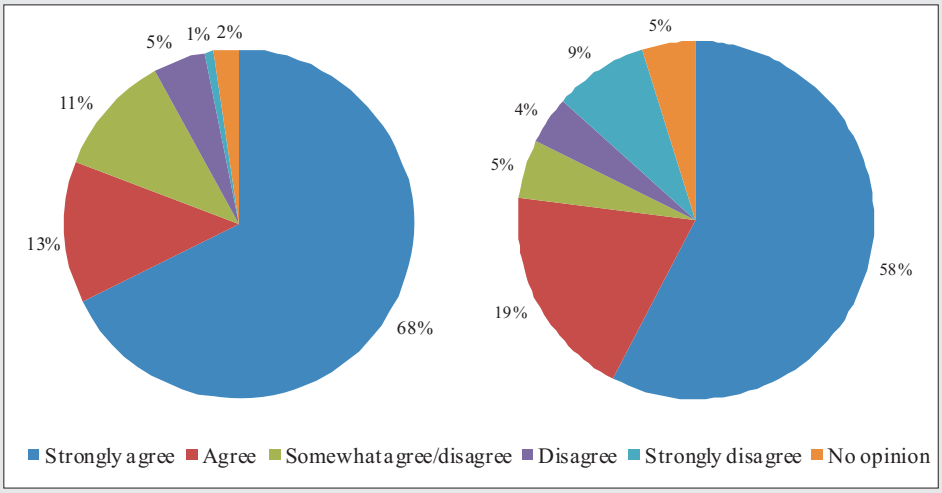


a. Non-Regrading Group:
I would take the opportunity to correct missed exam questions, if I thought it would enhance my learning of the material (Yes=2, No=1, No opinion=0, *M*=1.84, *SD*=0.53).

b. Regrading Group:
If points were not given for making corrections to missed exam questions, I probably still would have corrected the mistakes (Yes=2, No=1, No opinion=0, *M*=1.11, *SD*=0.65).

Figure 2a and b: Non-Regrading vs. Regrading Group: Motivation for Correcting Missed Exam Questions, $t_{(298)} = 10.80$***, $p < 3.567^{-23}$

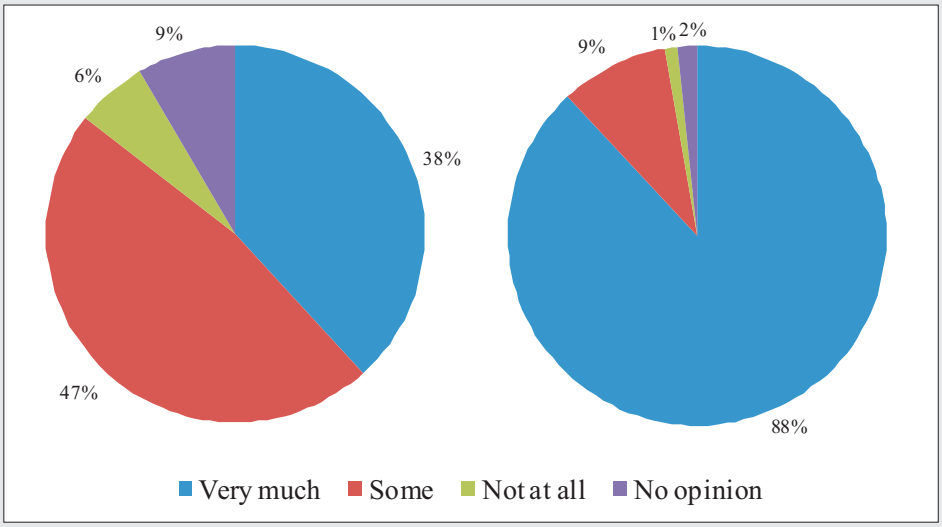
students in the non-regrading group either fully agreed or agreed that the opportunity to correct their exam would have alleviated anxiety regarding test taking, while 77% of the regrading group stated they felt less test anxiety with the opportunity to correct their exams ($t_{(304)} = 2.34^{**}, p < 0.020$). These findings build on the study of Brye et al. (2005) who reported decreased anxiety among his students. In the regrade study by Nickels and Uddin (2003), students stated that even though they did not use the regrade possibility, they felt it was nice to know that they had the option, and it allowed them to be a little more relaxed.



a. Non-Regrading Group:
The idea that I could make corrections to missed exam questions would have put me more at ease during the exam (Strongly Agree=5, Agree=4, Somewhat agree/disagree=3, Disagree=2, Strongly disagree=1, No opinion=0, *M*=4.35, *SD*=1.16).

b. Regrading Group:
The idea that I could make test corrections to missed exam questions put me more at ease during the exam (Strongly Agree=5, Agree=4, Somewhat agree/disagree=3, Disagree=2, Strongly disagree=1, No opinion=0, *M*=3.99, *SD*=1.53).

Figure 3a and b: Non-Regrading vs. Regrading Group: Test Anxiety, $t_{(304)} = 2.34^{***}, p < 0.020$



a. Non-Regrading Group:
Rate to what extent you learned from the mistakes you made on the exams in this class (Very much=3, Some=2, Not at all=1, No opinion=0, *M*=2.15, *SD*=0.87).

b. Regrading Group:
Rate the usefulness of correcting missed exam questions (Very much=3, Some=2, Not at all=1, No opinion=0, *M*=2.84, *SD*=0.51).

Figure 4a and b: Non-Regrading vs. Regrading Group: Post-Exam Learning, $t_{(168)} = 7.72^{***}, p < 1.004^{-12}$

Post-Exam Learning

The additional time students spend on correcting their exam and working on class material may be beneficial, as this repeated exposure to the material may add to their learning. As figures 4a and 4b indicate, in the non-regrading sample, 38% felt they learned "very much" from the mistakes they made on the course exams, while 47% learned "some" from these mistakes. In the regrading group, 88% of the students felt that correcting their tests was very useful and caused them to learn from their mistakes, and an additional 9% stated they experienced some learning benefit from it ($t_{(168)} = 7.72^{***}, p < 1.004\text{-}12$). Thus, this question clearly suggests that students feel there is learning benefit to correcting missed exam questions.

This is consistent with previous studies in which students indicated that the regrade policy did result in increased learning (Bacon and Beyrouty, 1988; Nickels and Uddin, 2003). It also confirms the findings by Haskett (2001), who allowed students who were unhappy with their grades to resubmit their term papers and abstracts as many times as they wished until they had obtained the grade they wanted. Haskett describes this regrading method as a powerful teaching tool, since several students showed significant improvement in their writing ability after obtaining feedback and resubmitting their work. For example, one student who struggled with his writing style on the early assignments turned in later papers that were of very high quality on the first attempt (Haskett, 2001).

Benefits and Costs to Instructor

Regrading does require a heavy time commitment for both the professor and the students. Given that this study has only been carried out in classes with less than 50 students, the instructor's added time

commitment due to regrading could prevent this alternative measure from working in a large class setting. However, given that this study only employed exams in short answer formats, which are quite time-consuming to grade, larger classes could be accommodated with the regrading option in a multiple choice exam format. Thus, the method could work in a large classroom setting depending on the type of exam chosen. Even if the students would solve a few exam questions together in the classroom on the day the exam would be returned, there would likely be an added learning benefit.

In addition, correcting missed exam questions is not only beneficial to the students, professors may learn from repeated exposure to students' work as well. When a professor takes the time to review a student's exam for a second time, it allows for an insight to which exam questions students struggle with and which ones they succeed at. Thus, reviewing what students miss on their exams provides reliable feedback which allows professors to adjust their teaching styles accordingly. Another benefit to the professor is the opportunity to incorporate more peer-learning activities since the students will already be familiar with one another.

Previous studies observed an improved student-instructor relationship (Longer et al., 1987; Risley, 2007; Nickels and Uddin, 2003). Risley (2007) found that the students felt better about the class, as they felt more fairly treated by the instructor. This was observed in our study as well: Allowing students to correct their exams resulted in less apprehension regarding exam taking and resulted in a more relaxed classroom environment.

Lastly, allowing students to gain more points by regrading exams lessened the need and want for extra credit activities which can cause stress and a large time commitment to the professor.

Summary

This study constitutes a unique contribution to the existing literature because it evaluates whether altering a traditional assessment tool can enhance student learning. Our study shows that the opportunity to correct their semester/quarter exams significantly eased students' test anxiety, which would create a more positive learning environment. Correcting missed exam questions as an alternative teaching method allowed for increased student interaction, more positive attitudes regarding exam taking and a better learning environment. This alternative exam lifecycle also revealed students' affinity for using their books and notes to correct answers and working together in groups in addition to visiting the professor for assistance.

Furthermore, the survey suggests that the additional opportunity for students to review missed exam questions may help to retain the information long term. This study shows that if professors and students are willing to put in the time and effort to correct missed exam questions and regrade exams, the benefits may outweigh the time commitment. Students who were given the opportunity to re-submit their exam for regrading expressed that they were more likely to learn from their mistakes than the non-regrading group. Repeated exposure to material and the opportunity to re-submit exams that have already been graded may help students retain information and learn from their mistakes, as opposed to the traditional exam, which is routinely discarded after completion.

Additionally, correcting missed exam questions allows instructors to see where most students struggle with the material that is being taught. Thus, teaching styles could be adjusted accordingly. Ultimately, this may lead to higher exam grades during the next quarter, if the educator was successful in conveying the material in an improved way. It could be argued though, that through regrading a mere inflation of the students' grades may occur. However, this was not confirmed by previous literature, as Risley (2007) found that only about 18% of his students who participated in a similar regrading activity received a higher semester/quarter course grade. Even if allowing students to resubmit their work for more points does not affect their final course grade, the students' morale is increased and a better learning environment and student/teacher relationship is established (Nickels and Uddin, 2003). In our study, students overwhelmingly indicated a positive attitude about the opportunity to make corrections to missed exam questions for regrading.

This study leaves some questions open for future research. As a preliminary study in this area, it is limited to college students at two universities in California and Arkansas. Expanding the geographic focus of the study to include college students on more U.S. states, or even other countries, would enrich the findings. Further data collection may continue, where more detailed data on the students' time spent and method of regrading the exams will be collected. Additional information about student learning will be collected by repeating questions from the semester/quarter exams on the final exam. Although students indicated that they learned from their mistakes, an objective comparison of final exam grades will need to be conducted to quantify whether their learning was realized and retained sufficiently long term to score well on the final exam. Given that the regrading option is not offered on the final exams of either treatment groups, a comparison by final exam grades could show additional insight into student learning.

Literature Cited

Bacon, R.K. and C.A. Beyrouty. 1988. Test retakes by groups of students as a technique to enhance learning. Journal of Agronomic Education 17(2): 99-101.

Bain, K. 2004.What the best college teachers do. Cambridge, MA: Harvard University Press.

Brye, K.R., M.C. Savin, and E.E. Gbur. 2005. Graduate-level science classes: How important are extra time, open notes, and book when evaluating students with calculation-oriented exams? NACTA Journal 49:2-9.

Haskett, J. 2001. Integrating inquiry-based learning, student feedback, and lecture in a science course. Journal of Natural Resources and Life Science Education 30: 23-26.

Light, R. 1990. The Harvard assessment seminars. Cambridge, MA: Harvard University, Graduate School of Education and Kennedy School of Government.

Longer, D.E., D.B. Marx, and D.W. Albers. 1987. The influence of unannounced partial retesting on learning and classroom attendance. Journal of Agronomic Education 16:3-5.

McKeachie, W.J. 2002. McKeachie's teaching tips. 11th ed. Boston, MA: Houghton Mifflin Company.

Nickels, K. and M. Uddin. 2003. The impact on student learning of resubmission of work and flexible deadlines. Proceedings from the Annual Meeting of the American Society for Engineering Education, Gulf-Southwest Annual Meeting, Arlington, Texas, 19-21 March.

Risley, J.M. 2007. Reworking exams to teach chemistry content and reinforce student learning. Journal of Chemical Education 84: 1445-1447.

Collaborative Approach for Teaching Information Literacy in an Introductory Plant Science Course[1]

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Abstract

After an assessment of student learning outcomes indicated that information literacy (IL) was a weakness in the plant and soil science programs, instructors in the introductory plant science course collaborated with the Washington State University Libraries to incorporate IL into an existing assignment. The objectives of this paper are to describe the incorporation of an IL web-based learning environment into the course and to evaluate the effectiveness of the environment in improving students' abilities to find and use information in two consecutive classes. The environment featured a series of tutorials covering the IL standards of: needed, accessing, evaluating, and using information, followed by a quiz and an essay for each standard. The essays and a final comprehensive assignment tested the students' abilities to apply the information learned from tutorials. The class average on the pretest, taken before the online tutorials, was 59% in 2007 and 51% in 2008. The average quiz score after completing the tutorials was 89% and 80% in 2007 and 2008, respectively. Student performance on the quizzes was correlated with subsequent performance on the assignment both years, suggesting that the online learning environment shows potential as an effective tool in helping students learn and apply IL concepts.

Introduction

The need to produce information literate graduates who can effectively navigate and use information is increasingly acknowledged in response to the ever-expanding information environment. A common misconception is that today's students have grown up with the internet, are comfortable interacting with the web, and arrive at institutes of higher education fully information literate. However, a study by the Educational Testing Service of 3,000 college students and 800 high school students found only 13% of the students were information literate (Foster, 2006). We have found similar deficiencies in our plant and soil science programs at Washington State University (WSU). An assessment of student learning outcomes in 2006 and 2007 revealed that information literacy (IL) was a weakness in these programs (Cerny-Koenig et al., 2007). Information Literacy is one of Washington State University's (WSU) six Learning Goals of the Baccalaureate; the educational goals WSU has determined our baccalaureate graduates should achieve (WSU Office of Undergraduate Education, 2005).

Information literacy (IL) can be defined as the ability to acknowledge an information need, access appropriate resources efficiently, critically evaluate the information retrieved, and use the information effectively, while understanding the legal and ethical implications surrounding its acquisition and use (American Library Association, 2000).

A key component to locating scholarly resources, particularly in the academic environment, is the ability to express an information need in the form of a search strategy. Rowlands and Nicholas (2008) reported that difficulties in developing effective search strategies for locating scholarly resources are the result of students' inadequate understanding of their information need. This tendency results in the use of natural language searches that generally produce inadequate returned resources for the information need.

A common frustration for instructors is evaluating student papers comprised mostly of open web sources, or information sources that are inappropriate for the assignment or information need. The instructors' main concern is that undergraduates use open web and secondary sources in place of primary sources (Scott and Simmons, 2006; Spackman, 2007). Spackman (2007) suggested that accessing and classifying peer-reviewed resources as primary, secondary or tertiary may be beyond the abilities of many students while Brown and Krumholz (2002) felt students motivated by convenience would find alternate less scholarly sources when full-text articles were not available locally. Using these convenient information resources is exaggerated by ease of electronic access.

The ability to critically evaluate resources is essential to successfully navigating today's informa-

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tion environment. Students tend to scan information quickly, spending little time on any one [web] page (Rowlands and Nicholas, 2008). This behavior suggests a lack of rigor in many undergraduate literature reviews (Scott and Simmons, 2006).

The extent to which a student uses proper source documentation in undergraduate papers is indicative of the understanding of the legal and ethical issues surrounding research. Brown and Krumholz (2002) noted that even after educational intervention, the lack of cited sources in student papers continued to be problematic. A failure on the part of instructors, in terms of student accountability, is also evident in student papers that show little respect for intellectual property.

Instructors who desire to include IL activities in their classes often feel overloaded with disciplinary material and struggle to find a suitable manner for relevant incorporation of IL. Instructors with this conflict often seek opportunities for self-directed learning, generally in the form of online instruction (Leckie and Fullerton, 1999). Online IL instruction has been shown to be as effective as instruction provided in person (Bridgland and Whitehead, 2004; Nichols et al., 2003). While online or face to face instruction are viable options, a blended approach of online and face- to- face instruction is preferred, often producing the most effective results (Bridgland and Whitehead, 2004; Brown and Krumholz, 2002).

Although it is clear that IL seems to be a deficiency in many curricula, it is unclear who should be teaching IL: course instructors, librarians, or both. There also is confusion about the type of assistance available from libraries and some librarians feel many teaching faculty lack an understanding of the IL skills necessary in today's world (Leckie and Fullerton, 1999). Therefore, a collaborative approach is becoming the favored method of instruction (D'Angelo and Maid, 2004; Spackman, 2007; Sult and Mills, 2006).

At WSU, students majoring in applied plant sciences (e.g. Horticulture, Crop Science, and students from many other agricultural majors) are required to take an introductory plant science class entitled "Cultivated Plants" (Crops/Hort 102). This course provides an excellent opportunity for explicitly incorporating IL instruction to 'close the loop' on the weakness in IL determined in our program assessment. Therefore, instructors in the introductory Crops/Hort 102 course collaborated with WSU librarians to incorporate IL instruction through development of an additional component into an existing course project. Research suggests learning is improved when students are immersed in a project requiring IL skills (Brown et al., 2003; Leckie and Fullerton, 1999). The objectives of this paper are 1) to describe the incorporation of an IL focused, web-based learning environment into an introductory applied plant science class, and 2) to evaluate the effectiveness of the environment in improving students' abilities to find and use information during two consecutive Crops/Hort 102 classes.

Materials and Methods

Plant science course. The IL instruction was initially incorporated into the cross-listed Crops/Hort 102 "Cultivated Plants" course at WSU in fall 2007. The course is required for all Crop Science, Agricultural Business and Technology Systems, Agricultural Education, Organic Agriculture Systems, Pest Management Systems, and Plant and Soil Systems majors and is also taken by many Horticulture majors. It is co-taught by faculty from Crop Science and Horticulture. The goal of the course is to introduce students to the importance of agronomic and horticultural plants in Washington by highlighting the production, innovative research practices, processing, and utilization of the state's

Table 1. Example of the Crop Report Assignment from the Course Syllabus

Crop report (100 points)

- Choose an important Washington crop of interest to you. (It cannot be one of the crops listed on the lecture part of the syllabus).
- Write a 3 - 4 page double-spaced, type written paper[z] on the crop's production requirements, including a general production schedule for the crop.
- Report on the major processing and/or use of the crop in the state
- Summarize the findings of a current (published after 2000) research project involving the crop.
- Report the current statistics on production acreage and value.
- Use at least 4 information sources but no more than one of each of the following: scholarly journals, newspapers, books, personal communication, trade journals, and websites.
- Create an additional 1-page section of the paper discussing the different types of information found in each of the sources you used. Describe how each was useful in creating your paper.

[z]In 2008, students were required to do a 15 to 20 minute presentation instead of a written report but the same required information was communicated.

Table 2. Example of the Rubrics Used for Grading the Crop Report

2007 Written Report (100 points)
- Mechanics (50 points)
  - Proper format and length of paper
  - Accuracy of information
  - Proper completion of annotated bibliography
  - Completed on time
- Writing quality (30 points)
  - No spelling or grammatical errors
  - Well organized
- Overall quality of the paper (20 points)
  - Informative, interesting and easy to follow
  - Completed all required information

2008 Oral Presentation (100 points)
- Mechanics (60 points)
  - Proper format and length of presentation
  - Accuracy of information
  - Proper completion of annotated bibliography
  - Completed on time
- Presentation quality (20 points)
  - Effectiveness of slides
  - Speaking ability
- Overall quality of the presentation (20 points)
  - Informative, interesting and easy to follow
  - Completed all required information

major crops. One of the primary course assignments traditionally has been a report on an important Washington crop. In 2007, the report was in the form of a written paper and in 2008, a 15 to 20 minute presentation. This assignment was identified as being the most appropriate for incorporating an IL component. The requirements for the crop report assignments are in Table 1. The rubrics used to grade the assignments are shown in Table 2. In fall 2007, the course had 43 students enrolled: six freshman, 13 sophomores, 13 juniors, and 11 seniors. In fall 2008, the course had 41 students enrolled: 16 freshmen, nine sophomores, ten juniors, and six seniors.

Incorporating the IL web-based learning environment. In fall 2007, an additional course objective was added to the syllabus: "evaluating and properly using quality information sources that are relevant, balanced and current." To help accomplish this objective, course instructors collaborated with the WSU Libraries Instruction Department to incorporate an additional component into the crop report assignment. This new facet of the assignment directly addressed the standard IL elements required to complete the assignment using the Libraries' Information Literacy Education (ILE) learning environment. ILE is designed to deconstruct a research project and focus on critical IL components rarely addressed in the classroom (e.g. database search skills, evaluating resources, distinguishing between popular and scholarly sources). Using ILE, students learn how to 1) determine the extent and type of information needed for their assignment [needed information], 2) access scholarly information in a variety of formats effectively and efficiently [accessing information], 3) critically evaluate information quality [evaluating information], 4) use the information to accomplish a specific task and produce better final products [using information], and 5) understand the legal, ethical, and social issues surrounding the use of information [understanding information use] within the context of their assignment.

The ILE learning environment was introduced at the beginning of each semester by the senior author (Borrelli), an instructional design librarian, who gave two introductory lectures on the importance of finding and using information efficiently regardless of discipline. Prior to the lectures, a written pretest was distributed to each of the students to determine their baseline knowledge of IL. The pretest included 15 true/false or multiple-choice questions on the topics covered in the IL standards. Students were told that their pretest scores would not count toward their grade, but their participation in the pretest was calculated as a portion of their total participation points for the course.

The students were directed to the WSU Libraries' ILE learning environment (http://www.wsulibs.wsu.edu/ile/) and instructed to choose the Crops/Hort 102 course in the dropdown menu. The Crops/Hort 102 ILE assignment page was comprised of an introduction, a short series of online tutorials, and two assessment sections. The assessment sections tested the students' learning of the information in the tutorials and their ability to transfer the concepts learned to their assignment for each of the five IL standards: needed information, accessing information, evaluating information, using information, and understanding information use. The using information and understanding information use standards were combined into one module in ILE and will be referred to as using information throughout the remainder of this paper. The web application was designed and maintained by the collaborating librarians.

After completing the tutorials for each IL standard, students logged onto a password-protected screen to take a short multiple-choice quiz to test their learning; each quiz had six to fourteen questions. They could repeat the quiz a second time to improve their score and the higher of the two scores was recorded.

Students were then asked to apply the information learned in the tutorials to elements in their crop report in the Assignment Specific Assessments (ASAs) section of ILE. The ASAs offered students the opportunity to focus on a component of the crop report related to a specific IL standard. Examples of the ASAs for each standard are provided in Table 3. The dates for completion of the tutorials, online quizzes, and ASAs were listed in the syllabus, with students having one to two weeks between deadlines for each phase of the assignment. During both semesters, the crop report was introduced to the class during week two of the semester, and the final crop report was due during week 10.

The crop report accounted for 100 of the total points for the course. The quizzes and ASAs were worth 80 points; ten points for each of the four IL quizzes and ten points for each of the four ASAs. The other points for the course included weekly quizzes on each of the crops covered in the course, a written paper on a student's interview with a grower, and class participation. In 2007, there were 650 total points and in 2008 there were 570 total points for the class. The ILE quizzes were graded electronically and the grades automatically posted in a password-protected section for instructors. Individual students received their results electronically immediately after completing each quiz. Instructors' comments on the ASAs and scores could be returned electronically to the students. Timely feedback from the instructors was especially critical for the ASAs since each was designed to help navigate students through to the next stage of their crop report. In 2007, after the four standards were completed, students submitted a hard copy of their crop report to the instructors. The 2008 class gave their presentations during the last two weeks of the semester. Pearson Correlation Coefficients among scores were determined with SAS (SAS, 1999).

Evaluating effectiveness of the IL learning environment. At the end of the semester, students completed a self-report survey regarding their perceptions of the effectiveness of the online learning environment. The first question asked how helpful the environment was in completing the crop report using a 4-point scale, ranging from 1 ("not helpful") to 4 ("very helpful"). Four other questions asked the students to rate how various issues affected their ability to use the IL standards effectively. The questions used a 4-point scale, ranging from 1 ("strongly disagree") to 4 ("strongly agree").

Based on the comments from students in Crops/Hort 102 during fall 2007, ILE was improved for use in the same course in 2008. To further document improved student learning in IL in the course, quiz questions were reworded to focus on concepts and applied scenarios, and a new pretest was designed that more effectively coordinated with the information in the tutorials and crop report.

Table 3. Examples of the four Assignment Specific Assessments (ASAs) Found at the End of the Online Learning Tutorials

ASA 1: Needed information

Identifying your information needs is an excellent place to begin approaching any assignment. By identifying the information needed one can begin to address each component individually and progress through the assignment efficiently.

1. Select an important Washington crop.
2. Provide an outline of the information you will need to complete your crop report.

ASA 2: Accessing information

For your crop report it is necessary to use library resources to gain access to information not freely available on the web using library databases.

1. Indicate which database(s) and catalogs you intend to use in your information research process.
2. Develop a search statement using the techniques described in the tutorials (Boolean operators, phrase searching, clustering, and truncation) to find a current research project (preferably one from Washington State University) involving your crop.

ASA 3: Evaluating information

Your crop report necessitates your ability to distinguish between types of periodicals and the information contained within each variety.

1. Find four information sources comprised of no more than one of each of the following: scholarly journals, newspapers, books, personal communication, trade journals, and websites.
2. For each of your four sources, identify two characteristics that indicate that the source you have selected is scholarly or popular.

ASA 4: Using/Understanding information

Your crop report will require incorporating outside sources to convey authority of the information included.

1. Provide an example of how you will cite a resource in the appropriate format:
   - In text example
   - In the bibliography (create a bibliographic citation for one source)

   Including a quotation in a paper necessitates the introduction of the quote as well as original scholarship (your thought /s) to be included.
2. Provide an example of how you may introduce a quotation in your paper including author's name and work.
3. Provide an example of how you will support the quote in your paper by providing an additional sentence or two of original scholarship.

Results and Discussion

Initiation of the collaboration and roles of collaborators. When IL was determined to be a weakness during our program level assessment of learning outcomes (Cerny-Koenig et al., 2007), instructors in the Crops/Hort 102 course contacted the design librarians in the WSU Libraries Instruction Department to help address the issue. The librarians were in the process of piloting a web-based IL learning environment in introductory science courses at WSU. The introductory plant science course, along with six other courses, was chosen to use in the pilot study.

The course instructors worked with the librarians to develop an assignment that would be appropriate for the ILE learning environment. The crop report assignment was selected due to the project's potential focus on IL and, being a phased assignment, provided multiple opportunities for students to receive feedback throughout the semester.

One of the librarians, (Borrelli) guest lectured during two class sessions to introduce the ILE learning environment project to the class, administer the pretest, and discuss IL related topics. The librarians developed, or selected from the open web the most appropriate tutorials to use for the class assignment, wrote the quizzes, and created the password protected grading section for the instructors. Students reported any technical problems to the librarians.

The course instructors were responsible for introducing the plant science related aspects of the project, for grading and providing feedback on the students' ASAs, and for managing student grades. In 2008, the librarians also helped provide feedback on search strategies and potential information sources to explore for the ASA on accessing information.

Approval was obtained from the WSU Institutional Review Board to report and assess the students' scores and survey responses.

Information literacy pretest. The class average on the pretest, taken by the students before IL instruction, was 59% and 51% in 2007 and 2008, respectively. There were no significant correlations between scores on the pretest and average scores on the quizzes, ASAs, or the crop report for either 2007 or 2008 (data not shown). The low pretest scores may be attributed to the diversity of interdisciplinary concepts presented in the questions. Although the pretest was not a good predictor of future student performance, the low scores on the pretest demonstrated to the students how much they did not know about IL. Several authors have pointed to the dangers of assuming IL competency in students (Rowlands and Nicholas, 2008; Foster, 2006; Gross and Latham, 2007; Williams et al., 2006). Competency theory, as described by Kruger and Dunning (1999), suggests

that one's own incompetence in an area may prevent a person from realizing that they are in fact incompetent and may cause them to overestimate their ability. Scott and Simmons (2006) suggest that assessing student abilities before an intervention will assist in demonstrating a need for, and in adapting, instruction.

Assignment assessment: Quizzes. Individual student scores on the quizzes ranged from a low of 40% for evaluating information to 100% earned by some students on all standards. Students earned the lowest quiz scores on the accessing information standard both years (Table 4). This suggests that our students are not comfortable using the library website to successfully search for and find information. This is consistent with research showing that 89% of college students use search engines to begin an information search while only 2% start from a library website (Rowlands and Nicholas, 2008). Students appear to be more familiar with these simple interfaces than complex interfaces in library databases. The average quiz score on the evaluating information standard was the second lowest of the four quiz scores; 89% in 2007 and 81% in 2008. The speed of students' web searching indicates little time is spent in evaluating information for relevance, accuracy, or authority (Rowlands and Nicholas, 2008). There is also a lack of understanding of different resource types (Leckie and Fullerton, 1999) and a tendency for students to use open web searches and secondary sources instead of primary sources (Scott and Simmons, 2006).

We suspect that the quiz questions used in 2007 reinforced the concepts of the tutorials more than they assessed learning, so questions were rewritten for the fall 2008 course. The revised quiz questions focused on the students' understanding of information sources and on more applied concepts than those in 2007 (Table 5). Therefore, lower quiz scores in 2008 may be attributed to the revised focus of the questions.

Assignment specific assessments: ASAs. In 2007, students scored the lowest on the using information standard (Table 4). Although students appear to have understood the tutorials on using information (average quiz score of 96%), based on their ASA average score of 77%, they had difficulty in properly applying that knowledge. This result is consistent with previous program assessment findings that the least improvement between the sophomore and senior levels in relation to IL skills was in the documentation of sources (Cerny-Koenig et al., 2007). It again has been our experience that properly citing references in the text and in the bibliography is challenging for students. Higher quiz scores in the using information area may be attributed to the students' understanding of such IL concepts as copyright and fair use which were included in the quizzes, but did not necessarily transfer to the crop report assignment. Assessment of the crop report in relation to using information was focused more on appropriate integration and citation of sources. However, in 2008, student scores on the using information ASA were higher (82%) than in 2007 (77%) suggesting the instructors may have done a more effective job of explaining this aspect and its application to the project.

Students performed best on the needed information ASA both years (Table 4). They seemed to be comfortable with outlining and determining the type of information they needed to complete their assignment.

Correlation of student performance among assignments. Student performance on the quizzes was correlated with subsequent performance on the crop report both years (in 2007, $r = 0.60$; $p \leq 0.001$ and in 2008 $r = 0.34$; $p \leq 0.05$). Students who performed better on the quizzes tended to score higher on the crop report, suggesting that the learning environment was effective in helping students learn, build upon, retain, and apply information literacy concepts. Similar correlations were observed between performance on the ASAs and the crop report in 2007 ($r = 0.37$; $p \leq 0.05$). However, these results must be interpreted with caution, since this study did not utilize a control group. All students completed the IL tutorials; we cannot compare their performance with that of students who did not complete the tutorials. Furthermore, it is possible

Table 4. Description of the four Information Literacy (IL) Standards, Average Quiz Score, and Average Assignment Specific Assessments (ASAs) Score for each of the Standards

	Average score			
	Quiz		ASA	
IL standard description	Year			
	2007	2008	2007	2008
1. *Needed information* - determine the extent and type of information needed for the assignment	91%	89%	90%	89%
2. *Accessing information* - access scholarly information in a variety of formats effectively and efficiently	79%	74%	85%	84%
3. *Evaluating information* - critically evaluate information quality ethically and legally	89%	81%	89%	80%
4. *Using information* - use the information to accomplish a specific task and produce better final products	96%	81%	77%	82%

that better students will tend to score higher on quizzes, ASAs, and the crop report than poorer students, regardless of the instruction. The results have not been analyzed by student ability.

The final crop reports from students in the fall 2007 and 2008 classes appear to contrast noticeably with the crop reports from students in previous years when ILE was not used (data not shown). In previous reports, students tended to include only the first five information sources found in a search, regardless of quality. Students in the fall 2007 and 2008 provided sources that were more current, relevant, and of a higher quality than those used in previous crop reports.

Student responses. Survey responses suggested that the IL tutorials and ASAs were 'somewhat helpful' to the students in completing their crop reports (Table 6). Students also 'somewhat agree' that they had adequate time to complete the tutorials, that the tutorials were easy to understand, and that there was a strong connection between the tutorials and the assignments. However, they 'somewhat disagree' that there were no technical issues with the learning environment in 2007. Technical issues with logging into the system and submitting the ASAs were encountered by some of the students the first year. However, since the collaborating librarians had designed the system, it was easy for both students and instructors to work with the design librarians directly to determine the cause of the problems. Students' responses improved for this issue on the 2008 survey.

Written comments from the students indicated they felt IL should be taught in an English course and they did not see the relevancy of learning about it in a plant science course. Williams et al. (2006) documented similar attitudes in academia, noting a scarcity of IL integration in disciplines other than library science and education. Therefore students' views are a reflection of the culture of the institution they are a product of and instruction in information research is currently being provided primarily in composition courses. However, the idea of using an IL component as part of an existing course assignment has been found to be more popular than teaching an entire course on IL (Leckie and Fullerton, 1999). In 2008, 34 evaluations were submitted, of those, 26 (76%) 'somewhat agreed' or 'strongly agreed' that there was a strong connection between the tutorials and the assignments. As IL becomes a focus in courses throughout the university, hopefully, students will find the relevance of IL due to its interdisciplinary nature.

Table 5. Examples of Quiz/Pretest Questions Used in 2007 and Improved for 2008

Quiz question used in 2007

Which of the following is not an example of a primary source in the sciences?

A. Published results of a research trial
B. Review of the results of several experiments or trials
C. Published results of a research study
D. Proceedings of conferences or meetings

Quiz question improved for 2008

While researching a paper you're writing for your plant science class, you come across an article comprised of a discussion of several research projects on the same topic. Is this paper a primary or secondary source?

A. Primary
B. Secondary

Quiz question used in 2007

All of the following are examples of plagiarism except:

A. Asserting ideas of others without acknowledging their sources
B. Reordering words or clauses from someone else's work without attribution
C. Copying an entire document and presenting it as your own
D. Paraphrasing another's writings including a parenthetical reference

Quiz question improved for 2008

Analyze the statement below and compare it to the original source to determine if it has been plagiarized.

Statement to Analyze:

Because email communication does not involve direct human contact, survey respondents may have only classified in-person communication as human help (Johnson, 2003).

The Original Source:

"Survey respondents may have only viewed face-to-face communication as human help, while not considering email as human help because of its technological mask" (Corey Johnson, published 2003, page 58).

A. Plagiarized
B. Not plagiarized

Table 6. Questions and Responses from Student Survey after Completing the Online Learning Tutorials, Assignments, and Crop Report (using four-point scale from 1 = disagree/ not helpful to 4 = strongly agree / very helpful)

Question	Mean response (standard dev.)	
	2007	2008
1. How helpful do you feel the information literacy tutorials and assignment specific assessments were in completing your crop report?	2.6 (0.87)[z]	2.7 (0.73)[z]
2. Rate the following issues on how much each affected your ability to use the online learning tool:		
a. The length of time required to complete the tutorials was adequate.	3.3 (0.71)[y]	3.4 (0.65)[y]
b. There were no technical issues with the computer.	2.4 (0.95)[y]	3.1 (1.03)[y]
c. The tutorials were easy to understand.	3.0 (0.81)[y]	2.9 (0.74)[y]
d. There was a strong connection between the tutorials and the assignment.	3.0 (0.76)[y]	2.9 (0.77)[y]

[z] Response values range from 1 to 4, where 1 = "not helpful" and 4 = "very helpful."
[y] Response values range from 1 to 4, where 1 = "strongly disagree" and 4 = "strongly agree."

Summary

The incorporation of the ILE environment into the plant science course contextualized instruction by helping students learn, build upon, and retain IL concepts in a practical crop assignment. Sources incorporated in students' work were more current, relevant, and of a higher quality than those used in previous semesters. The asynchronous nature of online learning afforded the students the opportunity to work through the tutorials at their own pace and on their own time. The environment also provided opportunities for instructors to give feedback to the students as they progressed through each of the four standards. The ILE learning environment has been substantially revised and is scheduled to be released as an open source product in early 2010.

Literature Cited

American Library Association. 2000. Information literacy standards for higher education. (http://www.ala.org/ala/mgrps/divs/acrl/standards/informationliteracycompetency.cfm) American Library Association. (January 28, 2010).

Bridgland, A. and M. Whitehead. 2004. Information literacy in the "E" environment: An approach to sustainability. Jour. Academic Librarianship 31(1): 54-59.

Brown, C. and L.R. Krumholz. 2002. Integrating information literacy into the science curriculum. College and Research Libraries 63(2): 111-123.

Brown, C., T.J. Murphy, and M. Nanny. 2003. Turning techno-savvy into info-savvy: Authentically integrating information literacy into the college curriculum. Jour. Academic Librarianship 29(6): 386-398.

Cerny-Koenig, T., C.A. Perillo, C.H. Pearson-Mims, K.M. Williams, G. Brown, A. Morozov, W.L. Pan, and W. Hendrix. 2007. Piloting a program-level learning assessment plan in plant and soil science. NACTA Jour. 51(3): 26-33.

D'Angelo, B.J. and B.M. Maid. 2004. Moving beyond definitions: Implementing information literacy across the curriculum. Jour. Academic Librarianship 30(3): 212-217.

Foster, A. 2006. Students fall short on 'information literacy,' educational testing services study finds. Chronicle of Higher Education 53(10): A36.

Gross, M. and D. Latham. 2007. Attaining information literacy: An investigation of the relationship between skill-level, self-estimates of skill, and library anxiety. Library and Information Science 27(3): 332-353.

Kruger, J. and D. Dunning. 1999. Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. Jour. of Personality and Social Psychology 77(6): 1121-1134.

Leckie, G. and A. Fullerton. 1999. Information literacy in science and engineering undergraduate education. College and Research Libraries 60(1): 9-29.

Nichols, J., B. Shaffer, and K. Shockey. 2003. Changing the face of instruction: Is online or in-class more effective? College and Research Libraries 64(5): 377-388.

Rowlands, I. and D. Nicholas. 2008. Information behaviour of the researcher of the future. (http://www.jisc.ac.uk/media/documents/programmes/reppres/gg_final_keynote_11012008.pdf). University College London CIBER Group. (March 19, 2008).

SAS. 1999. Version 8. SAS Institute, Cary, NC.

Scott, L.K. and S.R. Simmons. 2006. Incorporating primary literature in undergraduate crop science courses. Jour. of Natural Resources and Life Sciences Education 35: 225-233.

Spackman, E. 2007. Utilizing focus groups to evaluate an information literacy program in a general biology course. Science and Technology Libraries 27(3): 3-28.

Sult, L. and V. Mills. 2006. A blended method for integrating information literacy instruction into English composition classes. Reference Services Review 34(3): 368-388.

Washington State University, Office of Undergraduate Education. 2005. Six learning goals of the Baccalaureate. (http://gened.wsu.edu/overview/goals-objectives/). Washington State University. (January 27, 2010).

Williams, M., K.A. Goodson, and W.G. Howard. 2006. Weighing in on the research paper option: The difference that information literacy skills can make. PS, Political Science and Politics 39(3): 513-519.

Factors Influencing the Use of Instructional Materials by Agriculture Teachers among Public and Private Secondary Schools in Botswana

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Abstract

This paper examined and compared factors influencing the use of instructional materials (IMs) among agriculture teachers in public and private secondary schools in Gaborone, Botswana. The results show that teachers in public schools were younger and had fewer years of teaching experience, but had higher qualifications than those in private schools. The availability of IMs was higher in private than public schools, but teachers in public schools were more favorably disposed to IMs use than teachers in private school. Significant differences exist between public and private schools teachers for availability of IMs ($t = -2.33$, $p < 0.05$) and attitude towards the use of IMs ($t = 2.91$, $p < 0.05$). Important predictors of the use of IMs are availability of IMs ($t = 3.65$), teaching position ($t = 2.51$), and teaching experience ($t = -2.45$). Educational policy makers and planners should pay proper attention to these variables to improve the use of IMs in schools.

Introduction

Instructional materials are a variety of materials in various formats which influence student's learning and instructor's teaching which have evolved in recent years to include computer and VCR player/recorder technology, textbooks, library books, periodicals, pamphlets, art prints, study prints, pictures, transparencies, films, filmstrips, slides, videocassettes, videodiscs, audio cassettes, sound recordings, compact discs, computer software, CD-ROMS, and electronic resources. Varrella (1989) stated that several available instructional materials will serve their purposes, if effectively accessed and efficiently used. Instructional materials enhance effective and appropriate developmental experience, quality of instruction, instructional methods and techniques (Young, 1999). The use of a variety of instructional techniques helps to make learning more effective by appealing and maximizing the use of senses for learning. LittleJohn and Windeatt (1989) argue that materials have a hidden curriculum that includes attitudes toward knowledge, teaching and learning, relationship of teacher and student and the society. Materials have an underlying instructional philosophy, approach, method, and content, including both linguistic and cultural information. Illustrations are important because many people form impressions based on the visual presentation of ideas. It is important that illustrations avoid portraying characters as stereotypes or caricatures (Bebell et al., 2004).

The effectiveness of instructional materials depends upon the manner and the degree to which they meet the needs of teachers and students. Any evaluation must examine usage, scope of print and non print collections, frequency of removal of biased and outdated materials, and procedures that promote ease of use and accessibility (Bebell et al., 2004).

Instructional materials are selected based on the principles of provision of accurate, well-written materials that will enrich and support the adopted curriculum, taking into consideration varied interests, abilities, and maturity levels of the students served; provision of materials that will stimulate growth in factual knowledge, literary appreciation, aesthetic values, and ethical standards; provide a background of information that will enable students to make intelligent judgments in their daily lives. Others are selection of materials on opposing sides of controversial issues to provide guidance and practice in critical reading and thinking; representativeness of the many religious, ethnic, and cultural groups and their contributions to heritage; and placing principle above personal opinion and reason above prejudice in providing high quality and diverse materials (Young, 1999).

Instructional materials are often depicted as audio-visual aids used by a communicators to facilitate the understanding of learners by involving more of their senses, especially those that relate to hearing and seeing (Kitao and Kitao, 1997; Agbamu, 2006). Audio-visuals make learning relatively permanent, help to arouse and maintain interest of the learner, encourage learners' involvement in the learning process, stimulate self-activity, widen the range of probable experience, and help to add depth and variety to learning (Agbamu, 2006).

The foregoing describes the use and importance of instructional materials in teaching especially, agriculture which is a practical oriented subject. Despite the aforementioned qualities, inherent are several factors that affect the use of instructional materials, which can be classified as teacher, and technology related characteristics. Sahin (2006)

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noted that computer expertise, computer access, attitude, support, and faculty characteristics were found as major factors that affect use of instructional computer technologies. Mumtaz, (2000) reported that a number of factors which influence teachers' decisions to use ICT as IMs in the classroom are access to resources, quality of software and hardware, ease of use, incentives to change, support and collegiality in their school, school and national polices, commitment to professional learning and background in formal computer training.

The objective of this study was to determine and compare factors influencing the use of instructional materials among agriculture teachers in public and private secondary schools in Botswana. Specifically, personal characteristics of teachers were identified, availability of instructional materials was ascertained, attitude to instructional materials was determined, significant differences were tested between private and public agriculture teachers and the determinants of instructional materials use were explored.

Materials and Methods

The study was carried out in Gaborone, the capital of Botswana, due to the highest concentration of public and private schools in the country. The target population was all agriculture science teachers in Gaborone. From the list of public schools, 14 were randomly selected and at least five out of an available eight teachers were interviewed per school. For the private schools, five schools were selected and at least two out of five available teachers were interviewed per school. The final sample size was 74 for public schools and 11 for private schools. A structured questionnaire was developed based on literature review and objectives of the study and comprised of personnel characteristics, attitude of teachers towards use of instructional materials, which was anchored on 5-point Likert scale of strongly agree (5), agree (4), undecided (3), disagree (2), and strongly disagree (1), which were reversed for negative statements. With respect to availability, teachers were asked to indicate from a list of 16 instructional materials those that are available for use in their schools. The questionnaire was face validated by Lecturers from the Department of Agricultural Economics, Education and Extension in Botswana College of Agriculture and has a reliability coefficient of 0.90. Data were analyzed with Statistical Package for Social Sciences (SPSS) version 16 using frequency counts, percentages, t-test and probit regression analysis.

Results and Discussion

Table 1 shows the personal characteristics of agriculture science teachers for public and private schools. There are 57% and 64% males in public and private schools respectively, which may be attributable to high numbers of male enrollment in agriculture courses as influenced by the perception that agriculture is a male career. The majority (79%) of the public school agriculture teachers were between 25 and 35 years of age while at least 73% of the private school teachers were 35 years old. Closely related to the age categories of the teachers is their marital status, with 77% in the single category in public

Table 1. Distribution of Personal Characteristics of Respondents*

PERSONAL CHARACTERISTICS	PUBLIC SCHOOLS	PRIVATE SHOOLS
Gender		
Male	42 (56.8)	7 (63.6)
Female	32 (43.2)	4 (36.4)
Age (years)		
20-25	5 (6.8)	-
25-30	38 (51.4)	-
30-35	16 (21.6)	-
35-40	13 (17.6)	8 (72.70)
More than 40 years old	2 (2.7)	3 (27.3)
Marital status		
Single	57 (77.0)	-
Married	17 (23.0)	11 (100)
Qualification		
Diploma in Secondary education	18 (24.3)	-
Diploma in Agricultural education	12 (16.20	7 (63.6)
Higher Diploma in Agricultural education	4 (5.40)	-
BSc in Agricultural education	37 (50.0)	3 (27.3)
Others	3 (4.10)	1 (9.10
Position held		
Assistant teacher	18 (24.3)	-
Teacher	33 (44.6)	10 (90.9)
Senior teacher II	13 (17.6)	-
Others	10 (13.5)	1 (9.1)
Teaching experience		
Less than 5 years	38 (51.4)	-
5-10 years	19 (25.70)	9 (81.8)
10-15 years	15 (20.3)	2 (18.2)
More than 15 years	2 (2.80)	-

* Figures in parenthesis are percentages

schools, but all teachers in private schools were married. In the same vein, while 51% of teachers in public schools have less than five years of teaching experience, 81% of teachers in private schools have between five to ten years of teaching experience. This trend may be due to the fact that graduates from colleges and universities were placed on teaching jobs immediately after they have completed their studies. Table 1 further show that 50% have BSc degree in public schools as against 27% in private schools. Teachers in public schools are more qualified than those in private schools although teachers in private schools have longer years of teaching experience. This may be attributed to high wage demand by teachers with high qualification which private schools would avoid in order to increase their profit.

From the list of 16 instructional materials (IM) in Table 2 the most prominent IMs in public school are text books (95.9%), posters (91.9%), live specimens (81.1%), and television (86.5%). This may be linked with the adequate funding and finance support by government to public schools. Conversely, common IMs in private schools are textbooks (100%), flip chart (100%), audio recordings (100%), and agricultural laboratories (90.9%). The availability of these IMs in schools may be because they serve as prerequisites for approval from the Ministry of Education to establish private schools. The trend of IMS availability shows the commonly used IMs in both public and private schools. Notably, a greater percentage of private schools (90.9%) have agricultural laboratories, audio recordings (100%), flip chart (100%) and radio (72.7%) than public schools (66.2%, 24%, 77% and 26%, respectively). The public schools however had higher percentages in terms of 3-D models, over head projectors textbooks, television, live specimens, and posters. Kadzera (2006) reported a low usage of instructional materials among tutors in Teachers Training Colleges in Malawi. This was attributed to lack of training, unavailability of the technologies, and lack of maintenance.

Table 3 shows a list of 15 statements about teachers' attitude toward the use of IMs in public and private schools. The respondents were asked to rate the statements using 5- point Likert scale as follows; 1 (Strongly disagree), 2(Disagree), 3(uncertain), 4(Agree), and 5(Strongly agree). The actual mean is 3 due to the rating scale, and mean greater than 3 denoted that teachers were favorably disposed and mean of less than 3 denoted unfavorable dispositions by teachers. The results in Table 3 revealed that teachers in public schools were favorably disposed to IMs make teaching interesting (4.04), instructional materials increase students' understanding during lesson (3.93). Teachers in private school were favorable towards instructional materials increase students' understanding during lesson (3.36), activate and maintain interest of students (3.18). Table 4 shows that teachers in both public and private schools were unfavorably disposed to towards instructional material are a waste of teaching time (3.98 and 3.81 respectively). This might be due to the ability of the teachers to handle the IMs. Cavas et al. (2009) noted that Turkish science teachers have positive attitudes toward the use of ICT as instructional materials

The results of the t-test analysis showing differences between public and private teachers on availability, knowledge and attitude towards IMs are presented in Table 4. To determine significant differences, the t values for unequal variance were selected due to the difference in sample sizes of teachers in public and private schools. Significant differences exist between public and private schools' teachers for the variables, availability ($t = -2.33$, $p < 0.05$) and attitude towards the use of IMs ($t = 2.91$, $p < 0.05$). For availability of IMs for teaching, private schools have higher mean (24.72) which implies that there are more IMs available for teaching in private schools than public schools (22.63). With respect to attitude towards the use of IMs, teachers in public schools were more favorably disposed (43.04) than private school teachers (39.27). Cavas et al. (2009) reported that Turkish science teachers' attitudes toward the use of ICT as

Table 2. Availability of Instructional Materials in Public and Private Schools*

	PUBLIC SCHOOLS		PRIVATE SCHOOLS	
INSTRUCTIONAL MATERIAL	Available	Not available	Available	Not available
Agricultural laboratories	49 (66.2)	25 (33.8)	10 (90.9)	1 (9.1)
3-D models	40 (54.1)	34 (45.9)	2 (18.2)	9 (81.8)
Over head projectors	34 (45.9)	40 (54.1)	4 (36.4)	7 (63.6)
Text books	71 (95.9)	3 (4.1)	11 (100)	-
Work books	17 (23)	57 (77)	-	11 (100)
Television	64 (86.5)	10 (13.5)	4 (36.4)	7 (63.6)
Audio recordings	24 (32.4)	50 (67.6)	11 (100)	-
Slide projector	27 (36.5)	47 (63.5)	1 (9.1)	10 (90.9)
Slides	27 (36.5)	47 (63.5)	1 (9.1)	10 (90.9)
Microscope	31 (41.9)	43 (58.1)	1 (9.1)	10 (90.9)
Live specimens	60 (81.1)	14 (18.9)	5 (45.5)	6 (54.5)
Flip chart	57 (77)	17 (23)	11 (100)	-
Posters	68 (91.9)	6 (8.1)	5 (45.5)	6 (54.5)
Radio	26 (35.1)	48 (64.9)	8 (72.7)	3 (27.3)
Tapes	24 (32.4)	50 (67.6)	1 (9.1)	10 (90.9)
Chalk/white board	74 (100)	0(0)	11 (100)	-

* Figures in parenthesis are percentages

Table 3. Attitude of Teachers in Public and Private Schools towards Use of Instructional Materials*

Attitudinal statements	Public		Private	
	Mean	SD	Mean	SD
Instructional materials are easy to use	1.59	0.70	1.27	0.46
They make teaching interesting	4.04	0.91	2.90	1.13
Instructional material increase students' understanding during lesson	3.93	1.18	3.36	0.80
Instructional material are a waste of teaching time	3.98	1.01	3.81	0.60
With use of instructional material, the syllabus is not completed	3.72	0.86	3.27	0.46
Cannot use instructional material	2.63	0.76	2.18	0.75
Instructional materials are difficult to prepare	2.02	0.93	1.81	0.40
I have adequate knowledge in using instructional materials	1.54	0.86	1.18	0.40
I need training to use various instructional materials	2.02	0.66	1.27	0.46
Instructional materials activate and maintain interest of students	2.41	1.29	3.18	1.40
Instructional materials are accurate and current	2.54	1.04	2.09	0.30
There is no sufficient time for field trips and visits	2.85	1.08	2.27	0.46
It is difficult to have appointment with Subject matter specialists	3.00	1.20	2.36	0.80
Instructional material is readily available in my school	3.62	1.33	3.63	0.80
Instructional materials does not provide for student participation	1.44	0.50	1.45	0.52

* Figures in parenthesis are percentages

Table 4. T-test Analysis of Showing Differences in Availability, Knowledge and Attitude between Public and Private Schools Use of Instructional Materials

Variables	Groups	N	Mean	Std. Deviation	Std. Error Mean	t	df	p
IMs availability	Public school	74	22.63	2.84	0.33	-2.33	13	.036
	Private school	11	24.72	2.76	0.83			
Knowledge of IMs Use	Public school	74	24.28	1.45	0.16	0.68	14	.507
	Private school	11	24.00	1.26	0.38			
Attitude towards IMs Use	Public school	74	43.04	5.69	0.66	2.91	18	.009
	Private school	11	39.27	3.69	1.11			

Table 5. Probit Regression Analysis of Factors Influencing the Use of Instructional Materials in Public and Private Schools

Parameters	Regression Estimate	Std. Error	t	p
Availability	0.16	0.04	3.65	0.00
Knowledge	0.06	0.03	1.72	0.08
Attitude	0.002	0.01	0.106	0.91
Gender	0.03	0.10	0.28	0.77
Age	-0.19	0.10	-1.77	0.07
Marital status	-0.30	0.16	-1.79	0.07
Qualification	-0.02	0.06	-0.35	0.72
Position	0.12	0.05	2.51	0.01
Teaching experience	-0.19	0.08	-2.45	0.01
Teachers' Groups (public/private)	-1.01	0.27	-3.65	0.00
Intercept	-7.99	1.82	-4.37	0.00
Chi-Square	131.65			
df	73			
p	0.00			

instructional materials do not differ regarding gender, but differs regarding age, ownership at home and experience.

From the results of the Probit model presented in Table 5 the Chi-square value was used to determine the goodness of fit of the model. The value is statistically significant at one percent level. The result also shows that four variables are statistically significant at 5%. These are availability of IMs (t = 3.65), teaching position (t = 2.51), teaching experience (t = -2.45), and groups (t=-3.65). Seemingly, the more the availability of IMs, the higher the teaching position the more the use of IMs in public and private schools by agriculture science teachers. Furthermore, the inverse relationship between teaching experience and teachers' groups suggest that the use of IMs is dependent on the years of teaching experience and whether the teacher belongs to public or private schools. It also indicates that an increase in any of these variables will lead to a decrease in the probability of use of IMs in the schools.

Summary

The paper has clearly shown that agriculture science teachers in public schools are younger with fewer years of teaching experience than private schools but teacher in public schools have higher qualifications than those in private schools. Instructional materials are more available for teaching in private schools than public schools but teachers in public schools are more favorably disposed to the use of instructional materials than teachers in private school. Prominent instructional materials in public schools are text books, posters, live specimens and television, while in private schools are text books, flip chart, audio recordings and agricultural laboratories. Significant differences exist between public and private schools' teachers for availability of instructional materials and attitude towards the use of instructional materials. Important predictors of the use of instructional materials are availability, teaching position, and teaching experience. It is therefore important that educational policy makers pay proper attention to these variables to improve the use of instructional materials in schools. The study recommends that emphasis should be placed on the

use of instructional materials in preparing teachers and provision of in-service training to update skills.

Literature Cited

Agbamu, J.U. 2006. Essentials of agricultural communication in Nigeria. Lagos, Nigeria: Malthouse Press Ltd.

Avgerinou, M. and J. Ericson. 1997. A review of the concept of Visual Literacy. British Jour of Educational Technology 28(4): 280-291.

Bebell, D.M. Russell and O.L. Boston. 2004. Measuring teachers' technology uses: Why multiple-measures are more revealing. http://coe.nevada.edu/nstrudler/Bebell_04.pdf. (September 28, 2008).

Cavas, B., P. Cavas, B. Karaoglan, and T. Kisla. 2009. A study on science teachers' attitudes toward information and communication technologies in education. The Turkish online Jour of Educational Technology – TOJET 8(2): Article 2 http://www.tojet.net/

Kadzera, C.M. 2006. Use of instructional technologies in teacher training colleges in Malawi. PhD Diss. Virginia Polytechnic Institute and State University http://education.toodoc.com/doc/26916/. (November 6, 2009).

Kitao, K. and S.K. Kitao. 1997. Selecting and developing teaching/learning materials. The Internet TESL Jour. IV (4) http://iteslj.org/.

Littlejohn, A. and S. Windeatt. 1989. Beyond language learning: Perspective on materials design. In R.K. Johnson (ed.), The second language curriculum. Cambridge, MA: Cambridge University Press.

Mumtaz, S. 2000. Factors affecting teachers' use of information and communications technology: A review of the literature. Technology, Pedagogy and Education 9(3):319-342.

Sahin, I. 2006. Literature review on major factors that affect COE faculty use of instructional technology. In C. Crawford et al. (eds.). Proceedings of Society for Information Technology and Teacher Education International Conference. Chesapeake, VA: AACE. Retrieved from http://www.editlib.org/p/22365.

Varrella, G. 1989. Instructional materials: Being an effective consumer. The Agricultural Education Magazine (7):20-21.

Young, C. 1999. Fayette County School corporation policy section 4.04. http://fayette.k12.in.us/admin/Section4.pdf. (September 28, 2008).

Factors that Influence Youth Retention in Northwest Ohio

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Abstract

This study analyzes the trends and issues related to youth retention in Northwest Ohio. Researchers sampled over 875 graduating seniors from 16 high schools within six counties throughout Northwestern Ohio. Results highlight future career and educational goals of these young people, their impressions of their home communities as a place to live and work, and the impacts on their post-high school choices. Youth whose parents are originally from Northwest Ohio and those young people who earn higher wages in part-time employment are more likely to believe that they will return to Northwest Ohio to live and work. Results suggest that the area is not seen as a viable option for the highest achieving high school students. Students with GPA of 3.75 or higher report an overall lower rating of Northwest Ohio as an employment location for them.

Theoretical Base

Career development and occupational choice are important decisions for older youth. Not only do occupations provide a means to support individuals and families, but they also provide meaning and purpose in life for many. The context of the school and community culture has a significant impact on youth occupational choice (Ferry, 2003a). A study of Pennsylvania graduating high school youth found that parents and family members had the biggest influence on youth occupation choice. Closely following parents in terms of influence was the young person's evaluation of their own personal skills, aptitudes, and academic efficacy. Other influences included part-time or volunteer work experience, teachers and school projects (Ferry, 2003b). It is also suggested by Ferry (2003b) that the key to changing youth perceptions about potential careers will be to provide parents, schools, and communities the tools to communicate positive opportunities about local employment.

A study of Rural West Virginia High School Students (Chenowith and Galliher, 2004) found that family and peer influence are significantly strong predictors of college aspirations for male youth, while individual academic preparation and external barriers (such as economic issues) having stronger influence on female decisions to seek post-secondary education. This same study found that youth whose parents either had a college education themselves or whose parents worked in professional fields were more likely to plan to attend college and see it as an available opportunity for them. Providing youth to a variety of careers in a realistic manner will be essential to broadening options and opportunities for youth. Adolescents commonly select career options from those they readily understand and can see. The diversity of career options presented to rural youth can be particularly limited in some areas.

Students in a Pennsylvania study of high school graduates reported "money" or financial means to attend school or training" as the number one barrier to achieving their occupational goal (Ferry, 2003b). Rural youth tended to have lower educational and career aspirations than their urban counterparts. Major contributors include lower socio-economic status of rural families and the limited scope of available opportunities presented to rural youth (Haller and Virkler, 1993).

The out-migration of youth from rural areas is an issue predominantly driven by economic factors. Rural adolescents, more frequently than their urban or suburban counterparts, are more likely to experience the conflict of choice between the desire to live close to family and the necessity of moving away to achieve success. Youth who choose to place a predominant weight on the desire to remain close to home in their future career choice are more likely to feel limited and are more likely to have lower career aspirations (Hektner, 1995). A study of Pennsylvania youth found that youth who planned to stay were

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Table 1. Population Change1990-2030 (Projected) of 20-39 year old subset

County	Population 1990 (20-39)	Population 2030 (20-39)	% Change
Mercer	11,460	12,430	+8.5%
Putnam	10,140	8,760	-13.6%
Henry	8,510	7,070	-16.9%
Williams	11,140	8,330	-25.2%
Van Wert	8,900	6,510	-26.9%
Paulding	6,070	3,980	-34.4%
State-Wide	3,443,800	3,173,580	-7.8%

Source: Ohio Department of Development

motivated to do so because of family and the culture in the rural area, the connection to family being very strong in these young people. Those planning to leave their home-based rural setting were deciding to leave based on better employment opportunities (Ferry, 2003a).

The objectives of this research study were to analyze the current trends related to career, education, and future residency choice of high school graduates in Northwest Ohio. Specific components included:

What are the current trends of youth interest in career and educational objectives, particularly in rural Northwestern Ohio?

How do young people feel about their home community as it relates to their future intent of either remaining or returning to live and work?

How do parents, peers, economic factors, and distance from post-high school educational institutions impact educational decisions after high school graduation?

What factors influence the intention of youth to either remain or return to the Northwestern Ohio area upon graduation?

Methods

This descriptive and correlation study was conducted in spring of 2008 to assess workforce competencies, career and educational aspirations, and overall retention of graduating high school youth in Northwestern Ohio. Sixteen high schools were identified in six study counties (Mercer, Van Wert, Williams, Henry, Putnam, and Paulding). After receiving approval from Wright State University Human Subjects Review and Ohio State University Human Subjects Review, a written survey instrument was administered in 16 cooperating Northwestern Ohio High Schools with 875 high school seniors providing usable instruments for this research project. Anonymity and confidentiality of participants and their individual responses were maintained throughout the project.

Data analysis using SPSS was utilized to evaluate multiple components of the research. Descriptive statistics analyzed overall youth ratings of community perception. Pearson correlations were used to determine interrelation between various components of the research. Cronbach's alpha of .90 indicates a high level of confidence in instrument validity.

Results

Demographic Data

This sample of students from 16 cooperating school districts in six Northwestern Ohio Counties (Williams, Henry, Paulding, Putnam, Van Wert, and Mercer) is comprised of 875 high school seniors (as of May 2008). Approximately 52% of the sample was female. A large number of their parents were employed in the management/professional, manufacturing, and skilled trades as professions. A relatively low percentage of the parents of these high school seniors had completed Bachelors or Graduate Degrees (approximately 22% of mothers and 17.5% of fathers).

The majority of respondents indicated that their parents were originally from Northwest Ohio with over 80% of both parents being from the area. The vast majority of these Northwest Ohio high school seniors were employed at-least part-time. Over 59% of these seniors indicated that they were working 11 hours or more per week. At the end of their high school programs, most reported that they were not allocating a large amount of time studying per week. Over 84% of high school seniors indicated that they were allocating two or less hours per week studying. More than half of the respondents indicated that they were actively engaged in volunteer work on a weekly basis. A sizable number (9.4%) were volunteering more than five hours per week. High school seniors reported relative success in their academic work (when analyzing high school grade point average). Over 61% of seniors reported grade point averages of 3.0 or higher.

Post-High School Plans of Northwest Ohio Graduating Seniors

The researchers explored the intended high school plans of this sample of high school seniors. The vast majority (80.0%) reported an intention of attending college. In addition, 8.1% indicated that they were entering the workforce directly, 6.0% had chosen a trade school option, 3.1% selected a military plan, and 2.9% were unsure of their post high school plans (Table 2). Of those seeking a trade school education, the most popular program areas included Auto/Mechanical (32.7%), Skilled Trades (21.2%), and Health Care (13.5%) (Table 3). The top three programs of study for those planning to attend college include Medical (29.7%), Business (17.1%), and Education (13.0%) (Table 4).

Moving outside of the home to attend college or trade school is the plan reported by 69.2% of high school seniors. Those that are moving, tend to report an overall close locale for their college/trade school of choice. More than 50% of those that have selected to commute to a college or trade school will commute to seek their training (Table 5). In reporting the distance of their move to seek an advanced education, 63.2% reported a location less than two hours away (Table 6).

Table 2. Post High School Plans of HS Graduating Seniors

Category	Number	Percent
College	695	80.0%
Workforce Directly	70	8.1%
Trade School	52	6.0%
Military	27	3.1%
Don't Know	25	2.9%
Total	869	

Table 3. Program of Study – Trade School

Program Area	Number	Percent
Auto/Mechanical	17	32.7%
Skilled Trades	11	21.2%
Health Care	7	13.5%
Driving/Trucking	4	7.7%
Business	2	3.8%
Education	1	1.9%
Other	7	13.5%
Total	52	

Table 4. Program of Study – College

Program Area	Number	Percent
Medical	205	29.7%
Business	118	17.1%
Education	90	13.0%
Engineering	50	7.2%
Liberal Arts	34	4.9%
Social Sciences	30	4.3%
Agriculture	23	3.3%
Physical Science	23	3.3%
Computer Science	21	3.0%
Other	59	8.5%
Total	691	

Respondents were asked what type of job category they would seek upon graduation, if entering the workforce directly. Manufacturing, Construction/Skilled Trades, and Agriculture were the most common areas of intent for direct from high school employment (Table 7). Of those working directly, 78.9% indicated that they believed they would stay in the Northwest Ohio Area for employment, while 21.1% revealed that they would be leaving the area.

The Army was the branch of military service most likely indicated by those choosing the military as their post-high school plan, reported by 41.4% of service-bound youth. Other branches of service included the Marines, Navy, Air Force, and the National Guard.

Table 5. Commute Distance (Those Commuting to College or Trade School)

Distance	Number	Percent
Less than 15 minutes	32	13.6%
15-30 minutes	89	37.7%
30-45 minutes	68	28.8%
45-60 minutes	36	15.3%
More than 60 minutes	11	4.7%

Table 6. Move Distance (Those Moving to College or Trade School)

Distance	Number	Percent
Less than 2 hours	318	63.2%
2-3 hours	113	22.5%
3-4 hours	34	6.8%
4-5 hours	15	3.0%
5-6 hours	5	1.0%
More than 6 hours	18	3.6%
Total	503	

Youth Perceptions of their Home Communities

The high school seniors in this sample reported overall positive ratings of their community on a series of twelve perception indicators. Highest overall mean ratings on these questions were reported on the following two areas: "Northwest Ohio is a Safe Place to Live" and "Northwest Ohio is a Good Area to Raise a Family." Youth tend to have an overall lower rating of Northwest Ohio when evaluating the cultural, entertainment, and overall employment opportunities of the area (Table 8).

Impacts on Youth Retention

The researchers analyzed if there was an impact on youth retention and if their respective parents were originally from Northwest Ohio themselves. Youth whose parents were born and raised in Northwest Ohio reported a significantly higher rating on the "Desire to Live in Northwest Ohio." "Northwest Ohio will Provide a Good Job," and "My Mother Influences me to Remain in Northwest Ohio" ($p<.05$) (Table 9). As reported in Table 10, youth whose parents were from Northwest Ohio were significantly more likely to reveal a greater employment opportunity in Northwest Ohio and that their fathers encouraged them to remain in Northwest Ohio (as compared to their peers whose parents were not originally from Northwest Ohio) ($p<.05$).

Not only do young people whose parents originate from Northwest Ohio tend to perceive their future employment success in Northwest Ohio more optimistically, but they also tend to have an overall more positive view of their respective community (when compared to their peers whose parents were not originally from NW Ohio).

According to findings reported in Table 11, the highest achieving high school students reveal a lower perception of employment viability for them-

Table 7. Job Classification of those Entering Workforce Directly

Category	Number	Percent
Manufacturing	13	18.3%
Construction/Skilled Trades	13	18.3%
Agriculture	12	16.9%
Food Service	8	11.3%
Business	6	8.5%
Retail	4	5.6%
Secretarial	3	4.2%
Health Care	2	2.8%
Other	10	14.1%
Total	72	

Table 8. Youth Perceptions of their Community (Likert Scale 1=Strongly Disagree, 5=Strongly Agree)

Question	Mean Rating
Safe place to live	4.39
Good area to raise a family	4.07
Schools are of high quality	3.64
Area share my beliefs	3.62
I can get a good education in this area	3.49
My parents want me to stay in the area	3.38
There is positive growth in the area	3.37
Area is interesting and fun	2.81
Enough cultural activities	2.72
There are enough employment opportunities in the area	2.60
There are enough shopping/restaurants in the area	2.20
Other people know too much about me	*4.24*

Table 9. Youth Perceptions of their Community Differences Based on Maternal Alumni Status (Likert Scale 1=Strongly Disagree, 5=Strongly Agree)

Question	Mean Rating Mother from NW Ohio (n=702)	Mean Rating Mother not from NW Ohio (n=153)	Levene's Test Significant Difference
Safe place to live	4.45	4.20	$p \leq .05$
Good area to raise a family	4.14	3.82	$p \leq .05$
Schools are of high quality	3.68	3.47	$p \leq .05$
Area share my beliefs	3.73	3.16	$p \leq .05$
I can get a good education in this area	3.56	3.16	$p \leq .05$
My parents want me to stay in the area	3.50	2.82	$p \leq .05$
There is positive growth in the area	3.43	3.14	$p \leq .05$
Area is interesting and fun	2.89	2.45	$p \leq .05$
Desire to live in Northwest Ohio	3.08	2.42	$p \leq .05$
My mother strongly influences me to remain in NW Ohio	3.02	2.40	$p \leq .05$
Northwest Ohio will provide a good job	2.92	2.54	$p \leq .05$
Enough cultural activities	2.80	2.35	$p \leq .05$
There are enough employment opportunities in the area	2.69	2.15	$p < .05$
There are enough shopping/restaurants in the area	2.24	1.95	$p < .05$
Other people know too much about me	*4.27*	*4.16*	*NS*

Table 10. Youth Perceptions of their Community Differences Based on Paternal Alumni Status (Likert Scale 1=Strongly Disagree, 5=Strongly Agree)

Question	Mean Rating Father from NW Ohio (n=711)	Mean Rating Father not from NW Ohio (n=134)	Levene's Test Significant Difference
Safe place to live	4.45	4.20	$p \leq .05$
Good area to raise a family	4.16	3.63	$p \leq .05$
Schools are of high quality	3.72	3.26	$p \leq .05$
Area share my beliefs	3.75	3.01	$p \leq .05$
I can get a good education in this area	3.56	3.12	$p \leq .05$
My parents want me to stay in the area	3.47	2.86	$p \leq .05$
There is positive growth in the area	3.47	2.89	$p \leq .05$
Desire to live in Northwest Ohio	3.09	2.29	$p \leq .05$
My father strongly influences me to remain in NW Ohio	2.93	2.22	$p \leq .05$
Northwest Ohio will provide a good job	2.93	2.36	$p \leq .05$
Area is interesting and fun	2.88	2.47	$p \leq .05$
Enough cultural activities	2.77	2.39	$p \leq .05$
There are enough employment opportunities in the area	2.67	2.22	$p \leq .05$
There are enough shopping/restaurants in the area	2.20	2.10	$p \leq .05$
Other people know too much about me	*4.25*	*4.23*	*NS*

selves in Northwest Ohio ($p < .05$). When analyzing GPA and responses on "Desire to Live in NW Ohio" and "NW Ohio will Provide a Good Job," results indicate a significantly lower rating from youth with high school grade point averages of 3.75 and higher.

An additional variable analyzed in terms of its possible relationship to youth perception of future employment viability in Northwest Ohio was their high school employment. Youth earning higher overall pay per hour reported higher ratings on their "Desire to Live in NW Ohio" and "NW Ohio will Provide a Good Job for Me" ($p < .05$) (Table 12).

The researchers found considerable variance in the youth perceptions of the employment viability of their community and the parental support to remain in Northwest Ohio. Graduating seniors from Mercer and Putnam County reported higher overall employment perceptions of the area and indicated stronger encouragement from their parents to remain in Northwest Ohio (as compared to their peers in Van Wert, Paulding, Henry and Williams Counties) (Table 13.)

Conclusions

Ohio as a state continues to deal with youth retention. Not only is the state losing population, but a disproportionate share of this loss on the state-level is those highly educated and skilled young people. The impact of loss of youth is compounded in rural areas as they deal with the trend of population loss to metropolitan areas of the state and outside the state. Data from the Ohio Department of Development reveals a

continual trend not only in overall population loss in most areas of Rural Northwest Ohio, but a disproportionate loss of the 20 to 39 year old cohort group. This study, focused on rural Northwest Ohio, found a strong desire of young people to advance their education and skills beyond high school. Over 80% of high school seniors in this study were planning to advance their education in either a college or trade school setting. When looking at retention issues, we are not typically losing these students from the area upon starting their college or trade school program as 63% are seeking this education within a two hour radius of our region. The area has a strong education infrastructure in the region that students plan to utilize to seek advanced training.

Table 11. Impact of High School GPA on Youth Perception of Northwest Ohio (Likert-Based Questions 1=Strongly Disagree, 5=Strongly Agree)

HS GPA	N	Desire to Live in NW Ohio	NW Ohio Will Provide Good Job
Under 2.0	14	2.93	2.69
2.0-2.49	77	2.81	2.74
2.50-2.99	223	2.96	2.82
3.0-3.49	252	3.02	2.95
3.50-3.74	122	3.04	3.16
Higher than 3.75	139	2.83	2.52

Table 12. Impact of High School Employment and Pay Rate on Youth Retention Rankings Likert-Based (1=Strongly Disagree, 5=Strongly Agree)

Employment	N	Desire to Live in NW Ohio	NW Ohio will Provide a Good Job For Me
Not Employed	163	2.72	2.66
Under $5.00 per hour	34	2.85	2.35
$5.00 - $6.50 per hour	77	2.86	2.70
$6.51-$8.00 per hour	418	3.04	2.93
Over $8.01 per hour	141	3.07	3.04

Table 13. Impact of Community on Youth Retention Rankings Likert-Based (1=Strongly Disagree, 5=Strongly Agree)

County	Projected youth population loss/gain 1990-2030	N	Desire Live NW Ohio	NW Ohio Good Job	Mother Influence to Stay	Father Influence to Stay
Mercer	+8.5%	224	3.70	3.32	3.04	3.05
Putnam	-13.6%	171	3.09	3.09	3.11	2.87
Henry	-16.9%	53	2.45	2.64	2.79	2.76
Williams	-25.2%	154	2.55	2.57	2.89	2.84
Van Wert	-26.9%	113	2.41	2.44	2.45	2.40
Paulding	-34.4%	127	2.62	2.50	2.87	2.78

When analyzing the impressions that high school seniors have regarding Northwest Ohio, the results indicate an overall positive evaluation. High school seniors report Northwest Ohio as a "safe place to live," "a good place to raise a family," and that the "quality of the schools are very high." Most young people tended to report a desire to either remain or to return to the area to live and work. However, students did reveal that there were challenges in living in rural Northwest Ohio. Among the greatest challenges were the perceptions of limited professional jobs in their community, limited cultural activities, and less recreation and shopping options.

Generally, students indicate encouragement from their parents to remain in Northwest Ohio. Those students whose parents were originally from Northwest Ohio reported a higher level of interest in living in the area and indicated more positive evaluations of their home community. The families that are located here in Northwest Ohio tend to be deeply rooted with a strong desire reported by these young people to want to stay here if the employment opportunities are available for them.

Another interesting finding that influenced the retention likelihood of these youth was their employment during high school. Over 82% of high school seniors report that they are employed in a paid position. Youth earning higher overall pay per hour reported higher ratings on their "desire to live in Northwest Ohio" and also are more likely to agree that "Northwest Ohio will provide a good job for them."

Northwest Ohio has a strong foundation of stable families, strong communities, quality schools, and a history as a great place to live and raise a family. However, population trends reveal some challenges regarding the inability of the area to retain youth. A number of recommendations should be considered to further position Northwest Ohio to retain the next generation of working young people. Central to the issue of retaining youth in Northwest Ohio is employment opportunity for the next generation and the preparation for this group to match the future job needs of the area. The researchers suggest an analysis of the advising and preparation of high school students as they make choices in their future educational and career goals. These youth need to be aware of what future employment opportunities might look like. Career exploration, mentoring, young professional speakers, etc. can strengthen the link between community employers and their potential workforce. Internships, job shadowing, tours, and other methods of showcasing a realistic view of local employment opportunities will enable youth to make an educated knowledgeable decision on career goals. To encourage talented youth to remain in Northwest Ohio, they have to be able to see viable professional career options from a realistic perspective.

The linkage with future working professionals should continue beyond the high school setting as youth pursue college training. Some organizations and communities have been successful building

linkages with students in the form of internships, coops, and work study arrangements. As organizations consider their financial support of students traditionally given in the form of scholarship grants, they may want to consider formalizing the relationship in terms of a paid part-time or summer position, or asking for a return of investment with a certain amount of community service hours in the home community. A number of medical organizations in the Northwest Ohio area have been proactive in this arena providing paid internship experiences to talented college students to build a relationship and encourage their eventual employment in the area.

Literature Cited

Chenowith, E. and R.V. Galliher. 2004. Factors influencing college aspirations of rural West Virginia high school students. Journal of Research in Rural Education 19(2).

Damon, W., J. Menon, and K. Cotton-Bronk. 2003. The development of purpose during adolescence. Applied Development Science 7(3): 119-128.

Ferry, N.M. (2003a). Turning points: Adolescents' and young adults' reasoning about career choice and future employment. Pennsylvania Heartland Partnership. Penn State University.

Ferry, N.M. 2003b. Perceptions of the forces changing central Pennsylvania's economy. Pennsylvania Heartland Partnership. Penn State University.

Haller, E.J. and S.J. Virkler. 1993. Another look at rural-non-rural differences in students' educational aspirations. Journal of Research in Rural Education 9: 170-178.

Hektner, J. 1995. When moving up implies moving out: Rural adolescent conflict in the transition to adulthood. Journal of Research in Rural Education 11(1): 3-14.

U.S. Department of Labor. 1990. The Secretary's commission on achieving necessary skills.

Why Girls' Education Matters More: A Student Survey in Ho, Ghana

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Abstract

Fifteen students and three faculty members from The Ohio State University-Agricultural Technical Institute (Ohio State-ATI) in collaboration with 10 more students from The Ohio State University-Columbus, Kenyon College, and The College of Wooster traveled to Ho, Ghana to investigate what obstacles impede girls' primary education. The group constructed a survey in a pre-travel class and interviewed over 130 women and 60 girls. The researchers discovered that 98.0% of respondents agree that Ghana needs to put more emphasis on girls' education and that moving forward in development will require both societal support and personal development. The biggest impediments to educating girls is the cost (54.4%), even in so-called public schools, followed by the recognition that large families make it difficult for parents to have money to invest in their girls (11.4%) and, hence, girls must work at home, in the market, or in the field (11.4%). Changing this reality will require public support (16.4%) and forward thinking on the part of the community (6.6%). Additionally, a key factor in this survey process was the benefits to our students. They reported that this study offered them a means to discuss substantive issues with local women in scripted conversations, to develop self-confidence, and to learn the effect of different life opportunities.

Introduction

When Jawaharlal Nehru stated, "You can tell the condition of a nation by looking at the status of its women," he was alluding to the fact that women and girls throughout the world work many more hours than their male counterparts and, as their reward, have less access to healthcare, food, and education. It took until the 1980's for the world to get serious about addressing this inequity in any meaningful way. "Experts believe educating girls is the most important investment in the world [because of] how much they give back to their families," says Gene Sperling, top economic advisor to both Presidents Barack Obama and Bill Clinton (Alter, 2008). Development specialists discovered that, when programs emphasized girls' education, declines in women's fertility, infant, child and maternal mortality, and HIV infection rates followed. Educated mothers improve their farming techniques resulting in improved nutrition for their children. Educated women pay for well-baby care and have money for doctors when their children are sick. Moreover, girls' education accounted for increases in both women's earnings, which were 20% higher for girls who completed primary school, and the likelihood that their children would persist in school (Levine, 2006). The World Bank decided to encourage African governments to invest in improving the educational status of girls so that when they reach womanhood they may have the opportunity to break the intergenerational transmission of poverty and Ghana's government resolved to take this step (World Bank, 2000).

In 2000 a team from the Forum for African Women Educationalists (FAWE) studying girls' primary education sought to determine why girls' enrollment stubbornly remained well below the 50% mark. Ruby Avotri et al. (2000) cited as contributing factors: the cost of schooling, the frequent incidence of child labor, low nutrition and health status, few role models, low aspirations, large family size, distance to school, low parental educational attainment and employment opportunities, inadequate educational materials and facilities, and non-supportive attitudes and behaviors of teachers. Researchers frequently heard the same story, that teachers mistreated girls. "The added problems of sexual harassment, early pregnancy, and the lack of female teachers to act as role models in junior secondary school were major obstacles to female education" (Fentiman et al., 1999). Girls' embarrassment at not having toilet facilities during menstruation or proper clothing like shoes added to the likelihood of their dropping out. The lack of ability to protect themselves from predatory teachers or village men as they walked to school convinced parents to keep their daughters home where they were also available to help with household chores or petty trading alongside their mothers.

The FAWE report proposed changes, such as improving girl-centered learning materials, increasing school health and feeding, subsidizing school-

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related expenses for girls or allowing parents to make monthly rather than annual payments, providing separate toileting facilities, and shifting resources by increasing class size at the tertiary level. The study noted that, without intervention and with an annual population growth rate of 3.6%, Ghana's educational problems would get worse.

Table 1. Ghana Educational Statistics (World Bank 2009)

	2000	2005	2007
Primary Completion Rate	82%	86%	87%
Ratio of girls to boys in primary school	92%	95%	95%

In the decade since that report, girls' education in developing countries has remained a priority. Worldwide, the studies show that girls' enrolled in school has increased from 38% in 1980 to 48% in 2008. Unfortunately and unaccountably, during the same period, boys enrollment has decreased from 62% to a mere 52%; and 28% of all primary school aged children are still not attending (SASI Group, 2009). In Ghana, on the other hand, real improvement in completion rates show that currently 87% of children complete fifth grade (See Table 1). These statistics address neither the quality of the education nor the government's investment. While the United States spends 28% of education dollars worldwide, Ghana spends 5% on their GDP on education. Ghana allots 1.8% of the GDP for elementary education, which totals approximately $87 per pupil (SASI Group, 2009).

Readings and discussion revealed these realities to students in the fifth annual The Arts in Ghana with Service Learning, a two-part course that begins in Wooster with a three credit hour class in spring quarter and moves to Ghana for a five credit hour, three week residency in Ho and a few days each in Cape Coast and Accra in the summer (Figure 1). In the pre-travel course students study Ghana's history and culture with an emphasis on various art forms, such as drumming, dancing and singing, fantasy coffins, drum making and creating batik cloth. The coursework also keys in on social issues and solutions, like microfinance programs, health, agriculture and extension, and traditional governance (Elder, 2008). After studying the importance of girls' education to expand a country's development capacity, the faculty leaders proposed adding a collaborative research component to this tour and offered girls' education as the research area. Students agreed to develop questionnaires, to participate in conducting research as part of their in-country commitment, and to contribute to a final paper and presentation upon their return to the United States.

Through this project faculty and students collaborated to explore issues of girls' educational opportunities and life outcomes in order to determine the effect an emphasis on girls' education has had in Ho. (Note: This paper refers to "girls" as the Ghanaians educators and politicians generally do, meaning children and young women up to age eighteen.) In addition, students evaluated the impact of this research project on their experiences and understandings through group discussion, journaling and term paper writing.

Figure 1. Map of Ghana

Methods

Reading Ruth Levine's "Educating Girls, Unlocking Development" (2006) inspired students to find and discuss articles about education and girls' chances in developing countries. Then, they proceeded to develop a research design. They reviewed the FAWE surveys and found that those had isolated multiple factors, which mitigate against girls attending primary school (Table 2). They also ascertained that the effect of girls' education is great, leading to girls' marrying later, and having fewer and healthier children. It was encouraging to find that primary school-educated women are three times less likely to contract HIV/AIDS (Alter, 2008).

In small groups students listed the questions they most wanted answered based on those they had read in the FAWE survey. Fortunately, the one student who had traveled to Ho with previous study tours was available to guide each group as the groups compiled, reviewed and perfected questionnaires (Figure 2). Each student agreed to interview five Ghanaian women or girls, so that the group might collect a significant number of responses for analysis.

Students planned to interview secondary school girls and women from post-high school on. The

faculty team conferred with faculty in Ho to ask their help in identifying willing interviewees. Our hosts recruited women from the Akatsi Women's Microfinance Cooperative, women's bible study groups of the Evangelical Presbyterian Church, women members of the Dela church choir, Mawuko Girls' Secondary School girls, and women and girls working or living at Kekeli Hotel, our in-country residence.

Upon reaching Ho in June 2008, the group organized numerous occasions to conduct interviews. In Akatsi, four students attended a meeting of the Akatsi Women's Microfinance Cooperative where they spent one hour to one-half hour interviewing fifty rural women in four groups with one interpreter for each. Exchanges continued over lunch. The group accompanied some Akatsi women to their stores and factories: a hardware shop, a 6' x 6' shack on one of the main roads, where the proprietor sold nails, paint, and hammers, a soap factory just outside town where four workers were stirring up a batch of lye, coconut, and other ingredients into a bubbling brew, and the market where all viewed the skeleton of booths the traders staffed on market days.

Another afternoon, Divine Gbagbo, the choir director at Dela cathedral, asked the women to meet for interviews after choir practice. The group interviewed several English speakers first; then, enlisted their help as translators for those who did not. The 25 students each interviewed one woman and gave each a plastic bag filled with donated toothbrushes, tubes of toothpaste, nail clippers, pens, and pencils, which students had collected at home. One man insisted on being interviewed so that he could take his wife a gift.

On the day the group was scheduled to interview bible study members, the women appeared reticent. Students interviewed the first five bravest women. When they returned to their group meeting outside under a spreading tree, the other women saw the thank-you gifts and rushed to get in line to participate. Again, several translators helped with communication needs.

On Saturday afternoon the group walked to Mawuko Girls' Secondary School for the final interview event. Each student interviewed two or three girls. The students found that the girls wanted to continue the conversations well past the interview format. Throughout the rest of the residency in Ho, workers at the hotel and their relatives volunteered

2008 OHIO STATE ATI GIRLS' EDUCATION QUESTIONNAIRE

Informant's age range: 15-24 25-39 40-50 over 50

Key: Baseline Ed. Level: (Some primary SP, complete CP, some secondary SS, complete CS, some tertiary ST, Bachelor's degree BA/BS, Master's MA/MS, Doctorate PhD/MD/DDS)

Family Member	Education Level	Occupation
Father's mother		
Father's father		
Mother's mother		
Mother's father		
Mother's		
Father's		
Interviewee		
Daughter's (s')		
Son's (s')		
Granddaughter's (s')		
Grandson's (s')		
Other:		

Your opportunities

Current: Missed: Future:

Questions
1. How are family members' educations financed?
2. If you could study and become whatever you want, what would that be?
3. Will you be able to reach this goal?
4. Where will your education take you?
5. How far do you think you will be able to go in your education?
6. How has your education influenced your family's life?
7. Do you think Ghana's emphasis on girls' education has been successful?
8. What have been the effects?
9. Do you think Ghana should put even more emphasis on girls' education?
10. What type of education do you recommend? Most beneficial?
11. What else do girls/women need to be successful?
12. To your knowledge what percentage of college educated people remain in Ghana?
13. Would you remain in Ghana if you finished college?
    If yes, where would you live?
    If no, where would you live?
14. If there anything more important than education?
15. What is the quality of girls' education in Ghana? Strengths/Weaknesses?
16. Does the government do enough for girls' education?
17. What else should girls study?
18. How does your family rate the importance of education?
19. Do you feel you have to choose between education and family?
20. Will your education help your children? Community? How?
21. Why do people pursue an education?
22. What obstacles do you foresee?
23. Is education more important for boys or girls? Why?
24. Does girls' education help your community?
25. Do you come from a rural or urban background?
26. Have you had any female teachers?
27. Does having a female teacher inspire you or help in any way?
28. Are schools geared towards girls' needs ("girl-friendly")?
29. What opportunities do you hope for girls/women in the future?
30. What private benefits for girls' education do you see?
31. What social benefits for girls' education do you see?
32. Are girls' sincerely interested in school?
33. Why do women with more education delay having children? Have smaller families?
    Do you plan to have children? If yes, how many? At what age?
34. Can girls' education eliminate poverty? How?
35. Rank these factors that might retard girls' education? Use numbers 1-12 (1 is biggest roadblock)

_____ School costs too much	_____ Too many children in family
_____ Girl must work	_____ School is too far away
_____ Not enough food	_____ Parents not interested in education
_____ No access to health care	_____ Poor facilities, without toilets
_____ No women role models	_____ No books
_____ Don't want to go to school	_____ Books do not relate to girls' needs

Figure 2. Ohio State ATI Girls' Education Survey (2008)

Table 2. Impediments to Girls' Education (FAWE, 2000)

SOCIO-CULTURAL FACTORS
• traditional, accepted roles, including religious discouragement of education (Islam and *trokosi)*
• gender stereotyping in courses offered to girls
• parents' negative attitude, especially if illiterate themselves
• parents'fear of intimacy with opposite sex
• parents'fear educated girl will challenge and criticize
• educated girls adopt husband's name
• poor self-esteem among girls
• early marriage and pre-marital pregnancy
• separated parents can't control children
SOCIO-ECONOMIC FACTORS
• uneducated parents
• household size and poverty
• low nutrition and health status
• direct cost of education, including higher cost of girls' uniforms
• poor families rely on family members to contribute to survival
SCHOOL FACTORS
• fewer schools in rural areas, less access to preferred single-sex schools
• transportation or boarding costs
• poor facilities
• inadequate instructional materials
• teachers' low expectations for girls
• extremely poor teaching methods
• few female teachers and sexual harassment
• classes often not in local languages
POLITICAL AND INSTITUTIONAL FACTORS
• country's economic conditions
• employment prospects
• national policy on girls' education

to be interviewed. Students conducted interviews before breakfast and at the end of televised football (soccer) games. Students found the responses they received to be more nuanced. A great deal of humor accompanied these interviews, which opened up avenues to friendships.

Results and Discussion

This survey of more than 200 women and girls and one man in Ho yielded 175 completed surveys. All the information was entered into Microsoft Excel 2007. The Excel tables were then imported into SAS software (SAS Inst. Inc. Cary, NC). Data were treated as categorical data. We used PROC FREQ model, and significance was analyzed using the chi-square test. The interaction between responses and age were analyzed; however, this interaction proved insignificant. Therefore, we compiled all the girls' and women's responses.

The study found that, while quite a few of the interviewees' parents and grandparents only had the opportunity to attend some primary school (Table 3), 90.4% of the interviewees had attended or completed secondary school and 14% had attended or completed tertiary education. Our interview pool included one registered nurse who had recently retired, several secondary schoolteachers, the lone male interviewee who had attended the University of Legon, and three teachers' college graduates.

Respondents noted that parents increasingly emphasize school and more girls are attending school. Nearly all interviewees, 98.0%, agreed that Ghana should put even more emphasis on girls' education. They stated that the greatest obstacle to educating girls is the cost (Table 4). Parents must provide special clothes, pay annual textbook fees and miscellaneous school fees, such as money for a new roof, utility bills, and teachers' paper supplies, and lose the wages and help of their girls while they are in school and studying.

One in three interviewees went so far as to say that education for girls is more important than for boys. While 80.0% confirmed that having a female teacher inspired and helped girls, 82.0% described schools in Ho as already "girl-friendly." When asked

Table 3. Educational Attainment (Ohio State-ATI Survey 2008)

Family Member of Interviewee	Percent with NO education
My Grandmother	48
My Grandfather	39
My Mother	23
My Father	14
Interviewee	3

Table 4. Obstacles to Girls' Education in Ho (Ohio State-ATI Survey 2008)

PRIMARY OBSTACLE	Percent of respondents
School too costly	54
Girls must work	15
Too many children	12
Girls don't want it	6
Parents don't emphasize	6
Parents prioritize boys	4
Poor school facilities	1
No answer	1

P=0.39

the open-ended question, "What else do girls need to be successful?" some longed for more support for girls (16.4%) and a few for forward thinking (6.6%).

Women and girls in Ho believed that girls' education brings better jobs (31.9%), access to higher education (19.5%) and a woman president in the future (12.4%). For themselves, these interviewees expected their educations to lead to a satisfying career (37.7%), a better position (14.8%), an opportunity to get a university education (16.4%), or a chance to travel (11.5%).

But their overwhelming hope for the future points to education as a key factor in eliminating poverty (91.2%).

Benefits to Student Learning

Educators stress lifelong learning for students and seek to model that imperative. At Ohio State-ATI faculty members engage in research to inform and enrich their teaching. Since Ohio State-ATI only grants associate degrees, faculty members teach only first-year and sophomore undergraduates. They have neither teaching assistants nor research assistants. Working side-by-side with undergraduates to investigate the effects of national and international policy on the minds and lives of local people in Ho proved to be an enjoyable and reinvigorating experience.

In self-reports, students indicated that this research experience helped them to build self-confidence and self-awareness. One mentioned, *"I learned that I like doing interviews."* They grew from their opportunities to discuss substantive issue with interviewees, even in our scripted conversation, and in some cases the interview process initiated a lasting bond.

For nearly all the students, this was their first experience conversing through a translator. They discovered firsthand what "lost in translation" means when they had to discourage translators from answering for the interviewee. Understanding and interpreting different life chances helped them to see hope through Ghana's increased emphasis on education, especially girls' education.

Summary

Throughout this project, faculty and students collaborated to explore issues of girls' educational opportunities and life outcomes in order to determine the effect an emphasis on girls' education has had in Ho. Girls' education's role as an agent of social change is well documented. Ohio State-ATI students' survey sessions with rural girls and women in Ho about the effect education has had on their lives and those of their families showed that nearly all respondents (90.4%) had completed or were in the process of completing secondary school whereas a generation before approximately 50% of women and 40% of men had no education at all. Interviewees see a positive change in the emphasis on girls' education but agree that there is more to do. They showed a nuanced understanding of educational benefits when 54% rated family as more important than education (43.0%) but stressed that education will also improve their families.

Additionally, students learned how to conduct oral history and interviews, work collaboratively, construct a questionnaire, work with a translator, negotiate the importance of education in two cultures, and appreciate the relative difference in educational opportunities in the USA and Ghana. At the same time, the students learned that these countries' educational processes are far from complete. Through group discussion, journaling and term paper writing, students expressed that this research experience allowed them see how the social sciences can improve people's lives by assessing local needs to give leaders the information to help them make appropriate changes.

Literature Cited

Alter, J. 2008. Education: It's not just about the boys: Get girls into school. Newsweek 29 Sept. 2008.

Avotri, R., L. Owusu-Darko, H. Eghan, S. Ocansey. 2000. Partnership for strategic resource planning for girls' education in Africa: Gender and primary schooling in Ghana. Brighton, England: Forum for African Women Educationalists/Institute of Development Studies.

Elder, D.R. 2008. Growing tolerance through international arts education. International Journal of Arts in Society 1(4): 151-8.

Fentiman, A., A. Hall, D. Bundy. 1999. School enrollment patterns in rural Ghana: A comparative study of the impact of location, gender, age, and health on children's access to basic schooling. Comparative Education 35(3) 331-349.

Levine, Ruth. 2006. Educating girls, unlocking development. Current History March, 127-130. Social and Spatial Inequalities Group (SASI), University of Sheffield. 2009. Primary Education Spending. <http://www.worldmapper.org/display.php?selected=208>. (November 4, 2009).

World Bank, The. 2000. Can Africa claim the 21st century? Washington: The World Bank.

Interpersonal Skill Development Instruction

Galen Dodge and Rick Foster

Introduction

American employers in both the private and public sectors are coming to understand the importance of recruiting and hiring those college graduates who work effectively with people. For example, the Department of Natural Resources for the State of Wisconsin has adopted a new operating philosophy in its hiring practices that includes an emphasis on recruiting "people who work effectively as members of a team," who have "communications as well as technical skills" and who understand that "effective resource management means working with people as well as with the physical resource." (Besandy, 1986).

Naisbitt and Aburdene (1985) stated that "We will not see profits grow if we do not learn how to grow people." According to these two experts on corporate America, "In an information society, the effective management of human resources is any organization's competitive edge."

In a 1988 study conducted by Selection Research, Inc. (SRI) of Lincoln, Nebraska, it was observed that the people of Nebraska recognized the need for interpersonal and communication skill development as prerequisite to sustained employment in agricultural fields. Other research indicates the primary reasons for termination of employment in most fields are related to a lack of interpersonal communication skills rather than technical or occupation specific skills.

The assumption that interpersonal skills are at least as important as technical agriculture skills for students provided the basis for the development of a course in Interpersonal Skills Development (Ag Ed 102) currently being offered to students at the University Nebraska-Lincoln through the Agricultural Education Department in the College of Agriculture. A person's attitudes are feelings that are a reflection of his/her underlying values (Dodge, 1986). Both attitudes and values influence outward behavior on the part of people. If learning is taken to be a change in the learner's behavior, then attitudes toward people and the inherent values we hold for them can be influenced through the learning process (Saylor, Alexander, and Lewis, 1981). This study was conducted to determine if enrollment in such a course can have a significant influence on the attitudes and interpersonal skills of College of Agriculture students.

Course Background

The goal of Ag Ed 102 is to enable students to adopt a more positive and accepting awareness of themselves and others, and to enhance leadership qualities which will be manifested in both an improved society as well as improved performance in their chosen career after graduation. More specifically, the course is designed to make students aware of the potential in all human beings and to "tap" that potential by identifying and encouraging strengths in others through the practice of active listening skills, the development of empathy, the appreciation of differences and similarities among all human beings in order to develop basic trust for the building of positive interpersonal relationships.

Experiential in nature, each class of 30 is divided into three small groups, with an undergraduate teaching assistant assigned to each group. The role of the teaching assistant is to reinforce in all students, through practical exercises, the theories and concepts offered during lecture. In addition, students are required to participate in community volunteer projects which are supervised by various cooperating human service agencies in the Lincoln area. In this setting, students are able to practice, on a one-to-one basis with others, the interpersonal and communication skills learned in class. Students are expected to observe and record in a journal the responses of their "client", with particular attention given to the positive growth and development not only of the client, but their own personal growth, self understanding, and development as well. Normally, strong positive relationships develop and become observable during the eighteen week semester.

Ag Education 102 did not always exist in its present form. Initially, in 1978, it was included as a "closet course" and listed as Ag Communications 399 Independent Study. Over a period of time, faculty members of the College of Agriculture who were aware of the course began to appreciate its particular appropriateness, especially for freshman and sophomore students. As a result, in 1984, the course was brought out of the closet, officially approved and subsequently listed as Ag Ed 102 Interpersonal Skills. Because it is considered somewhat nondisciplinary in the traditional sense, a number of faculty members continue to remain somewhat skeptical concerning the value of the course and its place in an applied biological curriculum like that of agriculture. As a result of faculty skepticism and the growing number of students enrolled in the course each semester, it seemed important to design and conduct a research study to determine the impact of the course on students.

Currently, Ag Ed 102 is offered to all students at the University of Nebraska. Five sections with enrollment limited to 30 students each are taught both Fall and Spring semesters. Approximately 75 students are turned away each semester for lack of space.

Design of the Study

The study was conducted as an experimental design to answer the research question about whether a course in interpersonal skill development could significantly impact students attitudes and values. The treatment group consisted on students who had enrolled in Ag Ed 102 during the academic year. The control group consisted of students enrolled in a freshman level agronomy class and a freshman level agricultural economics class, but who had not enrolled in Ag Ed 102 previously.

Selection of the Sample

The population for this study was identified as all students in the University of Nebraska-Lincoln who were enrolled in

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Ag Ed 102 during the school year 1987-88. The treatment group was made up of 385 students. For comparison purposes, a control group of 112 students who had never enrolled in Ag Ed 102 was selected to participate by completing the exact pretest and post-test survey which was completed by Ag Ed 102 participants.

Development of the Survey

The pretest and post-test surveys for both the treatment and control groups were identical. Thirty-four statements reflecting interpersonal and self awareness concepts were listed as part of a Personal Attitude Scale (PAS). Students were asked to indicate the extent of agreement or disagreement with each statement.

The survey was reviewed by several University of Nebraska faculty members to establish face validity. A Cronbach Alpha Reliability Coefficient was calculated (r = .82), from field test data indicating the survey was reliable.

Collection of the Data

The survey instruments were completed by students in the treatment and control groups during the first week of classes each of the Fall and Spring semesters during 1987-88. The post-test was identical to the pretest, and was administered to both groups during the final week of classes, prior to final examinations.

Analysis of Data

All data were coded and entered into the UNL computing system via IBM personal computers. The following analyses were performed:

1. Means, frequencies and standard deviations were calculated on all demographic as well as survey items.
2. T-test comparisons of mean scores were used to determine if significant differences existed between control and treatment groups, pretest and post-test groups, background of the students by major, and background of the students by gender.

Findings

Control Group Data

To determine if increases in positive attitudes regarding interpersonal skills and self awareness were attributable to participation in the Ag Ed 102 class, a sample of 112 students who had not enrolled in the course served as a control group. Both pretest data and post-test data were collected at the times similar to that of Ag Ed 102 students. There were no significant differences between pretest and post-test attitudinal scores for the control group on any of the 34 items. This would indicate that over the same time frame, those not participating in the course did not gain additional insights into the importance of interpersonal skills and self awareness activities, as reflected by the PAS items.

Difference Between Control and Treatment Groups (Pretest) Comparisons of the treatment group (students enrolled in Ag Ed 102) and the control group are presented for both the pretest and post-test in Table 1. It was observed that students enrolled in Ag Ed 102 had substantially more positive attitudes regarding 12 of the 34 PAS items prior to enrolling in the Ag Ed 102 course. The pretest was administered prior to coverage of any of the material in the class. Such a difference would indicate that students who preferred to enroll in the class already have an edge on others in the area of effective interpersonal relationships. Indeed, the class attracted those who valued interpersonal skills and self awareness attributes. Since Ag Ed 102 is an *elective* course, this finding can be easily understood.

Table 1 also shows comparisons of the treatment group and the control group as measured at the end of the semester. The data indicate a significant difference in attitude on 28 of the 34 items (P<.05) with Ag Ed 102 participants having more positive attitudes about interpersonal and self awareness skills. This finding clearly indicated the increase in positive attitudes was a result of instruction through the Ag Ed 102 classes.

Attitudinal Differences for Ag Ed 102 Students

The attitudinal scores of students prior to enrollment (pretest) and after completion (post-test) of Ag Ed 102 Interpersonal Skill were examined. Students were asked to indicate their agreement or disagreement with selected statements about personal beliefs and attitudes when working with others in interpersonal situations.

It was observed that students expressed more positive attitudinal scores on 32 of 34 self awareness interpersonal skills statements after completion of the course than at the beginning. Fifteen (44%) of the items were significantly more positive (P<.05). Those self awareness and interpersonal skill items showing the greatest improvement in positive attitudes were:

- ability to maintain conversations
- remembering names of others
- being happy for success of others
- being part of group decision making processes
- helping others helps me
- having an objective understanding of myself
- finding time for myself
- having empathy for others
- recognizing good in everybody
- doing the right thing regardless of peer pressure
- being aware of personal strengths and weaknesses
- having several role models
- not willing to compromise personal values
- appreciating experiences in life
- trying not to judge others on hearsay

Attitudinal Differences by Agricultural Background

When students with agricultural majors were compared with students with non agricultural majors, only two self awareness and interpersonal skill statements were observed to have significant differences in attitudinal scores on the pretest, while no differences were observed on the post-test items.

These findings would indicate that, although both groups showed consistent positive attitudinal growth on most statements, there were no statistical differences between students with agriculture and non agriculture majors in their attitudes

either prior to or after completion of Ag Ed 102.

Attitudinal Differences by Gender

Students enrolled in Ag Ed 102 were compared by gender when expressing both pretest and post-test attitudinal scores related to interpersonal and self awareness statements. It was observed that female students expressed more positive attitudes than males on 28 of 34 pretest items (14 significantly different at the .05 level), and on 32 of 34 items on the post-test (10 significantly different at the .05 level).

Conclusions

The following conclusions were made from the findings of this study:

1. Enrollment in an Interpersonal Skills development class significantly increases the positive attitudes of students toward themselves as well as others.
2. There is no difference in the amount of growth in positive attitude as a result of participation in Ag Ed 102 because of a students' enrollment in an agricultural major versus a nonagricultural major.
3. Female students enter the course and leave the course with significantly more and stronger positive attitudes regarding interpersonal and self awareness skills than male students according to PAS items.
4. Students not enrolled in an interpersonal skills course (control group) failed to gain more positive attitudes on any of the items measured.

Based on the conclusions of this study, the following recommendations are made regarding the inclusion of an appropriate interpersonal skills development component for undergraduates in the Colleges of Agriculture.

1. Students in the college of agriculture should be highly encouraged to complete an interpersonal skills course during their academic preparation.
2. Students majoring in agriculture who will be working directly with people in the industry should be required to complete a course in interpersonal skill development.
3. Faculty members should be encouraged to integrate interpersonal skill development into existing courses within the college of agriculture.
4. Faculty members should be encouraged to objectively evaluate their own offerings to determine the actual learning outcomes or behavioral changes attained by students enrolled in their courses.

References

Besadny, Carroll D. (1986). State of Wisconsin Department of Natural Resources Cover Letter Accompanying the May-June *DNR Digest*.

Dodge, Galen W. (1986). *Priceless People*. (2nd edition). Metromail Corporation, Lincoln, Nebraska.

Naisbitt, John and Aburdene, Patricia. (1985). *Re-Inventing the Corporation*. Warner Books, Inc. New York, New York.

Saylor, Galen J., Alexander, William M., and Lewis, Arthur J. (1981). *Curriculum Planning for Better Teaching and Learning*. Holt, Rinehart, and Winston. New York, New York.

Selection Research INC. (1988). Public Perception and Image of Agricultural Education in Nebraska. A Commissioned report for the UNL Department of Agricultural Education. Lincoln, Nebraska.

Table 1: Comparison of Treatment and Control Group Pre-test and Post-test Attitudinal Scores on Selected Interpersonal Skill Concepts Associated with Ag Ed 102

Attitudinal Items		Control (N=112) Pre	Control (N=112) Post	Treatment (N= 385) Pre	Treatment (N= 385) Post	T-Value Pre	T-Value Post
I find it easy to get to know people	M	2.46	2.46	2.19	1.89	2.74**	6.38**
	SD	.92	.90	.93	.73		
I am able to maintain a conversation with someone new	M	3.02	3.01	3.10	3.14	-.76	-1.00
	SD	1.11	1.07	1.04	1.12		
I have difficulty remembering names	M	3.35	3.38	3.31	2.75	.29	4.81**
	SD	1.22	1.17	1.17	1.09		
I make an effort to meet new people	M	1.77	1.71	1.62	1.51	1.77	2.34
	SD	.81	.85	.75	.68		
I maintain good eye contact with others	M	2.26	2.00	2.02	1.70	2.35*	2.95**
	SD	.94	1.01	.96	.85		
I am careful not to interrupt others when talking	M	3.57	3.40	3.06	3.12	4.30**	2.09*
	SD	1.03	1.08	1.14	1.14		
I try to tune in to what others say	M	2.33	2.30	2.14	2.01	2.01*	2.85**
	SD	.89	.91	.86	.85		
I am genuinely happy for others' success	M	2.29	2.12	1.89	1.65	4.74**	5.97**
	SD	.84	.81	.77	.64		
I do what is right regardless of peer pressure	M	2.35	2.16	2.36	2.03	-.16	1.46
	SD	.85	.82	.92	.76		
I defend others from "behind the back" comments	M	2.35	2.39	2.18	2.02	1.89	4.50**
	SD	.80	.78	.81	.67		
I am aware of both my my qualities and strengths	M	2.23	2.26	2.25	1.83	-.16	4.98**
	SD	.78	.86	.84	.69		

Attitudinal Items		Control (N=112) Pre	Control (N=112) Post	Treatment (N= 385) Pre	Treatment (N= 385) Post	T-Value Pre	T-Value Post
I have several role models in my life	M	1.72	1.68	1.45	1.28	3.76**	5.87**
	SD	.71	.65	.68	.55		
I am confident in being a success	M	1.93	1.83	1.85	1.63	.92	2.44*
	SD	.85	.88	.79	.69		
I don't rely on luck for success	M	2.43	2.53	2.56	2.28	-1.37	2.36*
	SD	.92	1.02	.92	.88		
I always finish what I set out to do	M	2.59	2.51	2.53	2.23	.66	2.93**
	SD	.81	.88	.84	.80		
I am a good listener	M	2.25	2.04	2.07	1.95	2.01*	1.08
	SD	.82	.81	.82	.73		
There is good in everybody	M	1.78	1.64	1.42	1.37	4.77**	3.75**
	SD	.82	.81	.65	.68		
I am confident in carrying out a plan	M	2.49	2.33	2.34	2.13	1.77	2.26*
	SD	.75	.81	.80	.77		
I have empathy for others	M	2.75	2.69	2.65	2.24	1.05	4.84**
	SD	.90	.82	.87	.79		
I am not willing to compromise my values	M	2.82	2.98	2.90	2.57	-.61	2.97**
	SD	1.08	1.21	1.16	1.18		
There is some good in ever person	M	2.48	2.39	2.13	1.78	3.14**	5.49**
	SD	1.10	1.15	1.04	.89		
Experiences in life determine personality	M	2.46	2.49	2.15	1.81	3.05**	6.58**
	SD	1.06	1.09	.95	.82		
My procrastination leads to poor performance	M	3.40	3.40	3.23	3.01	1.49	2.94**
	SD	1.05	1.19	1.11	1.12		
There are advantages to group problem solving	M	2.07	1.94	1.95	1.66	1.32	2.96**
	SD	.93	.94	.88	.78		
I sometimes judge others on physical traits or hearsay	M	3.44	3.30	3.10	2.59	3.43**	6.15**
	SD	.92	.99	.93	.99		
I look for positive before negative traits in others	M	2.60	2.53	2.27	2.01	3.10**	5.12**
	SD	1.03	.94	.97	.85		
I have confidence in handling unexpected situations	M	2.72	2.56	2.71	2.41	.10	1.28
	SD	1.05	1.05	1.02	.94		
I find helping others also helps me	M	2.33	2.23	2.21	1.80	1.40	4.75**
	SD	.78	.84	.78	.77		
Luck has little to do with being a good leader	M	2.05	2.20	1.99	1.89	.64	2.76
	SD	.99	.99	.86	.93		
I am willing to admit my mistakes	M	2.15	2.10	2.06	1.83	1.03	3.40**
	SD	.86	.81	.76	.63		
I don't have enough control over my life	M	3.31	3.32	3.10	2.72	1.81	4.62**
	SD	1.12	1.06	1.10	1.12		
Good leaders will clarify everyone's job description	M	2.02	1.82	1.94	1.82	.90	-.13
	SD	.86	.73	.79	.91		
I have an objective understanding of myself	M	2.21	2.26	2.20	1.70	.10	6.97**
	SD	1.02	.89	.83	.62		
Even with current demands, I find time for myself	M	1.97	2.10	1.99	1.60	-.14	5.60**
	SD	.96	.82	.88	.74		

Note: Control group = 112 students who had never enrolled in Ag Ed 102
Treatment group = 385 students who completed Ag Ed 102 during 1987-88 Scale: 1 = Strongly agree, 2 = Agree, 3 = No Opinion, 4 = Disagree, and 5 = Strongly disagree.
* = Significantly different mean scores (P<.05) ** = Highly significantly different mean scores (P<.05)

A Taste of Teaching

Many undergraduate students in the sciences go on to obtain M.S. and/or Ph.D. degrees, because it is part of their long-term goals (e.g., they want to be a professor or obtain another position requiring a graduate degree) or because they are pushed that way, receiving advice that a graduate degree will be necessary for any career advancement. Many of the graduate students in the sciences, including wildlife science, serve as teaching assistants to obtain part or all of the funding for their graduate education. Many of these students are unaware that they will be serving as a teaching assistant and have little experience and expectations regarding instruction or being a teaching assistant.

To better prepare prospective graduate students for the possibility of teaching and provide an experience allowing them to make a more informed decision as to whether they want to teach in the future, we developed an undergraduate student teaching assistant program. This program provides undergraduates with information on teaching, a "taste" of the teaching experience, and an opportunity to interact with instructors during the design of class activities and assignments. During the past 6 years, 14 students have been involved with our program entitled Teaching Wildlife. Students in the program serve as teaching assistants in a junior-level, Wildlife Ecology and Management course, which typically contains 100 to 150 students. The only prerequisite is that they have successfully completed the course. Students can participate in Teaching Wildlife as a one-credit, graded course or as an extracurricular voluntary program. In either case, students read several papers on pedagogy, including one dealing specifically with teaching courses in wildlife science; meet regularly with us to discuss the readings, instructional methods in general, and the instruction of the specific course they are assisting with; assist us with the development of assignments, including problem sets and other homework, term papers, quizzes, and exams; work with graduate teaching assistants and us on grading assignments; attend all class meetings; and keep a journal detailing how the content and delivery of the course can be improved in the future. Additionally, we work with each student to develop and deliver at least one 15 to 30 minute lecture, including associated assignments and discussions. Students choose a topic from a set of predetermined major concepts or issues for the course. For each topic, we provide the minimum content to be covered, but they can add more. We provide undergraduate assistants feedback on their lecture and presentation and suggestions for improvement, and they received similar feedback from the graduate teaching assistants and students enrolled in the course they are assisting.

At the end of each semester, we meet with the undergraduates who participated in Teaching Wildlife to get feedback on the course, and to review their observations, encourage suggestions, and enable them to synthesize their reflections on their experience as an assistant. In a few cases, we have been able to speak to students who participated in the program and are now in graduate school. All feedback from students from Teaching Wildlife has been positive. After completing Teaching Wildlife, several students determined that teaching was not something they wanted to do and adjusted their career path accordingly. Others, who had not intended to go to graduate school or become teachers, concluded that teaching was a strength and are now following that career path. And, several, including two who became graduate teaching assistants, reported that their undergraduate experience in Teaching Wildlife prepared them for their current roles as graduate teaching assistants and gave them a "leg up" on the other graduate students.

Several specific experiences from Teaching Wildlife may be particularly noteworthy and of benefit to other instructors: 1) participating students were unaware of the challenges of designing high-quality course assignments, particularly exams, and reported an increased awareness of how other instructors develop courses and assignments; 2) most students gained an appreciation for and skill in public speaking, effective teaching, and "handling" a relatively large class, and as one student put it, "experiencing and overcoming the terror of being in front of that many people;" 3) the students enrolled in the course in which these undergraduates assisted indicated that they did not feel the addition of the undergraduate teaching assistants was detrimental to their learning experience and the overall class, and in some cases thought it enhanced their experience and piqued their interest in teaching; and 4) it has provided us with tremendous feedback from students who have taken the Wildlife Ecology and Management course and then observed it a second time from an instructor's point of view, which has allowed us to significantly improve course content and delivery (e.g., we have added new and enhanced old content to more clearly illustrate the relevance and value of certain homework and reading assignments, and more clearly linked the various topics covered during the course.

We believe Teaching Wildlife illustrates the benefits of such undergraduate experiences to the

participating students and the course itself, and promote the development of similar programs in the sciences elsewhere. In the case of our program, we are working to expand it to more students and additional courses. We would appreciate suggestions for improving Teaching Wildlife from other instructors.

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From Business to Government to Schools, Wind Power is Creating New Opportunity

Wind power, long used on farms for tasks such as pumping water, is finally moving to the big city. The renewable resource, which is being used to aerate ponds and generate electricity, is producing surprising savings, ROI, and opportunity for a wide range of city folk – from businesses like John Deere dealers; to cities like Montpelier, ID; to schools like Sault College in Ontario, Canada and Autry Technology Center in Enid, OK.

Wind energy is the fastest growing source of electricity in the world. In the United States, a record 2,431 MW of wind power was installed in 2005, capable of producing enough electricity to power 650,000 typical homes. Resource assessments have found that the windy areas (class three and above) in the United States—if fully developed—could supply more than four times the nation's current electricity needs.

Empowering Business

A growing number of businesses are looking to wind power not only to offset rising power costs, but also to present a "green" marketing advantage. State-of-the-art technology improvements have convinced many that now is the time to act.

For the first time, the technology is designed for commercial farms or businesses on the electric grid, not just remote off-grid sites. Unlike traditional windmills requiring a complex DC to AC power inverter prone to breakdown, grid-compatible technology like Endurance's can provide up to 30% more power and greater reliability.

Van Houweling, Perry, Iowa, has installed an S-Series wind turbine by Endurance Wind Power. The unit is capable of producing up to 20,000 kWh per year, about 20% of the site's needed power. A larger unit capable of producing over 200,000 kWh per year is scheduled to produce about 85% of the power needed at his upcoming west Des Moines, Iowa site.

The renewable power provided by the wind turbine, along with other measures taken, helped the new BTI-Greensburg facility become the world's first LEED Platinum John Deere facility. LEED (Leadership in Energy and Environmental Design) is the U.S. Green Building Council's highest certification for sustainable design.

A number of features help users get the most out of the next generation technology: controls and electronics at ground level; a high wind sensor and dual disc brakes that automatically stop and release the rotors when appropriate; and remote monitoring and control of a turbine operation via a wireless interface.

Empowering Government

While the U.S. Department of Energy's "20% Wind Energy by 2030" report examines the feasibility of using wind energy to generate 20% of the nation's electricity demand by that date, current policies are of more immediate help to those looking at wind power.

As of March 2009, the federal government offers an investment tax credit for the purchase and installation of qualifying small wind electric systems, worth 30% of the value of the system, according to the U.S. Department of Energy Wind & Hydropower Technologies Program website.

Empowering Schools

As schools and communities face volatile energy costs, tight budgets, and a growing need for good jobs, some are harnessing wind power to generate energy and opportunity.

For instance, when Sault College recently installed a 35 kW Endurance wind turbine on-campus, they were the first college in Ontario, Canada to power their Student Life Center using renewable energy, while offering exciting hands-on learning opportunities.

As a learning tool, the turbine is its own classroom. Ironworker apprentices lower the tower as required; civil engineering technicians inspect the tower annually; and mechanical and electrical students learn how to maintain the turbine. Even the process automation students get involved, creating a system to analyze data and show how much power the turbine is producing.

"Because the turbine is essentially a scaled down version of large megawatt units, students get practical hands-on experience they can't get from a book," says Colin Kirkwood, Dean of Sault College's School of the Natural Environment, Technology and Skilled Trades. "Companies with wind turbines have already hired our graduates, and visiting international executives say they're looking for this type of skill set in new hires."

Sault College students are now working on a web-based control system interface that will make the wind turbine a learning tool for the wider community, according to Kirkwood.

"The goal is for prospective students, community members, even elementary, middle, and high school students to track our power generation and carbon credits via our website," explains Kirkwood. "More interactivity means more involvement."

The college's Applied Research Center will also offer applied research with the turbine to companies looking to enter the wind energy market.

"The turbine underlines our commitment to build a better environment," says Trevor Rising, P.Eng, Sault College's Supervisor of Maintenance and Construction. "It not only changed our skyline, it changed our way of thinking."

U.S. schools and technology centers are also taking advantage of wind-powered opportunities.

For instance, Autry Technology Center in Enid, OK, one of the five original technology centers in the state, selected a Model S-250 wind turbine by Endurance Wind Power.

"We chose the Endurance turbine as an economical opportunity to start generating our own power and provide students an actual working model for educational purposes," says Dr. Marcie Mack, Assistant Superintendent of Autry, which is part of the Oklahoma Career and Technology Education system which includes 29 technology centers with over 55 campuses and various programs within Oklahoma high schools.

With Autry's current Mechatronics program, the school teaches the fundamentals of topics such as pneumatics, fluid power, motor controls, industrial electricity, and programmable logic controllers. For students who want to go beyond the fundamentals and specialize as a wind technician, the school collaborates with other technology centers to help them achieve their career goals.

The wind turbine, which is about 126 feet tall and weighs 650 lbs., once generated 720 kilowatt hours in a two-week period, and generates an average of about 1100 kilowatt hours of power for school use each month.

"The wind turbine creates an awareness of the wind industry in our community," says Mack. "Other benefits to our facility are its safety features, quiet mode of operation, and its ability to connect directly to our power source."

While much is said about wind power's potential to produce clean, abundant energy without greenhouse gas emissions, in the near future more will be said about its ability to generate savings, jobs, and opportunity.

For more information about wind-powered energy, visit http://www.endurancewindpower.com/.

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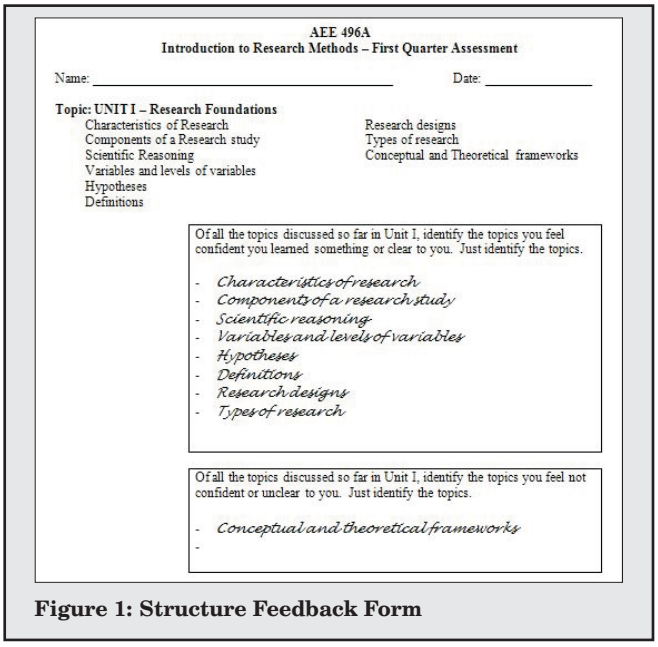
Structured Feedback: A Tool for Teaching and Learning

A three-fold approach to teaching based on learning (new knowledge acquisition); application (transferring that new knowledge to real life situations/settings), and; reflection (refining and adjusting content and delivery) is very important for teachers to prepare students in the emerging global society. This three-fold approach also offers a unique setting for learners to attain the knowledge and skills needed for higher order learning and thinking. In the following paragraphs, we describe a strategy, "Structured Feedback" that we have used in our efforts to improve teaching and learning at the undergraduate level. First, we define the strategy and describe the process used to implement the strategy. Second, we present results of its use in two courses and comment on student and teacher perspectives on the use of this teaching strategy.

Structured Feedback is a mid-semester learning/assessment tool designed to provide feedback to students and for the instructor to adjust teaching during the course of the semester. In Structured Feedback, students respond to their level of confidence in learning (or not learning) the content/topics presented in class (see Figure 1). Each student in class is provided with a Structured Feedback form to indicate their perceived level of confidence on the topics/concepts discussed in class. The form is divided into two sections. Section one contains the course # and title, space for writing student name, date, and lists topic/concepts discussed in class. Section two contains two boxed areas for students' responses. Students write the topics/concepts with which they are confident in the "upper" box, and write topics/concepts with which they are not confident in the "lower" box (see Figure 1).


AEE 496A
Introduction to Research Methods – First Quarter Assessment

Name: _____ Date: _____

Topic: UNIT I – Research Foundations

Characteristics of Research
Components of a Research study
Scientific Reasoning
Variables and levels of variables
Hypotheses
Definitions
Research designs
Types of research
Conceptual and Theoretical frameworks

Of all the topics discussed so far in Unit I, identify the topics you feel confident you learned something or clear to you. Just identify the topics.

- Characteristics of research
- Components of a research study
- Scientific reasoning
- Variables and levels of variables
- Hypotheses
- Definitions
- Research designs
- Types of research

Of all the topics discussed so far in Unit I, identify the topics you feel not confident or unclear to you. Just identify the topics.

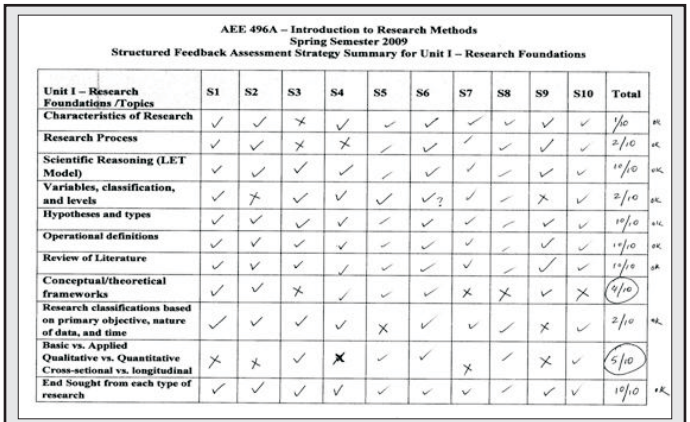
- Conceptual and theoretical frameworks
-

Figure 1: Structure Feedback Form

The instructor gathers the Structured Feedback responses from each student and summarizes the responses to determine which topics or concepts students are confident and comfortable with and which topics or concepts students had difficulty understanding or need emphasis or reinforcement. An example summary of responses of all students are

recorded in a matrix table format (Figure 2) where the concepts/topics are listed on the left column of the matrix table while the student identification numbers are listed on the top row of the matrix table. As feedback, each student receives an individual Structured Feedback sheet and summary of responses (matrix table) for the entire class. Responses from left to right in the matrix table (Figure 2) reflects the overall response for the entire class, while the responses from top to bottom reflect individual student feedback.

The matrix table helps the instructor to make adjustments for the entire class as well as attention to individual students in the class. For example, as shown in Figure 2, student # S3 needs emphasis in three of the topics, while the overall class needs reinforcement on topics such as conceptual/theoretical frameworks, and research classification topics. Other ways the matrix table can help the instructor include: 1) reemphasizing a particular topic or concept, 2) changing and/or adapting teaching style, 3) giving additional examples to clarify, and 4) meeting with individual students requiring further assistance.



AEE 496A – Introduction to Research Methods
Spring Semester 2009
Structured Feedback Assessment Strategy Summary for Unit I – Research Foundations

Unit I – Research Foundations /Topics	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	Total
Characteristics of Research	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	9/10
Research Process	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	8/10
Scientific Reasoning (LET Model)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10/10
Variables, classification, and levels	✓	✗	✓	✓	✓	✓?	✓	✓	✗	✓	8/10
Hypotheses and types	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10/10
Operational definitions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10/10
Review of Literature	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10/10
Conceptual/theoretical frameworks	✓	✓	✗	✓	✓	✓	✗	✗	✓	✗	4/10
Research classifications based on primary objective, nature of data, and time	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓	8/10
Basic vs. Applied Qualitative vs. Quantitative Cross-setional vs. longitudinal	✗	✗	✓	✗	✓	✓	✗	✓	✗	✓	5/10
End Sought from each type of research	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10/10

Figure 2: Summary Sheet (Matrix Table) for Structured Feedback Responses

We have used this strategy in two different courses at the undergraduate level. Student reactions have been very positive and almost all students agree that this teaching strategy helped clarify doubts they had about certain concepts/topics. Overall, students agreed that this strategy helped them identify where they need further help or reinforcement on key concepts discussed in class. Select student comments included:

"I really liked this because I can ask the teacher to help in a systematic way."

"One way of showing that the whole class or very few students understood the concepts taught in class."

From the instructor perspective, this strategy has helped to re-examine and re-evaluate time spent on a topic and corresponding evaluations. Further, the use of this strategy helped refine teaching skills, provided mechanisms to deliver feedback to students on a regular basis, and gave confidence that the students are learning as evidenced by performance and participation. From the students' perspective, students realize that they are responsible for content if they missed class. Structured Feedback is a valuable tool for both teacher and students in terms of reinforcing key concepts; in preparing or reviewing for exams; in changing teaching style or strategy; and making mid-semester adjustments.

The Structured Feedback strategy may not be applicable as defined in the setting of a large class because of its inherent time/effort requirements. However, creative use of instructional technology may address this limitation. Also, providing timely and frequent feedback to students is critically important for this strategy to be successfully implemented and to be of value to students and the instructor. As we try to improve this strategy further, we plan to explore: 1) how to capture or account for higher level learning objectives, 2) the amount of time spent on each topic and corresponding feedback, 3) other assignments to show linkages to learning objectives, and 4) linkages to test performance.

Rama Radhakrishna, John Ewing, Naveen Chikthimmah, & Tracy Hoover
The Pennsylvania State University

NACTA Yesterday

50 +/- Years ago *(Vol V, No 2, 1961)*

"Only those who no longer are alive make mistakes," someone has said. It is obvious at this point (and most confusing) that the present editor in setting up the numbering system for the publication used very poor judgment in inventing a "convention" year instead of using the calendar-year. In order to prevent further confusion, we are starting to number on calendar-year basis with the first issue in 1962. It is a well-know fact that a regular quarterly schedule has not been followed.

The first two issues in 1957 and 1958 were called NEWSLETTERS, since the third issue in August of 1958 the term JOURNAL has been used.

30 Years ago *(Vol XXIV, No 2, June, 1980)*

A report of agricultural enrollment in member institutions for the fall of 1979 showed that junior and senior classes are larger than freshman and sophomore classes, suggesting that transfer programs are becoming more prominent. The sophomore class is slightly smaller than the freshman class, perhaps due to attrition. The junior class is substantially larger than the sophomore class, possibly reflecting the size of the transfer group. The senior class is larger than the junior class, perhaps because some require more than the typical eight semesters to graduate.

Nationally the graduate enrollment is roughly two-thirds in masters programs and one-third doctorial students.

The composition of national enrollment is roughly 90,000 undergraduates, 13,000 masters and 7,000 doctoral students.

The distribution of undergraduates by the broad catagories or fields are as follows:

Field	Percentage
Animal Science	19.3
Related Sciences	15.9
Natural Resources	15.9
Plant-Soil Science	15.2
Social Science	15.1
General Agriculture	10.5

Because the 1978 data did not distinguish between undergraduate and graduate women, the trends cannot be stated with confidence. If the 1978 data included only undergraduates, then the percentage of women stayed at approximately 30%. Because of incomplete data for graduate women, we can assert only that a least 5 % of the graduate students are women.

20 Years ago *(Vol XXXIV No. 2, June, 1990)*

Danny Terry from Central Missouri State University suggested that NACTA become a facilitator/coordinator of one or more international exchange programs, serving as a central focal point in the process. Information and details about an upcoming exchange could be published in the NACTA Journal….perhaps a member of the International Agriculture Committee would coordinate students wishing to experience agriculture in an international setting.

On a broader scale, perhaps the NACTA Journal could serve as a "notice board" for student exchange of various types….Would NACTA involvement in international education be possible, beneficial, and feasible? ….there is a possibility that NACTA can make important contributions and have a significant impact on the teaching and understanding of agriculture on an international level. Thus I challenge each NACTA member to consider these possibilities. (Note: Danny was one of the first members to encourage NACTA to become engaged in international exchange)

10 Years ago *(Vol. 44 No. 2, June 2000)*

At the NACTA meeting at Delaware Valley in Doylestown, Pennsylvania the Distinguished Educator Award was presented to Dr. Robert C. Sorensen. Dr. Sorensen has been an active NACTA member for 23 years. He served as Nebraska State Coordinator for 20 years, as Central Regional Director for 3 years, and as Chairman of the NACTA Journal Award Committee for the past five years. He taught Soil Resources, Soil Nutrient Relationships, and Agronomy Sophomore Seminar. He has taught in the University Foundation Program for New Freshmen, and also serves as the Undergraduate Teaching Coordinator for the Department of Agronomy.

Dr. Sorensen has received the Teacher Fellow Award, the Outstanding Teacher Fellow Award, and the E. B. Knight NACTA Journal Award. At the University of Nebraska he has received the Distinguished Teaching Award, the Instructional Innovation Award, the Gamma Sigma Delta Teaching Award, and the Recognition for Contributions to Students five times. The Soil Science Society of America honored him with the Resident Instruction Award. He is one of two faculty members from the College of Agricultural Sciences and Natural resources to be selected for Academy of Distinguished Teachers at the University of Nebraska. (Note: Dr. Sorensen was a model of the academic scholar and was a leader in NACTA and a role model for others)

Jim McKenna
NACTA Historian

Prairie Fire

By Dan Armstrong, iUniverse, Lincoln, Nebraska, 2007, Paperback, $25.95, 483 pages, ISBN 0-595-43398-7.

Can novels be used in courses on production agriculture? In general, our first challenge is to engage students with sometimes complex material, for them to learn the principles, and then to apply information to real-world situations. Yet equally or more important is to encourage critical thinking skills and an ability to evaluate the relevance and applicability of in-class topics and learning to contemporary challenges in agriculture and the food system. Prairie Fire is in fact a novel that may help achieve the goals of achieving relevance and promoting responsible action. The book is more than a totally engaging story that captivates the reader as if it were a Dan Brown suspense adventure. It reflects careful research and analysis of a modern-day systemic problem in the global food system, and provides a strong political statement that questions the organization of our most important industry as well as our basic values. What could be more useful for a university course?

Author Dan Armstrong is editor and owner of Mud City Press in Eugene, Oregon and has written extensively on political and environmental issues. In Prairie Fire, he weaves a complicated story of the plight of modern day farmers who are dependent on monoculture systems and expensive production inputs such as seed, fertilizer, and chemical pesticides. In the U.S. Midwest they are locked into a marketing system for grain crops that is dominated by a handful of large, multinational corporations whose power and control were described in Merchants of Grain by Dan Morgan in 1979. Prairie Fire begins with a protest directed toward this power and economic domination, when several farmers burn their crops just before harvest in order to deprive the corporations of windfall profits from a wildly fluctuating international wheat market. A Missouri farmer and leader of the National Grange sees this as an opportunity to mobilize farmers across the country in a coordinated strike that would not only bring attention to their fragile economic position but also to the exorbitant profits reaped by a few companies capable of manipulating world supply and prices.

Farmers going on strike in 2016? As hard as this is to believe, through the internet it has become possible to organize a widely dispersed group of farmers with common concerns. A meeting of farmers in Kansas creates a movement that quickly captures the interest and support of wheat growers across the country. With multiple sub-plots that include a coalition with Montana-based militia, a decorated war hero from Afghanistan turned wheat farmer in Kansas, a socially-concerned reporter in Washington, and various caricatures of leaders in government, military, and the business establishment, the novel unfolds across the Midwest but jumps to the oil fields of Central Asia and the financial hub of Singapore. More than a device to build suspense, these forays abroad illustrate the total connectedness of world financial and grain markets and the consequences of a globalization of economics that transcends any single government. What unfolds is an intriguing and even believable saga of the potential consequences of financial and political power run amok, and the populist reaction that sounds plausible even in the conservative farming culture of the U.S. heartland.

From the agricultural angle, Prairie Fire is exceptionally well researched, with timely and appropriate information about how wheat is grown and the complicated interactions among crop, soil, and weather and how current systems are highly dependent on purchased inputs from outside the farm and the region. Information about soil fertility and fertilizers, crop dependence on timely rainfall, and protection from insects and pathogens is provided in a credible form. From the grassroots level of the farm to the intricacies of the complicated international grain trade, the details are laid out well. Traders who have perhaps never seen a wheat drill planter or a combine for harvest expose us to the potentials of manipulation. To combat this power, the farmers arrive at a solution that is against their very principles, and their commitment to produce food for a hungry world. Although the suspense of the narrative keeps the reader engrossed, the ending is less than conclusive, leaving us to speculate on what could happen if any of a number of scenarios were followed. This is the beauty of a well-told story.

To the informed reader, the book brings up memories of the battle between wheat farmers and the Pacific and Southwest Railroad described in The Octopus, by Frank Norris, published in 1901. Its hard-hitting expose of corporate greed reminds us of the meat packing industry and The Jungle, from 1906, by Upton Sinclair. And the level of power and influence of the grain companies even today could be considered parallel to that described in The History of the Standard Oil Company, in 1904, by Ida Tarbell. The plight of farmers that was characterized by the Joad Family in The Grapes of Wrath, in 1939, by Pulitzer and Nobel Prize winner John Steinbeck rings true for wheat farmers today in the Midwest.

This list of literary triumphs is formidable, but Prairie Fire has the potential to raise awareness and

lead to social change in ways similar to each of the above. For this reason, the book could be considered as an essential reading in courses in Agroecology, Agricultural Economics, Policy and Political Science, and Rural Sociology. One should be warned that there is explicit sexual content and violence in the book, perhaps used by the author to sell more books. Providing alternatives for concerned students could be an option. When the sexual content is mentioned during the introduction of class assignments, of course, it could be an incentive for people to read a book that they would otherwise skim through quickly. Undoubtedly, this is can broaden the perspective of how the wheat industry functions in a compelling way that few textbooks could achieve. It is sure to catalyze valuable discussion about corporate agriculture, moral and ethical issues, and the long-term future of agriculture and the global marketing system. What more could we hope for in our classes and seminars?

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Harnessing America's Wasted Talent: A New Ecology of Learning

By Peter Smith, Jossey-Bass, A Wiley Imprint, San Francisco, California, hard-cover, 179 pages, $40.00, ISBN 978-0-470-53807-4

Peter Smith's book offers interesting concepts of perceived transformations that may well be necessary for implementation by institutions of higher education; especially for those who have a high degree of competency but their career promotions are hampered by not having a college degree. Smith presents thought provoking new teaching methods for learning and teaching because of today's school failings and their consequences. The book focuses on three ways that traditional universities hinder students' academic growth that leads to wasting their respective talents. Smith then introduces a new paradigm that uses technology to exploits personalizing education for every learner that meets their specific career needs.

Chapter 1 builds a case for the value of learning outside of College. Smith describes the "Law of Thirds." He claims that roughly one-third of ninth-graders in American schools do not graduate from high school; one-third have graduated from high school but have no college education; and one-third go on to college but only 20% had at least an Associate's Degree within ten years. He makes the claim that an academic marketplace that emphasizes credentials over competence dominates the system at the workplace.

Chapter 2 addresses issues as to why our system of higher education is not a system at all because it is a collection of highly autonomous, independent institutions, vigorously resistant to any overarching or outside controls. Despite the diversity of mission, orientation, and governance, the operating structure and assumptions behind how colleges operate have changed less over the last three hundred years than any other western institution.

Chapter 3 describes the characteristics of how people learn personally. One trait of learning is that it's always purposeful, Learning happens because the learner wants it to happen. People learn in whatever ways they learn best.

Chapter 4 speaks to why so many older adult learners simply drift with the tides of life, choosing not to engage with enrolling in college courses. Smith makes the claim that colleges historically see the rejection and failure of students as a necessary part of their business. He further claims that colleges can justify rates of failure because part of their accepted societal role has been to winnow out "less capable" students, leaving the value of higher education to those who could achieve from it.

Chapter 5 explains an interesting premise that colleges place high barriers between the learning done outside of the school and academic progress toward a degree inside school. The denial of experiential learning done outside of college is grounded in the concept that learning of value can only happen in academic settings. He goes on to say that learners are trapped academically by their unrecognized on the job learning.

Chapter 6 describes anecdotes to show how institutions of higher learning protect academic standards as an academic dodge to avoid engaging change. He cites examples that persons who want to change programs in a different institution in a different state need to repeat courses because the institution use the "not completed here" stamp to discount successful and legitimate learning completed elsewhere. He makes the claim that this academic smugness has become a current-day seething scandal.

Chapter 7 shows how our system of higher education is based on and organized around the principle of scarcity and that the resources needed to provide an education must be collected in one place – a campus- because there is an insufficient supply of those resources in the general community. Colleges are built around the curriculum. They organize facilities, faculty, libraries, and laboratories to house, support, and entertain the students who come to learn. In this chapter Smith introduces a historic foundation for teaching and learning. He talks about the availability of high-quality curricular content to previously un-served learners with online opportunities for teaching and learning that have not existed before.

Chapter 8 Smith expresses his views on exportation of curriculum content and assessment of learning from the classroom to the Web. In this model the responsibility for presenting the material and evaluating learning is no longer the private and individual professional responsibility of each faculty member in a classroom; it is now the responsibility

shared between the individual faculty member and instructional designers.

Even though there is some redundancy in the book, I recommend that NACTA colleagues read it because Peter Smith makes the reader think about our system of higher education as it relates to meeting the educational needs of future generations. There are places where the reader will strongly agree and disagree with the innovative points Smith brings forward for others to contemplate. A change in higher education is never easy.

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Crop Rotations in Organic Farming: A Planning Manual

By Charles Mohler and Sue Ellen Johnson, Editors. Natural Resource, Agriculture, and Engineering Service, NRAES-177, Cooperative Extension, Ithaca, New York. July 2009, paperback, 156 pages, $24.00, ISBN 978-1-933395-21-0.

While there are numerous books that include research results and recommendations on crop rotations for organic farming and horticultural crop production, few are completely dedicated to the practical details of rotation design. In Crop Rotations in Organic Farming, editors Charles Mohler at Cornell and Sue Ellen Johnson from the New England Small Farm Institute bring university research and farmer experience together into a practical volume that will prove useful to students and farmers alike.

Based on a three-day intensive retreat with 12 experienced organic farmers, two of the chapters describe how rotations contribute to soil health, pest management, soil tilth, and robust diversity in the soil microbial community. These enhancements through rotation can lead to reduced production costs, diversity in the field environment as well as the product mix, and both biological and economic resilience. The farmers also provided details on their specific rotations with four- and five-year sequences of vegetable crops. There are two examples of three- and five-year rotations of field crops. All of these are proven models that have given good results in the field.

One useful component of the book that emerged from the retreat was a series of figures and charts that describe the sequence of decision making on the farm, starting with the goals of the farmer and family and moving through logical steps of assessing available labor and facilities, plus exploring markets, toward the sequencing of crops and decisions on how to bring the pieces together. The farmers emphasize the importance of scouting out markets for organic vegetables and grains before planning the field implementation steps, since it is essential to have a good handle on the marketing and economic dimensions before making needed investments in organic rotations.

In a key chapter on the important processes in crop rotation, several researchers explore the details and mechanisms of how and why rotations work well in the field. These include the restorative power of grass and legume sod crops and the all-valuable cover crops that can be planted between cash crops. Ways that rotations of non-similar species interrupt weed, insect, and pathogen reproductive cycles are described, along with emphasis on sequences of legumes with cereals, summer with winter crops, and perennials with annuals. Although there is a science foundation to the chapter in each section, the language is accessible and explanations clear for those with minimal science background.

A number of specific examples of rotations and how to plan them for the long term provide practical guidance to a person with limited experience in organic farming and horticulture. Examples of work tables for planning what species to include, what areas of each to plant, planting and harvest dates make this a useful "cookbook" with several "menus" for how to proceed with the all-important preparations for a profitable and environmentally sound organic system.

Special attention is given to the conversion process, a three-year period in the U.S. to move from conventional to organic production. New to many readers will be the chapter on different types of intercropping, where two or more species can overlap in their growth cycles or be planted together in the same field. The combinations of crops that are most compatible are listed in a table. Of particular value to farmers and students of agriculture in the Northeast U.S. are the appendix tables of crop characteristics, problems that can occur with some crop sequences as well as rotations that promote success, sources of inoculums for common pathogens, crop pathogens that are most frequently found, characteristics of common weeds in this region, and a useful list of references.

For researchers seeking a technical treatment of any of these characteristics and mechanisms of rotations, there is much greater depth in the primary literature. For the student or farmer who wants a single source of practical information on how and why rotations should be developed, this is an ideal resource to have on the shelf. The book is practical, easily understood, and based on solid research as well as farmer experience. It can be highly recommended for an introductory course in agronomy, and especially for the study of organic farming.

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