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Honor Codes: Do They Promote an Ethical Culture at Land Grant Universities?1

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Abstract
The aim of this study was to examine the comprehensiveness, quality and completeness of honor codes, as ethical artifacts, used by 1862 Land-Grant Universities. This was achieved by taking the codes and comparing them against one another and evaluating whether they meet the qualifications set forth by Turner and Beemsterboer (2003). Narrative document analysis of the honor codes provided on the institution’s webpages was the primary methodology for this qualitative exploratory study. The findings showed, generally, that universities did not provide the necessary inclusions which qualified an honor code as being effective. No distinct pattern emerged in regards to the necessary elements laid out by Turner and Beemsterboer (2003), although it is important to note that a small portion of the sample far exceeded the norms of the majority. An even smaller percentage went so far as to distinguish the differences in the values stated by the university mission and those proposed in the honor code. The results of this study prompted many recommendations. The most prominent being a call for increased education on honor codes and the policies surrounding them.

Keywords: honor codes, ethics, student learning

Introduction
Most universities claim as their purpose the development of ethical and civic minded citizens. One of the ways that universities institutionalize this process is the development and enforcement of university honor codes. It is assumed that the use of honor codes promotes an ethical culture. Nevertheless, despite the efforts of academic institutions, academic dishonesty continues to rise. Whitley (1998) conducted a meta-analysis of studies on academic dishonesty and found that more than 70% of college students engage in acts of academic dishonesty. In a more recent study, Rettinger et al. (2004) noted 83% of the students self-reported cheating at least once while in college. While this statistic may be surprising for some, it shows the prevalence of academic dishonesty. Harding et al. (2004) found academic dishonesty in high school was a good predictor of the same behavior in college among engineering students and the dishonesty did not stop there. Those same students were also more likely to violate workplace policies and make other unethical decisions as professionals. Because of this, it is imperative for universities to make a positive impact on academic honesty during the process of college student development.

Previous research indicates that many different factors influence academic dishonesty (Turner and Beemsterboer, 2003; Yahr et al., 2009). Among these factors, the existence of honor codes or codes of conduct at an institution, appears to correlate with a lower incidence of student reported cheating (Arnold et al., 2007; McCabe and Trevina, 2011). Another factor influencing academic honesty is the social norms of the classroom (Jordan, 2001; Whitley, 1998). If students feel their peers are cheating, they are more likely to engage in cheating as well. It is possible that the existence of an honor code creates a social norm that discourages academic dishonesty (Konheim-Kalkstein et al., 2008).

Honor codes take many forms, from simple statements to extensive documents. At some institutions, students are asked to follow these statements but are not required to sign an agreement. At other institutions, students are required to sign the university code of conduct, thus establishing a contract of behavior. The impact of honor codes is influenced by how well they are communicated and integrated into the university culture, as well as the consistency with which they are enforced (McCabe and Trevina, 2011; Molnar and Kletke, 2010).

Conceptual Framework
Ethics and organizational culture are perpetually linked. Organizational culture includes “sets of structures, routines, rules and norms that guide and constrain behavior” (Schein, 2004, p. 1). Organizational culture influences the way organizations view ethics and morality and codes of ethics influence the typology of the organization. The first step of understanding organizational culture is to discover the cultural typology, which

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Honor Codes

governs these organizational nuances. When one can diagnose cultural typologies, it gives vast insight into the everyday workings of that organization. By looking at artifacts and espoused believes and values, researchers can assess behavior.

Given the variety and complexity of most university’s honor codes, as well as the different organizational cultures in which they reside, it is difficult to know all elements of a sound honor code. Before the recent upsurge in honor code creation, Turner and Beemsterboer (2003) outlined nine elements of an effective and constitutionally valid honor code. The elements include:

1. a statement of values endorsed and upheld by the code
2. a list of enumerated violations
3. a list of sanctions for violation of a code premise
4. a description of the governing judiciary group responsible for upholding the code
5. a description of the process to be followed should a violation be reported
6. a statement of confidentiality of the process and outcomes
7. a provision for recording proceedings
8. a provision for a written decision within a specific time period
9. a provision for appeal if the outcome is averse to the accused (p. 1125)

These nine elements for an effective honor code will be the deductive lens for which the researchers will analyze honor codes for the 1862 land-grant universities.

Purpose of the Study

While general studies of academic dishonesty have been conducted, no research has compared 1862 Land-Grant Universities with elements of accepted best practices in honor code development. This study seeks to fill that void. The first step of understanding the impact of honor codes on creating and maintaining an ethical organizational climate is to examine the artifacts of the culture (Schein, 2004). For a university, there is no better ethical artifact than the honor code. The purpose of this study is to compare honor codes or codes of conduct among all 1862 land-grant institutions in the United States and to assess their effectiveness in promoting an ethical culture within the parameters given by Turner and Beemsterboer (2003).

Methods

For this qualitative exploratory study, the central research methodology was narrative document analysis. By using public webpages dedicated to the university’s honor code as the primary source of information, the researchers could access the honor artifact as the student or any consumer of public records would. This added a layer of organizational authenticity.

Merriam (2009) notes document collection via the internet has improved qualitative studies. In gaining access to information otherwise hard to obtain by traditional methods of data collection, studies are deeper and richer. This study is no exception. The increase of public information acts has forced institutes of higher education to become more transparent with student codes.

1862 land-grant institutions were chosen as the population given their similar tripartite missions. Institutions with similar missions are more likely to have similar organizational cultures (Schein, 2004). A list of 1862 land-grant universities was downloaded from the Association of Public and Land-Grant Universities’ website (APLU, 2011). Due to the organizational structure of non-continental United States universities, they were excluded from the data collection. The university web-sites for the remaining 50 institutions were searched for honor codes or honor statements via the internal web-site browser. Of the 50 universities, 45 yielded public data, which contained honor codes. Five of the university’s honor codes and systems were available only to students via password-protected sites.

The information from each university was downloaded and printed. Deductive data analysis was performed on the collected data from each university. Using the framework of Turner and Beemsterboer (2003), the researchers utilized data based on the nine identified elements. Content analysis produced unitized data, which were then deductively coded into their corresponding categories. Convergent as well as divergent patterns emerged from the data. To ensure credibility of results, an expert audit review produced a positive conformability judgment (Patton, 2002).

Results and Discussions

Holistically, the United States’ land-grant institutions have not provided the necessary inclusions, outlined by Turner and Beemsterboer (2003), which would denote an honor code as being effective and constitutionally valid. And if they have, the data would be uncovered only if one was willing to follow a winding path to uncover all the intricacies. Though, as in most situations of broad comparison, a small portion of the sample has exceeded the norms of the majority. All nine of the elements produced interesting results, most of which followed no sort of pattern. While certain components were found in nearly all the honor codes, others remained a rarity.

Statement of Values

Nearly 90% of the honor codes evaluated in the research contained a specific statement of the values that they upheld and endorsed. These ideals were meant to reflect the school’s mission and vision. They ought to encompass an attitude towards morals, ethics and the importance of character. They should also mention a dedication to, not only teaching, but also research and extension. It is easy to understand why this was such a popular feature. It is the simplest to write and least legalistic in its nature. Even more interesting was the fact that there was not much variation among these statements. Most were summarized in one sen-
tence and nearly all included words such as “integrity,” “honesty” and “ethical.” The University of Arkansas eloquently articulated these values in the preamble of their Academic Integrity Statement:

“As a community of scholars, we uphold academic integrity and our Honor Statement as foundational to appropriate conduct within the university setting. The fundamental trust that work presented as one’s own truly represents one’s own intellect and effort underlies our mission as an educational, research and service institution; moreover, this trust is central to our peers’ recognition of the value of a University of Arkansas degree. Thus, this document represents a deeply- and commonly-held set of values. (University of Arkansas, 2011, para. 1)

It can be concluded that 1862 land-grant universities do a good job of not only identifying values, but also communicating their values. Because of the tripartite mission, land-grants often must discuss their mission with constituents (Herren and Edwards, 2002). It is also worth noting several universities intertwined the meanings of ethics and morals. These two words, while similar, have very different meanings (Pojman and Fiser, 2009). Ethics has to do with individual decisions and intent while morality is how ethical decisions affect others around you. It would add clarification to honors codes to not only delineate these, but describe violations and sanctions in accordance.

Enumerated Violations

Enumerated violations encompass those behaviors and actions that are prohibited. Turner and Beemsterboer (2003) noted a disclaimer should be included in this section. The provision should point out that the behaviors chronicled in this section will fall under a broad classification, and the enumerated list might not be extensive enough to afford every possible infringement. This was another component that was covered in majority of the honor codes. Just over 80% of the institutions provided a list of unacceptable conduct. As a rule, the schools that included this element listed behaviors that could be considered consistent with common views of violations. Cheating, plagiarism and falsification were terms collectively found within the sample. Some even went so far as to provide a detailed definition of what actions would qualify a behavior as a violation. This was a noteworthy finding, because most would assume that the definitions would be nearly identical across the board. But, there was a significant amount of discrepancy from one document to the next. For example, Purdue offers a harsh definition of plagiarism by calling it, “a special kind of academic dishonesty in which one person steals another person’s ideas or words...” (Purdue, 2009, para. 4). On the other hand, Iowa State University provides a much milder explanation by categorizing plagiarism as “misrepresentation of another’s work as one’s own” (Iowa State, 2011, para. 4). There is a sizable amount of room left open for interpretation between the ideas of stealing something versus merely misrepresenting it. Instances also existed where one institution would provide a violation that others had overlooked. Texas A&M University sets this precedent (Texas A&M University, 2011) by its consideration of complicity as a punishable behavior. An individual can be found guilty of academic dishonesty just by making it possible for another to commit misconduct. Complicity differs from most of the other acts in that it is a third-party violation.

The variation of language between and among universities led the researchers to question the meanings of each violation. While some universities were clear on the meanings and variations of a violation, others left a lot to speculation. For students to construct a deeper understanding of violations, less ambiguity in violation statements is necessary and will lead to a stronger ethical climate.

Sanctions for Violations

In most cases, when an honor code provided a list of enumerated violations, it was followed at some point by sanctions that could possibly be administered if a student or faculty member was found guilty of the charges. Nearly 70% of the sample provided a description or listing of possible sanctions. Just under half of that group included this element immediately following their listing of violations. The other, roughly 40%, incorporated sanctions into other sections of their honor code. Often, it was found in the portion of the code detailing the procedures that would be followed if a violation were to occur. Popular forms of punishment included a failing assignment or course grade, required public service, or expulsion from the university. Many of the institutions used in the research also gave themselves the option of offering an XF sanction. Mississippi State University is one these schools. Its honor code states that this penalty is “intended to identify a student that has failed to uphold the values of academic integrity” (Mississippi State University, 2011, para. 15). A guilty student will carry the XF indication on their transcript as a sign that their failure in a course was due to academic dishonesty.

While sanctions were found in almost all codes, they were often in anomalous places. Consumers of the honor codes might have difficulty finding the sanctions. This could be an issue not only for students, but also professors who are in the process of either assigning sanctions or going through the judiciary process.

Governing Judiciary Group

When accusations as serious as academic dishonesty are being made, it is imperative for a university to have a group of individuals charged with managing the proceedings. Turner and Beemsterboer (2003) articulated the necessity for including, not only a detailed description of this governing judiciary body, but also information pertaining to membership qualifications and the process involved with committee selection. One-half of the honor codes that were examined included a segment dedicated to referencing or detailing the duties and composition of the group charged with oversee-
Honor Codes

ing the proceedings. For the most part, the descriptions had common threads of characteristics than ran through them. Findings showed that they were typically comprised of students, faculty and non-faculty members. The Ohio State University boasted the largest panel with thirty-six members (Ohio State University, 2007, para. 37). A majority vote seemed to be the most common way to determine if an infraction had occurred. While there were noticeable norms, some of the universities failed to meet them. For example, the University of Delaware’s Code of Conduct designates a verdict is to be decided on by the faculty member responsible for the accusation and a representative from the Office of Student Conduct (University of Delaware, 2011, para. 2). But, it fails to describe how the representative is chosen and what qualifications he/she was required to meet.

It can be concluded there is not a consistent view of judiciary groups shared by 1862 land-grant universities. The variation includes not only make-up but in group processes. While the majority were made of faculty, staff and students, the combination and number represented varied greatly. There was also a consistent lack of transparency among the university honor codes. It was not clear how one would become part of the governing judiciary group. Qualifications needed and training required were assumed but not specified for most of the honor codes.

Process Description

Due to the legality that is a fundamental part of dealing with academic dishonesty, it is essential for an honor code to list the process that should be followed when a report is made. The documents should be written with the Fifth and Fourteenth Amendments to the United States Constitution in mind (Turner and Beemsterboer, 2003). The safeguards guaranteed by these amendments play a significant role in guaranteeing an individual’s right to due process of law. Some would question how the right to due process of law is applicable in a university setting. It comes from the understanding that once a student is admitted into a class, they are considered to have property interest in their education (Turner and Beemsterboer, 2003). Of the seventy percent of the schools that provided a process description, there was much variation. While some dedicated several pages to intricately detailing every aspect of the procedure, others would reference the judiciary process described in the general Code of Conduct. Still others, such as the University of California, Berkeley, provided a flowchart as a visual representation of the steps to be followed (University of California, 2004).

Making the process as simple as possible while maintaining the integrity of the system is important to the honor code system. It can be concluded the variation has more to do with the organizational composition of the honor code office (if there is one) than the values associated with the university.

Confidentiality

Even if an individual’s actions are not considered respectable or ethical, they still possess a right to privacy. An effective honor code should include a provision stating details on the confidentiality of the entire process and resulting outcomes. Of all the elements researched, this was the rarest. Findings showed a mere 18% of the sample even mentioned the accused individual’s right to privacy. This means over 80% of these land grant institutions are in direct violation with the terms established by the Federal Family Education Rights and Privacy Act (FERPA) of 1974. FERPA dictates that situations of this manner should be kept strictly confidential.

While FERPA is a concern all universities must address, the right of fair proceedings is sometimes sacrificed. All 1862 Universities should review this section of their honor codes to include privacy and confidentiality issues.

Recording of Proceedings

The consequences that might possibly result from a guilty verdict on a charge of academic misconduct could dramatically alter an individual’s life. Because of this, it is particularly important that there be no mistakes made or inconsistencies discovered in the records kept throughout the process. Over 60% of the schools sampled made note of some type of documentation to be kept. A few even went so far as to include provisions for audio and video recordings of the hearings. Research showed that this element, while seemingly simple, could be a complex and in-depth process. An institution must establish rules determining the length of time to save the documents and the availability of the records to the accused person and university officials. An individual should also be named to be responsible for the safekeeping of the records. The University of Vermont’s Code of Academic Integrity exemplified these qualifications by adequately addressing each topic (University of Vermont, 2011).

We concluded recording judicial processes is imperative in the transparency and fairness need to protect both the accuser and the accused. Audio as well as video recordings are now easier to conduct and save.

Time Period for Written Decision

Turner and Beemsterboer (2003) expressed the responsibility of university officials to provide notification to the accused individual within a certain time period. This is necessary to prevent delays caused by a slow litigation process or bureaucratic holdups. Only 30% of the land-grant institutions included in the research acknowledged this element. A significant amount of variation existed between the given time periods. There was not a recognizable pattern in regards to their length, or what decision is being provided. Some included a provision for notifying the accused individual of whether a hearing would be necessary, while some gave notice of a verdict. Still, others wrote this section pertaining to notice of what sanction had been chosen. Although it was a given characteristic this notification was to be
delivered in writing, some honor codes went so far as to say it must be sent through certified mail with verification of receipt. The University of Georgia’s Academic Honesty Policy was an example of this. It reads, “The decision of the Academic Honesty panel shall be mailed by the Office of the Vice President for Instruction to the student by certified U.S. mail and to the instructor(s)…” (University of Georgia, 2007, para. 69).

There is no pattern in the notification processes between 1862 land-grant universities. In one instance, it could take up to 120 calendar days before a student was notified of the judiciary decision. The ramifications for not having a publicized procedure outweigh the benefits. All universities should not only include the notification timeline in their honor policy, but also make it as prompt as possible.

**Appeals**

One can easily expect an accused individual to disagree with a decision when the judiciary body does not rule in their favor. So, it is necessary to include a provision that states the procedure to be followed in case an appeal is filed. Just over half of the sample provided this. In most cases, this element remained consistent from one university to the next. On the other hand, the University of Massachusetts, Amherst was very specific about circumstances that must exist for an individual to file an appeal. It requires a discovery of a rule violation during the hearing or submission of new evidence before one is allowed another hearing (University of Massachusetts, Amherst, 2011, para. 21).

Those universities which provided an appeals process were specific and detailed. Those universities, which do not discuss the appeal process, open themselves up for possible litigation.

**Recommendations**

Social learning theory states people learn by observing and then emulating the values, attitudes, and behaviors of people they find legitimate, attractive, and credible (Pojman and Fiester, 2009). The validity of this statement has a direct impact on honor codes and student behaviors in institutions of higher education. While the vast majority of 1862 land-grant universities articulated their values, few delineated between university mission values and honor code values. By not only expanding their definitions of ethics versus morals but linking values in the honor code with university mission values, land-grant universities could strengthen their honor codes and begin to perpetuate an ethical organizational climate.

It is also recommended that universities look at their enumerated violations portion of honor codes and add detail. The more details, the more students can understand. Universities must also create fluid honor codes, which can be modified. Technological change has added more opportunities for unethical behavior as well as more opportunities to catch the violations. Honor codes which can not only be updated but effectively communicated are invaluable.

Sanctions are an imperative part of an effective honor code. Daft (2002) states human development teaches us values dictate behavior and those behaviors have consequences. Holding true to this notion, honor codes should begin with values, discuss violations (behaviors) and then immediately discuss sanctions (conclusions).

Judicial board and processes also varied among the universities. It is recommended universities increase the transparency of the judiciary make-up and process. Discussing qualifications and training of the board members would aid in the clarification of the process. The description of the process should be detailed, but use as simple language as possible. Using legal language confuses constituents who may be part of the process (Carter, 2008).

Protection of the privacy of those involved in honors violations is important. Because of FERPA, some universities are shying away from recording the judicial process. This is a mistake. Confidentiality is not the same as anonymity. If universities record the process and keep them on a secured server, this will alleviate privacy issues while providing a record for future appeals. Proper training for those involved in the judiciary process is also recommended to ensure confidentiality.

Increasing the information given on judiciary decisions and appeals is needed for most 1862 land-grant honor codes. Promptness of decisions will aid in the scholastic development of the student, i.e. the student is less likely to commit the same infraction. Specifics are also important in this section.

We recommend that all 1862 land-grant universities to improve the search-ability of their honor codes or policies. Streamlining the connection between honor codes and honor policies is another recommendation. Honor codes should be separate from student codes of conduct. When grouped together, both became too verbose and hard to navigate. It also seemed those universities which combined the two had “watered down” versions of each.

Honor codes and policies should be expanded to include all university participants. While the majority focus on student violations, it is important to note faculty and staff are also found in violation of the code (Carter, 2008).

The most imperative recommendation for creating a culture of honor is to increase education on honor codes and policies. Adding honor code issues to freshmen seminar courses or as part of every core-curriculum course is one way to accomplish this task. Not knowing is not an excuse. Repeatedly discussing and reinforcing the honor code can imbue honor and integrity in a university’s culture (Biswa, 2013). Helping students and faculty understand the code, after they have been re-formatted, will add to the integration of the code into the organization. By creating a user friendly, complete honor code, universities create an organizational artifact which will lead to a more ethical environment.
Literature Cited


An Assessment of the Agricultural Literacy of Incoming Freshmen at a Land-Grant University

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Abstract
Because the world’s population continues to escalate rapidly, producing an abundance of food and fiber is of utmost importance. This revelation has implications for Americans being agriculturally literate. Agricultural literacy research has been conducted primarily at the pre-college level; however, little exists at the post-secondary level. This study, therefore, sought to assess the agricultural literacy of incoming freshmen students at Oklahoma State University. It was found that students in the College of Agricultural Sciences and Natural Resources scored statistically significantly better than their counterparts in other colleges regarding their agricultural knowledge. However, they scored only 61% correct on the agricultural literacy test, resulting in a rather insufficient knowledge base. Collectively, incoming freshmen students across the university campus did not possess a passing knowledge (i.e., 70%) of basic agricultural principles. The findings of this study point to the imperative for higher education faculty to educate students about the importance of agriculture and its significance for the United States and the world.

Introduction
With the world population forecasted to reach nine billion by 2050, the need exists for increased agricultural production (Blackburn, 1999; Hodges, 2005; Johnson and Jorgenson, 2006; Sayers, 2011) and literacy among U.S. citizens. It is not the responsibility of one entity within the agricultural industry to meet this challenge; rather, the industry should be taking steps to promote and educate consumers about the source of their food and fiber.

Presently, more than 50% of the world’s population lives in urban areas and does not produce their own food (Sayers, 2011). That number is projected to grow to more than 65% by the year 2050 (Johnson and Jorgenson, 2006). "The steady rise of urbanization has transferred the future of agriculture to a group of people with an overwhelming lack of support for agricultural issues" (Kovar and Ball, 2013). "Consumers think about food production constantly, yet know very little about how food is brought to the dinner table" (U.S. Farmers and Ranchers Alliance, 2011, para. 5). This gap between awareness and deeper understanding of the food and fiber system is an important area of research related to creating a basis for consumer education. With less than 1% of the U.S. population claiming farming as an occupation (Environmental Protection Agency, 2012), it is crucial that additional efforts be made to educate the public about agriculture and natural resources (Doerfert, 2011; National Research Council [NRC], 1988).

Because it is essential to human survival, everyone should have knowledge about agriculture (NRC, 1988). To achieve this goal, agricultural content is taught in public school systems beginning in the elementary grades as students are exposed to basic agricultural literacy, such as where their food is grown.

This study was grounded on the premise of the agricultural literacy movement initiated in the late 1980s, which assumes that each student will have sufficient knowledge in and about agriculture (NRC, 1988). According to the NRC (1988), students who have strong desires, passions and interests in agriculture should be offered education to prepare for careers in the industry. However, not all students have a desire to work in the agricultural industry. Although most will not be agricultural producers or food and fiber purveyors, they all will be consumers of food and fiber. Students,
Therefore, should receive education that helps them understand information and issues about agriculture (NRC, 1988).

Overall, agricultural literacy efforts during the past 20 years have focused on elementary students and educators (Balschweid et al., 1998; Kovar and Ball, 2013; Meischen and Trexler, 2003). Further, numerous agricultural literacy programs operate on a small scale reaching a narrow population (Kovar and Ball, 2013). Therefore, it is important for researchers, educators and extensions educators to determine areas in which citizens lack agricultural knowledge and concentrate on those aspects in future educational courses and programs (Frick, 1993; Kovar and Ball, 2013).

Unfortunately, little has been done to enhance agricultural literacy in post-secondary settings (Colbath and Morrish, 2010). Due to its mission of providing practical information to the population, the land-grant university system serves as one avenue for educating adults about agriculture (National Association of State Universities and Land-Grant Colleges [NASULGC], 2008; Renne, 1960). Land-grant universities (LGUs) have an important role to play in educating U.S. citizens about agriculture, especially as it relates to where their food sources originate as well as the transformative and allied processes making it ready for consumption. In an executive summary report written by agriculturists at Cornell University, it was recommended that LGUs “... provide public and private decision-makers with the information and tools they need to support an engaged food citizenry, a sound public food policy, and a vibrant food landscape” (“The Future of American Agriculture,” 2003, p. 7). To that end, faculty at LGUs should conduct practical, relevant, and applicable research with results that can be communicated easily to the general public (Fribourg, 2005; Nordstrom et al., 2000; Sandmann, 1991).

For years, the U.S. agricultural system has been regarded as the "most efficient and productive in the world" (Daly, 1981, p. 16). However, as environmental and economic issues continue to pose threats to a safe and sustainable food supply, it is imperative that people be knowledgeable about agriculture (Daly, 1981). For productivity to continue to meet the demand of the growing world, U.S. university graduates should be more knowledgeable about the agricultural industry. LGUs may need to increase their efforts to educate all students – regardless of their majors – about basic agricultural facts and concepts (NRC, 1988). The seminal question driving this study was, “What basic agricultural knowledge do incoming freshmen bring to a LGU?” The answer to this question will provide a reference point for how LGUs could respond to students’ needs for learning basic agricultural knowledge to be educated and informed citizens after graduation.

### Purpose and Objectives

The purpose of this census study was twofold: a) assess the agricultural literacy of all incoming freshmen (N = 4,081) at Oklahoma State University in the Fall semester of 2012, and b) determine the differences between students’ scores on an agricultural literacy test by college. Three objectives guided the study:

1. describe the sex and race or ethnicity of the incoming freshmen;
2. determine the agricultural literacy levels of the incoming freshmen across colleges; and
3. determine the differences between students’ levels of agricultural literacy by college for each Food and Fiber Systems Literacy theme.

### Materials and Methods

The instrument used in the study was a condensed version of the criterion-referenced test, Food and Fiber Systems Literacy (FFSL), as developed by Pense and Leising (2004). The original FFSL test included 50 questions that measured 10 items each for five thematic areas: 1). understanding food and fiber systems, 2). history, geography and culture, 3). science, technology and environment, 4). business and economics and 5). food, nutrition and health (Pense and Leising, 2004).

Criterion-referenced tests are used in schools, industries and the armed services because they offer valuable information about the actual skills or knowledge an individual possesses, which differs from what a norm-referenced test examines (Hambleton, 1986; Wiersma and Jurs, 1990). A panel of three credentialed, agricultural education teachers and three agricultural education graduate students wrote the test items based on the standards and benchmarks of the FFSL framework (Pense and Leising, 2004). After the test was completed, the questions were “validated by a panel of secondary school teachers of various disciplines to ensure each item addressed its corresponding FFSL benchmark content, the content was grade-level appropriate, and each item was language appropriate” (Pense and Leising, 2004, p. 89). In the original study, two pilot tests were conducted; the first had a reliability coefficient of 0.846, using the Kuder/Richardson-20 (KR-20) method and the final pilot test yielded a reliability coefficient of 0.933 (Pense and Leising, 2004).

For the purpose of the study reported on here, the researchers modified the original instrument to update it and reduce its size. Edits were made and reviewed by a panel of two faculty members in the Department of Agricultural Education, Communications and Leadership and one faculty member in the Department of Plant and Soil Sciences at Oklahoma State University. Revisions were minor and dealt with modifying the language for clarity; the modifications did not affect the integrity of the test. The test used in this study was condensed to 25 questions, which assessed each of the five thematic areas with five questions apiece. Each of the five sections was worth a total of five points. Thus, mean averages were calculated and compared by college for the five constructs.

Popham and Husek (1969) suggested that because internal reliability estimates compare individuals to specific criteria and not to other individuals, such reliability
estimates are not suitable for criterion-referenced tests. Conversely, Kane (1986) indicated internal consistency of criterion-referenced tests is a critical concern and stated that internal reliability coefficients above 0.50 suggested the instrument accurately reflected students’ accumulated mean scores. Therefore, the KR-20 formula was used to determine a post hoc reliability coefficient of 0.65 for the 25-item, criterion-referenced test used in the study, i.e., all 25 questions contributed appropriately to the internal consistency of the test.

Oklahoma State University is made up of six colleges consisting of the College of Agricultural Sciences and Natural Resources (CASNR); College of Arts and Sciences (CAS); College of Education (CoE); College of Engineering, Architecture, and Technology (CEAT); College of Human Sciences (CHS); and Spears School of Business (SSB) [Institutional Research and Information Management (IRIM), 2012]. A total of 185 majors and options are offered across the six colleges at Oklahoma State University, 2013). The study’s target population included students registered as incoming freshmen for the Fall semester of 2012 and who were at least 18 years old (N = 4,081).

The link to the instrument was transmitted to the participants electronically using students’ campus electronic mail (email) addresses. A frame of the students and their email addresses was collected from the Oklahoma State University’s Communications Department. The web-based, survey program, Qualtrics, was used to present the FFSL test for data collection.

The researcher followed a modified approach according to Dillman’s (2007) four-contact data collection method. The first email message was sent to the entire population (N = 4,081) on August 30, 2012. A follow-up, reminder email message was sent on September 10, 2012. The third and final reminder email message was sent on October 2, 2012. The data collection period ended on October 23, 2012. In all, 711 students attempted portions of the questionnaire. However, complete data sets existed for 500 students, which resulted in an overall response rate of 12.25%.

To control for non-response error, the researcher compared early and late respondents, according to the recommendations by Miller and Smith (1983). The first 25% of the respondents were considered early respondents and the last 25% were considered late respondents. The two groups were compared statistically using a t-test based on their test scores and demographic information (Tables 1 and 2). Because no statistically significant differences were found, the data presented by the respondents may be generalized to the population of all incoming freshmen during the Fall semester of 2012 at Oklahoma State University (N = 4,081) (Miller and Smith, 1983).

After the data collection period ended, the responses were imported into the Statistical Package for Social Sciences (SPSS). The researchers used an SPSS 19.0 data file to analyze the data descriptively, including central tendency, variability and relative standing (Ary et al., 1996; Creswell, 2012). In addition, one-way Analyses of Variances (ANOVA’s) were conducted to assess differences between more than two variables, as recommended by a statistician at Oklahoma State University, but were “only interpreted to reflect this population and not to infer to other populations outside the one examined” (M. Payton, personal communication, December 4, 2012). T-tests were used for the variables of interest with only two levels to describe interactions (Field, 2009).

Results

Objective one sought to describe the personal characteristics of incoming freshmen at Oklahoma State University during the Fall semester of 2012. Accordingly, 334 (62.82%) female and 198 (37.18%) male students identified their sex (Table 3). Of the students who opted to self-identify their race, 38 (7.19%) were American Indian, 17 (3.21%) were African American, 5 (0.90%) were Pacific Islander, 28 (5.29%) were Hispanic and 442 (83.41%) were White.

Objective two sought to determine the levels of agricultural literacy of incoming freshmen by college at Oklahoma State University in the Fall semester of 2012. On the 25-item, FFSL test, students in CASNR (n = 119, 23.83%) had the highest mean score (M = 15.33; SD = 9.17). Conversely, Kane (1986) indicated internal consistency of criterion-referenced tests is a critical concern and stated that internal reliability coefficients above 0.50 suggested the instrument accurately reflected students’ accumulated mean scores. Therefore, the KR-20 formula was used to determine a post hoc reliability coefficient of 0.65 for the 25-item, criterion-referenced test used in the study, i.e., all 25 questions contributed appropriately to the internal consistency of the test.

Table 1. A Summary of Frequencies Comparing Early and Late Respondents’ Selected Personal Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Early Respondents</th>
<th>Late Respondents</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>64</td>
<td>55</td>
<td>3.08</td>
<td>0.238</td>
</tr>
<tr>
<td>Female</td>
<td>111</td>
<td>72</td>
<td>3.79</td>
<td>0.443</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian</td>
<td>9</td>
<td>11</td>
<td>1.43</td>
<td>0.143</td>
</tr>
<tr>
<td>African American</td>
<td>3</td>
<td>6</td>
<td>1.31</td>
<td>0.193</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>3</td>
<td>1</td>
<td>1.14</td>
<td>0.260</td>
</tr>
<tr>
<td>Hispanic</td>
<td>10</td>
<td>5</td>
<td>1.23</td>
<td>0.221</td>
</tr>
<tr>
<td>White</td>
<td>148</td>
<td>103</td>
<td>2.34</td>
<td>0.020</td>
</tr>
</tbody>
</table>

Note: *p < .05; CASNR = College of Agricultural Science and Natural Resources; CAS = College of Arts and Sciences; CoE = College of Education; CEAT = College of Engineering, Architecture, and Technology; CHS = College of Human Sciences; SSB = Spears School of Business

Table 2. A Summary of Frequencies Comparing Early and Late Respondents’ FFSL Test Scores

<table>
<thead>
<tr>
<th>College</th>
<th>Early Respondents</th>
<th>Late Respondents</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASNR</td>
<td>39</td>
<td>22.59</td>
<td>3.06</td>
<td>0.012</td>
</tr>
<tr>
<td>CAS</td>
<td>40</td>
<td>15.33</td>
<td>2.30</td>
<td>0.130</td>
</tr>
<tr>
<td>CoE</td>
<td>20</td>
<td>12.78</td>
<td>2.16</td>
<td>0.031</td>
</tr>
<tr>
<td>CEAT</td>
<td>40</td>
<td>15.92</td>
<td>2.30</td>
<td>0.130</td>
</tr>
<tr>
<td>CHS</td>
<td>17</td>
<td>11.88</td>
<td>2.51</td>
<td>0.012</td>
</tr>
<tr>
<td>SSB</td>
<td>16</td>
<td>13.46</td>
<td>2.71</td>
<td>0.007</td>
</tr>
</tbody>
</table>

Table 3. Selected Personal Characteristics of Incoming Freshmen at Oklahoma State University during the Fall Semester of 2012.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>198</td>
<td>37.18</td>
</tr>
<tr>
<td>Female</td>
<td>334</td>
<td>62.82</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian</td>
<td>38</td>
<td>7.19</td>
</tr>
<tr>
<td>African American</td>
<td>17</td>
<td>3.21</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>5</td>
<td>0.90</td>
</tr>
<tr>
<td>Hispanic</td>
<td>28</td>
<td>5.29</td>
</tr>
<tr>
<td>White</td>
<td>442</td>
<td>83.41</td>
</tr>
</tbody>
</table>
An Assessment of the Agricultural

Table 4. Agricultural Literacy Test Scores of Incoming Freshmen at Oklahoma State University by College during the Fall Semester of 2012 (n = 500)

<table>
<thead>
<tr>
<th>Rank</th>
<th>College</th>
<th>f</th>
<th>%</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CASNR</td>
<td>119</td>
<td>23.83</td>
<td>15.33</td>
<td>8.21</td>
</tr>
<tr>
<td>2</td>
<td>CEAT</td>
<td>110</td>
<td>22.01</td>
<td>15.15</td>
<td>3.52</td>
</tr>
<tr>
<td>3</td>
<td>SSB</td>
<td>49</td>
<td>9.82</td>
<td>13.82</td>
<td>3.81</td>
</tr>
<tr>
<td>4</td>
<td>CoE</td>
<td>49</td>
<td>9.83</td>
<td>12.80</td>
<td>3.82</td>
</tr>
<tr>
<td>5</td>
<td>CHS</td>
<td>44</td>
<td>8.83</td>
<td>12.66</td>
<td>4.63</td>
</tr>
<tr>
<td>6</td>
<td>CAS</td>
<td>129</td>
<td>25.84</td>
<td>12.46</td>
<td>3.82</td>
</tr>
</tbody>
</table>

Note. CASNR = College of Agricultural Science and Natural Resources; CAS = College of Arts and Sciences; CoE = College of Education; CEAT = College of Engineering, Architecture, and Technology; CHS = College of Human Sciences; SSB = Spears School of Business

Table 5. Analysis of Variance Summary Comparing Test Scores Between Students’ Colleges during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
</table>
| College | 528.62 | 5 | 105.84 | 3.83 | 0.00*
| Error   | 1366.10 | 494 | 27.65 |
| Total   | 14189.88 | 499 |

* p < 0.05.

Table 6. A t-Test of Freshmen Students’ Sex and Test Scores during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>189</td>
<td>15.27</td>
<td>3.32</td>
<td>4.33</td>
</tr>
<tr>
<td>Female</td>
<td>317</td>
<td>13.45</td>
<td>6.15</td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05.

Table 7. Analysis of Variance Summary Comparing Theme 1* Test Scores by Students’ Colleges during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>22.117</td>
<td>5</td>
<td>4.423</td>
<td>2.47</td>
</tr>
<tr>
<td>Error</td>
<td>922.10</td>
<td>515</td>
<td>1.79</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4642.00</td>
<td>521</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05; *Understanding Food and Fiber Systems theme

Table 8. A Description of Students’ Test Scores for Theme 1* by College during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>Rank</th>
<th>College</th>
<th>f</th>
<th>%</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CEAT</td>
<td>115</td>
<td>22.52</td>
<td>2.95</td>
<td>1.33</td>
</tr>
<tr>
<td>2</td>
<td>CAS</td>
<td>133</td>
<td>25.31</td>
<td>2.75</td>
<td>1.42</td>
</tr>
<tr>
<td>3</td>
<td>CASNR</td>
<td>124</td>
<td>23.72</td>
<td>2.61</td>
<td>1.31</td>
</tr>
<tr>
<td>4</td>
<td>SSB</td>
<td>53</td>
<td>10.12</td>
<td>2.51</td>
<td>1.24</td>
</tr>
<tr>
<td>5</td>
<td>CoE</td>
<td>51</td>
<td>9.74</td>
<td>2.45</td>
<td>1.31</td>
</tr>
<tr>
<td>6</td>
<td>CHS</td>
<td>45</td>
<td>8.73</td>
<td>2.24</td>
<td>1.32</td>
</tr>
</tbody>
</table>

Note. CASNR = College of Agricultural Science and Natural Resources; CAS = College of Arts and Sciences; CoE = College of Education; CEAT = College of Engineering, Architecture, and Technology; CHS = College of Human Sciences; SSB = Spears School of Business; M = Mean score based on a scale of 0 to 5; *Understanding Food and Fiber Systems theme

Table 9. Analysis of Variance Summary Comparing Theme 2* Test Scores by Students’ Colleges during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>26.899</td>
<td>5</td>
<td>5.390</td>
<td>4.62</td>
</tr>
<tr>
<td>Error</td>
<td>601.502</td>
<td>516</td>
<td>1.166</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5037.000</td>
<td>522</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05; *History, Geography, and Culture theme

Table 10. A Description of Students’ Test Scores for Theme 2* by College during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>Rank</th>
<th>College</th>
<th>f</th>
<th>%</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CEAT</td>
<td>115</td>
<td>22.00</td>
<td>3.13</td>
<td>1.0</td>
</tr>
<tr>
<td>2</td>
<td>CAS</td>
<td>124</td>
<td>23.8</td>
<td>3.12</td>
<td>0.09</td>
</tr>
<tr>
<td>3</td>
<td>SSB</td>
<td>53</td>
<td>10.1</td>
<td>2.91</td>
<td>1.1</td>
</tr>
<tr>
<td>4</td>
<td>CAS</td>
<td>133</td>
<td>25.5</td>
<td>2.74</td>
<td>1.2</td>
</tr>
<tr>
<td>5</td>
<td>CHS</td>
<td>45</td>
<td>8.6</td>
<td>2.62</td>
<td>1.1</td>
</tr>
<tr>
<td>6</td>
<td>CoE</td>
<td>52</td>
<td>10.0</td>
<td>2.52</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Note. CASNR = College of Agricultural Science and Natural Resources; CAS = College of Arts and Sciences; CoE = College of Education; CEAT = College of Engineering, Architecture, and Technology; CHS = College of Human Sciences; SSB = Spears School of Business; M = Mean score based on a scale of 0 to 5; *History, Geography, and Culture theme

Table 11. Analysis of Variance Summary Comparing Theme 3* Test Scores between Students’ Colleges during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>25.587</td>
<td>5</td>
<td>5.117</td>
<td>3.09</td>
</tr>
<tr>
<td>Error</td>
<td>851.182</td>
<td>514</td>
<td>1.656</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6568.000</td>
<td>520</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05; *Science, Technology, and Environment theme

8.21 (Table 4). In contrast, students in CAS (n = 129, 25.84%) had the lowest mean score (M = 12.46; SD = 3.82). The average score for all students was 13.70.

Objective three sought to determine the differences between students’ levels of agricultural literacy by college for each FFSL theme. A statistically significant difference was found between students’ test scores and their college (F (5, 494) = 3.83, p = 0.00 (Table 5).

Statistically significant differences were found between CASNR and CAS (p = 0.01), CASNR and CoE (p = 0.01), and CASNR and CHS (p = 0.00). To determine practical significance, mean differences (MD) were calculated by subtracting the mean scores of colleges, as listed in Table 4. The practical significance can be observed by the mean differences found between CASNR and CAS (MD = 1.87), CASNR and CoE (MD = 2.53) and CASNR and CHS (MD = 2.67).

An independent-samples t-test was conducted to compare the test scores of male and female students (Table 6). A statistically significant difference was found (p = .00) between males (M = 15.27, SD = 3.32) and females (M = 13.45, SD = 6.15). The males scored higher and with less variability.

A statistically significant difference was also found between students’ theme 1 test scores in Understanding Food and Fiber Systems by college (F(5, 515) = 2.47, p = 0.03 (Table 7). Statistically significant differences were noted between CEAT and CoE (p = 0.03), CEAT and CHS (p = 0.00), CEAT and CoB (p = 0.04) and CAS and CHS (p = 0.03). The practical significance can be observed by the mean differences found between CEAT and CoE (MD = 0.50), CEAT and CHS (MD = 0.71), CEAT and CoB (MD = 0.44), as well as CAS and CHS (MD = 0.51) (Table 8).

A statistically significant difference was found between students’ theme 2 test scores for History, Geography and Culture by college (F(5, 516) = 4.62, p = 0.00 (Table 9). Statistically significant differences were revealed between CASNR and CAS (p = 0.01), CASNR and CoE (p = 0.00) and CASNR and CHS (p = 0.01). The practical significance can be observed by the mean differences found between CASNR and CAS (MD = 0.38), CASNR and CoE (MD = 0.60) and CASNR and CHS (MD = 0.50) (Table 10).

A statistically significant difference was found between students’ theme 3 test scores in Science, Technology and Environment by college (F(5, 514) = 3.09, p = 0.01 (Table 11). Statistically significant differences were found between CASNR and CAS (p = 0.01), CASNR and CoE (p = 0.02), and CASNR and CHS (p =
Table 12. A Description of Student Test Scores for Theme 3* by College during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>Rank</th>
<th>College</th>
<th>f</th>
<th>%</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CASNR</td>
<td>123</td>
<td>23.62</td>
<td>3.53</td>
<td>1.11</td>
</tr>
<tr>
<td>2</td>
<td>CEAT</td>
<td>114</td>
<td>21.92</td>
<td>3.53</td>
<td>1.23</td>
</tr>
<tr>
<td>3</td>
<td>SSB</td>
<td>53</td>
<td>10.21</td>
<td>3.36</td>
<td>1.51</td>
</tr>
<tr>
<td>4</td>
<td>CAS</td>
<td>134</td>
<td>25.62</td>
<td>3.12</td>
<td>1.32</td>
</tr>
<tr>
<td>5</td>
<td>CoE</td>
<td>51</td>
<td>9.81</td>
<td>3.04</td>
<td>1.31</td>
</tr>
<tr>
<td>6</td>
<td>CHS</td>
<td>45</td>
<td>8.73</td>
<td>2.96</td>
<td>1.62</td>
</tr>
</tbody>
</table>

Note. CAS = College of Arts and Sciences; and CoE = College of Education; CEAT = College of Engineering, Architecture, and Technology; CHS = College of Human Sciences; SSB = Spears School of Business; M = Mean score based on a scale of 0 to 5; *Science, Technology, and Environment theme

Table 13. Analysis of Variance Summary Comparing Theme 4* Test Scores Between Students’ Colleges during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>14,936</td>
<td>5</td>
<td>2.967</td>
<td>1.11</td>
</tr>
<tr>
<td>Error</td>
<td>1355.499</td>
<td>505</td>
<td>2.684</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>1370.434</td>
<td>510</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Note. *Business and Economics theme

Table 14. A Description of Student Test Scores for Theme 4* by College during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>Rank</th>
<th>College</th>
<th>f</th>
<th>%</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CEAT</td>
<td>170</td>
<td>21.62</td>
<td>3.04</td>
<td>1.12</td>
</tr>
<tr>
<td>2</td>
<td>CASNR</td>
<td>121</td>
<td>23.81</td>
<td>2.83</td>
<td>1.10</td>
</tr>
<tr>
<td>3</td>
<td>SSB</td>
<td>52</td>
<td>10.33</td>
<td>2.75</td>
<td>1.21</td>
</tr>
<tr>
<td>4</td>
<td>CoE</td>
<td>51</td>
<td>10.11</td>
<td>2.71</td>
<td>1.22</td>
</tr>
<tr>
<td>5</td>
<td>CAS</td>
<td>131</td>
<td>25.72</td>
<td>2.67</td>
<td>1.31</td>
</tr>
<tr>
<td>6</td>
<td>CHS</td>
<td>44</td>
<td>8.72</td>
<td>2.52</td>
<td>1.23</td>
</tr>
</tbody>
</table>

Note. CAS = College of Agriculture Science and Natural Resources; CAS = College of Arts and Sciences; CoE = College of Education; CEAT = College of Engineering, Architecture, and Technology; CHS = College of Human Sciences; SSB = Spears School of Business; M = Mean score based on a scale of 0 to 5; *Business and Economics theme

Table 15. Analysis of Variance Summary Comparing Theme 5* Test Scores Between Students’ Colleges during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>18,440</td>
<td>5</td>
<td>3.688</td>
<td>3.94</td>
</tr>
<tr>
<td>Error</td>
<td>486.371</td>
<td>519</td>
<td>0.937</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>3166.000</td>
<td>525</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*p < 0.05; *Food, Health, and Nutrition

Table 16. A Description of Student Test Scores for Theme 5* by College during the Fall Semester of 2012

<table>
<thead>
<tr>
<th>Rank</th>
<th>College</th>
<th>f</th>
<th>%</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CASNR</td>
<td>125</td>
<td>23.8</td>
<td>2.49</td>
<td>0.92</td>
</tr>
<tr>
<td>2</td>
<td>CEAT</td>
<td>115</td>
<td>21.9</td>
<td>2.37</td>
<td>0.91</td>
</tr>
<tr>
<td>3</td>
<td>SSB</td>
<td>45</td>
<td>8.6</td>
<td>2.20</td>
<td>0.90</td>
</tr>
<tr>
<td>4</td>
<td>CAS</td>
<td>134</td>
<td>26.5</td>
<td>2.10</td>
<td>1.01</td>
</tr>
<tr>
<td>5</td>
<td>CoE</td>
<td>52</td>
<td>9.9</td>
<td>1.91</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. CAS = College of Agriculture Science and Natural Resources; CAS = College of Arts and Sciences; CoE = College of Education; CEAT = College of Engineering, Architecture, and Technology; CHS = College of Human Sciences; SSB = Spears School of Business; M = Mean score based on a scale of 0 to 5; *Food, Health, and Nutrition

The practical significance can be observed by the mean differences found between CASNR and CAS (MD = 0.41), CASNR and CoE (MD = 0.49) and CASNR and CHS (MD = 0.57) (Table 12).

No statistically significant differences were found between students’ colleges (Table 13) and theme 4 test scores in Business and Economics (Table 14).

A statistically significant difference was found between students’ theme 5 test scores in Food, Health, and Nutrition and by college F(5, 519) = 3.94, p = 0.00 (Table 15). Statistically significant differences were noted between CASNR and CAS (p = 0.00) and CASNR and CoE (p = 0.00). The practical significance can be observed by the mean differences found between CASNR and CAS (MD = 0.39) and CASNR and CoE (MD = 0.58) (Table 16).

Summary

On the 25-question test, scores ranged from 12.46 to 15.33. CASNR’s mean score percentage was 61.2 and was the highest mean score by college (Table 4). Overall, the freshmen mean score on the agricultural literacy test was 56%, indicating the students did not demonstrate a passing knowledge of agriculture, if 70% is considered the threshold. Unfortunately, this finding is not uncommon and is congruent with the findings of other researchers, e.g., Colbath and Morrish (2010) and Pense and Leising (2004).

Statistically significant differences were found between CASNR and CAS, CoE and CHS. Males scored higher than females on the agricultural literacy test, which supports Colbath’s and Morrish’s (2010) findings who also found that male students expressed more agricultural knowledge than did female students. CASNR students outscored their counterparts in other colleges regarding the Science, Technology, and Environment Food, Health and Nutrition themes (Tables 12 and 16). CEAT students, however, scored higher than their counterparts in the CASNR for the Understanding Food and Fiber Systems (Table 8) and Business and Economics themes (Tables 8 and 14) and only very slightly in regard to the History, Geography and Culture theme (Table 10).

Recommendations for Additional Research

This study focused on the incoming freshman class at Oklahoma State University during the Fall semester of 2012; however, additional research should be conducted to examine the literacy levels of other classes, including graduating seniors. More understanding about the role of antecedent variables and differences in performance of students by college, which was essentially a proxy for clusters and undergraduate majors, also may be in order, e.g., agriculture and science course-taking in high school and related out-of-school experiences. Further, these students should be followed and assessed periodically to determine the impact their education at a LGU has on their knowledge and understanding of agriculture as well as related attitudes and behaviors.

This study should be replicated at other institutions with different freshmen populations. Specifically, students at LGUs should be compared to students at non-LGUs to determine the amount of agricultural literacy they bring to and exit with from those institutions.

Recommendations for Practice

Because criterion-referenced tests are used often for credentialing, an introduction to agricultural literacy...
An Assessment of the Agricultural Literacy of U.S. Students, Pre-college: K-12 Science Education Should Play in Improving the Agricultural Literacy of U.S. Students, Pre-college. It also may be important to explore what role agricultural educators at the institution studied, as well as consider more ways to incorporate aspects of themes 1, 2 and 4 into the students’ general education curricula.

Implications and Discussion

The improvement of agricultural literacy remains a work in progress. Even though an increase in providing more agriculturally infused curriculum for K-12 has occurred during the last three decades (Kovar and Ball, 2013; Pense and Leising, 2004), this study supports the fact that students are either not learning the concepts, or are not retaining this information. Why is that? With the overall mean scores on the agricultural literacy test being below average, it could be surmised that efforts to infuse agriculture into K-12 curriculum are either non-existent or not being done successfully. If agricultural concepts are to be taught in primary and secondary school settings, more emphasis should be exerted to ensure that future educators are attaining the content knowledge and pedagogical tools they need to create and teach lessons infused properly with agricultural facts, principles, and concepts. This could be an important role for agricultural educators at the institution studied, as well as at other universities with agricultural education programs. It also may be important to explore what role K-12 science education should play in improving the agricultural literacy of U.S. students, pre-college.

Literature Cited


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nactateachers.org/index.php/teaching-tipsnotes-sp-1804864485
Abstract

Employers continue to seek students who possess problem solving skills. This need has implications for how higher education faculty teach their classes. This study focused on determining how using student-centered teaching techniques, such as think-pair-share and peer-instruction, impacted students' (both graduates and undergraduates) levels of confidence and competence in performing STEM skills in a college-level course. In general, graduate students experienced higher levels of confidence at performing tasks related to the class than did their undergraduate counterparts. However, self-efficacy was a poor predictor of student success in the class, as weak correlations existed between their confidence and competence. When asked to perform simpler tasks, such as defining key terms, students were over-confident in their ability to do so correctly. When asked to perform more complex tasks, such as mathematical calculations to quantify a property or process of interest, students were under-confident in their ability. Overall, however, in-class interactions using student-centered teaching techniques helped improve student performance in the class, especially with undergraduate students, whose quiz scores improved more than graduate student scores following such interactions. This study supports the use of student-centered teaching on students' confidence and competence at performing STEM-related processes in higher education settings.

Introduction

Students' inability to solve problems has been an ongoing dilemma and a primary area in need of improvement for years (Candy and Crebert, 1991; Carnevale et al., 1990; Coplin, 2003; Espinoza, 1999; Evers et al., 1998; Stogdill, 1974). The need to help students solve problems in the agricultural industry has been especially important and well documented (Andelt et al., 1997; Robinson, 2009; Robinson and Garton, 2008a; Robinson and Garton, 2008b; Robinson et al., 2007). One reason students at the college level struggle to solve problems could be because instructors are more concerned about teaching technical content than they are about how students learn best or prefer to receive information (Knight and Yorke, 2003). As such, college instructors should consider altering their styles of teaching to fit the needs of their students better (Fuhrmann and Grasha, 1983) so that cognitive transfer can exist when learning about, developing skills in and applying technical competencies (Parr et al., 2006; Parr et al., 2008; Young et al., 2009).

Solving problems is a skill that is inherent to understanding and applying science. Because science, technology, engineering and mathematics (STEM) continue to garner much attention in the education arena, instructors should focus on ways to teach it best (Fox and Hackerman, 2002). It has been recommended that to enable students to solve problems and transfer their knowledge from one context to another, college instructors should strive to be more student-centered and less teacher-centered (Schuck et al., 2003). Becoming more student-centered can help students in becoming prepared for a vastly changing world where innovation, creativity and problem solving will be imperative to successful employment (Bransford, 2007). As such, methods of effective instruction should encompass active, cooperative, small group learning strategies (Springer et al., 1999) because they allow for higher levels of student engagement (Cooper and Robinson, 2000) and interest (Santrock, 2004) in learning the content. Springer et al. (1999) concluded that small-group learning has promise for helping students learn STEM principles at a higher level. Smith et al. (2009) concluded that:

More supportive and engaging learning environments can help us accomplish our most important outcomes for STEM graduates: stronger thinking and reasoning skills, problem formulation and problem-solving skills, skills for working together cooperatively with others and, especially, skills and confidence for figuring things out.

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Stillwater, OK

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²Professor, Agricultural Education, Associate Director, Institute for Teaching and Learning Excellence (ITLE), 100 ITLE; (405)744-3094; shane.robinson@okstate.edu
The Impact of a Social Interaction

Purpose of the Study

The purpose of the study was to determine how a 16-week, plant and soil science course titled, Soil, Weather, and Water, impacted graduate and undergraduate students’ confidence and competence in performing various technical, content skills from the beginning of the course to its end. The following objectives guided the study.

1. Determine how students’ confidence levels changed regarding their technical skills related to the course content from the beginning of the semester to the end.
2. Evaluate the extent of congruence between the students’ confidence and competence at performing technical skills at the end of the course.
3. Determine how in-class interactions (i.e., think-pair-share) impacted students’ competencies in the course.

Materials and Methods

The Soil, Water, and Weather course at Oklahoma State University exists to provide students with an introduction to the physics of the soil-plant-atmosphere continuum. The focus is on soil, its physical properties, and their interactions with water and weather in terrestrial ecosystems. Qualitative analysis is emphasized with applications in soil and environmental science, agronomy, ecology, hydrology and climatology. This course is taught each fall semester. Data from 2009 and 2010 were used for this study. During those two semesters, there were a total of 25 graduate students and 31 undergraduates enrolled (Table 1). Male students outnumbered female students 38 to 18. The instructor and instructional procedures were held constant in both years.

Students completed identical confidence assessments at the beginning and end of the course to allow evaluation of changes in student confidence levels over time. The researcher-developed confidence assessment consisted of 15 elements aligned with the course learning objectives (see Figure 1). Students were instructed to choose one of five confidence levels to best describe their confidence in their own ability to correctly complete the technical task required in each element. This confidence level was interpreted as an indicator of self-efficacy.

Student competence at the end of the course was assessed by student responses to eight questions on the in-class, closed-book final exam. Those questions corresponded to eight of the 15 elements on the confidence assessment.

Table 1. Classification and sex of students in SOIL 4683 “Soil, Water, and Weather” during 2009 and 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Classification</th>
<th>Sex</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Graduate</td>
<td>F</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>12</td>
</tr>
<tr>
<td>2009</td>
<td>Undergraduate</td>
<td>F</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>11</td>
</tr>
<tr>
<td>2010</td>
<td>Graduate</td>
<td>F</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>5</td>
</tr>
<tr>
<td>2010</td>
<td>Undergraduate</td>
<td>F</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>10</td>
</tr>
</tbody>
</table>

Figure 1. Instructions and first three elements of the 15-element confidence assessment given to students in SOIL 4683 “Soil, Water, and Weather” in Fall 2009 and Fall 2010

Table: For each task, circle the number to the right that best describes your confidence in your ability to correctly complete that task today.

<table>
<thead>
<tr>
<th>Task</th>
<th>Confidence Level (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Define rainfall interception.</td>
<td>0 25 50 75 100</td>
</tr>
<tr>
<td>2. Describe the relationship between rainfall interception and evaporation of water from soil.</td>
<td>0 25 50 75 100</td>
</tr>
<tr>
<td>3. Quantify the time at which ponding would occur for a specified rainfall rate and known soil hydraulic properties.</td>
<td>0 25 50 75 100</td>
</tr>
</tbody>
</table>
The Impact of a Social Interaction

Confidence assessment. The extent of congruence between competence and confidence was determined by comparing individual students’ confidence at the end of the semester regarding those eight elements with the correctness and completeness of those students’ responses to the corresponding exam questions. To explore factors affecting the relationship between confidence and competence further, technical tasks from the confidence assessment and final exam were classified into one of three categories: define, relate and quantify. These categories represent increasing levels of intellectual complexity from defining terms, to relating one concept to another, to solving a quantitative problem using mathematical analysis.

Peer interaction in the course was based on think-pair-share and peer instruction strategies, incorporating a mobile phone-based audience response system (Poll Everywhere). Near the beginning of a typical class period, students were required to complete a single multiple-choice question over the assigned reading or a concept previously discussed in the classroom. Students submitted answers using their mobile phone and the answers were stored by the servers of the audience response system. No information was revealed to the students at this stage regarding the correctness of their answer or the distribution of answers from their classmates. This first response was the think response because it was submitted after the student’s own reflection on the question. Next, students were instructed to discuss the question and their response to it with one or more classmates sitting nearby. Students were instructed to explain to each other the reason for their answer. After a short time of peer interaction (<5 minutes), all students were required to respond to the same multiple-choice question again using the audience response system. This second response served as the pair response because it was submitted after the student’s own reflection on the question. As expected, the confidence levels of students enrolled in the Soil, Water, and Weather course increased from the beginning of the semester to the end (see Figure 2). Similarly, Besterfield-Sacre et al. (1998) found confidence increases from the beginning to end of the freshman year for engineering students at some universities, but not all. Confidence increases throughout a semester-long class also have been reported for first year medical students (Butter et al., 2007). In the current study, male and female students had similar initial confidence levels (P = 0.90), similar final confidence levels (P = 0.80) and similar confidence increase (P = 0.92). Likewise, Lundeberg et al. (1994) found little evidence for gender differences in confidence among students enrolled in three psychology courses when confidence was assessed by item-specific confidence judgments as in the present study. They reported that the few confidence differences which existed were dependent on the context and the domain of knowledge being tested.

Analysis of variance was used to test for effects of year (2009 versus 2010), classification (graduate versus undergraduate) and sex (male versus female) on student confidence. Linear regression was used to evaluate the extent of congruence between confidence and competence. Analysis of variance was used to test for the effects of year, classification, sex and task type (define, relate, or quantify) on the discrepancy between confidence and competence.

Cross-tabulation and chi-squared tests were used to test for effects of year, classification and sex on the distribution of responses across the categories correct twice, incorrect to correct, incorrect twice, and correct to incorrect. All calculations and statistical tests were performed using Matlab (R2014b, Mathworks, Natick, MA).

Results and Discussion

Confidence Levels

As expected, the confidence levels of students enrolled in the Soil, Water, and Weather course increased from the beginning of the semester to the end (see Figure 2). Similarly, Besterfield-Sacre et al. (1998) found confidence increases from the beginning to end of the freshman year for engineering students at some universities, but not all. Confidence increases throughout a semester-long class also have been reported for first year medical students (Butter et al., 2007). In the current study, male and female students had similar initial confidence levels (P = 0.90), similar final confidence levels (P = 0.80) and similar confidence increase (P = 0.92). Likewise, Lundeberg et al. (1994) found little evidence for gender differences in confidence among students enrolled in three psychology courses when confidence was assessed by item-specific confidence judgments as in the present study. They reported that the few confidence differences which existed were dependent on the context and the domain of knowledge being tested.

Figure 2. Initial confidence, final confidence, and confidence increase for students in SOIL 4683 “Soil, Water, and Weather” in Fall 2009 and Fall 2010

Students completed a confidence assessment at the beginning and end of the course each semester. The researcher-developed confidence assessment included 15 elements focused on instructor-defined learning objectives for the course. Graduate and undergraduate students had similar initial confidence levels (P = 0.20), but graduate students had higher final confidence levels (P = 0.018) and a greater confidence increase (P = 0.0084).
Despite graduate and undergraduate students having similar initial confidence levels ($P=0.20$), the graduate students in our study had higher final confidence levels ($P=0.018$) and a greater confidence increase ($P=0.0084$). Few prior studies have compared confidence levels or other learning outcomes for undergraduate versus graduate students participating in the same classroom environment. Bruce et al. (2009) found confidence increases for graduate nursing students participating with undergraduate nursing students in a clinical simulation scenario, although the confidence increases were statistically significant for only three out of 16 survey items. No confidence data were collected for the undergraduate students in that study.

Artino Jr. and Stephens (2009) found that, among students enrolled in online courses at a large public university, graduate students and undergraduate students reported similar levels of self-efficacy during the last three weeks of the semester long courses. That finding contrasts with our results, which show higher final confidence levels for graduate students than undergraduates. These differing results may be partially explained by the fact that a slight majority of the undergraduates in the study by Artino Jr. and Stephens were non-traditional students (ages 25-47) whereas none of the undergraduates in our study were non-traditional. The increased age and experience of non-traditional undergraduates may contribute to them learning in ways that are more like graduate students than to traditional undergraduates. This hypothesis is consistent with the results of Wilkinson et al. (2004) who studied undergraduate and graduate students in a medical course and found that student age may be more important than having a prior degree in explaining student learning qualities (e.g., confidence in becoming a good doctor).

**Figure 3. Competence versus confidence for students in SOIL 4683 “Soil, Water, and Weather” in Fall 2009 and Fall 2010**

Competence was measured by student performance on eight questions on the final exam, which were linked to course learning objectives. Students’ confidence in their ability to correctly answer those questions was measured by the end of semester confidence assessment, taken prior to the final exam. Linear regression indicated only a weak positive relationship between competence and confidence for the graduate students ($r^2=0.14$, $P=0.067$) and no relationship for the undergraduate students ($r^2=0.02$, $P=0.50$).

**Figure 4. Discrepancy between student confidence and competence for three task types of increasing complexity (“Define”, “Relate”, or “Quantify”) at the end of the course in 2009 and 2010**

Positive values indicate over-confidence and negative values indicate under-confidence. Competence was assessed based on student performance on eight questions on the final exam. Those questions were linked to eight of the 15 learning objectives which were included in the student confidence assessment. In both years, students were over-confident in their ability to perform simpler tasks like defining key terms and were under-confident in their ability to perform more complex tasks like numerical calculations.

**Congruence between Confidence and Competence**

Students’ self-efficacy was not a good indicator of their actual ability (see Figure 3). Linear regression indicated only a weak positive relationship between competence and confidence for the graduate students ($r^2=0.14$, $P=0.067$) and no relationship for the undergraduate students ($r^2=0.02$, $P=0.50$). Students’ confidence in defining key terms, relating important concepts and solving quantitative problems was largely independent of their confidence level, a result consistent with prior studies. For example, for freshman engineering students at three schools, students’ self-assessed confidence levels showed generally weak or no correlations with their academic performance (Besterfield-Sacre et al., 1998). Similarly, for medical students attending an educational session, there was no correlation between level of confidence and performance in a standardized test (Morgan and Cleave-Hogg, 2002).

To explore the factors contributing to this discrepancy between student confidence and technical competence, we considered the intellectual complexity of the technical task assigned. We found that the discrepancy between confidence and competence was influenced by the intellectual complexity of the specific problem ($P<0.001$) and differed between years ($P=0.019$). When asked to perform simpler tasks such as defining key terms, students were over-confident in their ability to do so correctly (see Figure 4). In contrast, when asked to perform more complex tasks such as mathematical calculations to quantify a property or process of interest, students were under-confident in their ability (see Figure 4). The students’ under-confidence in quantitative tasks may be related to math anxiety (Ashcraft, 2002). The responses for intermediate complexity tasks, i.e.
The Impact of a Social Interaction

Students who answered a multiple-choice question incorrectly before peer interaction typically answered the same question correctly after a brief period of in-class peer interaction, even though they received no feedback from the instructor about their own or their classmates’ first answers (Table 2). This is evidence that the peer interaction facilitated learning at some level. The increased percentages of correct responses after peer interaction in the current study (21% for graduate students and 26% for undergraduates) are typical of results observed in prior studies. For example, correct responses increased up to 26% after peer interaction in a study involving first-year medical students (Rao and DiCarlo, 2000) and gains of up to 33% were observed in introductory physics courses (Crouch and Mazur, 2001).

A chi-squared test indicated significant differences in the categorical distribution of responses between graduate students and undergraduate students (P=0.001) and between years (P<0.001). Graduate students more frequently answered the in-class quiz question correctly before peer interaction than did undergraduate students (73% versus 65%). As a result, undergraduate responses improved more following interaction, with undergraduates switching from an incorrect to a correct answer 26% of the time after interaction compared with 21% of the time for graduate students. We are not aware of any prior studies examining differences in peer instruction outcomes between graduate and undergraduate students. Based on the higher final confidence levels for graduate students than undergraduate students (see Figure 2) and on the greater frequency of graduate students answering the in-class quiz question correctly prior to interaction (Table 2), we hypothesize that the participation of graduate students is beneficial for undergraduate students in a classroom environment that includes peer interaction. Further research to explore this hypothesis may be helpful in efforts to improve the design of upper-division undergraduate courses in which graduate students commonly enroll.

Summary

The upper-division Soil, Water, and Weather course with its student-centered teaching strategies resulted in increased student confidence levels regarding their technical skills from the beginning to the end of the semester. The confidence gains were larger for graduate (58%) than undergraduate students (42%). However, student confidence showed weak to no correlation with student competence at the end of the course, a result that is at odds with Bandura’s self-efficacy theory. The discrepancy between confidence and competence was influenced by the intellectual complexity of the assigned technical task. Students were over-confident on the simpler tasks and under-confident on the more complex, quantitative tasks. In-class interactions using active, cooperative learning approaches (think-pair-share/peer instruction) improved student performance on quizzes by >20%, with undergraduate student scores improving more than graduate student scores following interactions. Results from this study lead to several new research questions including: why do graduate students appear to benefit more than undergraduate students in the same classroom environment?; to what extent can discrepancies between student confidence and competence be reduced by approaches that account for the intellectual complexity of the assigned task?; and how much does the participation of graduate students benefit undergraduates in mixed, upper-division courses with substantial peer interaction? Taken as a whole, the results of this study provide clear support for the view that student-centered approaches in a college course have positive impacts on student confidence and competence in performing STEM skills.

Table 2. Percentage of student responses in four response categories for in-class quizzes before and after peer interaction in 2009 and 2010

<table>
<thead>
<tr>
<th>Classification</th>
<th>Correct twice</th>
<th>Incorrect to correct</th>
<th>Incorrect twice</th>
<th>Correct to incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate</td>
<td>72</td>
<td>21</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>63</td>
<td>26</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

Impact of Interaction

The upper-division Soil, Water, and Weather course with its student-centered teaching strategies resulted in increased student confidence levels regarding their technical skills from the beginning to the end of the semester. The confidence gains were larger for graduate (58%) than undergraduate students (42%). However, student confidence showed weak to no correlation with student competence at the end of the course, a result that is at odds with Bandura’s self-efficacy theory. The discrepancy between confidence and competence was influenced by the intellectual complexity of the assigned technical task. Students were over-confident on the simpler tasks and under-confident on the more complex, quantitative tasks. In-class interactions using active, cooperative learning approaches (think-pair-share/peer instruction) improved student performance on quizzes by >20%, with undergraduate student scores improving more than graduate student scores following interactions. Results from this study lead to several new research questions including: why do graduate students appear to benefit more than undergraduate students in the same classroom environment?; to what extent can discrepancies between student confidence and competence be reduced by approaches that account for the intellectual complexity of the assigned task?; and how much does the participation of graduate students benefit undergraduates in mixed, upper-division courses with substantial peer interaction? Taken as a whole, the results of this study provide clear support for the view that student-centered approaches in a college course have positive impacts on student confidence and competence in performing STEM skills.

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The Impact of a Social Interaction


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Mentorship Through the Lens of Servant Leadership: The Importance of Accountability and Empowerment

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Oklahoma State University
Stillwater, OK

Abstract

Connecting with the Millennial Generation can be challenging, as this generation is often described as unmotivated, incoherent and lazy. Servant leadership focuses on placing the needs of the follower before the needs of the leader, and empowers followers to take ownership for their efforts. Implementing quality mentorship through the lens of servant leadership could be a missing link to connecting purpose to content in college classrooms. The study describes first-semester students' perceptions of servant leadership in personal mentors at the beginning and end of the Fall 2014 Freshmen Orientation course in the College of Agricultural Sciences and Natural Resources at Oklahoma State University. Students rated accountability and empowerment as the highest servant leadership traits desired in their personal mentors in both the pre- and post-evaluations. The study yielded the following recommendations: Higher education institutions should develop student leadership groups around desired servant leadership qualities, such as accountability and empowerment; implement projects and assignments in classroom settings allowing students to take ownership of personal work; and investigate the influence of servant leadership in various college student settings. As the needs of college students evolve, the need to embrace student ownership and service in higher education programs becomes imperative.

Introduction

Today's undergraduate students are labeled one of the most lost, unmotivated and lazy generations to enter a college classroom (Elmore and Maxwell, 2008; Levine and Dean, 2012). In a 2007 report, the American College Health Association (2008) stated 93% of college students reported being overwhelmed by the college lifestyle; 44% claimed feeling signs of depression in college; 16% struggled with relationships in college and nearly 10% of students contemplated the thought of suicide. In addition, by 2030, individuals from the Millennial Generation will likely outnumber Baby Boomers by nearly 22 million people (Meyer, 2014). Exposure to life-mentors, peer-mentors and staff at higher education institutions likely could help develop future generations and leaders focused on serving others (Astin and Astin, 2000; Campbell et al., 2012; Parks, 2000).

Investing in younger generations is crucial to ensuring a prosperous future for the country and the world (Upcraft et al., 2005). Across the globe, less than one in six people have graduated from college (Elmore, 2015). As such, challenging and investing in first-year college students is critical to the success of higher education institutions and to the future of humanity (Maxwell, 1999; Upcraft et al., 2005). Yorke and Longden (2004) identified the first year as the most critical year for ensuring student retention. One theory to motivating first-year college students to become more engaged citizens and leaders is through the use of personal mentors (Terrion and Leonard, 2007; Velez et al., 2011). As students' needs evolve over time, high-quality mentors will distinguish themselves from average mentors by how well they set an example of servant leadership for their mentees, their peers and their communities (Liden et al., 2008; Upcraft et al., 2005). Understanding how students perceive and apply personal mentorship could help faculty in higher education understand the roles mentors play in improving student retention (Upcraft et al., 2005).

Academic performance and intrinsic motivation also are influenced by the individual mentors' leadership style (Campbell et al., 2012; Terrion and Leonard, 2007). Millennials desire being coached and mentored (Elmore and Maxwell, 2008). Unfortunately, few studies have evaluated how servant leadership qualities vary with the different types of mentors (Terrion and Leonard, 2007). The lack of research supporting effective mentorship styles combined with the gap of understanding the perceptions of followers when evaluating servant leadership is crucial to understanding the role of servant leadership in student success.
Mentorship Through the Lens

leadership (Van Dierendonck and Nuijten, 2011) provide a significant opportunity for future research in the development of first-year students (Upcraft, et al., 2005). Van Dierendonck and Nuijten (2011) firmly state the perspective of the follower on a servant leader’s behavior is missing.

Objectives

The following objectives were developed to guide this study:

1. Describe the selected characteristics (age, sex, and ethnicity) of incoming students in the Fall 2014 OSU CASNR – Freshman Orientation class (AG 1011).
2. Compare differences in incoming students’ perceptions of servant leadership traits in personal mentors at the beginning and end of the AG 1011 course in the Fall 2014.

Limitations

The following limitations were identified for this study:

1. The study is designed to describe incoming students’ perceptions of servant leadership traits identified in students’ personal mentors. Perceptions of servant leadership can be influenced by many variables, not just personal mentorship.
2. The results, findings, and conclusions related to servant leadership constructs in this study cannot be generalized to other populations.

Millennial Generation

Generations are defined by shared experiences within specific time periods and are often influenced by people, places, events and social references (Elam et al., 2007). Howe and Strass (2000) stated most of the current U.S. population is made up of five generations: the G.I. Generation (born between 1901 to 1924), the Silent Generation (1925–1942), the Baby Boomer Generation (1943–1960), Generation X (1961–1981) and the Millennial Generation (1982–2002). According to Elmore and Maxwell (2008), the next generation beyond the millennials will be known as Generation iY (born after 2003). However, most students who are enrolled in higher education institutions today are members of the millennial generational cohort (Elam et al., 2007).

First year students face many struggles during this vulnerable time of their lives and they long for guidance more than previous generations (Levine and Dean, 2012). In fact, Yorke and Longden (2004) identified four general reasons a typical student leaves their programs in higher education: (a) a misunderstanding of the program when they enrolled; (b) students’ experiences within the program; (c) struggle with adjusting to the demands of the program; and (d) situations in students’ lives outside of the program. In addition to the stress of choosing the right program, millennials also face many societal issues unique to their generation (Levine and Dean, 2012):

- Current undergraduates are the first generation of digital natives.
- Millennials are the most demographically diverse generation in the history of higher education.
- Millennials are the most connected generation where students have unlimited access to being wireless connected with other people, but the lack of interpersonal and communication skills makes them feel isolated.
- Current undergraduates believe the economy is the most critical issue facing the country’s future and nearly two-thirds of undergraduates leave college with substantial student loan debt.
- Millennials are described as a more entitled, immature, dependent and overprotected generation than previous generations.

Conceptual Framework

Servant Leadership Theory

The main purpose of servant leadership is to serve, empower and challenge followers to become leaders (Daft and Lane, 2011). Greenleaf’s discovery of servant leadership sparked a growing field of research interest (Barbuto and Wheeler, 2006; Farling et al., 1999; Page and Wong, 2000; Spears, 2002) and laid the groundwork for developing measurements attempting to define servant leadership (Van Dierendonck and Nuijten, 2011). Unfortunately, most attempts to define servant leadership have been inconsistent and without a universal standard of underlining constructs (Liden et al., 2008). Russell and Stone (2002) declared, “The literature regarding servant leadership is rather indeterminate, somewhat ambiguous, and mostly anecdotal” (p. 145). As a result, building an all-encompassing, conceptual model for servant leadership becomes difficult when nearly 40 different attributes have been used to describe constructs relating to this theory (Barbuto and Wheeler, 2006; Van Dierendonck, 2011). In an effort to conceptualize the theory of servant leadership, Parris and Peachey (2013) examined servant leadership within an organizational context, but still identified the lack of consistency in the definitions used to conceptualize servant leadership. As such, this study will focus on an operational definition of servant leadership, defined by Van Dierendonck and Nuijten (2011).

Van Dierendonck and Nuijten’s Approach to Servant Leadership

To more clearly define and operationalize characteristics of servant leadership, Van Dierendonck and Nuijten (2011) developed the Servant Leadership Survey (SLS) by focusing on transparent servant leadership behavior related to the well-being and performance of followers. The initial development and validation of the SLS involved three-phases: (a) exploring and analyzing factors defining servant leadership; (b) comparing the content validity of the SLS to other servant leadership measures; and (c) correlating the criterion-related
validity of how leaders behave toward followers in the workplace (Van Dierendonck and Nuijten, 2011).

After differentiating antecedents, behavior and outcomes, six preliminary themes emerged to form an operationalized definition for servant leadership, including empowering and developing people, humility, authenticity, intrapersonal acceptance, providing direction and stewardship (Parris and Peachey, 2013; Van Dierendonck, 2011). Selected managers who were labeled as servant leaders by experts from the European Greenleaf Centre for Servant Leadership were interviewed to seek clarity in the SLS construct development (Van Dierendonck and Nuijten, 2011). Subsequently, Van Dierendonck and Nuijten’s (2011) six original themes evolved into eight characteristics defining servant leadership, including empowerment, accountability, standing back, humility, authenticity, courage, interpersonal acceptance and stewardship (see Figure 1). Each of the eight constructs helps build consistency within the theory of servant leadership.

Methods

This study was conducted as a longitudinal, panel survey design, employed with a census approach (Creswell, 2012) to describe incoming students’ perceptions of servant leadership traits in personal mentors at the beginning and end of the Fall 2014 CASNR AG 1011 – Freshmen Orientation class. A census approach was the desirable method to use for the study as the researcher wanted to study the full population of incoming students in the CASNR AG 1011 – Freshmen Orientation class. The instrumentation used in this study included the Servant Leadership Survey (SLS) instrument (Van Dierendonck and Nuijten, 2011) and a researcher-designed general mentorship and demographic inventory questionnaire (Cramer, 2013; Kimmelshue, 2012). The demographic inventory was only included in the pre-questionnaire.

The data for this study was analyzed using IBM Statistical Package for the Social Sciences (SPSS) Statistics 21.0 for MacintoshTM. To reduce human error, SPSS was used to analyze data and report descriptive statistics (Field, 2009). Descriptive statistics were used to analyze central tendencies within the data (Creswell, 2012). Research objectives one and two were used for descriptive analysis. Frequencies and percentages were used to describe nominal data within categories (Creswell, 2012). Ordinal, or ranked data (Creswell, 2012), was analyzed using means and standard deviations.

Part 1: Servant Leadership Survey (SLS) Instrument

Several multi-dimensional instruments have been developed to measure servant leadership (Barbuto and Wheeler, 2006; Dennis and Bocarnea, 2005; Laub, 1999; Liden et al., 2008; Sendjaya et al., 2008; Van Dierendonck and Nuijten, 2011; Wong et al., 2007). Van Dierendonck and Nuijten’s (2011) SLS evaluates constructs related to both the leader and the follower while focusing on the follower’s perspective of the leader-follower relationship. Prior to taking each questionnaire, students were asked to consider their most influential mentor. Responses for the SLS instrument used a six-point Likert-type scale for each item: strongly agree, agree, somewhat agree, somewhat disagree, disagree and strongly disagree (Van Dierendonck, 2011).

Part 2: General Mentorship and Demographic Inventory Questionnaire

Campbell et al. (2012) and Snowden and Hardy (2012) identified a need for further research on the influence of mentorship in students at the undergraduate level. Therefore, with help from a panel of experts, the researchers refined nine closed-ended and semi-closed questions regarding perceptions of general mentorship to address general mentorships preferences in incoming students in AG 1011. Questions included labeling the category of students’ most influential mentors, identifying students’ most important quality found in a mentor, identifying how often students seek mentorship, listing the general types of community service in which students are involved and estimating how many hours of community service students have logged within the last month of completing the questionnaire.

To collect self-reported participant demographics, researchers modified nine closed-ended and semi-closed questions adapted from Cramer (2013) and Kimmelshue (2012). Based on Creswell’s (2012) recommendation to place sensitive questions after neutral questions in questionnaires, the demographic inventory was included at the end of the pre-questionnaire.
Reliability of the SLS Instrument

The SLS instrument (Van Dierendonck and Nuijten, 2011) was developed by an exploratory factor analysis and was further validated by multiple confirmatory factor analyses in the Netherlands and in the United Kingdom. The SLS instrument initially reported a range for internal consistency from 0.69 to 0.95. (Van Dierendonck and Nuijten, 2011). Kline (1999) stated internal consistencies below 0.7 could be expected in psychometric constructs because of diversity in the measures. Even still, internal consistency measures for construct reliability ranging from 0.69 to 0.95 between the two original SLS studies raised caution for the current study.

As such, post-hoc reliability scores were run within each subscale construct for the pre- and post-questionnaires. The pre-questionnaire yielded the following Cronbach’s alphas: 0.77 for empowerment (7 items), 0.72 for accountability (3 items), 0.53 for standing back (3 items), 0.83 for humility (5 items), 0.49 for authenticity (4 items), 0.53 for courage (2 items), 0.68 for forgiveness (3 items) and 0.52 for stewardship (3 items). The post-questionnaire yielded the following Cronbach’s alphas: 0.78 for empowerment (7 items), 0.72 for accountability (3 items), 0.60 for standing back (3 items), 0.83 for humility (5 items), 0.61 for authenticity (4 items), 0.64 for courage (2 items), 0.74 for forgiveness (3 items) and 0.57 for stewardship (3 items).

Caution was warranted because of the lower sub-construct reliability scores. As such, a follow-up exploratory factor analysis was conducted on the data and revealed a one-factor solution responsible for 24% of the variance. Three factors also were cumulatively responsible for 38% of the variance. The exploratory factor analysis of the current data confirmed Van Dierendonck’s and Nuijten’s (2011) factor analysis of the SLS in a Dutch composite sample where three factors also emerged from their data. From their study, factor one was interpreted as the “leader”-side of servant leadership, which was expressed through high loading of empowerment, accountability, vision and intellectual stimulation (Van Dierendonck and Nuijten, 2011). The leader component of servant leadership is identified as enabling followers to set clear goals, provide meaningful work situations and express personal talents (Van Dierendonck and Nuijten, 2011). Van Dierendonck and Nuijten (2011) labeled factor two as the “servant”-side of servant leadership, standing back, humility, authenticity, supportive leadership, and ethical leadership support the willingness to serve others through support and listening. Finally, Van Dierendonck and Nuijten (2011) third factor was identified as the forgiveness factor, where mistakes are recognized as growth opportunities and looking forward is better than looking back.

Recognizing Van Dierendonck and Nuijten (2011) also identified three primary factors in the SLS from an exploratory factor analysis in the Dutch study, and following the low sub-construct reliability scores and exploratory factor analysis for this study, internal consistency measures for the SLS instrument as a whole was measured. As a result, post hoc Cronbach’s alphas of 0.87 and 0.88 were yielded for the pre- and post-questionnaires, respectively.

Results and Discussion

Findings Related to Objective One

Eighty-five percent (j=369) of the respondents were 18 years old. The youngest respondents were 18 and the oldest respondent was 30. Fourteen students were pulled from the study for being under 18 years old at the time of the pre-questionnaire. In regards to reporting gender, 29.3% (j=127) were male and 70.7% (j=306) were female. The top two ethnic groups students identified were Caucasian and Native American or Alaska Native. Three hundred sixty-one students (83.6%) identified most closely to the Caucasian (non-Hispanic) race. Twenty-seven respondents (6.3%) identified as Native American or Alaskan Native.

Findings Related to Objective Two

A paired-samples t-test was conducted to compare students’ perceptions of servant leadership traits in personal mentors at the beginning and end of the CASNR AG 1011 – Freshmen Orientation class. Three measures showed statistical significance: authenticity at t(398) = -4.218, p < 0.001, r=0.21; humility at t(397) = -3.434, p=0.001, r=0.17 and stewardship at t(402) = -2.114, p= 0.035, r=0.21. Although the p-values showed statistical significance for authenticity, humility and stewardship, because of the large population size yielding high degrees of freedom for each pair, the effect sizes were between small and medium effects (r=0.1 and r=0.3, respectively; Cohen, 1992).

Accountability scored the highest servant leadership construct mean in the pre-questionnaire (M=5.39, SD=0.60) and in the post-questionnaire (M=5.42, SD=0.57; Table 1). Empowerment was close behind as the second highest rated construct in both the pre-questionnaire (M=5.29, SD=0.53) and the post-questionnaires (M=5.30, SD=0.54; Table 1). Forgiveness scored the lowest servant leadership construct mean in the pre-questionnaire (M=4.04, SD=1.092) and in the post-questionnaire (M=3.95, SD=1.19; Table 1).

Table 1. Incoming Students’ Perceptions of Servant Leadership Traits in Personal Mentors at the Beginning and End of AG 1011

<table>
<thead>
<tr>
<th>Construct</th>
<th>Pre-Questionnaire</th>
<th>Post-Questionnaire</th>
<th>t</th>
<th>df</th>
<th>p-value</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authenticity</td>
<td>399 4.55 0.734</td>
<td>4.71 0.741 -4.218 398 0.000 0.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humility</td>
<td>398 4.76 0.795</td>
<td>4.87 0.748 -3.434 397 0.001 0.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stewardship</td>
<td>403 5.10 0.624</td>
<td>5.17 0.644 -2.114 402 0.035 0.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forgiveness</td>
<td>398 4.04 1.092</td>
<td>3.95 1.190 1.750 397 0.081 0.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accountability</td>
<td>392 5.39 0.603</td>
<td>5.42 0.566 -0.008 391 0.314 0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing Back</td>
<td>402 4.81 0.773</td>
<td>4.84 0.784 -0.888 401 0.375 0.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courage</td>
<td>391 4.56 0.899</td>
<td>4.58 0.965 -0.422 390 0.673 0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empowerment</td>
<td>391 5.29 0.525</td>
<td>5.30 0.536 -0.409 390 0.683 0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. p < .05. Students were asked to answer questions based on their most influential mentor at the time of taking each question.
Conclusions and Implications

Objective one sought to describe the demographics of the Fall 2014 OSU CASNR – Freshman Orientation class (AG 1011). One finding that emerged from this data is how much of an overwhelming majority Caucasian females account for the population. One idea why males might not enroll in college as frequently as females do is young males often do not see immediate value in attending higher education institutions (Irvine, 2011). One recommendation for encouraging males to enroll in higher education is to ensure the value of their education is discussed prior to enrollment and encourage mentor interaction (College Stats, 2015). Mentorship provides value in engaging students on campus. When students feel connected to the mission of the college, they recognize the need for their education, which in turn, could boost enrollment numbers and maintain retention. This research yields implications for implementing strong mentorship components in higher education. Quality mentors not only improve the experience of education while students already are enrolled, but also it can be a key factor in recruiting. Further research is recommended for evaluating successful recruitment efforts, specifically in target demographics, including diverse ethnic groups and male populations.

One powerful implication of the second objective is the Millennial Generation feels the most successful when they are held accountable and empowered to do quality work (Elmore and Maxwell, 2008). Therefore, higher education institutions should develop mentorship programs that include a feedback component to provide constructive and positive feedback to students. If students feel more empowered and responsible in college, could their confidence and empowerment translate to the work environment, as well? Providing a feedback element to student programs might help millennials receive the development they desire at an earlier age so they could emerge more emotionally ready for their future careers. Providing this critical piece of workplace readiness might be the missing link to motivating students for life beyond college.

Recommendations

The following recommendations were assigned to match the needs of current populations: (1) develop student leadership groups around desired servant leadership qualities, such as accountability and empowerment; (2) implement projects and assignments in college classrooms settings enforcing students to take ownership and be accountable for their personal work; and (3) investigate the influence of servant leadership in various college student settings. Because students desire qualities in mentors, such as accountability and empowerment, leadership groups should be selected based on desired criteria.

Summary

Mentoring the millennial generation has raised huge concerns for educators and employers in the past. Fortunately, connecting with this generation could be as simple as engaging empowerment and accountability within mentor-to-mentee relationships. Mentors work to motivate mentees to hold themselves accountable for their work; therefore, teaching students at an earlier age the value of accountability might lead to more informed decisions in college. Certainly, generational differences may show millennials rate accountability and empowerment differently than older supervisors might. Even still, as the needs of current millennial college students evolve, the need to embrace student ownership and service in higher education programs becomes imperative. Society cannot expect to leave a legacy in this world without investing and mentoring future leaders (Elmore and Maxwell, 2008). The time to invest in tomorrow’s leaders by empowering students and holding them accountable for their expectations has never been more prevalent than now.

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Common Themes Emerged from Teaching Philosophies and Methods of Effective Postsecondary Teachers

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Abstract
The purpose of the study was to identify characteristics of effective teachers and explore common philosophical beliefs about teaching and learning in faculty members recognized for their effective teaching. At Texas Tech University, the Teaching Academy members are considered to be outstanding teachers. Academy members admitted in 2012 and 2013 were asked to submit a written copy of their teaching philosophy. Fifteen professors chose to take part in the study and their teaching philosophies were analyzed to determine common themes. Six themes emerged from the teaching philosophies: engage students in learning, maintain student interest, get to know students, assess student knowledge, set high expectations for students and participate in professional development. These participants were asked to participate in a one-on-one interview to discuss their ideas about effective teaching and to allow a researcher to observe them teaching a class. Three teachers consented to an interview and two teachers agreed to be observed. The data collected from the interviews and observations were compared to the themes from the teaching philosophies and supported those findings through triangulation of data. The information gained from this study can be used to identify areas of professional development that could be provided to increase teacher effectiveness.

Introduction
In order for students to succeed in the classroom it is important to have effective teachers. Many postsecondary level professors are not trained in pedagogy. They may be experts in content knowledge but have little formal development in teaching (Bok, 2013). Still, there are professors who are doing an outstanding job in the classroom regardless of the amount of training they have received. There are several books, including McKee’s Teaching Tips (Svinicki and McKeachie, 2011) Teaching and Learning in the College Classroom (McKeachie et al., 1986) and What the Best College Teachers Do (Bain, 2004), that provide suggestions on how to be an effective teacher at the postsecondary level. These suggestions cover a variety of topics from creating a syllabus to lecturing in large classes.

Students identified variability in teaching methods, providing opportunities for students to process information such as allowing time for discussions or assigning projects and the teacher elaborating on a topic and explaining it in terms the student can understand as teacher behaviors which help students cognitively engage in learning (Estepp and Roberts, 2013). A study of exemplary community college professors indicated common characteristics are a love for teaching, respect for students, student-centered teaching, ability to motivate students, knowledge of content, being organized and prepared, being a role model, participating in professional development and work ethic (Silvestri, 2013). Drummond (2013) suggested some best practices for college teachers. Some of these practices are: use strategies to engage students during lectures, provide reflective responses to student input, reward student participation, use active learning strategies, set goals for students and give students feedback (Drummond, 2013). Similarly, Weimer (2013) advises new teachers to speak, teach and care actively. Other studies indicated that behaviors/characteristics of effective teachers are: knowing the content and staying up to date on the content (LeBlanc, 2013; Sankey and Foster, 2012; Stronge, 2013), focusing on the students (Maxwell et al., 2011; Sankey and Foster, 2012; Stronge, 2013), teaching the students how to think (LeBlanc, 2013; Maxwell et al., 2011), varying instruction (LeBlanc, 2013; Stronge, 2013), communicating high expectations (LeBlanc,
2013; Stronge, 2013), showing enthusiasm (Sankey and Foster, 2012; Stronge, 2013), being organized (Sankey and Foster, 2012), communicating clearly (Sankey and Foster, 2012), treating all students fairly (Stronge, 2013), being a role model (Sankey and Foster, 2012), integrating technology (Sankey and Foster, 2012) and being flexible (LeBlanc, 2013). Professors should also continue to learn and develop their teaching skills (Camblin Jr. and Stegar, 2000; Randall, 2008). This can be accomplished by attending professional development sessions, reading research on teaching and learning, or watching and talking to other teachers. Durate and Fuchs (2013) admit they learned how to be better teachers by working with high school teachers. The most helpful thing they learned was they should plan lessons, not lectures (Durate and Fuchs, 2013).

Although there is some agreement in the existing literature there are also some differences that emerge. Perhaps these variations are due to location as cultures vary in different regions of the United States, as well as in different types of universities. Furthermore, it is possible differences exist since students change over time and thus the characteristics of effective teachers should also change. Continued study is necessary in this area to continue to provide knowledge for educators as to what beliefs of effective teachers are. This knowledge can help guide current and future teachers to become effective teachers. This study will explore and describe the common beliefs of effective teachers at Texas Tech University. This study was approved by the Institutional Review Board at Texas Tech University. Written consent was received from each participant.

In this study the lens of the conceptual framework is the belief that a teaching philosophy portrays a person’s beliefs about teaching (Boye, 2012), so a person’s teaching philosophy should give insight into how a person teaches (Schonwetter et al., 2002). Thus, reviewing a teaching philosophy is one way to learn the beliefs one has about teaching without talking to them or watching them teach. The beliefs shared in the teaching philosophy should guide their actions in the classroom and match statements made by the person if they are asked their views of effective teaching. Therefore, these three components (teaching philosophies, verbally expressed views of effective teaching and actual teaching practices) should all agree with each other. It is also conceivable to say all three of these components have an impact on the other components. For example, if a person expresses a new idea about teaching it should be reflected in their updated teaching philosophy and become a part of their classroom teaching. Likewise, if a teacher tries a new technique in the classroom that proves to be successful it should be reflected in their updated teaching philosophy and in their verbalization of effective teaching. Therefore, the conceptual framework of this study is that a person’s beliefs about effective teaching can be found in their teaching philosophy, will be verbally expressed when asked their thoughts about effective teaching, and can be seen when observing the professor teach.

Common Themes Emerged

Purpose of the Study

The purpose of this phenomenological study was to describe common themes emerging from teaching philosophies and methods of effective teachers at Texas Tech University. The guiding question was: What beliefs are common to effective teachers at Texas Tech University? The following questions were developed to guide the study.

1. What emergent themes can be found by analyzing and comparing the teaching philosophies of effective teachers at Texas Tech University?
2. When interviewed will these professors identified as effective teachers express the same themes that emerged from analysis of the teaching philosophies?
3. Will the themes that emerged from the analysis of the teaching philosophies be observed while watching the effective teachers in a normal classroom setting?

Methods

Qualitative research is appropriate to analyze and describe people’s beliefs (McMillan and Schumacher, 2006). The goal of this qualitative study is to explore and describe the phenomenon of effective teaching as expressed by the common beliefs of effective postsecondary teachers. Case studies focus on one phenomenon which the researcher chooses to understand in depth (McMillan and Schumacher, 2006). A case study approach was utilized in this study. Since the results provide additional understanding of existing research, it is considered an instrumental case study (Stake, 2008).

Sample

In qualitative research, purposive sampling is appropriate because the researcher wants to understand a phenomenon and not generalize to a larger population. (McMillan and Schumacher, 2006). To understand the phenomenon, a thick, rich description is desired so a smaller sample size is acceptable. Purposive samples can range from 1 to 40 or more (McMillan and Schumacher, 2006).

At Texas Tech University, the Teaching Academy members are considered to be outstanding teachers (Teaching, Learning, and Professional Development Center, 2013). The participants invited to participate in this study were the Teaching Academy members who were inducted in 2012 and 2013. These participants were chosen because it was likely they would still be working at Texas Tech University and their teaching philosophies would be up to date. Twenty professors were sent an email explaining the study and were asked to participate by providing their teaching philosophies to the researcher. Fifteen professors chose to participate, making the sample 15 Teaching Academy members who were inducted in 2012 or 2013.

Data Collection

Three ways of gathering data in a qualitative study are through interviews, observations and documents or
First, documents were collected from the participants. The participants were asked to provide a copy of their teaching philosophy for the researchers to analyze. All Teaching Academy members were required to submit a copy of their teaching philosophy as a part of their application process, therefore it was presumed that all members would have a written teaching philosophy. Fifteen members chose to participate and provided their teaching philosophies to the researcher via email. These philosophies were de-identified, assigned pseudo-names and stored on a password protected computer.

All 15 participants were asked to share their views of effective teaching through an interview. The one-on-one interview was semi-structured. Seven guiding questions were used with follow-up questions. Open-ended questions were used to allow the participant to add information that was not a part of their teaching philosophy. More specific questions were used to gain more detail about themes that emerged from the teaching philosophies. The interviews were audio recorded and transcribed verbatim using pseudo-names. The interviews lasted from 20 to 30 minutes. Due to the busy schedule of the participants, only three could be interviewed.

Two of the professors who agreed to interviews also allowed the researcher to observe them teaching a class. Field notes were taken with special attention to find instances that supported the themes which emerged from the teaching philosophies. An Instructional Observation Feedback form accessed from the Teaching, Learning, and Professional Development Center at Texas Tech University was also used to gather data from the observations. The researcher only observed one class for each professor. The observations lasted a minimum of 50 minutes and a maximum of 80 minutes.

Data Analysis
Rossman and Rallis (2003) recommend that analysis takes place throughout the research process. The constant comparative method of data analysis was used. As the teaching philosophies were received, they were analyzed and coded using NVivo. Categories were created to fit the material throughout the analysis. After all the philosophies were received, analyzed and coded; similar categories were combined; and themes emerged. Another researcher reviewed the philosophies and confirmed the themes. The researcher allowed a month to pass and then recoded the philosophies by hand instead of using NVivo. The same themes emerged.

The transcripts of the interviews were compared to the individuals own teaching philosophy to identify if the information provided in the interview agreed with the information in the teaching philosophy and if it provided information that was not part of the written philosophy. The transcripts were also compared to the themes that emerged from all the philosophies.

During the observations, the researcher looked for evidence that supported the beliefs of the teacher regarding effective teaching, as expressed in their teaching philosophy and interview. Analysis was made throughout the observation and after the observation by reviewing the field notes and observation form.

“Credibility, which refers to the confidence one can have in the truth of findings, can be established by several methods.” (Bowen, 2005 p. 215). Triangulation and peer debriefing are two of the methods (Erlandson et al., 1993) used in this study. Collecting three different types of data provided triangulation (Erlandson et al., 1993). Peer debriefing was utilized throughout the study to discuss data and themes. Researcher bias was controlled to improve credibility (Bloomberg and Volpe, 2008). The researcher is trained in pedagogy and has been a teacher at the secondary or postsecondary level for 17 years. This teaching experience, as well as experience training future secondary teachers, led to the researcher possessing some opinions about effective teaching prior to this study. By monitoring this bias, reflecting in a reflective journal, and keeping an open mind the researcher was able to control any bias.

Transferability refers to the ability of the reader to transfer the findings to a similar situation, individual(s), or setting (Bloomberg and Volpe, 2008; Erlandson et al., 1993). In order to enhance transferability, interviews were transcribed verbatim and thick description was used in the field notes from the observations. An audit trail was kept, containing the teaching philosophies, coding files, interview transcriptions, a reflexive journal, descriptive field notes and observation reports. Confirmability can be achieved if someone reviews the audit trail and confirms the research findings are plausible.

This study does have a couple of limitations. First, as is the case of most qualitative research, the results of this study cannot be generalized to a larger population. The reader can transfer this knowledge, but cannot generalize it. Second, time was a limiting factor. All 15 professors were asked to participate in an interview and observation, but several said they were too busy and some did not respond. With more time, the researcher would have continued to seek participation in those two data collection activities. Still, adequate data was obtained through the 15 teaching philosophies, three interviews and two observations.

Results
The first objective was to find emergent themes in the 15 teaching philosophies. It is important to point out these philosophies represented a variety of departments and only two departments had more than one participant in this study. Six themes emerged from the philosophies: engage students in learning, maintain student interest, get to know students, assess student knowledge, set high expectations for students and participate in professional development. These themes and support for these themes can be seen in Table 1.

Objective two was to determine if the professors who were interviewed agreed with the themes that emerged from the teaching philosophies. The interview

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Common Themes Emerged

**Objective two was to determine if the professors who were interviewed agreed with the themes that emerged from the teaching philosophies. The interview**
transcriptions were compared to the professors’ own teaching philosophies, as well as the themes that emerged from analysis of all the teaching philosophies.

The first interview was conducted with Cody. His teaching philosophy mentioned aspects of all the themes excluding getting to know students. In the interview, these same beliefs emerged. The other themes were supported by Cody’s philosophy and interview.

The second interview was with Dalton. In Dalton’s philosophy he addressed items related to the three most popular themes; engaging students, maintaining student interest, and getting to know students. The same information was shared in his interview. Dalton said there is constant interaction between students and the professor in his classroom. He often uses the Socratic Method to engage students. He also encourages class interaction and initiates discussions.

Dalton expressed, in both his philosophy and interview, the importance of getting to know students. Dalton did not mention setting expectations for the students or professional development in his philosophy, but when asked his thoughts of those areas he agreed they were both important.

The third interview was with Lindsey. The top four themes (engage students, maintain student interest, get to know students and assess student knowledge) were all a part of Lindsey’s teaching philosophy and supported by her interview. Lindsey said she is a very big proponent of active learning techniques. She uses a variety of activities to engage students including class/group discussions, daily writings and feedback exercises. These activities also help her assess the students’ understanding of the concepts. She said she notices that some professors try to teach too much information in one class leading to them lecturing the entire class instead of using engaging strategies. She maintains their interest by reminding the students “how they will use the material in later classes or in work settings.” She also uses examples from real life such as using the Titanic as an example when discussing risk management.

Although two themes (setting expectations and professional development) were not mentioned in her teaching philosophy, she agreed, in the interview, they were important. She said she uses the syllabus as a contract between the student and herself. It spells out what she expects of them in the class, and she sticks to it. She said professional development is very important. She recognizes most professors learn how to teach by watching their graduate advisor or by doing it themselves and believes it is important to participate in professional development to learn how to teach more effectively. She mentioned a national conference she recently attended that was very helpful. It introduced several strategies she is currently using in her classroom. She also mentioned all untenured faculty members in her department are observed and provided feedback for improvement purposes.

Dalton and Lindsey allowed the researcher to observe them teaching a class. Dalton’s class was 50 minutes and was in a large lecture hall with over 100 students. Lindsey’s class was 80 minutes and had about 45 students in attendance. It was not possible for the researcher to obtain any evidence that these two professors participated in professional development by observing them teach but evidence supporting the other five themes was gathered.

Both of these professors used questioning techniques during their lectures to engage students in learning. They both asked questions and allowed time for the students to think of an answer and then share it with the class. Dalton also used a polling technique by asking the class to raise their hands if they agreed with a certain statement. Lindsey engaged students by having them “turn to (their) neighbor and talk about these theories.” After the small group discussion they shared their thoughts with the entire class. Both professors used strategies to engage students in learning.

Dalton showed enthusiasm while teaching, He was excited about the topic he was teaching and moved around the room the entire class period. Lindsey started the class by talking to the students about the agenda for the rest of the semester. They both related material to

<p>| <strong>Table 1. Themes Emerged from Teaching Philosophies and Support for Themes</strong> |</p>
<table>
<thead>
<tr>
<th><strong>Theme</strong></th>
<th><strong>Quote from Teaching Philosophies</strong></th>
<th><strong>Existing Literature Supporting Theme</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage students in learning</td>
<td>Doug: Successful teachers should encourage students to learn by doing, and undertake explicit actions to engage the students within their course.</td>
<td>Drummond, 2013</td>
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<td></td>
<td></td>
<td>Estepp and Roberts, 2013</td>
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<td></td>
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<td>Sankey and Foster, 2012</td>
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<td></td>
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<td>Silvestri, 2013</td>
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<td></td>
<td></td>
<td>Weimer, 2013</td>
</tr>
<tr>
<td>Maintain student interest</td>
<td>Sara: I strive to make my classes educational and fun. I certainly want to teach my students about the topic at hand, but I also want to make sure that information is presented in such a way that their interest in the subject continues well beyond the course. If I bore my students and cause them to become disinterested, then I have failed as a teacher.</td>
<td>Maxwell et al., 2011</td>
</tr>
<tr>
<td>Get to know students</td>
<td>Marcy: I take great care in learning their names along with their strengths and weaknesses within the first few weeks of the semester. This enables me to understand my students’ learning processes and allows me to make my teaching more effective.</td>
<td>Sank and Foster, 2012</td>
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<td></td>
<td></td>
<td>Silvestri, 2013</td>
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<td></td>
<td></td>
<td>Stronge, 2013</td>
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<td></td>
<td></td>
<td>Weimer, 2013</td>
</tr>
<tr>
<td>Assess student knowledge</td>
<td>Adam: A critical part of assessing the class is to ask students questions in class, and get feedback to determine the level of understanding of the topics covered.</td>
<td>Svinicki and McKeachie, 2011</td>
</tr>
<tr>
<td>Set high expectations for students</td>
<td>Jason: When I consider the teachers who have had an impact on my life, they were individuals with high expectations of students, they were fair, and they worked as hard teaching as I did as a student. These are characteristics that I strive to achieve and maintain in my relationships with students---at both the graduate and undergraduate level.</td>
<td>Drummond, 2013</td>
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<td></td>
<td></td>
<td>Stronge, 2013</td>
</tr>
<tr>
<td>Participate in professional development</td>
<td>Cody: I always try to read up on research related to teaching before implementing new methods in my classroom, and I regularly read journal articles and other primary sources to keep abreast of current research on instruction.</td>
<td>Camblin and Stegar, 2000</td>
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<td></td>
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<td>Drummond, 2013</td>
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<td></td>
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<td>Maxwell et al., 2011</td>
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<td></td>
<td></td>
<td>Randall, 2008</td>
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<td></td>
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<td>Silvestri, 2013</td>
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</tbody>
</table>

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the real world and talked about how the material could be used in the students’ careers. Lindsey also asked the students to provide examples. Furthermore, she related the theories she was teaching to a survey the students had previously taken.

In a class of more than 100 students, it was tough to determine if Dalton knew his students. He did call some of them by name indicating some evidence he knew at least some of his students. On the other hand, it was evident Lindsey knew all her students. She arrived to class early. As the students were arriving she walked around the room and passed out papers. She did not ask anyone their name, so it was obvious she knew their names. She also welcomed them to class and interacted with the students. She finished passing back papers while the students were discussing a topic with their neighbor.

The professors were able to assess student knowledge through their questioning techniques. This does not adequately assess the knowledge of every student, but it does show an attempt to make sure students understand the concept. Lindsey also had the students complete a feedback assignment at the end of the class in which they had to compare the concepts learned in the lesson to concepts they had previously learned. This activity will allow her to see if each student understands the concepts.

Determining what expectations the professors set for the students was a little more difficult. It appeared students understood the professors’ expectations in the class. Dalton mentioned the “required reading” assigned, which indicated an expectation, but no other evidence regarding the expectations set was seen. Lindsey verbally reviewed some expectations she had for a group project in which the students were currently working. She also answered students’ questions about the project.

**Summary**

The purpose of this phenomenological case study was to describe common themes that emerge from teaching philosophies and methods of effective teachers at Texas Tech University. The first objective was to identify emergent themes in the teaching philosophies of 15 Teaching Academy members. The second objective involved interviewing these professors and comparing their answers with their own teaching philosophy as well as the themes that emerged from all the philosophies. The third objective was to observe the professors’ teaching and identify evidence that supported the themes found in the teaching philosophies and interviews.

Altogether, six themes emerged from the teaching philosophies. The themes are as follows:

1. Engage students in learning
2. Maintain student interest
3. Get to know students
4. Assess student knowledge
5. Set high expectations for students
6. Participate in professional development

Based on these philosophies, the three most important traits of effective teachers are engaging students in learning, maintaining student interest and getting to know the students.

During the interviews, the researcher was able to ask the professors their thoughts about specific topics, such as, “Do you think it is important for professors to participate in professional development?” All three professors replied yes, even though two of them did not mention it in their teaching philosophies. Space is limited in teaching philosophies; therefore one may not express all their thoughts regarding effective teaching. What one deems to be most important should be present in one’s teaching philosophy, but just because a theme is not mentioned in one’s teaching philosophy does not mean they do not think an aspect is important. During the interviews, all three professors interviewed agreed all six themes were important.

Some say actions speak louder than words. The researcher observed two professors in the classroom to determine if their actions matched their words. During these observations, evidence of every theme excluding one was observed in both classrooms. The researcher did not observe evidence the teachers participated in professional development but, that is not something one may expect to see in a classroom.

The participants came from many different departments, yet they identified similar beliefs about effective teaching. Some specifically stated, “in my field we...” implying other fields may not use the same techniques, when in fact, others were identifying the same practices. Different terminology was used, but the concepts were the same across departments.

Even though many professors have not been trained in pedagogy, effective teachers identify many of the same principles taught in teacher preparation programs. The results of this study can be used by individual professors to evaluate their own teaching. For example, if they are not currently engaging students in learning, they may start incorporating techniques suggested by these professors. It was identified participating in professional development is important. This study gives those who organize professional development workshops or conferences, topics in which to focus on and provide training in these areas.

Recommendations for practice would be for professors to participate in professional development of some kind. Professors should continuously try to find ways to become more effective teachers. They should utilize techniques to engage students in learning, maintain student interest, and assess student knowledge. They should also make an effort to know their students. This can be done at the beginning of the semester by having students introduce themselves and tell a little about themselves, fill out an information sheet, or write a paper about themselves. The professor could also learn about students by arriving to class early and simply talking to students as they arrive. Finding a way to learn students’ names, even in a large class, is also recommended.
Common Themes Emerged

Furthermore, the professors should set high expectations for their students and explain them clearly, either verbally or in writing through the syllabus, assignment directions, or grading rubrics.

Recommendations for professional development organizers would be to provide workshops that focus on the themes identified. Workshops could be presented to demonstrate and explain techniques for engaging students in learning, maintaining student interest, or assessing student knowledge. They could also provide examples of ways teachers get to know their students and techniques for remembering names. Training on how to write a detailed syllabus, assignment sheet, or grading rubric could also be helpful.

The researcher recommends this study be replicated at other universities using all three data collection methods. Research should also investigate the students’ views of traits of effective teachers. A quantitative study could gather demographics of professors related to the amount of training they have received in pedagogy and teaching strategies.

Literature Cited


Entrepreneurial Science and the Training and Aspirations of STEM-Focused Agriculture Graduate Students: An Exploration

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Abstract
The academic training and professional aspirations of students enrolled in science, technology, mathematics and engineering (STEM) graduate programs in three agriculture colleges were explored in the context of the current knowledge-based economy. Particular attention was placed on how, if at all, study participants associate innovation and entrepreneurship with their research interests and intended career paths. In doing so, participant awareness of and perspective on current demands and opportunities for entrepreneurial scientists were explored. Recommendations for increasing the alignment between the so-called “knowledge economy” (Powell and Snellman, 2004) and the academic training and professional aspirations of STEM graduate students enrolled in agriculture colleges were developed.

Keywords: agriculture graduate education, innovation, knowledge economy

Introduction
The present-day global economy centers on the rapid development and dissemination of innovation (Powell and Snellman, 2004). Economists have shown within this knowledge-based economy a positive association between the competitive position of nations in world agriculture markets and investments in scientific and technological research specific to food and fiber production (Alston and Pardey, 2014; Anderson et al., 1994). Consistent with this relationship, the U.S. has strategically positioned innovation and entrepreneurship at the core of its agricultural research development policies. For example, the President’s Council of Advisors on Science and Technology (PCAST) (2012) declared that investments in agricultural research should be increased to “create opportunities for new business ventures funded by the private sector and provide the means to train the next generation of farmers and ranchers and meet the workforce demands of U.S. agriculture in the 21st century” (PCAST, 2012, p. iii). The United States Department of Agriculture (USDA) has since allocated $75 million to establish three innovation institutes involving public-private partnerships and enhanced its Small Business Innovation Research (SBIR) program to further foster agricultural entrepreneurship (NIFA, 2015).

The diffusion of agricultural innovations within and across competitive markets is dependent on a highly trained workforce composed of professionals with both advanced scientific/technological expertise and entrepreneurial skills (Alsos et al., 2011; Murray, 2004). Indeed, the labor market demand for such diversely equipped professionals, who are heretofore referred to as “entrepreneurial scientists,” is high (Alston and Pardey, 2014; Rivera and Alex, 2008). The infusion of entrepreneurial principles and practices in graduate-level science, technology, engineering, and mathematics (STEM) education is well documented (Astebro et al., 2012; Mars et al., 2008; Mendoza, 2007). The current study contributes to this body of literature by developing insights specific to how, if at all, the academic training and professional aspirations of STEM graduate students enrolled in agriculture colleges were being influenced and shaped by current workforce demands for entrepreneurial scientists.

Conceptual Framework
Two theoretical frameworks guided this study. First, the primary characteristics of the knowledge economy (innovation and entrepreneurship) (Powell and Snellman, 2004) oriented an exploration of how, if at all, an economic environment in which entrepreneurial scientists are in high demand influences the training and development of STEM graduate students enrolled in agriculture colleges. Second, the organizational premises of academic capitalism (Slaughter and Leslie, 1997; Slaughter and Rhoades, 2004) framed how, if at all, STEM graduate students enrolled in agriculture colleges are introduced (formally and/or non-formally) to the principles and practices of innovation and entrepreneurship through their programs of study.

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The Knowledge Economy

Powell and Snellman (2004) described the knowledge economy as an economic environment that is global in scale and driven by “knowledge-intensive activities that contribute to the accelerated pace of technical and scientific advance, as well as rapid obsolescence” (p. 199). The expeditious production and dissemination of scientific and technological knowledge is central to industrial strategy and economic development policy (local, regional, national) within the knowledge economy. Under such conditions, corporations work to rapidly generate, protect and commercialize new knowledge in order to achieve and sustain competitive positioning within relevant industries. Concurrently, public officials at various levels of government work to increase global competitiveness through the establishment of aggressive policies that incentivize the entrepreneurial application of scientific and technological innovations (Mars et al., 2014).

In the knowledge economy, innovation involves the rapid transformation of scientific and technological discoveries into novel products or processes that hold potential economic and/or social value (Baregheh et al., 2009). Symbiotically, entrepreneurship is the strategic process through which such discoveries turned innovations are positioned within relevant markets (Drucker, 2001). The dominance of the knowledge economy has resulted in innovation and entrepreneurship being central to the competitive strategies of both start-up companies and established firms, as well as a range of other organizational-types (e.g., universities, economic development agencies).

The heightened and pervasive focus on the entrepreneurial application of scientific and technological discoveries impacts academic research in a variety of ways. For example, university researchers engaged in entrepreneurial science are increasingly willing to collaborate across disciplinary lines and organizational boundaries (e.g., university-industry partnerships) (Gulbrandsen and Smey, 2005). Cross-disciplinary and inter-organizational collaborations tend to result in greater productivity as indicated by entrepreneurial outputs (i.e., patents awarded, intellectual property licenses issued, business start-ups created) (Lin and Bozeman, 2006; Nowotny et al., 2003). However, the priority and incentives directed at entrepreneurial research with high commercial promise may constrain natural inquiry and basic (or pure) science (Schuetze, 2007). Critics have also argued that the enhanced focus on entrepreneurial science limits the scholarly exchange of ideas as researchers opt for patenting first and publishing second in order to protect the “secret sauce” of discoveries (Welsch et al., 2008).

The current study explored the potential ways in which contemporary demands for innovation and entrepreneurship influence the academic development and professional perspectives of STEM graduate students enrolled in agriculture colleges. In particular, how, if at all, the research interests and professional aspirations of these students were influenced by demands and opportunities for innovation and entrepreneurship was considered.

Academic Capitalism

Academic capitalism theory explains a myriad of implications associated with the permeation of market and market-like forces in higher education beginning in the 1980’s (Slaughter and Leslie, 1997; Slaughter and Rhoades, 2004). More specifically, the theory argues the following four organizational constructs emerged within colleges and universities from the needs and demands of the knowledge economy: interstitial organizations, enhanced managerial capacities, intermediating organizations and new knowledge circuits.

- Interstitial organizations are market-facing units developed within colleges and universities to encourage and support entrepreneurial activities and initiatives (e.g., technology transfer offices, university-sponsored entrepreneurship incubators).
- The managerial capacities of colleges and universities have been enhanced through the notable expansion of a professional workforce charged specifically with managing institutionally based entrepreneurial activities and initiatives (e.g., licensing agents; corporate relation directors).
- Intermediating organizations are standalone entities external to colleges and universities that facilitate inter-organizational boundary spanning between higher education institutions and external firms and organizations (Metcalfe, 2010).
- Knowledge circuits that connect otherwise fragmented actors within and beyond colleges and universities continually emerge and evolve in response to market and market-like opportunities and demands. For example, linkages between STEM faculty and students with counterparts in entrepreneurship education centers, which are most often positioned in business colleges, are knowledge circuits that commonly develop during the creation of research-based spin-off companies (Mars, et al., 2008).

Student exposure to and/or interaction with the preceding four academic capitalist constructs provided a conceptual lens through which to recognize and more fully understand how, if at all, the knowledge economy has influenced the training and development of STEM graduate students enrolled in agriculture colleges.

Methods

General Design

The current research was conducted using a qualitative, multiple case study design (Yin, 2014). This design created the opportunity to achieve greater analytical depth and breadth through the exploration of a single phenomenon across separate settings with common characteristics (Creswell, 2007; Miles and Huberman,
The central phenomenon explored here was the influence of the workforce demands for entrepreneurial scientists within the knowledge economy on the academic training and professional aspirations of STEM graduate students enrolled in agriculture colleges at three public land grant universities (LGUs). The inclusion of three similar, yet separate settings allowed this phenomenon to be considered beyond the context of a single agriculture college. Accordingly, the trustworthiness and transferability of the results were enhanced (Lincoln and Guba, 1985). The study was determined by the researcher’s home university to be exempt from institutional review board approval and oversight.

Site Selection

The three agriculture colleges included in this study were purposefully selected according to the following three criteria recommended by Miles and Huberman (1994): 1) relevancy of setting, 2) occurrence of activities and/or processes reflective of the topic of study and 3) accessibility of key informants. First, each of the three agriculture colleges was considered to be a particularly relevant setting based on being located within a LGU. LGUs share an institutionalized mission to foster community and economic development through the discovery and dissemination of scientific and technological knowledge. While this mission is mostly acted on through education and outreach activities, the diffusion of innovations through entrepreneurial initiatives is increasingly common within LGUs (Glenna et al., 2007; Mars, 2014). The study was thus enriched by the organizational proximity of each of the three agriculture colleges (and associated LGUs) to the knowledge economy. Second, all three of the agriculture colleges enrolled graduate students in a range of STEM-related programs of study. Third, final site selection was made after adequate access to key informants (i.e., STEM graduate students enrolled in agriculture colleges) and supporting data (e.g., program descriptions, curricula) was confirmed.

Qualitative research does not generate generalizable results. Instead, such research aims to develop new insights and propositions on phenomena to in turn be considered in settings similar to those included in a particular study (Merriam, 2009). The purposeful development of conceptually relevant variation between cases is one strategy for enhancing the transferability of qualitatively generated insights (Onwuegbuzie and Leech, 2007). The geographic diversity of the selected sites included in this study helped capture the national landscape of STEM-focused graduate education in agriculture colleges. This geographical breadth also helped position the study in the broader context of the previously described national economic strategy to remain competitive within the knowledge economy. The three sites ultimately selected are referred to by the following geographically descriptive pseudonyms: Southwestern University (SU), Middle University (MU) and Eastern University (EU).

Table 1. Participant Sample

<table>
<thead>
<tr>
<th>Participant Name (Pseudonym)</th>
<th>University (Pseudonym)</th>
<th>Program of Study</th>
<th>Degree Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adam</td>
<td>EU</td>
<td>Conservation Ecology</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Alvin</td>
<td>EU</td>
<td>Animal Sciences</td>
<td>Master’s</td>
</tr>
<tr>
<td>Bill</td>
<td>EU</td>
<td>Horticulture</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Carly</td>
<td>MU</td>
<td>BioChemistry</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Carmin</td>
<td>SU</td>
<td>Soil Sciences</td>
<td>Master’s</td>
</tr>
<tr>
<td>Chelsea</td>
<td>EU</td>
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</tr>
<tr>
<td>Chester</td>
<td>EU</td>
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<td>Doctoral</td>
</tr>
<tr>
<td>Donna</td>
<td>EU</td>
<td>Natural Resources</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Edward</td>
<td>MU</td>
<td>Plant Sciences</td>
<td>Master’s</td>
</tr>
<tr>
<td>Elizabeth</td>
<td>SU</td>
<td>Natural Resources</td>
<td>Master’s</td>
</tr>
<tr>
<td>Emma</td>
<td>EU</td>
<td>Animal Sciences</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Gabriella</td>
<td>MU</td>
<td>Animal Sciences</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Kevin</td>
<td>EU</td>
<td>Conservation Ecology</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Kylie</td>
<td>EU</td>
<td>Animal Sciences</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Luke</td>
<td>SU</td>
<td>Natural Resources</td>
<td>Doctoral</td>
</tr>
<tr>
<td>Madison</td>
<td>EU</td>
<td>Animal Sciences</td>
<td>Master’s</td>
</tr>
<tr>
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<td>MU</td>
<td>Wildlife Ecology</td>
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</tr>
<tr>
<td>Nicholas</td>
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<td>Doctoral</td>
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<tr>
<td>Nolan</td>
<td>EU</td>
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<td>Master’s</td>
</tr>
<tr>
<td>Oliver</td>
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</tr>
<tr>
<td>Owen</td>
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<td>Paul</td>
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<td>Master’s</td>
</tr>
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<td>Tyler</td>
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<td>Doctoral</td>
</tr>
<tr>
<td>Zachary</td>
<td>EU</td>
<td>Animal Sciences</td>
<td>Doctoral</td>
</tr>
</tbody>
</table>
Data Collection and Analysis

Data were gathered primarily through semi-structured interviews with each of the 24 participants. An interview protocol was designed to thoroughly explore with the participants how the knowledge economy and academic capitalism influenced their academic training and professional aspirations. The protocol was developed using the previously outlined principles of the knowledge economy (i.e., innovation and entrepreneurship involving scientific and technological research) (Powell and Snellman, 2004) and the organizational constructs of academic capitalism (i.e., interstitial organizations, enhanced managerial capacities, intermediating organizations, new knowledge circuits) (Slaughter and Rhoades, 2004). More specifically, participants were asked to do the following: 1) discuss their scholarly interests and career goals, 2) define entrepreneurship and innovation, 3) relate entrepreneurship and innovation to both their scientific/technological fields of study and career goals and 4) describe how, if at all, principles of entrepreneurship and innovation had been embedded (formally, non-formally, informally) in their academic training and/or professional experiences. The protocol was piloted with three agriculture graduate students enrolled in STEM-focused programs housed in the agriculture college at the researcher’s home university. The feedback gained was used to refine the focus and wording of the interview questions. The length of the interviews varied from 37 to 92 minutes. A third party service used audio recordings to transcribe each interview verbatim. Relevant curricular and programmatic documents at the departmental, college, and university levels (e.g., syllabi, course and workshop descriptions, campus event materials) were also collected and analyzed to confirm and enrich the findings revealed through the interview data (Miles and Huberman, 1994).

Following the recommendations of Miles and Huberman (1994), a structured coding framework was developed using the principles of the knowledge economy (Powell and Snellman, 2004) and organizational constructs of academic capitalism (Slaughter and Rhoades, 2004). The framework was then used to guide the deductive analysis of the data, which occurred at both the idiopathic and nomothetic levels (Gelo et al., 2008). Idiopathically, patterns and trends specific to individual participants were uncovered. Nomethetically, sample-wide (and thus inter-site) patterns and trends specific to the integration and permeation of innovation and entrepreneurship in STEM-focused graduate education within agriculture colleges were uncovered. The data were also inductively analyzed to illuminate any patterns or trends relevant to the study, but not captured by the structured coding framework (Strauss and Corbin, 1998).

The qualitative researcher is the central instrument for bringing meaning to data. As such, the knowledge, experience, and perspective of the researcher relevant to the phenomenon of interest heavily influence the qualitative research process (Chavez, 2008). This researcher leveraged nearly a decade of experience in developing and teaching interdisciplinary-based innovation and entrepreneurship courses within and outside of agriculture colleges to enhance the richness of the findings. This researcher’s well-established scholarly focus on innovation and entrepreneurship education brought further depth and perspective to the analysis. However, this researcher’s positionality to the topic of focus also threatened to bias the analysis. Accordingly, trustworthiness was further established through member checking and the triangulation of the interview and document data (Berg and Lane, 2014). Idiopathic and nomethetic analysis also brought greater richness and overall credibility to the findings (Gelo et al., 2008), while the creation and maintenance of an audit trail increased dependability and conformability (Lincoln and Guba, 1985).

Findings and Discussion

Participant Awareness: Knowledge Economy

The students were overall equally receptive to university- and industry-based career paths. Kevin, a Ph.D. student in Interdisciplinary Ecology at EU, captured this openness to multiple career paths when stating, “I’m pretty much open to anything. Working for the government, for the public sector, working for the non-profit sector, or for the academic sector will be options that I will contemplate equally.” Such receptivity was not driven, however, by the recognition of the demand for and strategic importance of entrepreneurial science within the knowledge economy. Students instead believed that compared to academia, industry would provide greater access to the resources necessary to pursue fruitful scientific and technological research and associated projects. For example, Nolan, a master’s student in Animal Sciences at EU with plans to pursue a doctoral degree, stated, “I’d like to stay in academia but if I had an opportunity in industry to work with research, I would definitely go too. I think industry has the money for research!” In general, participants considered careers in industry based more on a perceived sense of certainty and security rather than on an intrinsic drive to engage the knowledge economy through entrepreneurial activities.

Gabriella, Owen and Tyler were the only three study participants with some level of interest in becoming an entrepreneur. Gabriella, an animal sciences doctoral student at MU, and Owen, a biochemistry doctoral student at MU, were also the only participants with direct experience working in an entrepreneurial environment prior to entering their graduate programs. Owen’s experience working in a biotechnology start-up introduced him to the “world of entrepreneurial research” and shaped his goal of becoming an entrepreneur. He was keenly aware of the demand for entrepreneurial scientists across various industrial sectors, as well as the availability of government subsidies to support research-based biotechnology start-ups. He stated, “I’m not going to write grants all day and be restricted in what
I want to do because of its [university] bureaucracies. I’d much rather on my own go after SBIR grants that the government is throwing at entrepreneurial techies.” Gabriella worked for a consulting firm that supported university technology transfer activities prior to beginning her doctoral program. Similar to Owen, Gabriella’s interest in entrepreneurship was driven by a desire for scientific autonomy. She had distaste for the constraints placed on researchers within established firms that typically conform to industry trends. She commented, “Based on what I have seen, there aren’t many interesting new strategies for incorporating science into the [cattle] industry. I think I could do more cutting edge stuff on my own.” Owen was also disenchanted by the prospects of working within a corporate-sponsored laboratory. He said, “Even in industry there are too many rules and constraints. The current economic environment is perfect for someone like me with advanced training, creative ideas, and the drive to be my own success story.” The third student with entrepreneurial intent was Tyler, a conservational ecology doctoral student at EU. He had no entrepreneurial experience, but perceived entrepreneurship to be a pathway to self-determined success. He stated, “I see people start businesses or come up with an idea to fit a market niche and then they’re able to empower themselves and overcome their own economic lot that they were basically dealt in life… This inspires me.” The entrepreneurial awareness of these three participants was spawned from industry experience and/or personal observations rather than directly from the influences of the knowledge economy on their academic training and professional development.

With the exception of Gabriella, Owen and Tyler, the study participants had given little direct thought to the concept of entrepreneurship and its intersection with scientific and technological research. However, the participants did consistently describe entrepreneurship as a general process involving individuals that autonomously start and operate businesses. For example, Carley, a biochemistry doctoral student at MU, indicated “an entrepreneur is someone who has made opportunities for themselves… like someone who starts a company or something like that to make a profit on their own.” Elizabeth, a natural resources master student at SU, described entrepreneurship as “having the freedom to make money by turning nothing into something.” Likewise, Zachary, an animal sciences doctoral student at EU stated, “the way I see it, it’s [entrepreneurship] dependent on the person, the individual. It’s almost like an instinct to see and act on business opportunities.”

Overall, study participants identified creativity, novelty and the usefulness of discovery as the primary attributes of innovation. According to Carmin, a soil sciences master student at SU, innovation is “the ability to create something robust but new and useful for technology and society.” Adam, a conservation ecology doctoral student at EU, echoed a similar understanding when indicating innovation involves “creating a novel and creative approach to look at an issue or address a problem.” Participants also consistently associated innovation with research and discovery. For example, Tyler stated, “innovation is coming up with new models or tweaking old models to provide additional insight into phenomena that we want to research.” Similarly, Emma, an animal sciences doctoral student at EU, linked innovation to her research activities in the following way: “I feel like the research I do is to figure out and develop new things that could potentially work better than what currently exists. This is innovation.” She went on to say, “after the scientist innovates and creates something that works, then entrepreneurs step in and put it [discovery] out there in the market.” Thus, participants viewed innovation as an important attribute of their current research activities and future scientific or technological careers. However, they also made a distinction, whether directly or indirectly, between the scientific process of research and the subsequent commercialization of innovative outputs. This distinction suggests participants were as graduate students isolated from both the entrepreneurial opportunities and demands of the knowledge economy.

**Participant Awareness: Academic Capitalism**

While all study participants recognized an intersection between innovation and their roles as scientists and technologists, only three viewed themselves as emerging entrepreneurial scientists. Considering the importance of scientific and technological entrepreneurship to competitiveness within the knowledge economy, this general pattern was somewhat surprising. However, participant awareness of and engagement in academic capitalism (or lack thereof) as graduate students sheds some insight on this finding. Specifically, participants were mostly distanced from the influences of academic capitalism and thereby the entrepreneurial opportunities and demands of the knowledge economy as experienced from within higher education.

None of the participants had experience interacting with market-facing interstitial units (e.g., technology transfer offices, university-sponsored entrepreneurship incubators) at their universities. Similarly, none of the participants indicated having interactions with university professionals charged with facilitating academic entrepreneurship (e.g., patent licensing agents). No references to university resources relevant to academic entrepreneurship were included in the 47 syllabi analyzed as part of this study, nor were such resources prominently featured on departmental or agriculture college websites. Thus, participants had minimal exposure to and consequently little awareness of entrepreneurial resources located within campus-wide interstitial units.

Participants received some non-formal training on intellectual property (IP) protection. However, this training was not specific to protecting the economic value of discoveries through entrepreneurial strategies (e.g., patenting, copyrighting). Instead, faculty mentored students on establishing and guarding the academic...
value of novel data. For example, Bill, a horticulture doctoral student at EU, reported, "Faculty in the division talk to us about it [IP protection], but not so much in terms of entrepreneurship. More like a moral or academic conduct issue, you know, avoid certain people who might steal your ideas or data." Similarly, Chester, an environmental sciences master student at SU, stated, "My thesis advisor tells all of us in the lab to be careful of where you post things or if you present at a conference, don’t just give all your data away before publishing it."

The common association of IP protection with scholarly positioning extenuated the divide between the academic experiences of the participants and the entrepreneurial underpinnings of the knowledge economy.

Participants were alert to the availability of courses related to innovation and entrepreneurship that were offered outside of the agriculture colleges at each university. Examples of the topics addressed through such courses included IP protection, technology commercialization and strategic communication. Campus-wide announcements and word of mouth shared between students alerted the participants to the availability of these courses. For example, Bill stated, "I saw a flyer for one or two interdisciplinary IP courses being offered through the law school. I don’t believe that any similar courses are offered directly through us [agriculture college]." Tyler was made aware of a graduate certificate offered through the business college during an informal conversation with other students. He stated, "They [business college] offer a certificate in entrepreneurship to graduate students that are not studying business… I don’t know a lot about it or if it is even relevant to my career."

Without faculty guidance, the study participants were only vaguely aware of the various entrepreneurial learning opportunities available at their universities and even less certain of the relevancy of these opportunities to their scientific and technological careers.

Participants did regularly observe and participate in interdisciplinary collaboration within the three agriculture colleges. For instance, Owen, a biochemistry doctoral student at MU, described benefiting from the diverse range of expertise he had access to through collaborations between the microbiology and plant sciences department. He stated, "It’s [departmental expertise] almost 50-50, people working on plants and then people working on human health and disease and then just a couple of random people are working with bacteria… ultimately, it [interdisciplinarity] is beneficial for everybody." Conversely, participants made far less mention of interdisciplinary activities and experiences that transcended the boundaries of the agriculture colleges. Participants also made no mention of having access to any entrepreneurial knowledge circuits that may have intersected their departments, colleges, or universities. In short, participants were mostly isolated from the organizational attributes and activities of academic capitalism and, more broadly, the knowledge economy.

The participants in the current study indicated being largely isolated from the entrepreneurial opportunities and demands of the knowledge economy. Such isolation was revealed through two central findings. First, participants had little awareness of the entrepreneurial potential underlying their scientific and technological training and research. While participants commonly associated innovation with their academic interests and activities, they did so specific to discovery and the advancement of knowledge through traditional academic channels (e.g., peer reviewed publications). Moreover, only three of the 24 participants identified entrepreneurship as a relevant component of their current and future scientific and technological career aspirations. Second, participants were mostly distanced from the four organizational structures of academic capitalism, which Slaughter and Rhoades (2004) argue tie colleges and universities to the knowledge economy. Next, several key recommendations for increasing the alignment between the knowledge economy and STEM graduate education in agriculture colleges are provided.

Faculty members in agriculture colleges are encouraged to engage their graduate students more directly in their own entrepreneurial activities and industry collaborations; albeit in a judicious manner that considers potential conflicts of interest associated with the faculty-student dynamic (Mars, et al., 2008). Such engagement does not inherently imply faculty pushing their students toward entrepreneurial and/or industrial career paths. Instead, the inclusion of graduate students in entrepreneurial activities and industry collaborations is an opportunity for faculty to further mentor their students on scientific entrepreneurship and the relevancy of research and discovery to the knowledge economy (Mendoza, 2007). Without such faculty mentoring, graduate students are likely to overlook or unnecessarily discount potential career opportunities within industry and other entrepreneurial-type environments (e.g., start-up companies). Also, greater involvement in entrepreneurial activities and industry collaboration under faculty supervision would further prepare students to independently generate research funding. Indeed, the capacity to generate research support using entrepreneurial strategies (e.g., competitive positioning, resource acquisition, stakeholder mobilization) is advantageous to students intending to pursue academic careers within colleges and universities that are increasingly resource strapped.

University-wide entrepreneurship education is also a promising approach to introducing agriculture graduate students to innovation and entrepreneurial leadership. Entrepreneurship education is now an interdisciplinary field that transcends the boundaries of the business schools in which the underlying curricula are typically located (Levenburg et al., 2006; Solomon, 2007). Less formal, yet meaningful learning opportunities relevant to the knowledge economy are also available through programs sponsored by interstitial units such as technology transfer offices and university-sponsored entrepreneurship incubators (Stephan, 2001; Siegel and Phan, 2005). Examples of such programs include workshops on topics such as IP protection and start-up...
funding allocation strategies, as well as guest lectures by entrepreneurs and executive leaders from a range of agricultural and life sciences (and other relevant) industries.

Entrepreneurial learning via the interstitial units and managerial capacities developed and enhanced through academic capitalism would also provide STEM graduate students enrolled in agriculture colleges access to more diverse knowledge circuits. The knowledge circuits attributed to academic capitalism are interdisciplinary and inter-organizational (e.g., university-industry connectedness) in nature (Slaughter and Rhoades, 2008). Observing and/or participating in these knowledge circuits, which typically do not directly intersect formal classroom settings, would thus increase student exposure to and understanding of the cross-sector and multi-disciplinary nature of research and development within the knowledge economy.

Summary

The current study is not intended to critique the influences of the knowledge economy and academic capitalism on agriculture colleges or to encourage a market fundamentalist approach to agriculture research and instruction. Instead, the purpose is to provide an initial understanding of how, if at all, STEM graduate students enrolled in agriculture colleges relate their academic training and professional aspirations to the knowledge economy. Indeed, the pros and cons of overlaying graduate education in agriculture colleges with market-based principles and practices warrant debate. However, such debate is beyond the scope of this study. Accordingly, scholars are encouraged to further pursue the relevant issues and concerns through objective research and constructive dialogue.

The implications of the knowledge economy on the academic training and professional aspirations of agriculture graduate students in non-STEM programs of study (e.g., agribusiness, agricultural education and leadership, rural sociology) should also be examined. Such research should raise awareness of how entrepreneurship and innovation influence the preparation of not only those students preparing to be leaders in agricultural-based industries, but also those pursuing careers in community development and education. Future research on the intersection of the knowledge economy and undergraduate education across the agriculture disciplines is also encouraged.

Literature Cited


Entrepreneurial Science


Abstract
The purpose of our study was to explore the impact of a nontraditional approach, competing narratives, in a large-enrollment higher education course. Post-secondary students enrolled in a Natural Resource Conservation 101 course participated in a project to evaluate the efficacy of a competing narratives analysis on the development of critical thinking skills. Students’ critical thinking skills were evaluated before and after the competing narrative coursework using a standardized critical thinking assessment test scored by faculty graders. The pedagogical approach consisted of a series of writing assignments to critically assess readings from two popular, opinionated texts with contradictory messages on the topic of anthropogenic climate change. A third authoritative, neutral-toned text on climate change was provided as a reference. Students were asked to confirm data interpretation, identify logical fallacies and biases and generally compare and contrast the competing narratives. Using paired t-tests for comparison of pre-/post-course scores, critical thinking skills improved for five of the 15 specific skill areas assessed by the test. Students’ post-course scores were also higher than national norms for seven of the 15 skill areas. Specific critical thinking skill areas for which students’ scores improved to higher than national norms aligned with competing narratives assignment learning objectives.

Introduction
To accommodate the evolving needs of 21st century students, pedagogical approaches such as making content relevant to students, developing thinking skills, addressing misunderstandings directly and fostering creativity are becoming more prevalent (Saavedra and Opfer, 2012). Today’s students have a unique set of skills that can be organized into six primary categories: life, workforce, applied, personal, interpersonal and noncognitive (McComas, 2014). We analyzed the effect of a “competing narratives” pedagogical approach on the development of students’ skills identified in McComas’s (2014) applied and personal skills categories. The applied skills category addresses accessing and analyzing information, effective communication, and determining alternative solutions to problems. The personal skills category addresses curiosity, imagination, critical thinking and problem solving (McComas, 2014). The pedagogical approach for this study used teaching strategies suggested by Saavedra and Opfer (2012) to encourage students to analyze and evaluate the claims of two book narratives with opposing viewpoints (competing narratives) on global climate change.

The competing narratives approach is grounded in constructivism. This educational philosophy suggests learning should occur in authentic environments and, thus, knowledge construction is enhanced when the experience is authentic (Doolittle and Camp, 1999; Splan et al., 2011). One role of higher education is to build on students’ previous knowledge and authentic experiences while encouraging them to use higher-order thinking skills, such as those expressed in Bloom’s (1956) taxonomy. Specifically, the development of students’ critical thinking abilities is often targeted through pedagogical approaches that urge students to analyze, synthesize, and evaluate (Bloom, 1956; Duron et al., 2006).

Traditional pedagogical approaches cannot achieve the constructivist values desired in higher education when dealing with many students at once (Bostock, 1998). Therefore, the purpose of our study was to explore the impact of a nontraditional approach, competing narratives, in a large-enrollment higher education course. The pedagogical approach used in this study remained consistent with the constructivist approach by encouraging students to incorporate their personal experiences in the analysis, synthesis, and evaluation of two distinctly different global climate change viewpoints expressed in
Using Competing Narratives

two separate book narratives. Two research questions guided this study:
1. How are students’ critical thinking abilities affected by a competing narratives pedagogical approach?
2. After completion of the entry-level, semester-long course, how do students’ critical thinking abilities compare to national norms?

Methods

Montana State University’s (MSU) introductory Natural Resource Conservation course (NRSM 101) is an entry-level, three-credit course. Course objectives include introducing global and local soil, water, range-land, and wildlife conservation issues and improving students’ abilities to think critically about natural resource management. In addition to a standard text to address contextually based concepts (Chiras and Reganold, 2009), two short, competing narratives with provocative and opposing views on global climate change (Berger, 2013; Goreham, 2013) were assigned so students could evaluate the strengths of presented arguments. A third climate change text, more authoritative and neutral in political tone (Eggleton, 2013), was used to help students reconcile disagreement between the competing narratives.

Early in the semester, students were introduced to common fallacies of critical thinking as well as examples of fast and slow thinking. Fast thinking is characterized by jumping to conclusions based on personal biases and emotional inclinations, whereas slow thinking is represented by logical and reasoned thought (Kahneman, 2011). Critical thinking skills were initially targeted and developed through a writing assignment based on the main text, Chiras and Reganold (2010). Then, in weeks 13 and 15 of the 16-week semester, students submitted written assignments that compared and contrasted arguments from the competing narratives, using the neutral climate change text as a mediator. In total, three writing assignments were used to encourage students to examine the scientific merit of various arguments presented in the competing narratives.

The MSU Institutional Review Board approved the study protocol and all participants provided written informed consent prior to participation in the study. The target population was all undergraduate students enrolled in NRSM 101 during the fall 2014 semester (N=209). Similar to numerous other studies that explored the development of students’ critical thinking abilities (Bers et al., 1996; Friedel et al., 2008; Iwaoka et al., 2010; Perry et al., 2015), we used a matched-pairs pretest–posttest design. Pretests and posttests were administered separately during weeks 1 and 15 of the 16-week semester.

Based on the pedagogical approach and learning outcomes of NRSM 101, we determined the Critical Thinking Assessment Test (CAT) was the most appropriate instrument to evaluate students’ critical thinking abilities. The CAT is a tool supported by the National Science Foundation and created to assess and improve critical thinking abilities (Center for Assessment and Improvement of Learning [CAIL], 2010). Among other uses, it is designed to evaluate the effects of a specific course through a pretest–posttest design (CAIL, 2012). As displayed in Figure 1, it includes 15 short-answer questions based on real-world situations developed to accurately assess important components of critical thinking, such as effective communication, the ability to evaluate and interpret information, problem solving and creative thinking (CAIL, 2010).

Under direct supervision of a CAIL-trained individual, 10 faculty members representing multiple academic disciplines scored the CAT assessments. Detailed scoring rubrics provided by CAIL were used to enhance consistency and reliability in evaluations. The CAT was administered to the entire population (N=209). However, because of limited resources (primarily faculty scorers’ time), 40 matched pairs were randomly selected for scoring. After culling matched pairs for completeness, 37 (n=37) were deemed usable. This quantity of assessments met CAIL’s recommendation of obtaining a minimum of 10 matched pairs to evaluate changes in critical thinking abilities through a pretest–posttest design.

Satisfying common belief that reliability coefficients of 0.80 or higher are “sufficiently reliable” (Gall et al., 1996, p. 200), CAIL (2010) reported inter-rater reliability examinations on the CAT at the level of 0.82 and a test-retest reliability coefficient of greater than 0.80 (CAIL, 2012). To further ensure inter-rater reliability, two faculty scorers evaluated each question; if the initial two scorers disagreed, a third scorer evaluated the question. A numerical average of the three scores was recorded. At an alpha level of 0.70, internal consistency was deemed reasonably good by CAIL (2010). The lower internal consistency was due in part to the numerous components of critical thinking evaluated by the instrument (CAIL, 2010).

Per typical educational research, statistical significance was set a priori at $p < 0.05$ (Gall et al., 1996). The $t$ distribution was used to determine the level of sta-
tical significance of an observed difference between sample means among small samples sizes (Gall et al., 1996). To address research question one, paired-samples t tests were used to determine if the pedagogical approach of NRSRM 101 made a statistically significant difference in students’ critical thinking abilities. To address the second research question, a one-sample t test used CAT national norm data collected from freshmen- and sophomore-level higher education students across the nation was conducted. Students’ posttest scores were selected for this comparison to take into account any effects of enrollment in NRSRM 101. Effect sizes quantifying group differences were interpreted using Cohen’s (1992) criteria, wherein 0.2 is considered small, 0.5 is moderate and 0.8 is large.

Results and Discussion

Our sample was primarily composed of females (62.2%) less than or equal to 20 years of age (67.6%). Nearly the entire sample (91.9%) self-identified as white. The demographic representation was as expected for this course. Historically, NRSRM 101 has been comprised of approximately 75.0% freshmen or sophomores between the ages of 17 and 20 years of age. Multiple paired-samples t tests were conducted to compare pre-course and post-course critical thinking abilities according to the 15 specific skill areas assessed by the CAT (Table 1). Students’ posttest scores were statistically (p < 0.05) higher than their pretest scores on five of the 15 specific skill areas and on their overall CAT total score.

Representative of the strongest increase between pretest and posttest performance (p < 0.01; d=0.78), students’ abilities to evaluate the strength of correlational-type data aligned with the desired outcomes of the competing narratives pedagogical approach. As a component of one of the three primary writing assignments, students were asked to examine evidence provided by the authors of the competing narratives and evaluate the validity of claims. This prompt pushed students to evaluate competing claims that were often represented through correlational type data and displayed in charts or graphs. The same targeted approach serves as a possible explanation to the second strongest increase between pretest and posttest performance (p < 0.05; d=0.61), summarizing a pattern of results in a graph.

Students also saw substantial, significant increases in their abilities to use and apply relevant information (p < 0.01; d=0.51) and to identify and explain the best solutions for real-world problems (p < 0.05; d=0.59). Beyond the initial assignment that prompted students to examine evidence and validity, students were repeatedly asked to apply relevant theories and information to the real-world issues presented in the competing narratives. According to Saavedra and Opfer’s (2012) 21st century teaching recommendations, this deliberate approach of continually incorporating real-world, relevant applications could help explain the increase in both aforementioned critical thinking skill areas.

Research question one asked how students’ critical thinking abilities were affected by the use of a competing narratives pedagogical approach. Reflective of McComas’s (2014) 21st century skills and Saavedra and Opfer’s (2012) teaching strategies, our primary conclusion is that enrollment in an entry-level, semester-long course that uses a competing book analysis approach to encourage students to analyze and evaluate claims can positively influence students’ overall critical thinking abilities. Abiding by the tenant of constructivism, wherein learning should occur in authentic environments and be enhanced by personal experience (Doolittle and Camp, 1999; Splan et al., 2011), the competing narratives approach impelled students to construct new knowledge from inspecting their own previous experiences and opinions of global climate change and strive for the higher levels of Bloom’s (1956) taxonomy.

Results from the second research question served more as a benchmark for the critical thinking abilities of a targeted group of students within the College of Agriculture. Research question two sought to compare students’ posttest scores with CAT national norm data through t tests (Table 2). Students’ posttest scores were higher than national norm data on seven of the 15 skill areas assessed by the CAT, as well as on their overall CAT score. Students displayed the greatest separation above national norms in their abilities to evaluate the strength of correlational-type data (p < 0.001;
Using Competing Narratives

$d=0.98$), provide alternative explanations for spurious associations ($p < 0.001$; $d=0.87$), and use and apply relevant information ($p < 0.001$; $d=0.72$). The only skill area where students scored lower than national norm data was in their ability to identify additional information needed to evaluate a hypothesis ($p < 0.01$; $d=0.63$).

Due to demographic and academic program differences, care must be taken when comparing students’ scores to CAT national norm data. Even though these students’ posttest scores were higher than national norm data on seven of the 15 CAT skill areas, their pretest scores were already higher than national norm data on two of the 15 skill areas. Posttest scores were used as the primary comparison unit to incorporate potential effects of the competing narratives approach. The seven CAT skill areas where students excelled beyond national norms were reflective of their abilities to evaluate and interpret information and solve problems. However, similar to Perry et al.’s (2014) observations of a comparable population, students in this study did not outperform national norms in the skill areas founded in creative thinking and effective communication. “Creativity is not a fixed characteristic…rather, it is incremental, such that students can learn to be more creative” (Saavedra and Opfer, 2012, p. 12). Thus, educators must not forget the importance of integrating opportunities for their students to engage in creative thinking.

Summary and Implications

Implications for curriculum development and teaching stem from the conclusion that the competing book analysis approach had a positive influence on students’ overall critical thinking abilities. Therefore, instructors who are seeking alternative approaches to increasing students’ critical thinking abilities should consider the competing narratives approach. As Saavedra and Opfer (2012) established, learning 21st century skills, such as critical thinking, requires relevant content, teaching through the disciplines, and addressing misunderstanding directly. “When personal context and meaning are established and critical thinking occurs, instructors can increase competency” (Riehle, 2012, p. 234). The pedagogical approach used in our study intentionally incorporated a relevant topic of interest that crossed multiple disciplines and allowed numerous opportunities to discuss information fallacies. We recommend that educators who wish to replicate this approach follow a similar method, without negating the importance of student involvement and writing. For knowledge to be constructed rather than transmitted, students need to engage with the teaching process and content (Hussain, 2012; Narayan et al., 2013).

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Going Against the Grain: Recruiting Atypical Students into a College of Agriculture

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Abstract

Despite the increased number of students enrolled in agriculture and natural resources (ANR) colleges, a diminishing agricultural workforce creates a demand for non-traditional agriculture students. To fill the gap between workforce needs and ANR college graduates, new strategies must be developed to recruit students who have little or no connection to ANR. The purpose of this study was to identify the recruitment experiences influencing students with little knowledge or experience in ANR to enroll in a college of agriculture. Versatility of degree programs, interactions with faculty and institutional characteristics such as scholarships, faculty advising, student organizations and small-community atmosphere were identified as factors contributing to participants' committed interests in the College of Agricultural Sciences and Natural Resources at Texas Tech University. Participants suggested recruitment messaging focused on real world applications of degree programs and importance of atypical students within the discipline would have been influential to their transition into an atypical degree program. A major implication of this study is the need to address the exclusivity of the ANR industries as perceived by outsiders. Recruitment messaging should focus on inclusion by promoting the diversity of people and opportunities within agriculture and natural resources disciplines and careers.

Introduction

With the world’s population expected to reach 8 billion people by 2025 (United Nations, 2013), the global agricultural system is challenged to produce more food using fewer natural resources. However, the agricultural workforce equipped to handle the global demands is diminishing. The average age of a U.S. principal farm operator increased from 52 years old in 1987 to 57 years old in 2007 (USDA, 2009). Of the 54,000 annual job openings that were estimated to occur within agriculture, food and natural resources between 2010-2015, an average of 29,300 graduates from colleges of agriculture and life sciences, forestry and natural resources and veterinary medicine were expected to fill those jobs each year (Goecker et al., 2010).

The existing gap between career opportunities and the number of experienced and qualified graduates to fill them is expanding. The supply of agricultural industry professionals is not meeting employer demand. A survey conducted by the Coalition for a Sustainable Agricultural Workforce (2013) found agribusiness companies were concerned about their ability to fill open positions through 2015. Six of the largest companies surveyed agreed: (1) the pipeline of graduates in agriculture and natural resources (ANR) disciplines was lacking, (2) they anticipated challenges in finding quality applicants, (3) there would be difficulty in hiring the education and experience needed and (4) some hires would need to be retrained (CSAW, 2013).

Although enrollment in college-level ANR degree programs has increased more than 30% in the past eight years, the number of graduates cannot keep up with the need for young agriculture professionals (SFAC, 2014).

Society has slowly moved away from its agrarian foundation since the Industrial Revolution. The United States has experienced a large abandonment of farming as a livelihood (Grandil, 2014; Lobao and Meyer, 2001). Russell (1989) found students enrolled in agriculture programs lacked the agricultural background and related experiences possessed by previous students. Between 1983 and 1985, only 46% of freshman enrolled in the University of Illinois’ College of Agriculture had been, at least, enrolled in a high school agriculture program. Between 1986 and 1988, that figure dropped to 32.3% (Russell, 1989). Both secondary and post-secondary ANR programs must adapt to changes in industry and the prospective student population to provide the quantity and quality workforce these industries demand (Martin, 2003).

The agricultural workforce will have to come from a population that has no natural connection to agriculture to fill the expanding gap between the number of graduates and available jobs in the ANR industries.
(SFAC, 2014). These changes present an opportunity for post-secondary ANR programs to revise recruitment strategies toward a niche audience where academic major and career choice are largely based on interest. However, little is known about these potential prospects and their motivation for pursuing a degree or career field where they lack in knowledge and experience.

The recruitment programs within colleges of agriculture must begin to incorporate strategic communications to reach niche groups of prospective students, current students, parents, alumni and donors (Baker et al., 2013; Smith, 2002). There is a need to develop new strategies that draw non-agriculture students to colleges of agriculture as the pool of prospective students becomes further removed from production agriculture (Rayfield et al., 2013). This begins with understanding what influences a student’s decision related to academic and career choices (Chapman, 1981).

Lingenfelter and Beierlein (2006) found recruiting practices for agricultural programs were most successful when specific interests were targeted. “Promoting agriculture as a whole is not enough” (Settle et al., 2012, p. 72). Agriculture must become relevant to students’ lives and connected to their interests to recruit a new ANR workforce. Russell (1989) suggested colleges of agriculture would benefit from taking a more active role in introducing students to opportunities in agriculture.

Myers et al. (2004) identified teacher quality and commitment, program quality, focus on production agriculture, perceived career opportunities, salary considerations, image of agriculture and the program, and availability of agriculture programs to students as issues affecting agriculture program recruitment success. Similarly, Morgan and Shim (1990) discovered perceived career image was the most significant factor affecting attitudes toward a specific major. Shenafi (2013) found 84% of the 170 surveyed students agreed only students with a farm background should pursue agricultural-related careers.

Fraze et al. (2011) found urban high school students developed a more positive attitude concerning agriculture as a subject, college major and career after attending an agriculture recruitment workshop. Settle et al. (2012) found non-agriculture students’ self-efficacy and career interest in agriculture increased after participating in an agricultural communications workshop. However, students with an existing agriculture background were not as receptive to the program’s ability to increase self-efficacy and career interest, suggesting similar programs should focus on non-agriculture students.

Understanding the predictability factors for students when choosing a major could influence educational programs and/or recruiting tools used by high schools, colleges, industry and government (Hegerfeld-Baker et al., 2015). Colleges of agriculture can use this information to develop targeted recruitment strategies and diversify the profile of graduates available to fill positions in the food, agricultural and natural resource systems (Bobbitt, 2006).

**Theoretical Framework**

This study utilized Chapman’s Model of Student College Choice (1981) to guide the development of discussion questions specific to the recruitment experiences of typical students found influential to their decision to enroll in the College of Agricultural Sciences and Natural Resources (CASNR) at Texas Tech University. The model represents student college choice as being influenced by both the characteristics of the student and external influences (Figure 1). For the purpose of this study, the characteristics of the students were acknowledged as affecting the available recruitment opportunities and experiences of students, but were not investigated in depth. External influences discussed by the model are grouped into three categories: (1) the influence of significant persons, (2) the fixed characteristics of the institution and (3) the institution’s effort to communicate with prospective students (Chapman, 1981).

**Methods**

The purpose of this study was to identify the recruitment experiences influencing atypical students’ decision to enroll in CASNR at Texas Tech University. The objectives were to (1) identify the recruitment experiences influential to atypical students’ decision to enroll in CASNR at Texas Tech University and (2) identify the messages influential to atypical students’ transitions into CASNR at Texas Tech University.

The population for this qualitative study was current undergraduate students with little to no ANR knowledge or experience prior to their enrollment in CASNR at Texas Tech University. Knowledge and experience in ANR were defined as previous involvement in an extracurricular or educational agriculture or natural resource activity or organization, such as FFA or 4-H and being less than two generations removed from production agriculture or natural resources.
This study utilized a purposeful sampling method of participants based on the following criteria used to describe the atypical student populace:

- Over the age of 18
- Participant never participated in or was a member of 4-H or FFA prior to their enrollment in CASNR.
- Participant never took an agriculture or natural resources education course prior to their enrollment in CASNR.
- Participant’s parents were never dependent on an income accumulated from production agriculture and/or natural resources.
- Participant’s grandparents were never dependent on an income accumulated from production agriculture and/or natural resources.

This study’s sample included ten participants. Three focus groups were conducted with three participants in the first two focus groups and four participants in the third focus group. The Texas Tech University Institutional Review Board approved the study protocol and all participants provided a written informed consent prior to participation in the study.

Data were collected during three focus groups conducted in February and March of 2015. Data analysis occurred during and after data was collected. Each focus group lasted between 60-90 minutes and was video recorded to document verbal and nonverbal responses and aide in transcription. Each focus group used 14 open-ended discussion questions regarding participants’ transitions and experiences influencing their interest in ANR and subsequent enrollment in a post-secondary degree program. Discussion questions were developed to explore atypical students’ interest development in ANR as well as their commitment to an academic or occupational pursuit within a related subject area. Questions focused on participants’ recollection of activities or events that influenced their initial interests, decision-making process and final decision regarding enrolling in CASNR. A variety of probing questions were used to reveal unique meaning and understanding of the phenomenon under investigation.

Focus group discussions were transcribed verbatim from the audio recordings. Field notes were taken immediately following each focus group session as well as during the review of video-recordings to note nonverbal communication between participants. The compilation of transcriptions and field notes from the three focus groups resulted in 60 pages of written data and 223 minutes of video. Data analysis began after all focus group discussions were transcribed. The researcher utilized an open, axial and selective coding method to sort the data into units of meaning. Data was analyzed using the directed content analysis method.

It was important during data collection to allow participants to express their own thoughts completely. Therefore, the data portrayed the actual words and natural progression of participants and reflected their own experiences at the time of the focus group (Seidman, 2006). The researcher also made entries in the researcher’s journal and took notes corresponding to each focus group to establish within-method triangulation, a validation of credibility within the findings. Utilizing the researcher’s journal, transcriptions of each focus group were compared and crosschecked to verify the accuracy of findings to confirm observations and conclusions from multiple data sources (Ary et al., 2010). Notes also included the rationale and context in which decisions were made throughout the investigation. This rich, descriptive data established transferability of the findings.

Dependability was established through a thorough description of the research methods utilized throughout the investigation (Thomas and Magilvy, 2011). This includes purpose, selection of participants, data collection, data analysis and findings. Audio and video files, transcripts, notes and journal entries were also organized and stored in a retrievable form on a computer to increase dependability (Ary et al., 2010). All focus group audio records were transcribed verbatim. The researcher developed a list of themes and re-read all transcripts after a two-day period to check for bias.

Results and Discussion

Research objective one was to identify the recruitment experiences influential to atypical students’ decision to enroll in CASNR at Texas Tech University. One theme emerged from the data analyzed for this objective, CASNR interest development, which was specific to what the participants experienced as being influential in choosing CASNR and committing to subsequent enrollment. Participants reported CASNR offered a variety of degree options that facilitated multiple interests, the opportunity to interact with faculty and staff on a personal level and a specific set of institutional college characteristics that influenced their decision to enroll. These institutional characteristics were relatively fixed within the short-term perspective of CASNR, which allowed participants to compare and contrast the characteristics of other institutions (Chapman, 1981).

Combination of Interests

Some participants noted the versatility of the college’s degree programs allowed them to combine their interest in activities they were already comfortable and confident in with newly developed agricultural-related interests. The availability of degree programs allowed participants to pick and choose degree paths they could relate to and learn more about. One participant said, “In my degree program, we learn graphic design, advertising and public relations with a little bit of ag thrown in. So, I feel like whatever life throws at me, I can take it.” Another participant said, “It’s really interesting to realize how alike the business side of everything is compared to if you look at what I am learning in the ag department to my friends that are in the actual business department. It is the exact same kind of thing except for the fact that we are learning more life problems.”
Faculty/Staff Interactions

Participants stated faculty and staff interactions were a distinguishing characteristic of CASNR that influenced their commitment to their degree programs. Comments solicited by faculty and staff during these interactions helped shape participants’ expectations (Chapman 1981). Similarly, Washburn (2002) found personal conversations with college professors were most useful to students when choosing a college. Through these interactions, participants said they were introduced to the opportunities within CASNR that would best fit their needs as students and they were able to develop an idea of what life in the college would be like. One participant stated, “I got to meet people within the department and really see the passion our faculty has for student success and how people see opportunities for us and our skills and in turn, provide opportunities for us to become better in what we are doing.”

Fixed College Characteristics

Additional college characteristics that influenced atypical students’ decisions to enroll were scholarships, faculty advising, student organizations and the small, community-type atmosphere within CASNR. These college characteristics, congruent to the fixed college characteristics represented in Chapman’s model, represent the factors participants were able to compare and contrast between other colleges of agriculture.

Research objective two sought to identify the messages influential to atypical students’ transitions into CASNR at Texas Tech University. Chapman (1981) describes the college’s efforts to communicate with students as an important external influence on student college choice. These efforts can include written information (i.e. recruitment materials), campus visits and admissions/recruiting events. None of the participants recalled specific written information as being influential to their decision to enroll in CASNR. However, campus visits and recruitment events were noted to affect their decision because of the opportunity to meet and interact with the college’s faculty and staff, which was most influential in their decision.

Participants stated specific messaging targeted for atypical students should be utilized. This theme represents the messages participants felt would have been effective in attracting them to CASNR earlier in the college choice process. Two subthemes, real world applications and the importance of atypical students, were developed through the discussion of messages participants wish they would have heard when considering their academic and career pathways.

Real World Applications

The majority of participants talked about the functionality of their degree programs and the current and future relevance of ANR industries. A common misconception of ANR-related degrees is that they can only be utilized within ANR industries. However, participants unanimously declared their degree would be useful to them in a real-world setting because ANR will always be a relevant industry. One participant said, “I am applying what I am learning in a practical way in my home.” Many participants talked about the job security and long-term importance of their degrees. One participant expressed this view by saying, “There is job security out there in agriculture jobs and agricultural degrees because agriculture is not going away. We always have to have it.”

Many participants reported they would have transitioned into the discipline earlier if the benefits of pursuing a career in the agriculture industry had been communicated to them earlier in life. Participants also said their transition into CASNR would have happened earlier if they had known about the different options available to them academically and vocationally. For example, one participant said, “I wish there would have been more information about getting a degree within the ag industry because there are so many different options. I think when you hear about getting a degree or job within the ag industry, it is very small or very specific.” In conclusion, one participant said, “My advisor told me you have unlimited options if you get an agriculture and natural resource degree.”

Importance of Atypical Students

Participants suggested making atypical students feel important during the recruitment process would be beneficial. The data analysis for this subtheme was compiled from the discussion of the benefits of having atypical students in the field of ANR. One participant said, “We come from different backgrounds and we bring different aspects other kids wouldn’t. I think more from an outside perspective. If you have been within the industry your entire life, I think you can be in a bubble.” Identifying the benefits of atypical students to the overall success of ANR programs would provide encouragement to students with similar backgrounds considering entering the career field.

Summary

Overcoming the challenge of increasing food production while using fewer natural resources in the global agricultural system will take a new breed of farmer. This study explored the effective recruitment strategies in influencing atypical students’ decisions to enroll in a post-secondary ANR program. The findings from this study were used to revise the recruitment efforts for Texas Tech University’s College of Agriculture and Natural Resources to attract prospective atypical students.

College recruitment must begin to incorporate strategic communications to reach niche groups of prospective students, current students, parents, alumni and donors to stand out in the competitive market place (Baker, et al., 2013; Smith, 2002). CASNR should promote inclusion of atypical students by focusing on the diversity of programs and career options the discipline of ANR has to offer. Many participants reported they assumed ANR industries, including available academic
and career opportunities, were exclusive to individuals with knowledge or experience in related fields. CASNR could start profiling their current student body to identify where and what backgrounds students are coming from, as well as what their academic and career aspirations are. Profiles could then be used, with consent, to recruit other niche groups of students to the programs. An atypical student campaign should be developed and distributed by promoting diversity through various written and digital recruitment materials including flyers, brochures, picture and videos. Future research on the effectiveness of the campaign in recruiting niche groups of students should later be conducted.

CASNR recruitment initiatives focus primarily on institutional characteristics of the college. Scholarships, faculty advising, student organizations and small community-type atmosphere were the characteristics most influential to the atypical students who participated in this study. These characteristics should be used to inform the focus of written materials targeted toward typical students. When targeting prospective atypical students, recruitment messages should focus on the need for atypical students in the discipline, functionality of degrees and current students with atypical backgrounds.

These findings emphasize the influence faculty interactions have on atypical student major choice. After meeting or having a personal conversation with a professor, staff member, or current student, participants reported feeling more informed in their expectations of the degree programs. These perceived expectations worked to inform goals of future behavior. Faculty should play a proactive role in the recruitment process of atypical students, which would involve the incorporation of faculty members in admission and recruitment events.

**Literature Cited**


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Check it out: http://www.nactateachers.org/
A Classroom Experiment to Show How Markets Set Prices

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Abstract

We designed and implemented a so-called Wisdom of the Crowd experiment to demonstrate how information in markets set market prices. Wisdom of the Crowd concepts suggest that random, uncorrelated answers to a simple problem or question given by a group of people will often converge on the correct answer, even though few (of none) of those answering have special knowledge regarding the question. This is similar to the way markets synthesize bids and offers from participants to settle on a price. Students in two courses, production economics and futures trading, were asked to guess the number of jelly beans in a jar. The statistical summary of all guesses was presented to each course in a follow-up lecture on the role of prices and markets in the economy. Results deviated from what we expected in that the average guess of each course was far below the actual number of jelly beans in the jar. We hypothesized this was a result of how the experiment was implemented and informally confirmed this hypothesis with a post hoc experiment. The flexibility of the experiment allowed us to use the bias present in the guesses as a part of the lecture on prices and markets in the economy. Post-experiment surveys indicated that 80% of students saw a clear linkage between the experiment and how markets set prices. Seventy five percent of students indicated that the experiment gave them a better understanding of prices and markets and 93% stated the experiment would be beneficial for future students.

Introduction

Comprehension of how efficient markets arrive at prices is foundational to understanding economic theory. Agricultural economics undergraduates encounter the concept early in their careers in introductory microeconomic theory classes. However, students must continue to add depth and nuance to the idea in order to succeed in upper-level courses related to agricultural economics and to achieve success when applying their knowledge to real-world agricultural economic problems. Because of its importance, revisiting the topic of markets and prices throughout an agricultural economics program is essential.

Instructors of economics have the unfortunate reputation of not appreciating teaching (Becker, 1997). In general, a heavy reliance on “chalk and talk” defines economic theory classes (Watts and Becker, 2008). Recent years have seen an increase in the inclusion of other methods. For example, the popularity of classroom experiments in economic courses have grown (Carter and Emerson, 2012; Dickie, 2006; Watts and Becker, 2008). Carter and Emerson (2012) explain that experiments in economics classes have the ability to improve student involvement, perception of economics and retention of material. Instructors of agricultural economics, which is quite applied by its nature, also increasingly utilize experiential learning (Koontz et al., 1995; French and Turner, 1989) and classroom experiments (Barnett and Kriesel, 2003; Hendricks and Drysdale, 2015).

We developed and implemented a classroom experiment designed to show students how the seemingly unrelated input from many participants come together to set prices in a market and how such system can be skewed by certain factors. The motivation for implementing this teaching strategy was the importance of teaching how markets function and the chance to take advantage of the aforementioned benefits of classroom experiments. The experiment is easy to adapt to any class where the idea of markets is important. In addition to the teaching value, the interactive experiment is a way to allow students (even in large classes) to be actively engaged in the classroom experience. The experiment is simple enough for beginning economics students yet flexible enough to be adapted to more advanced courses.

Materials and Methods

The experiment was based on the “wisdom of the crowd” (WOC) concept (Surowiecki, 2005). WOC has been put forth in various ways as a method of taking

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advantage of and synthesizing diverse opinions among a group of people. Most recently, WOC was the focus of a popular book by James Surowiecki (2005). The idea is that asking a large group of individuals to answer a question, estimate a value, or solve a problem and then using the average across their responses often yields a better result than asking an individual. The concept has been used in applications from classroom experiments in finance (Treynor, 1987) to numerous prediction markets (Tziralis and Tatsiopoulos, 2007). The prevalence of examples makes it possible to utilize external print, audio and video resources to explain the WOC idea to students and give them the chance to explore the topic on their own and learn more about it.

WOC relates to markets because, in a competitive market, no one buyer or seller can set the price. In an efficient market, information from buyers, sellers and relevant factors is synthesized to arrive at a market price. No single individual chooses the market price, but all are involved. Economic theory teaches that (assuming competitive conditions) this market price will provide incentives for resources to be used in the most efficient way.

The WOC experiment this study is based upon was conducted as follows in an intermediate-level production economics course and an applied futures and options trading course. We partially filled a transparent glass jar with jelly beans and kept a count of how many beans were in the jar. On the first day of class during the Spring 2016 semester, the jar was placed at the front of the classroom. Students were given prepared half-sheets of paper. Questions on the sheet asked for their best guess of how many jelly beans were in the jar. They were also asked to provide their classification (i.e., freshman, sophomore, junior or senior) and gender. The guesses of each course were labeled to maintain the ability to check for statistical differences across courses.

We summarized the results and presented them to each course group in a later class session. In the production economics course, the results were presented as a means to introduce the review lecture on prices and markets. In the futures trading class, the class session was used as a way to discuss the efficiency of markets and how futures prices reflect available information. In both cases, the experiment fit well with course objectives.

The typical conclusion of a WOC activity is that the average guess of the people surveyed is quite close to the correct answer and is better than a majority of the individuals who guessed (Surowiecki, 2005; Treynor, 1989). The fact that the average guess is close to the correct answer is often a surprise and gets the attention of students. Participating students also enjoy seeing how close their personal guess was to the correct number of jelly beans in the jar. This engagement provides an enjoyable learning experience that will be remembered.

### Results and Discussion

Results from our experiment were different from anticipated. There were 441 jelly beans in the jar. The average guesses of both classes were considerably lower than the actual number. Table 1 contains a statistical summary of the guesses. The average guess of the 94 production economics students participating was 237.9 jelly beans and the average across 32 futures trading students was 286.5. Both classes guessed very low. In fact, across both classes, 43% of the individual guesses were closer to the true value than the average guess of the group. This kind of result is uncommon but does happen (Steiner, 2015). Although initially anti-climactic, this result provided a teaching moment.

Suroweiki (2005) explains that WOC is quite impressive in many situations but also that certain conditions must be met. Particularly, guesses must be unbiased and uncorrelated. If guesses are unbiased, an individual guess is just as likely to be high as low. That is, nothing makes everyone’s guess tend to be low or high. In this case, the errors from high guesses and those from the low guesses cancel each other out, in a way, when an average is taken. The resulting average, then, generally converges on the correct number, as more observations are added. If there is a factor that biases every guess, the mean will converge on some number higher or lower than the correct answer. Correlation among guesses has a similar effect. If people allow the guesses (or behavior) of others to influence their own guesses, then the guesses (and, therefore, the errors) are correlated. This social impact will skew the guesses and make converging on the correct answer less likely. As both classes guessed low and the means of the two classes’ guesses were relatively close, we hypothesized that experiment design or social impact had introduced a downward bias into the guesses.

We used a post hoc experiment to test for a bias in the guesses. Specifically, we repeated the experiment with graduate students and allowed them to pick up the jar and examine it before guessing. The reasoning behind this was that the classrooms used in the original experiment were large and many students were far away from the jar of jelly beans. This perspective could have made the jar seem smaller than it is and, thus, caused students to guess low. Eighteen graduate students were surveyed. The average of their guesses was 482, which is quite near the actual number of 441. Further, only two of the guesses (11%) were better than the average, in terms of absolute deviation from the actual number of jelly beans in the jar. These results are much more consis-

<table>
<thead>
<tr>
<th>Table 1. Guesses of How Many Jelly Beans Were in a Glass Jar</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev.</th>
<th>Max</th>
<th>Min</th>
<th>N</th>
<th>T-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>264.1</td>
<td>247</td>
<td>115.6</td>
<td>735</td>
<td>80</td>
<td>105</td>
<td>-2.12*</td>
</tr>
<tr>
<td>Female</td>
<td>217.3</td>
<td>200</td>
<td>107.5</td>
<td>450</td>
<td>64</td>
<td>32</td>
<td>-2.20*</td>
</tr>
<tr>
<td>Production Economics</td>
<td>238.0</td>
<td>229.5</td>
<td>107.4</td>
<td>735</td>
<td>64</td>
<td>94</td>
<td>---</td>
</tr>
<tr>
<td>Futures Trading</td>
<td>286.5</td>
<td>285</td>
<td>125.3</td>
<td>620</td>
<td>114</td>
<td>43</td>
<td>---</td>
</tr>
<tr>
<td>All</td>
<td>253.2</td>
<td>232</td>
<td>115.1</td>
<td>735</td>
<td>64</td>
<td>137</td>
<td>---</td>
</tr>
</tbody>
</table>

Notes: Two-tailed T-test with assumption of unequal variances were performed to compare the mean guess of subgroups. The subscript y indicates the t-statistic from the test between average guesses of male and females and z between the production economics class and the futures trading class. *The null hypothesis that the means were equal was rejected at the 0.05 level.
A Classroom Experiment

tent with what one generally sees in WOC experiments. This provided some confirmation that the way we implemented the experiment in the two courses likely biased all guesses downward.

As mentioned, the statistical summary of the guesses was presented to each class and compared to the correct number of jelly beans in the jar. As the average guess across all students and the average of subsets (i.e., each course, each gender, classification) were all substantially lower than the correct answer, that became the focus of the discussion. The students were shown a video of another jelly bean experiment that resulted in an average guess that was almost exactly the same as the correct number. We then discussed why our experiment might have turned out differently. The results of the post hoc survey of graduate students were presented along with the hypothesis that perspective and distance from the jar had biased the results. This was appropriate because markets can fail in similar ways. If there is information or consumer expectations that widely affect buyers and sellers in a market, those participants will adjust their ideas of a reasonable price accordingly. These adjustments may not reflect any real change or the change in the value of the product being bought and sold. This behavior can result in a so-called market bubble where prices are not consistent with the fundamental asset value (Brunnermeir, 2008). It should also be noted that there is disagreement around the definition and nature of market bubbles (Bhattacharya and Yu, 2008), though it is generally agreed upon that market participants can, at times, be swayed by external factors. Even though unexpected, the consistent downward bias among all students (and all tested subsets of students) provided an interesting example of how markets can fail when assumptions about competitiveness of markets (e.g., everyone has the same information and everyone behaves rationally) are not met.

After the discussion of the experiment results and their linkage to how markets work, students were asked to complete a survey on their perceptions of the experiment and how it affected their desire to learn more about related concepts (Table 2). Results are pooled across all participating students. Responses by course and gender are available from the authors but are so similar to the aggregate that we do not report them here. Results indicate that students could relate the process of many people guessing a value to the way many buyers and sellers interact in a market. Eighty percent of students either agreed or strongly agreed with the statement “There was a clear linkage between the jelly bean jar experiment and how markets work”. Further, 75% either agreed or strongly agreed that the experiment increased their understanding of how prices and markets are related. Perhaps even more importantly, students reported that the experiment increased their desire to learn. When asked if the experiment increased their desire to learn more about WOC, 87% agreed or strongly agreed. Seventy-four percent answered similarly regarding the concept of how markets work. Finally, nearly all participating students (93%) indicated that they think future students would benefit from the jelly bean jar experiment.

Summary

In order to engage students and provide an alternative to a strictly “chalk and talk” approach to teaching the economic concept of how markets set prices, we designed and implemented a WOC classroom experiment and follow-up lesson. The experiment involved asking students to guess how many jelly beans were in a jar at the front of the classroom. The statistical summary of guesses was presented to the class in a follow-up lesson. The focus of this lesson was that, just as all the average guesses reflected the information contained in the individual guesses of the students, prices reflect information contributed by all potential buyers and sellers. In this case, the average guess of all students was quite low, as were the averages of various subsets of students. This bias in guesses was exploited to explain how external information can bias a group of people and the importance of understanding assumptions of competitiveness in markets.

Students responded well to the experiment and engaged in both the guessing session and follow-up lesson. Attitudes and classroom environment suggested the students were interested in the outcomes and enjoyed the involvement. A post-experiment survey confirmed this. Ninety-three percent of the students indicated that they think the experiment would benefit future students and the most students stated that the experiment increased their desire to learn about markets and WOC.

Teachers of economics at all levels can readily implement this experiment. The cost and time investment are minimal. There are several high-quality video resources available online to supplement the lesson and familiarize students with the fascinating history of WOC. The experiment is also quite flexible. For students who are at the beginner level, the simple act of guessing and seeing the average com-

Table 2. Student Perceptions and Learning Outcomes from the Jelly Bean Jar Experiment

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>There was a clear linkage between the jelly bean jar experiment and how markets work.</td>
<td>15 (12%)</td>
<td>89 (68%)</td>
<td>25 (19%)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>This exercise has given me a better understanding of how markets and prices are related.</td>
<td>13 (10%)</td>
<td>65 (50%)</td>
<td>29 (22%)</td>
<td>3 (2%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>This exercise has increased my interest in understanding how markets work.</td>
<td>16 (12%)</td>
<td>80 (62%)</td>
<td>32 (25%)</td>
<td>2 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>This exercise has increased my interest in understanding the principle of “the wisdom of the crowd”.</td>
<td>41 (31%)</td>
<td>73 (56%)</td>
<td>15 (12%)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>I think future students would benefit from participating in the Jelly Bean Jar Experiment.</td>
<td>41 (31%)</td>
<td>80 (62%)</td>
<td>8 (6%)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Notes: Students indicated their agreement with each statement using the five categories listed in the table. The table shows the number of students choosing each level of agreement for each statement. Numbers in parentheses show the corresponding percentages of students (rounded to the nearest whole percentage point).
pared to the correct number will be illustrative. When dealing with more advanced students, the discussion can involve more detail about the nature of competition and how markets can fail. In fact, instructors could attempt to intentionally bias the results of some students by designing experiment instructions and preparatory information (see Treynor, 1989 for an example) and examining the results with a focus on how asymmetric information impacts markets. A natural extension would be to include more complex statistical analysis of results (e.g., t-tests among subsets of students with a discussion of why some groups guess differently than others). There are certainly numerous other changes that could be made to the experiment.

The jelly bean jar experiment is a flexible, easy to implement classroom experiment to teach how markets set prices and to enhance student interest in the topic. Students respond well to the experiment and follow-up activities. As experiential learning and classroom experiment use continue to become more prevalent in the agricultural economics (and economics) classroom, this simple, effective experiment will be a valuable addition to economics instructors’ pedagogical repertoires.

Literature Cited

Abstract

Study abroad is a complex and dynamic topic, with many interesting implications on society as the world becomes more globalized. Study abroad programs vary based on many structural factors such as length of stay, location, quality of institutions and language immersion. Student experiences associated with such programs are influenced by these structural factors as well as personal factors including the student’s personality and goals for the trip. This study examines students’ perceptions of the impact of their experiences studying abroad. The research questions included: How do students perceive the personal impact of their study abroad experience? What factors shape these perceptions? What motivates students to study abroad? And what are the students’ anticipated short and long-term impacts of study abroad? We used narrative inquiry methodology to obtain in-depth personal profiles detailing the perceptions of five undergraduate students at Penn State regarding their experience and how to make meaning of it. The study specifically focuses on what motivates students to participate in study abroad, how students perceive the personal impacts of their international experience, what factors shape these perceptions and the short and long-term impacts of this perception. The results of the study showed that all the interviewed students expressed intrinsic and extrinsic factors which they believe motivated them to study abroad. Each student also shared at least one goal they strived towards during their study abroad. Students’ perceived expectations of their study abroad experiences were extremely varied and influenced the outcomes of their trip. Every student shared at least one short-term effect and believed that their experience abroad is impacting their life and will continue to do so in the future. This research highlights important themes for future analysis of the impacts of studying abroad.

Keywords: study abroad, self-perception, student learning, meaning making

Introduction

Many undergraduate students in the United States elect to spend some time during their college experience studying abroad. During the 2010-2011 academic year, 273,996 US students studied abroad to receive academic credit (Institute of International Education, 2012). Over the past two decades, the number of US students participating in study abroad programs has more than tripled (Institute of International Education, 2012). Universities offer students a variety of ways to study abroad. At The Pennsylvania State University (Penn State), students can select a wide variety of programs in countries all over the world. The Penn State University Office of Global Programs (UOGP) advertises 156 programs for undergraduate students.

Students in colleges of agriculture across the country, including those at Penn State, are going beyond the borders of the United States to learn more about other cultures, emerging agricultural sectors and contemporary issues in the industry from the perspective of local citizens in other countries. This experience may, at first blush, seem like a fun trip for an undergraduate student, but this type of global exposure is critical to getting the next generation of agriculturalists to broaden their own viewpoints, develop empathy for other global citizens and communities, and more fully embrace the challenges and opportunities that come with feeding a developing and growing world.

In 2014-15, 181 students in the College of Agricultural Sciences at Penn State traveled to 29 countries (College of Agricultural Sciences Senior Survey, 2015). These students participated in embedded courses (one to two weeks), short-term trips (two to three weeks), summer abroad activities (six weeks) and full semester...
abroad programs (12 to 13 weeks). In most instances, the travel aligned with the student’s major or specific areas of interest, however other trips were group experiences for student organizations like the Food Science Club or the Dairy Science Club. Through this travel to other countries, students embrace a higher level of self-sufficiency (especially when in countries where English is not the primary language), a stronger understanding of cultures outside of Pennsylvania and their own local communities, and an enhanced sense of place for the area visited. Additionally, students are able to more fully compare agriculture in that region with that which they are familiar, breaking down barriers that lead to agricultural ethnocentrism or biases against other ways of producing food. This global exposure is important to move students beyond what they know, or think they know, and to get them to better understand what is at the global level.

Additionally, global travel as an undergraduate, gives students the rare opportunity to build a network of industry allies around the world, rather than the more typical scenario where they get to know only local alumni well. This interaction with leaders in other nations can lead to internship opportunities, career options, or even further exploration of a topic of interest to the student. As students look for career opportunities following their undergraduate education, these trips and experiences not only make them stand out as top candidates, but also put new/younger employees on track to additional opportunities because of the potential for them to relocate to other countries with the growing number of multinational agribusinesses (Vorhauer-Smith, 2013). Many companies will share that they have an expectation that college has prepared students with the fundamental knowledge they need to receive even more training and guidance as a professional. What makes students stand out to employers are the soft skills, including cultural awareness, team dynamics, self-motivation, that will make them a high functioning member of the organization. Increasingly, for many firms high functioning employees have the capacity to work overseas or at the very least to work on cross-cultural assignments.

More and more high school students are coming into college with international experience for the same reasons, an increased world view and the ability to be more competitive in a global economy. Reading about other countries or using technology to engage with international partners is not enough to give students a robust understanding of what is happening globally. It is imperative that future global leaders actually go abroad and get that sense of place that can come only with sharing meals, experiences and new cultures with partners around the world and their fellow students traveling with them (Vorhauer-Smith, 2013).

Research indicates that studying abroad benefits student development through attaining increased foreign language proficiency, intercultural understanding, knowledge of the host country and, “a more realistic appraisal of their capabilities,” (Chieffo, 2000, p.2). As the global community establishes more connections across borders and nationalities, international education becomes an invaluable resource for undergraduate students in navigating professional careers and personal lives.

Studying abroad is unique to each student and does not necessarily follow a predictable path or result in the same outcomes for all individuals (Mendelson, 2004). Much research has focused on an attempt to generalize about outcomes associated with studying abroad, but this experience also lends itself to analysis at the individual level. In-depth narrative analysis of individual students’ experiences can add detail, richness and personality to the body of literature on studying abroad. The purpose of this research is to study individual students’ self-perceptions concerning how their study abroad impacted their life and what factors are involved in the level of impact.

The lead author of this manuscript studied abroad twice in her undergraduate education and both of her experiences abroad had substantial impacts on her life, mostly in the long-term but in the short-term as well. This led her to ask if other students also feel that their studies abroad have impacted their lives, whether it has shaped their career path, living location, academic major, personal interests or other life decisions. This research was the emphasis of the author’s honors thesis.

This case study is useful to improve the development and organization of study abroad programs, solidifying study abroad as an important part of students’ education in the global society. The overarching question guiding this research question centers on student self-perceptions of their study abroad experience. Two more specific questions address what factors influence students’ perceptions of how their experience impacted them in the short-term and how they anticipate it will impact them in the long-term. The research questions are: How do students perceive the personal impact of their study abroad experience? What factors shape these perceptions? What motivates students to study abroad? And what are the anticipated short and long-term impacts of study abroad?

In the following section, we provide the literature review and conceptual framework to examine these research questions. Next, we include the qualitative narrative inquiry case study methodology, followed by the results and discussion. Finally, in the last section we present a summary of the research findings.

**Literature Review**

Much research focuses on both personal and global reasons why students elect to study abroad. Miller (1993) claims that there are several personal reasons why students choose to study abroad. First and most commonly, students travel abroad because they want to refine their foreign language skills. Second, they desire to promote awareness and significance of other cultures
Within their respective majors. Third, students seek to establish international contacts.

Kitsantas’s (2004) work uses the Study Abroad Goals Scale to reveal three other common personal reasons students indicate for studying abroad. The three factors include: enhancing cross cultural skills, becoming more proficient in their subject matter and socializing. The purpose of Kitsantas’s (2004) study was to show how students’ goals influence their achievement of these outcomes.

Anderson (2003) discusses how many students go abroad in search of a transformative and authentic international experience. “Students personalize their perceptions of other nationalities after having the experience of living in a different country,” (Anderson, 2003, p.48). Once personal perceptions have been developed, individuals can relate to another culture on a new and familiar level. This embodies the idea of intercultural sensitivity which is defined by the emotion that people bring to intercultural interactions. It requires a person to have a positive attitude toward those from other cultures (Forgues, 2005, p.6). Although intercultural sensitivity is not a direct reason to study abroad, this idea and other global trends and theories suggest large-scale influences for why students study abroad.

Internationalism refers to the advocacy of cooperation between nations and suggests another impetus for students to study abroad. Forgues (2005, p. 1) states that internationalism is so important to student success in life that it must be incorporated into the curriculum…. that our students require a perspective that is broader than that offered on one campus in one country. Society is becoming increasingly diverse and in order to succeed, students need to receive a multicultural education, which Forgues (2005, p. 14) defines as: A structured process, designed to foster understanding, acceptance and constructive relations among people of many different cultures. Ideally, multicultural education encourages people to see different cultures as a source of learning and to respect diversity in the local, national and international environment.

These concepts of intercultural sensitivity, internationalism and multicultural education are all related to the larger trend of globalization. The world is getting smaller as more and more connections develop between nations’ communications, cultures and economies (Friedman, 2008). This reality increases the need for students to be able to work in a diverse society, thus placing further importance and value on study abroad programs.

When exploring literature on the impacts on student development from study abroad, common themes emerge that include, “expectations, contrast, understanding/not understanding, language, identity, regional associations and change” (Miner, 2008, p.iii). These themes are evident in research that focuses on the entirety of the student’s international experience. For example, Miller (1993) divides the experience into the time prior to the trip, the stay itself and then the reentry stage. Different themes exist within each of these stages and some themes are evident in all three. Expectations, or students’ expected outcomes from the experience, occur prior to the trip and then are constantly being contrasted and evaluated during the stay. Students also form different levels of understanding with regards to their experiences, language skill and cultural competency throughout their stay in another country. In the reentry stage, students evaluate if and how they have changed as a result of their time abroad as well as revisit the expectations they had prior to the trip.

Theoretical Framework

We ground our theoretical framework for this research in the cognitive theory of motivation (Bandura, 1989) as well as the theory of planned behavior (Azjen, 1991) in order to analyze how motivations, expectations, goal-setting and self-efficacy influence a specific behavior, in this case, studying abroad.

The cognitive theory of motivation helps to understand the ways in which students perceive the personal impacts of their study abroad experience. This theory explores how a person can motivate themselves to engage in a certain behavior. Bandura’s theory asserts that people’s expectations guide their behavior; one will act in ways they believe will produce an outcome they desire (Bandura, 1989). It also distinguishes between two different types of motivation: intrinsic and extrinsic. Intrinsic motivation refers to the drive to fulfill inner potential and interests (Bandura, 1989). Extrinsic motivation is the desire to achieve tangible rewards such as praise or money (Whitbourne, 2011). Another aspect of this theory is the idea of self-efficacy, a concept that indicates an individual’s confidence level of successfully achieving an outcome. If an individual believes they will be successful, they generally have higher goals and stronger commitment (Tollefson, 2000). This theory asserts that expectations relate to behavior.

If expectations and desired outcomes lead to certain behaviors, then students pursue various experiences in order to achieve certain outcomes or expectations. Studying abroad is one of these experiences which students frequently choose to engage in during their undergraduate education. The factors that result in the decision to study abroad have the potential to be different for each student, indicating that an in-depth understanding of an individual’s motivations may help to add greater nuance to the current understanding of student motivations for engaging in study abroad experiences.

The theory of planned behavior complements Bandura’s cognitive theory of motivation. Ajzen (1991) asserts that studying behavior must account for variability across situations rather than relying on aggregations of data and information. His is, “a theory designed to predict and explain human behavior in specific contexts” (Ajzen, 1991, p. 181). A general tendency under this theory is that if an individual has strong intentions for a behavior, it is more likely that they will perform this behavior and achieve their desired results (Ajzen,
1991). However, the existence of strong intentions does not guarantee that the individual will initiate a particular behavior. Factors such as availability of resources and opportunities influence and potentially limit whether an individual will perform a given behavior. Therefore, behavior is affected by motivations as well as ability, referred to by Ajzen (1991) as behavioral control.

Together, the cognitive theory of motivation and the theory of planned behavior demonstrate that the connection between motivation and behavior is complex and specific to each individual. Expectations, motivations and self-efficacy influence a person’s behavior (Bandura, 1989) but the impact of these influences is subject to variability (Azjen, 1991). The inquiry focuses on the effect of students’ motivations on the behavior of studying abroad. Specifically, we reviewed the student narratives to determine the factors that influenced their behavior, in this case, the choice to study abroad. In light of these theories, Figure 1 models how these elements interact. Intrinsic and extrinsic motivations impact each other and feed into a person’s self-efficacy and expectations of an experience. A person’s self-efficacy and expectations influence their chosen behavior. Finally, the person reflects on the alignment of their expected and actual experiences and the results of reflection may impact the future motivations a person may have.

![Figure 1. Conceptual Framework]

**Methods**

This research examines students’ motivations for studying abroad and self-perceptions of the impacts of their study abroad experience. The research objectives include learning more about individual students’ experiences abroad and providing future students and faculty involved in study abroad programs a useful resource to analyze student experiences. Given the nature of the research topic, qualitative methods are the most appropriate.

Peters et al. (2010) utilize and describe the method and rationale of narrative inquiry. The goal of this method is not to establish a statistically significant relationship, but rather to detail in-depth experiences and contribute insights that enrich the dialogue about a topic. Given this goal, the narrative inquiry approach focuses on the construction, interpretation and analysis of first-person interviews and narratives. Each person is interviewed and their interview transcript is edited into a profile which provides a unique and expansive account of their experience abroad (Peters et al., 2010). The method’s focus on story-telling allows for interviewees to explore the dynamic nature of their own experiences and communicate naturally with the interviewer. Story-telling is a universal human trait, across culture and throughout history, which people use to educate, communicate, persuade and connect (Hsu, 2008).

Narrative inquiry was chosen because it provides deep and detailed experiences of individual students who have studied abroad. This method enhances the base of information about studying abroad, which will hopefully facilitate future program development and organization, encourage other students to study abroad and reiterate the importance of studying abroad in a global society.

**Research Procedures**

We developed this research in light of Maxwell’s (2005) Qualitative Research Design to ensure its success and quality. We chose a small, purposeful sample of five Penn State undergraduate students who studied abroad. The study was cross-sectional, occurring at one point in time due to time restrictions. We chose students who have completed study abroad programs because the study focuses on the impacts of students’ experiences abroad and students are only able to reflect on the entirety of their experience after completion. All research was conducted with approval from Penn State’s Institutional Review Board.

We began this research by contacting current undergraduate students at Penn State who have studied abroad. We interviewed an African American male liberal arts student, a white female health and human development student, a Chinese female geography student, an African American female agriculture student and a white male landscape architecture student. These students studied in Central America, South America, Europe, Africa and Oceania. The five chosen students vary in major, gender, race and study abroad location. While the emphasis was not on a large, broad sample to make statistical conclusions, we sought substantial variety of characteristics between the five students to broaden the likelihood of capturing a diverse set of motivations and perceptions.

Each interview took place in a quiet study room in the Penn State library. Each interview was recorded and subsequently transcribed by a professional transcription service. We edited each transcript into a profile narrative. The editing process involved editing for grammar mistakes as well as arranging the document into a coherent and cohesive narrative. After we edited the profiles, we sent them back to the student for member checking (Maxwell, 2005). Once we received each student’s edits and comments, we made appropriate revisions. Then, according to the conceptual framework, we evaluated and cross-analyzed the profiles to understand their motivations and how these students perceive the personal impact of their experience abroad.
Student Perceptions of the Impact

Validity

There are two main concerns to the validity of this research. First, due to the potentially subjective nature of storytelling, there could be misinterpretation of stories and perspectives. In order to combat this, we used member checking; one of the best ways to rule out misinterpretation of informants’ language and perspectives (Maxwell, 2005). Second, we had pre-existing relationships with the participants who were interviewed. This was helpful throughout the interviews because the participants felt more comfortable sharing stories with us, rather than a stranger. This enriched the information obtained in the interviews. However, the interviewer’s knowledge of the participants could have an impact on interpretation of the data. Member checks address this potential threat to validity by ensuring proper interpretation of the interviews. Also, professional interview protocols were followed in conducting the interviews.

Method Strengths and Weaknesses

The main strength of the narrative inquiry method is the emphasis on story-telling. This method captures the personal and unique attributes of each individual’s study abroad experience. The ability to verbally transport someone to a place they have never been through descriptive words and images is an important skill. Through stories, we can learn about and better understand people we have never met or places we have never travelled.

As with all methods, this method has weaknesses. Five students were interviewed, rather than surveying a large population. Many people assume that studies must have a conclusive answer to specific research questions or definitive proof or disproof of hypotheses. That is not the goal of this research. Each interview and narrative provides different individualized personal insights into the topic of study abroad. This method is also time-consuming, thus limiting the number of interviews that can be conducted and narratives that can be processed, within a given time frame. Overall, analysis of individual narratives will benefit the base of study abroad literature by providing documentation of actual lived experiences.

Results and Discussion

This section includes the data and analysis from the interviews conducted with five Penn State students who engaged in study abroad experiences. We used pseudonyms and changed the students’ locations of study to protect the anonymity of the students interviewed. Mark studied abroad for a semester in Santiago, Chile. Morgan studied abroad in Madrid, Spain, for a summer program. Evan traveled to Belize for a week with a professor, participated in a summer program in Kenya and studied abroad in Munich, Germany, for a semester. Teegan considers herself to be studying abroad for all four years at Penn State since she is from China and she also studied abroad in Mozambique for a semester. Finally, Elizabeth studied abroad through direct exchange in Australia for a semester.

Each student profile is complex, unique and reflexive. Together, the profiles provide insight into motivations for studying abroad and how the students interviewed for this research perceive studying abroad has already and will continue to influence their lives. The findings raise questions and suggest further research that should be pursued on this topic by interviewing more students at Penn State and at other universities as well. Information was synthesized and gleaned from the interviews about student motivations, expectations and outcomes of their time abroad, as well as their sense of the meaning and significance of their international experiences. Taken individually, the interviews are in-depth and reflective accounts of five students’ experiences studying abroad. Taken collectively, they invite others to join the discussion about studying abroad via these student profiles and stories.

Motivations

Evan declared in his profile, “I wanted to go abroad and see firsthand how cultures interact...not through movies or documentaries or reading. You need to live it.” Several other students echoed this statement by expressing their personal beliefs in the importance of lived, authentic and new experiences in other countries, with people of different cultures. In today’s world, people are connected through technology and trade to almost every part of the world. Some individuals are no longer content to hear about other countries on the news or see pictures online; they want to experience it firsthand. The students interviewed explained various personal attributes or tendencies which they believe motivated them to study abroad and pursue a firsthand international experience. What follows explores why authentic lived experience is so important to these students.

Intrinsic Factors. Several common themes emerged among the students regarding why they believe they chose to study abroad. Each student mentioned their desire to travel. Teegan said, “I’m a traveler, so I want to experience every continent.” Evan also expressed a similar goal: to travel to every continent by the time he is 30. Mark described his knack for traveling. Elizabeth grew up as a military child and she said, “all the traveling...played a big role in my development and I want to continue that and broaden my knowledge of the world through travel.” Lastly, Morgan said, “I think my intrinsic desire to see the world and learn more about other cultures was a big factor.” Not all the students explained where their desire for travel comes from, but each of them recognized it was a major motivator for them to study abroad.

The “knack for traveling,” as each student expressed, leads into another theme, appreciation for new cultures and the desire to experience them in an immersive and authentic way. Several of the students indicated they sought opportunities that would drive them off the beaten path and enable them to have some truly unique and genuine cultural experiences. Morgan described how her study abroad program helped her pursue authen-
tic experiences. Her program planned many trips for the students and arranged for local guides to teach them about the city of Madrid. She said that she was able to learn things that she would never know if she went to Madrid as a tourist. Certainly, the program structure has a significant impact on what opportunities are available, but the student’s goals and desires for the trip are incredibly important to determine whether or not they will elect to take advantage of opportunities. For example, Morgan explained that a lot of other students chose not to attend the planned trips and in response to that she said, “I went on all the trips and tried to have as many of the cultural experiences that were offered to me.” Evan explained that he sees the bigger picture in life and he enjoys seeing how cultures interact and how different people live their lives. In one of his stories, he described an experience getting to know the city of Zurich with a local citizen. He said “All three days that I was there with him, he showed me around. I got to see some stuff that I wouldn’t have seen if I had gone by myself or just looked at a tourist map.” Both Morgan and Evan indicated the value of learning from local citizens. Mark talked about his love of Spanish-speaking culture, which encouraged him to study abroad in Chile so he could immerse himself in the language and culture every day. The desire to pursue culturally authentic and non-touristy experiences encouraged several of these students to study abroad.

Another common attribute among some of the students interviewed was their perceived need to “change sceneries.” Elizabeth described this by saying, “I studied abroad the spring of my sophomore year because by then I was getting really antsy and wanted a change of scenery.” She credits her desire for a change of scenery to her military upbringing; she was accustomed to moving every two years. In a similar vein, Mark said, “I am the type of person that needs a change of scenery every now and then. I’m a person who likes to mix things up.” This quote suggests that there is a certain type of person who for varying reasons needs to experience a change of place and pace every once in a while. Studying abroad can fulfill this urge to find new scenery and provide this type of student with the mobility they seek.

There were many unique personal motivations among the students as well. For example, Teegan studied abroad in Mozambique through Penn State. She desired to pursue this additional international experience in order to get to know Americans and develop meaningful relationships with other Penn State students. Evan conveyed another unique motivation, his appreciation of nature. He explained his love of natural environments and said, “I’ve always been attracted to the natural aspects of different areas.” In several of his stories from Germany, Kenya and Belize, he included many details on the natural environments and recounted various meaningful experiences he had discovering a place’s natural beauty. We mention these motivations in order to reiterate the uniqueness of each student’s international experience.

**Extrinsic Factors.** Among the students interviewed, there was a great variety in the extrinsic factors they believe influenced their decision to study abroad. As displayed in the conceptual theory of motivation, extrinsic and intrinsic factors influence each other. The intrinsic factors that led these five students to study abroad are unique and since they influence the extrinsic factors that encourage students to study abroad, it is logical that there would be variety among the extrinsic factors as well. Additionally, each student described different extrinsic factors because of the distinct and unique nature of each student’s undergraduate experience. Given these two main reasons, it is difficult to generalize the wide variety of extrinsic factors that motivated these five students to study abroad.

However, there are several broad themes that emerged from the students’ interviews regarding the importance of goals. Each student mentioned that they wanted to study abroad to meet some type of academic goal. The specific goals varied among the students. For example, Evan chose to travel to Belize and study abroad in Kenya because he wanted to learn and apply what he was studying at Penn State to real-world situations. Elizabeth chose her program in Australia so that she would be able to take interesting classes not offered at Penn State and use them for the specialization required in her major. Teegan chose to study in the US so she could study psychology and get a degree from an American university.

Several of the students interviewed specifically mentioned they wanted to study abroad to improve their language skills. Morgan and Mark both wanted to get better at Spanish and Teegan desired to gain skills and confidence in speaking English. Overall, each student interviewed desired to engage in new cultures and experiences in the context of their undergraduate experience and chose international programs that allowed for involvement, engagement and pursuit of new opportunities as well as met the requirements of their degree programs.

**Expectations and Outcomes.**

Similar to the motivations of these five students to study abroad, their perceived expectations of their study abroad experiences are also extremely varied. The most common expectations among these students are culture shock and impact. Most students expected they would experience culture shock over the course of their study abroad program in one form or another. Students varied in their preparation for what to expect; much of this variation is due to what information the program offered before the student began the program. For example, both Mark and Morgan received packets of information to brief them on some cultural differences they should be aware of before they traveled to their study abroad destinations.

Several of the students expected that they would experience adventures during their time abroad. For example, Elizabeth mentioned that she was anticipating...
Student Perceptions of the Impact

a lot of opportunities to explore Australia and have adventures. Evan also indicated that for all three of his study abroad experiences, he was expecting to have unique and exciting opportunities. Every student expected that their time abroad would have some impact on their life. The following sections of analysis will discuss this topic more in depth.

Personal Goals. Several of the students interviewed described goals that they set for themselves regarding their study abroad experience. The three most commonly expressed goals include experiencing cultural immersion, venturing outside of one’s comfort zone and learning a language. Morgan said that her goal of cultural immersion encouraged her to participate in all the activities offered by her study abroad program. Other students who sought to experience cultural immersion made efforts to engage in local activities and traditions as well as discuss various cultural concepts with local people. Mark explained that through learning more about Chile from various experiences throughout the program and living with his host family, he gained, “his own sense of Chilean pride.”

Students who desired to get out of their comfort zones articulated that studying abroad was the perfect opportunity to participate in a new culture, learn or refine a language, eat new foods and visit new places. Each student pursued this desire through various means, but each of the five students reflected that leaving their comfort zone was a personal goal and that it somehow influenced their behavior abroad. Teegan chose her study abroad program in Mozambique because she wanted a challenge. She set goals for herself that pushed her to interact with American students and become better at speaking English. As Teegan indicated and we have already reported in the section on extrinsic factors, many students set goals for themselves to improve their foreign language skills. Mark declared, “I went to Chile with learning Spanish as my main priority...that was the most important thing.” Morgan also made learning Spanish one of her main goals.

The connection between goal-setting and behavior is valuable to analyze because many scholars have reported a strong positive correlation between goal-setting and achieving desired behavior. However, self-efficacy also affects whether the individual will successfully achieve their goal. For example, Morgan expressed her desire to improve her Spanish but also said that the language barrier was much harder than she expected and that she did not have much confidence in speaking Spanish. This also demonstrates how expectations influence behavior. She did not expect that speaking Spanish would be so difficult, so she felt discouraged in her attempts to speak Spanish.

Challenges. Most students encountered at least one challenge during their time abroad. Some students described how difficult it was to be separated from family, friends and significant others during their time abroad. Evan recalled a few instances throughout his trips abroad where he greatly missed his girlfriend. He told of a trip he and several others made to a sandbar and said, “That isolation made me think of my girlfriend and realize how far away we actually were and how much I missed her.” Mark also expressed how much he missed his girlfriend, as well as his family and friends at Penn State. Another challenge previously mentioned was the language barrier; Mark, Morgan and Teegan all cited this as a major difficulty. Elizabeth enlightened us about the challenges she faced by being a racial minority in Australia. She said, “I realized when you’re outside the US or even in some parts of the US, people see you as the color of your skin and that is always how it’s going to be.” This was not a challenge Elizabeth was expecting to face and the following section explores how expectations may influence outcomes.

Outcomes. In this section, “outcomes” refer to specific events or experiences that happened during each student’s time abroad, not as broader results from their experience (this will be discussed in the next section). Every student had certain expectations, both specific and general, regarding their study abroad experience. Regarding culture shock, Evan was not as overwhelmed by the cultural differences he witnessed in Kenya as he had expected he would be. Mark and Morgan had opposite reactions. They both indicated that no amount of briefing could have prepared them for experiencing cultural differences. Regarding the interpretation of time in Spain, Morgan said, “It’s so much different to expect something than to experience it. You can read about it but it’s different when you actually need to get somewhere a half hour late, because you’re not going to get there on time.” This could imply that no amount of preparing or expecting will affect the outcomes of an individual’s experience abroad.

Everyone’s expectations uniquely influenced outcomes of their trip, however there is not a clear correlation; the importance of expectations also depends on many of the previously analyzed aspects of a study abroad experience. For every student, many of their expectations were met, some were not and many unexpected outcomes occurred. Although that is a simple and straightforward assessment, due to the uniqueness of each student’s expectations and experience, it is not possible to make assumptions about how expectations affect outcomes.

Meaning and Significance

Each student was asked to reflect on their time abroad and how they perceive their experience has and will continue to impact their lives. The questions encouraged them to discuss ways their study abroad experience influenced them immediately upon their return home, how it is still influencing their life today and how they perceive it will affect their future. Each student addressed these questions thoughtfully and reflectively.

Short-Term Impacts. There were several broad themes regarding how students perceive their time abroad influences their life in the short-term. Initial
impacts that students noticed after their return from studying abroad include habitual changes, new interests, changing relationships, desire to advocate for study abroad programs and new ways of thinking about their home country. To cite a few specific examples, Evan explained that in Germany, "If you eat right-handed, you are supposed to cut with your right hand too. You're not supposed to switch utensils, so I learned to eat with my left hand. I still do that every time I eat."

Evan believed that in Germany, "If you eat right-handed, you are supposed to cut with your right hand too. You're not supposed to switch utensils, so I learned to eat with my left hand. I still do that every time I eat." Morgan noticed that she has been a lot later for events and appointments than she was before her trip; she has become more laidback. Elizabeth adopted a love for rugby. Mark knew that his relationship with his girlfriend was more serious when he returned. He said, "I told my mom that if things worked out with my girlfriend Ally, I was going to marry her." Each student said that after their trip, they recognized the importance and significance of studying abroad and began to encourage others to study abroad.

Teegan reflected on the differences between Mozambique and China and could critically analyze environmental policies and practices in her country.

Long-Term Impacts. This question prompted many long responses because this is the phase each student is in now; they are reflecting on how their experience abroad is impacting their life now and will affect their life in the future. Several students said that their time abroad made them very conscious of their own wasteful practices and initiated or encouraged a desire to live in a more environmentally-conscious manner. Almost every student indicated that their experience has influenced future plans for their life such as where they want to live and what sort of career they will pursue. Inspired by the work she did in conservation, Teegan began to research careers in China that focus on conservation and environmental preservation. She said, "It gave me a new idea of what I can do in the future." She is not alone in this response. Evan discussed the idea of living abroad, or in an urban area, which he had not considered before spending a semester in Germany. Morgan and Elizabeth also expressed interest in an internationally focused career.

The students were asked to specifically reflect on any impacts that their experience abroad has had on their personality, attitude, or beliefs. In various ways, every student underwent personal growth during their time abroad. Several broad themes include becoming more comfortable with new experiences, practicing independence and gaining soft skills such as improvisation or flexibility. Evan and Teegan both described how through their time abroad and engaging in new activities and witnessing different cultures, they became more comfortable with new experiences. For Teegan, her experience in Mozambique radically affected her personal development; it gave her much more confidence speaking English and interacting with Americans. Mark explained many ways in which he grew personally, especially in independence, during his time abroad. He said, "Being in Chile has been part of my development into a man and some personal epiphanies." Elizabeth spoke about various soft skills she gained from her time in Australia that have helped her while interviewing for jobs.

Each student was able to identify many short and long-term impacts they believe resulted from their experiences abroad. The reflective nature of the interview encouraged students to analyze their own experience and discover some truths about themselves and their experiences that they may not have fully understood before. We benefitted immensely from hearing each student’s story and hope that Mark, Morgan, Evan, Teegan and Elizabeth all found their interviews beneficial as well.

Summary

Our research pursued the questions: How do students perceive the personal impact of their study abroad experience? What factors shape these perceptions? What motivates students to study abroad? And what are the students’ perceived short and long-term impacts of study abroad? We utilized narrative inquiry methods to develop the case study to explore these research questions. We interviewed five undergraduate students from Penn State University, who participated in a study abroad experience. From these interviews, we created individual narratives which we organized into themes according to the conceptual frame work (see Figure 1). We examined student motivations for studying abroad, student expectations and outcomes, and the meaning and significance students ascribe to their experience in terms of how they perceive study abroad has impacted them in the short-term and long-term. In the next several paragraphs, we review the highlights of the findings in a similar structure as the Results and Discussion section. We summarize the motivations, expectations and outcomes, and meaning and significance of these five students’ experiences abroad.

All the interviewed students expressed intrinsic and extrinsic factors which they believe motivated them to study abroad. The motivations vary among each student due to the uniqueness of each student’s undergraduate experience but there were some similarities, such as the desire to travel and an appreciation for experiencing new cultures in an immersive and authentic way. Each student also shared at least one goal they hoped to achieve by studying abroad and pursued opportunities to help them meet this goal, or strive towards it. The three most-cited goals include immersing oneself in a new culture, having experiences outside of one’s comfort zone and learning a new language.

Each student interviewed had a unique experience with studying abroad. In fact, millions of students from all around the world have unique experiences studying abroad. As with the theme of unique experiences, students’ perceived expectations of their study abroad experiences were also extremely varied. Most students anticipated they would experience culture shock and impact; much of this anticipation stemmed from what information the program offered before the student began the program. The individual’s expectations influenced the outcomes of their trip, even though some
expectations were not met and many unexpected outcomes occurred. For example, each student had some type of a challenge whether they expected it or not.

In response to the interview questions, each student reflected on their time abroad and how it influenced them. Every student expressed at least one short-term effect such as habitual changes, new interests, changing relationships, desire to advocate for study abroad programs and new ways of thinking about their home country. Also, each student shared that their experience abroad is impacting their life and will continue to influence their life in the future, including future plans for where to live and what sort of career to pursue. Other broad themes include increasing their comfort with new experiences and gaining soft skills like improvisation and flexibility.

Based on these research findings, there are several recommendations for future research. Further research should be done to understand how students perceive the personal impacts of their study abroad experiences. It would be valuable to conduct a longitudinal study where the researcher would interview students before and after their time abroad. This would add an interesting dimension to the study: for example, being able to compare more accurately what the student expected before the trip and what actually happened. The students interviewed were able to discuss their expectations prior to the trip, but their assessment is not extremely precise since they had already returned from their trips. Additionally, it would very valuable to interview faculty and staff involved in study abroad programs, as experience suggests that they also learn and change through their experiences with study abroad programs.

Studying abroad shapes students, not just individually but also in terms of society and what type of citizens these students will be in the future. This could be another opportunity to complete a longitudinal study to follow certain students before, during and after their study abroad experience in order to see what career paths they follow, where they live and so on. Given the reality of globalization, individuals are connected to people and places all over the world, so it is essential for university students to learn about different people and places in order to be fully engaged and informed citizens in the global society.

Study abroad is an important phenomenon to study in today's world of increasing globalization as these experiences have the potential to foster mutual understanding and global conversations between individuals and nations. Within the context of this research, we have seen how studying abroad creates globally-minded and more culturally-aware students. Based on this research, studying abroad is a fantastic tool to enhance student learning and can greatly enhance a student's undergraduate experience. The research results indicate that the motivations of and effects on students vary widely and are personal in nature. When orienting for and engaging with students throughout their international experiences, the findings of this study suggest that emphasizing the expression of individual motivations, expectations and impacts may help students to rectify cognitive dissonance with regards to their expectations and experiences. Additionally, these individual expressions may help educators tailor curricula, in-country events and re-entry reflections for participants to increase student learning and satisfaction.

**Literature Cited**


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The Influence of Crib Sheets on Veterinary Students Exam Performance, Perceived Stress, and Retention of Subject Matter Knowledge

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Abstract

The purpose of this two-year longitudinal study was to examine the performance of veterinary students on exams utilizing crib sheets to determine their effects on exam performance, perceived exam stress, and retention of subject matter knowledge. Scores for individual exams where crib sheets were permitted were compared with exam scores where crib sheets were not permitted utilizing one-sample t-tests. One-sample t-tests were also utilized to determine the influence of crib sheets on subject matter knowledge retention for a cumulative exam. A questionnaire was distributed to capture students’ perceptions about the value of crib sheets. Researchers found crib sheet use enhanced student exam performance, but did not improve retention of subject matter knowledge. Results from the questionnaire indicated students perceived crib sheet use as a way to decrease exam anxiety and provide support during studying and testing. Disadvantages surfaced by students included that crib sheets could be used as a crutch and could decrease learning. It is recommended that instruction on strategies for use be implemented in any course using crib sheets. Overall, crib sheet use was perceived as positive by students and could be a viable way to combat high levels of anxiety and depression in veterinary students.

Introduction

The existing curriculum for the education of veterinary medical students delivers an enormous amount of subject matter in a four-year instructional time frame. As medical knowledge and societal expectations for veterinarians have increased, there has been an increase in the volume of information veterinary students are expected to learn (NAVMEC, 2011). In the College of Veterinary Medicine at the University of Missouri, didactic coursework in the second year of veterinary education is compressed into eight-week instructional periods. During the eight-week instructional period in which Virology is taught, students are also taking Parasitology, Bacteriology and Pathology courses. This intense eight-week instructional period has forced students into what they describe as a “binge and purge” mode of learning. They cram for one exam, take the exam, dump the information from their mind and then begin cramming for the next exam. Students have frequently verbalized to their instructor that the pressures to perform well academically on exams in this eight-week instructional period are significant sources of stress.

Exploring alternative testing strategies that might allay students’ concerns about their academic performance and decrease the levels of stress students experience when they are studying and taking exams is warranted because so many of today’s veterinary students are struggling to maintain positive mental health. Several recent studies have documented an unusually high prevalence of both anxiety and depression in veterinary students (Hafen et al., 2008; Reisbig et al., 2012; Siqueira Drake et al., 2012). Depression rates of surveyed veterinary students have been reported to be between 33% and 69% and these rates far exceed the rates of depress-
tion found in the general population and among other health professional students (Cardwell et al., 2013; Hafen et al., 2008; Siqueira Drake et al., 2012). These high rates of anxiety and depression have been linked, in part, to academic stressors that are embedded in the current educational system. These academic stressors include a challenging and intense curriculum, an ever-increasing amount of material to learn, unclear instructor expectations, a very heavy workload and very little time for relaxation or rest (Reisbig et al., 2012; Siqueira Drake et al., 2012). Some researchers have concluded that for many students, the current veterinary medical educational process acts as a chronic stressor, plunging susceptible students into chronic poor mental states like anxiety and depression (Hafen et al., 2008; Reisbig et al., 2012). These poor mental health states may persist as students leave school and enter the workforce; thus having long-term negative consequences for the individual (Hafen et al., 2008; Reisbig et al., 2012).

High levels of anxiety in veterinary students are often correlated with perceived high levels of academic stress (Reisbig et al., 2012). Primary academic stressors reported by veterinary students in previous studies were concerns about grades, exam performance and frustration with having insufficient time to learn the material (Gelberg and Gelberg, 2005; Reisbig et al., 2012). Veterinary students at the University of Missouri have verbalized similar concerns to their instructor. Veterinary students who are struggling with anxiety are even further disadvantaged as their coursework progresses because anxiety impedes learning. Anxious individuals lack the ability to concentrate and they also develop deficits in working memory (Hopko et al., 1998; Robinson et al., 2013). These memory deficits are accentuated when individuals are both anxious and depressed (Kizilbash et al., 2002). The negative effects of anxiety on exam performance are also prevalent in the literature. Students with high levels of anxiety perform more poorly on exams than students who are not anxious due to both impaired cognition and memory deficits (Cassady, 2004).

In an effort to reduce exam anxiety, crib sheets have been utilized in various educational disciplines (Butler and Crouch, 2011; Erbe, 2007; Gharib and Phillips, 2012; Gharib et al., 2012; Mathew, 2012). A crib sheet, also known as a cheat sheet, is a one-page sheet of notes created by a student when preparing for an exam that is then used as an aid when taking the exam (Raadt, 2012). The use of crib sheets has been shown to be strongly preferred by students over a closed-book testing format (Erbe, 2007; Larwin et al., 2012; Mathew, 2012). Crib sheets have also been proposed to facilitate learning, but the literature shows mixed results. Some studies have reported improved learning and performance on exams, while other studies report insignificant improvements in exam scores (Dickson and Miller, 2006; Erbe, 2007; Larwin, 2012; Larwin et al., 2012).

Proponents of crib sheets support their use for several reasons (Larwin, 2012; Larwin et al., 2012). First, crib sheets can increase learning because they can facilitate student engagement with the course materials. The preparation of the sheet encourages students to review, re-organize and clarify their thoughts about the subject matter. As students spend time preparing and revising their sheets, they are learning the material. Hand-written crib sheets have been found to be the most effective (Larwin, 2012). Another explanation for crib sheets improving exam performance relates to their effects on the emotional state of the student who is taking the exam. The use of a crib sheet provides the student with a positive perception of being able to remain in control during the exam. It thus provides a sense of emotional comfort and an expectancy of greater success (Raadt, 2012). Larwin et al. (2012) speculated the benefit of crib sheet use was not due to actual better mastery of the course subject matter; rather, it was due to the positive emotional effects of crib sheet use on the student. Detractors of crib sheet use claim they hamper learning because students merely write down information and then they do not study it sufficiently to learn it (Gharib et al., 2012; Larwin et al., 2012). Students can develop a dependency on the sheet and it may be used as a crutch instead of as a learning tool. Finally, Gharib and Phillips (2012) reported good students perform well on exams regardless of exam format. They recommended the use of crib sheet exams in situations where instructors wished to decrease student anxiety levels (Gharib and Phillips, 2012).

Previous studies of crib sheet use in education have applied their use across different scientific disciplines, ranging from psychology to applied mathematics and statistics. To date, there has been only one published study evaluating learning outcomes in veterinary students when crib sheet use is permitted, but it was limited to one year (Vogelweid et al., 2014). It was recommended future studies examine the long-term effects of exam aids to determine subject matter knowledge retention with use of crib sheets (Vogelweid et al., 2014). The goals of this study were to examine the performance of veterinary students on exams when crib sheet use was permitted to determine the effects of crib sheets use on the perceived amount of exam-induced stress, and to evaluate the effects of crib sheet use on retention of subject matter knowledge.

Materials and Methods

Participants

Data were collected over two years from second-year veterinary students enrolled in a Virology course in 2012 and 2013. All second-year veterinary students were informed about the study and were eligible to participate. During the first week of class, one of the co-investigators met with the students to explain the objectives of the study and voluntary participation was sought. Students electing to participate in the study were informed of the data analyses that would be conducted and that they would be asked to complete an opinion survey after the course. The course instructor remained blinded...
to the identities of participating students until after the submission of the final course grades. Students who elected to participate in the study signed consent forms. The study was approved by the Campus Institutional Review Board of the University of Missouri.

To establish that students in these two classes were essentially equivalent academically, entering GPA and GRE scores data were compared. Students participating in the course in 2012 had an average GPA of 3.77 and an average GRE of 1122 when they were admitted to veterinary school. Enrolled students in 2013 had an average GPA of 3.72 and average GRE of 1125 when they were admitted to veterinary school. In 2012, 111 of 115 enrolled students participated in the study. In 2013, 110 of 112 enrolled students participated in the study.

Method

The Virology course is a didactic course taught over an eight-week instructional period and consisted of five lectures per week. There were five non-cumulative exams given over the eight-week instructional period and they were spaced at approximately equal intervals. A subject matter knowledge retention exam (exam 6, see paragraph below) was given in week eight. All exams consisted of multiple choice questions given using a computerized testing format. For exams where the use of the crib sheet was permitted, the crib sheet was one side of one-half of an 8.5” x 11.5” sheet of paper on which students could hand-write any information they chose to help them with recall of information during the exam. Students were not given any prior instruction on how to prepare or use a crib sheet.

This study was conducted over two years (2012 and 2013) utilizing a parallel design. For both years, the lecture schedules, exam schedules and exam questions were matched. The only change in the course between Year 1 (2012) and Year 2 (2013) was permitting students in Year 1 to use crib sheets for exams 1, 3 and 5; while students in Year 2 were permitted to use crib sheets for exams 2 and 4. By alternating the use of the crib sheet on exams given over two years, direct comparisons of performance could be made. In both years, exam 6 was a retention exam given during the final week of the instructional period. The memory retention exam was comprised of 20 multiple-choice questions from previous exams 1-4; 10 questions from exams in which a crib sheet had been used and 10 questions from exams in which no crib sheet had been used. Questions for the memory retention exam were selected in Year 1 from questions most students had previously answered correctly on exams 1-4.

Students’ opinions about crib sheet usage were obtained via a questionnaire students completed after the conclusion of the Virology course. The questionnaire consisted of Likert-scale questions about the perceived value and usefulness of the crib sheet, questions about the effects of crib sheet preparation on exam preparation time, questions about student’s perceived level of stress during Virology and essay questions that asked students to summarize the advantages and disadvantages of crib sheet use in Virology. The number of participating students who completed the survey was 107 in Year 1 and 94 in Year 2.

Analytic Strategy

The study compared the scores for individual exams in which crib sheet use was permitted with the score for that same exam when crib sheet use was not permitted. For example, the scores in years 1 and 2 were compared for Exam 1. This comparison was done using one-sample t-tests. One-sample t-tests were also used to determine the influence of crib sheets on subject matter knowledge retention scores (exam 6). The mean class scores for each exam from Year 1 was tested against the participants’ scores for Year 2. For all t-tests, differences were considered significant if \( p < 0.05 \).

Questionnaire data regarding students’ perceptions of crib sheet use were analyzed by calculating the mean and standard deviation for the Likert-scale questions. Students were also asked to report their perceived stress during the Virology course using Likert-scale questions and this data was analyzed utilizing frequencies. For the essay question data, a summary of the students’ opinions about the major advantages and disadvantages of crib sheet use was obtained as follows. One of the investigators read each student essay response and categorized the students’ responses. To establish reliability, a co-investigator repeated this process and found similar categories. The major perceived advantages of crib sheet use stated by the students could be itemized into the following subcategories determined by a combination of the two investigators analysis of the essay question data: 1) Crib sheet use decreased stress or test anxiety; 2) Crib sheet use increased engagement with the subject matter and increased learning; and 3) Crib sheet use provided emotional comfort or a sense of security when taking the exam. The major perceived disadvantages of crib sheet use stated by the students could be itemized into the following subcategories: 1) Dependency on the crib sheet decreased student learning; and 2) Use of the crib sheet slowed test taking speed. Some students listed multiple advantages or disadvantages of crib sheet use in their responses, and each advantage or disadvantage stated by a student was placed into the appropriate subcategory and counted. Finally, the categorized responses were summed, and converted to a percentage of the total number of responses.

Results and Discussion

Exam Scores and Comparison of Crib Sheet Use on Exam Scores (Exams 1-5)

Tables 1 and 2 display the exam score means and standard deviations for 2012 and 2013, respectively. Data from exam 4 in Year 1 were excluded from the analysis due to a technical error that occurred during the administration of the computerized examination that might have compromised the validity of the exam.
Crib Sheet Use and Subject Matter Knowledge Retention

For retention exam 6, there was a statistically significant difference between exam 6 questions 1-10 and exam 6 questions 11-20 in 2012 and 2013.

- Exam 6 questions 1-10 2013 (no crib) was statistically significantly lower than exam 6 questions 1-10 2012 (crib), \( t(111) = -4.32, p=0.00 \).
- Exam 6 questions 11-20 2013 (crib) was statistically significantly lower than exam 6 questions 11-20 (no crib), \( t(105) = -1.39, p=0.00 \).

Crib Sheet Use and Students’ Perceptions

Responses to the Likert scale questions regarding students’ perceptions of crib sheet use are shown in Table 5 for 2013. For the 2013 questionnaire, an additional question was added: “During the weeks where multiple exams were scheduled, I found the crib sheet helpful in preparing for and taking my Virology exam.” This question was included in year two after the instructor received multiple comments in their course evaluations regarding the helpfulness of the crib sheets during periods of the semester with multiple exams. The 2012 data regarding students’ perceptions were similar to 2013, (see previous findings reported in Vogelweid et al., 2014).

Responses to the Likert scale questions regarding students’ perceptions of their stress levels during the Virology course were reported in frequencies. Greater than 75% of the veterinary students that participated in this study experienced at least a moderate level of stress during the Virology course. Students in Year 1 reported the following stress levels: 78 students experienced moderate stress, 6 students experienced high stress and 1 student experienced very high stress. In Year 2, 60 students experienced moderate stress, 24 students experienced high stress and 3 students experienced very high stress.

In essay responses, students stated the advantages of crib sheet use (250 total response statements) outnumbered the disadvantages (186 total response statements). Students stated the primary advantage of crib sheet use was it improved their level of engagement with the subject matter and it facilitated their learning (44.4% of responses). A second advantage of crib sheet use was it reduced the level of anxiety or stress associated with taking the exam (38.8% of respondents). A smaller number of students derived emotional comfort or support from the use of the crib sheet. Students stated the major disadvantages of using a crib sheet were its use either decreased their learning scores. For consistency, exam 4 was also struck from the analysis for year 2.

To compare exams from 2012 to exams from 2013, one-sample t-tests were utilized. These data are shown in Table 3. For exams 1, 2, 3 and 5 there was a statistically significant difference between mean exam scores in 2012 and means exam scores in 2013.

- Exam 1 2013 (no crib) was statistically significantly lower than exam 1 2012 (crib), \( t(111) = -4.60, p=0.00 \).
- Exam 2 2013 (crib) was statistically significantly higher than exam 2 2012 (no crib), \( t(111) = 2.70, p=0.01 \).
- Exam 3 2013 (no crib) was statistically significantly lower than exam 3 2012 (crib), \( t(111) = -2.53, p=0.01 \).
- Exam 5 2013 (no crib) was statistically significantly higher than exam 5 2012 (crib), \( t(111) = 3.34, p=0.00 \).
(37% of respondents) or it made it easier to neglect studying (35% of respondents). Fewer students stated using the crib sheet was disadvantageous because it slowed their test taking speed (9% of respondents) or the time spent preparing the sheet took time away from more productive studying (10% of respondents). A few students stated the exam questions seemed harder when crib sheet use was permitted. Only one student thought the crib sheet gave a false sense of security and one student stated the act of preparing the sheet was actually stressful. Responses to the survey essay questions are summarized in Tables 6 and 7.

**Discussion**

Crib sheet use by veterinary students enhanced exam performance and permitted students to score higher on exams. This mirrors findings from various studies documenting the positive effects of crib sheets on exam performance (Dickson and Miller, 2006; Erbe, 2007; Raadt, 2012). This effect was significant for exams 1, 2 and 3. The exception was exam 5 in 2013 (no crib) which was statistically significantly higher than exam 5 in 2012 (crib). This phenomenon could have occurred for a variety of reasons. First, as the Virology course progressed, students could have learned how to study more effectively and became more comfortable with the course instructor, course expectations, and exam structure. Second, due to the use of crib sheets in the Virology course for some exams, students may have experienced decreased overall stress allowing them to study and retain more information for exam 5.

While the use of crib sheets enhanced the general exam performance of the students, it did not have the desired outcome on subject matter knowledge retention as evidenced by the comparison of questions from retention exam 6 for 2012 and 2013. It is possible the purpose of crib sheets may need to be focused on recall performance and stress relief as opposed to longer-term subject matter knowledge retention. It is also possible relying on the crib sheet for some information could limit subject matter knowledge retention for exam 6. It is recommended additional studies be conducted to investigate the long-term influence of crib sheets on subject matter knowledge retention to rule out any negative effects of crib sheet use. Other long-term measures and approaches should also be considered as this study only spanned the course of two years.

Overall, the students preferred to use crib sheets in their Virology course. Student responses to the Likert-scale questions were similar from 2012 to 2013 (see Vogelweid et al., 2014). For both years, students indicated they agreed their stress levels were lower during exams allowing the crib sheet, the crib sheet was helpful in reinforcing and remembering materials, and they would prefer to use the crib sheet for all exams in Virology and for other courses. In 2012, student responses indicated they agreed the crib sheet helped them to retain the course information longer. However, in 2013, student responses regarding the role of crib sheets in retaining course information did not fall into the real limits of agree. Perhaps, students are using the crib sheet as a crutch and not truly learning the course material. It is recommended future studies investigate how the students are using the crib sheets to identify possible issues and solutions. Possibly the issue is not the crib sheet itself, but how it is being developed and utilized by the students.

Students’ perceptions about the advantages of crib sheet use mirrored their responses to the Likert-scale questions. The biggest advantage for students was the use of crib sheets decreased their perceived overall stress. Stress levels reported by veterinary students in this study reflect those reported by other institutions (Hafen et al., 2008; Siqueira Drake et al., 2012). The perceived reduction of stress by the students while using the crib sheet is important in light of the links between academic stress and anxiety and depression (Reisbig et al., 2012; Siqueira Drake et al., 2012). Previous studies have also found crib sheet use reduces anxiety (Butler and Crouch, 2011; Erbe, 2007; Gharib and Phillips, 2012; Gharib et al., 2012; Mathew, 2012) and recommended the use of crib sheets (Gharib and Phillips, 2012). It is recommended crib sheet use continue to be implemented in this program and other veterinary programs as way to reduce potentially harmful stress in students.

Related to decreasing stress and anxiety, another student advantage of the crib sheet was it provided emotional comfort and support. This could also contribute to the reduction in stress experienced by some students. This phenomena of the crib sheet as a “security blanket” is discussed in previous literature (Larwin et al., 2012) and while this may be the case for some of the students in this study, it still contributed to a perceived reduction in stress. Again, with the high levels of anxiety and depression linked to veterinary students (Cardwell et al., 2013; Hafen et al., 2008; Siqueira Drake et al., 2012), it is recommended crib sheets be utilized to help alleviate some of the stress and pressure associated with veterinary programs, even if their use is more focused.
on student comfort than a true knowledge development or reinforcement tool.

Students also reported some disadvantages of crib sheet use. The most frequently reported disadvantages were dependency on the crib sheet decreased learning and the crib sheet was utilized as a crutch to neglect studying. Similarly, other researchers have described students utilizing crib sheets as a crutch and developing a dependency on the tool (Gharib et al., 2012; Larwin et al., 2012). These concerns could be alleviated with proper training on the use of crib sheets as a tool. Like any other teaching tool the intentionality of crib sheets must be clear in order for it to be effective. Raadt (2012) recommended students do the following in order to utilize crib sheets effectively: match the ordering of the course subject matter to the crib sheet content, record abstract representations of concepts as opposed to specific examples, and avoid recording answers of past examinations in hopes it will appear on the exam. By explicitly describing strategies for optimally using a crib sheet, its effectiveness could be strengthened. It is recommended educators of veterinary medicine describe strategies for use when introducing a crib sheet to their curriculum.

Future research based on the results of this study could include expanding the use of crib sheets to outside of the Virology class. The students expressed they would like to use crib sheets in their other veterinary courses both through the questionnaire and verbal comments to the instructor. Virology is only one of four classes taught to students during the eight-week instructional period, so if the goal of crib sheet use is to reduce stress and enhance exam scores it could be beneficial to implement this tool in other courses. Another avenue for future research could be to provide explicit instruction on how to optimally utilize crib sheets as recommended by Raadt (2012) and then investigate students’ perceptions on crib sheet use. Finally, it is important to replicate this study at other institutions with veterinary programs to see if similar results are found.

Summary
Based upon the findings of this study it can be concluded the use of crib sheets in veterinary medicine education may enhance exam performance. Students viewed crib sheets as a way to decrease their overall exam stress and desired to continue to use crib sheets in future courses. Some negative effects of crib sheets included students viewing them as a crutch to neglect studying and no connection was found between crib sheets and retention of material. It is recommended future studies explore specific strategies for crib sheet use to result in the optimum combination of stress reduction without dependency on the tool. Research on the use of crib sheets in other veterinary medicine courses is needed to see if similar results are found.

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The Influence of Crib Sheets


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Evaluation of Professional Development Resources for Swine Science Distance Education Instructors

Rebecca Wiers¹ and Greg Miller²
Iowa State University
Ames, IA

Abstract

The purpose of this study was to evaluate three professional development resources (conference, webpage and webinar) created for swine science distance education instructors in two programs: Professional Swine Manager and Swine Science Online. Instructors reported applying what they had learned at the conference and rated the new methods from the conference above average on a five-point scale. Instructors indicated the webpage was above average in quality and rated the resources on the page as good or excellent. Instructors ranked the webinar as the most useful of the three resources evaluated. Most instructors considered the webinar valuable and would attend an additional webinar if given the opportunity. Webinars were found to be favored by instructors over other professional development options due to convenience and ability to interact with fellow instructors. We recommend that webinars be given priority over face-to-face conferences when planning future professional development activities and programs for this audience of swine science education instructors.

Introduction

Swine production in the United States is a growing industry. A March 2005 inventory reported 59.9 million head of hogs and pigs (U. S. Department of Agriculture, 2005). The same quarterly inventory from March 2015 reported 65.9 million head—an increase of six million head in just ten years (U. S. Department of Agriculture, 2015). There are many jobs available in the swine industry; however, many professions connected with swine production are not located on producers’ farms.

Dr. M. Hogberg is a member of the Swine Science Online Policy Committee and sits on the U.S. Pork Center of Excellence (USPCE) Board of Directors. He said the National Pork Board analyzed the number of and enrollment in swine classes offered by U.S. colleges. This analysis revealed a need for additional educational programming (Hogberg, M., personal communication, August 4, 2015). A partnership between the National Pork Board and universities in the Great Plains AgIDEA consortium helps meet this need. The USPCE established online courses to provide an opportunity for students to learn more about swine production regardless of the university they attend, and students register for the courses through the Great Plains AgIDEA program. The main goal of the Professional Swine Manager (PSM) and Swine Science Online (SSO) programs is to provide a greater number of trained personnel for the swine industry in the future (Hogberg, M., personal communication, August 4, 2015).

While the number of instructors associated with PSM and SSO is small, this group is crucial to the education of students interested in the swine industry nationwide. Because of the importance of this group, research into how these instructors prefer future professional development is needed to ensure quality education for swine industry professionals.

Bjelland et al. (2014) conducted a study to identify professional development needs of instructors in the PSM and SSO programs. Because of the needs assessment, three professional development resources were created. A workshop occurred in summer 2013, a webinar was offered in October 2014 and instructors gained access to a webpage in January 2015.

The present study was an outcomes-based evaluation of the value of these resources to PSM and SSO instructors.

Questionnaires are often used in evaluating programs when it is desirable to collect information quickly and easily (McNamara, 2006). Because questionnaires are easy to analyze and inexpensive to administer, they are also recommended when limited resources are available for the evaluation (McNamara, 2006). The PSM and SSO instructors are located across the country and have busy schedules. Using an online questionnaire allowed the instructors to participate at their convenience and eliminated potential interview scheduling conflicts between researchers and instructors.

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Other researchers who studied similar strategies for professional development found that certain components are helpful in participant learning. One of those components is informal networking and interaction with one another during the professional development. Finsterwald et al. (2013) evaluated a teacher education program using, in part, a survey with qualitative, open-ended questions and quantitative closed questions. Finsterwald et al. (2013) found there to be a positive effect of knowledge exchange with colleagues during the professional development. Eller (2010) recommended that program planners set aside unstructured time for participants to network and learn from one another. Hustler et al. (2003) found that new teachers saw their professional development as connected to their need for interaction with more experienced teachers and wanted more interaction with other teachers. These studies show the need for interaction among instructors during professional development.

Many studies show the importance of professional development for teacher knowledge. Finsterwald et al. (2013) showed an increase in teacher knowledge is necessary for the successful implementation of changes in instructional practices within the classroom. Organized professional development is one way to encourage that increase in teacher knowledge. Thabisile and Dlamini (2015) found that agriculture teachers in their study continue to participate in professional development because of their individual motivations to build their own knowledge and competence. Sometimes, motivation to participate in professional development is lacking, but if some participants are motivated to grow in their knowledge, others may become motivated, according to participants in another study (Steyn, 2010). Steyn (2010) also found that professional development participants did not have positive experiences with previous short courses, but thought private development programs were more impactful. The overall conclusion of Steyn (2010) stated that professional development needs to be continuous for it to function optimally. Hustler et al. (2003) also showed that teachers perceived that continuous professional development significantly impacted their professional development, teaching skills and desire to learn more.

One way that the networking between learners can be improved is through technology when learners are at a distance. Rossing et al. (2012) found that students using iPads in courses felt they could interact more with one another compared to a typical lecture course. Students also appreciated that they could use internet browsers to find information outside the required textbook (Rossing et al., 2012).

The purpose of this study was to evaluate PSM and SSO instructors’ perceptions of three professional development resources. The study had four research objectives:

1. Describe the perceived quality of the online educator resources webpage.
2. Determine the value of the professional development resources provided to PSM and SSO instructors.
3. Determine which professional development resources instructors preferred.
4. Determine what professional development instructors preferred to have available in the future.

Materials and Methods
This study used descriptive survey research methods for an outcomes-based evaluation of the program activities. Outcomes-based evaluation asks if program activities are meeting clients’ needs (McNamara, 2006). In this case, the clients are PSM and SSO instructors. The Iowa State University Institutional Review Board approved the study protocol prior to survey administration. The study population was all instructors (n=18) associated with the PSM and SSO programs. The USPCE provided a list of instructors and their contact information.

The study instrument was an online questionnaire composed of closed and open-ended questions grouped into four categories: (a) the summer 2013 face-to-face professional development workshop, (b) the online educator resources webpage on the USPCE website, (c) the October 2014 webinar and (d) overall evaluation of the resources. Questions were written to avoid misleading, confusing, or embarrassing respondents and formatted to avoid respondents giving answers they thought the researchers wanted or didn’t want (Ary et al., 2010). Questions with multiple-choice answers were set up with a 5-point or 4-point Likert-type scale. Some questions included a comment box for respondents to provide more detail. One question requested that respondents rank the resources in order of usefulness. The questions were also designed to evaluate achievement of the desired outcomes stated in the USDA Challenge Grant that funded the professional development resources. We analyzed the questionnaire to judge the clarity and conciseness of each question. A colleague at the USPCE reviewed the questions to ensure content validity and confirm the questionnaire would provide valuable information to the USPCE about the professional development resources.

The questionnaire was administered online with Qualtrics. Based on recommendations from Dillman et al. (2008), instructors were contacted four times by e-mail and a fifth time by U.S. mail. The e-mail contacts contained a link to the questionnaire. Contacts were separated by five to seven days. The response rate was 55.6% (n=10).

Descriptive statistics including frequencies and percentages were used to summarize the data. The Qualtrics platform was used to generate histograms for selected variables.
Results and Discussion

Half of the respondents (n=5) had accessed the webpage before completing the questionnaire, and they unanimously rated it above average. Furthermore, respondents who had already used resources from the webpage (n=2) rated those resources as good or excellent. Based on these responses, PSM and SSO instructors perceive the webpage to be above average quality.

There is evidence that all three resources are valuable to PSM and SSO instructors. Of the five respondents who had accessed the webpage, none indicated the website was not valuable or of limited value, and 80% (n=4) reported it was either valuable or very valuable (Table 1). Only two respondents had used resources from the face-to-face workshop, but both reported it was valuable. Four of the five respondents who attended the webinar agreed it was valuable (Table 1).

Instructors were asked to rank which of the three resources was best, in their opinion. Nine of ten respondents answered this question. A majority (66.7%, n=6) of those respondents ranked the webinar as the most useful resource of the three options (Figure 1).

A comment box provided an opportunity for respondents to explain their ranking. One instructor provided a thorough description:

Webinars typically are easier to accommodate in my schedule and they allow one to ask questions, etc. They are superior to the Webpage because they have an interactive component. Webpage is second since it can be updated with new information on a regular basis and I can access it at any time. Face-to-Face is the least. It is the most time consuming and typically the least productive. I think it might be good as an introductory step...

Other respondents provided similar comments. Time, participant interaction and travel concerns were common reasons provided to explain rankings. On the basis of these comments, it makes sense that PSM and SSO instructors prefer webinars, which eliminate the need for travel but provide an opportunity for interaction with the instructor and other learners.

These findings are consistent with those of Berridge et al. (2012), who also asked instructors to rank resources and explain the ranking. In that study, instructors preferred to choose where and when they learn and appreciated the ability to attend a webinar or use a webpage wherever they are or want to be at the time (Berridge et al., 2012).

Centner (2014) reported that learners in online programs retain more information when they engage in quality interactions with other learners and can practice skills. Webinars are an excellent tool for engaging students and instructors during courses and providing professional development at a distance to ensure more effective learning through quality interactions. Finsterwald et al. (2013) and Eller (2010) also support this result since both studies found that networking amongst the learners has a significant positive impact on the learning. Using fully online training has been shown to be an effective method for some training programs, suggesting that webinars would be adequate as the only program offered in certain circumstances (Alsofyani et al., 2013).

Seventy percent (n=7) of respondents said they would attend another face-to-face workshop if given the chance and eight of nine respondents (89%) said they would participate in a second webinar (Figure 2). Based on these results, we recommend that webinars be the
first choice when developing additional professional
development resources for instructors in the PSM and
SSO programs.
Six out of nine respondents (67%) indicated the
resources were effective or very effective when used
together to develop their online teaching methods and
techniques (Figure 3). The willingness of instructors in
this study to attend future webinars and workshops
supports the idea that instructors desire continuous
professional development as opposed to a one-time
occurrence (Hustler, et al., 2003).

Summary
Due to the small sample size, no conclusions can
be based solely on this study. Even so, the study con-
tributes to the knowledge base related to the application
of instructional technologies in the professional devel-
opment of college teachers of agriculture. We encour-
age readers to contemplate the importance of our find-
ings to the small but critically important group of PSM
and SSO instructors. In addition, results of this study are
highly consistent with previously published studies as
indicated in the discussion of findings.
Overall, PSM and SSO instructors who used the
webpage or participated in the face-to-face workshop
and webinar found these resources valuable and
effective. Most instructors prefer the webinar. They want
interaction with each other, as well as the ability to attend
without travel time or expenses.
Based on the results of this study and its consistency
with findings from related research, we recommend that
the USPCE provide further professional development
for PSM and SSO instructors entirely online, primarily
via webinars. Webinars should include interaction not
only between learners and instructors but also among
learners themselves. The webpage should be maintained
and kept current if it is to continue serving as a useful
and effective resource between webinars. Further evalu-
ation should occur as additional professional
development resources are offered and as the PSM
and SSO programs or instructors change. This relatively
small group of instructors is very influential in the swine
industry. Delivering professional development programs
to them in the manner they prefer can significantly
impact hundreds of students across the United States.

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Perceptions of African Americans’ Persistence in Careers in the Forestry/Natural Resources Management Professions: The Tuskegee University Case

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Abstract
This study focused on Tuskegee University forestry/natural resources management graduates’ perspectives about persistence in forestry/natural resources management careers. Data collection occurred via descriptive, simple random sample. Study population consisted of all graduates of Tuskegee’s forestry/natural resources management programs who are employed in or seeking employment in the forestry/natural resources management professions. The population included those who graduated from Tuskegee University and those who transferred and graduated from host universities. The objectives were to describe the perceptions of African Americans persistence in careers in the forestry/natural resources management professions, to identify what demographic characteristics can be used to explain variance in the perceptions and to obtain preliminary data that provide insight and can inform the professions of ways to retain African American employees in the forestry/natural resources management careers. When asked “what gave you strength to persist in your job,” the respondents reported confidence in my ability, family love and support and my faith in God and/or the goodness of mankind, I need the job to support myself and family, support from a Black and/or Caucasian colleague(s), support of my organization’s upper management and other.

Introduction
Historically, African Americans have made important and lasting contributions to the American forestry/natural resources management industries. This is in spite of the low number of African American professionals employed in the industries. There are multiple reasons for the low number of professional African American forestry/natural resources management workers in the U.S.A. The list of reasons includes the well-documented low interest in these disciplines (Payne and Theoe, 1971) and the result is a low number of baccalaureate degrees earned annually by African Americans. The above could be related to low exposure to the disciplines, resulting from a low number of African American role models in minority communities and/or in the industries. Thus, a critical need exists for the increased representation of such individuals to ensure the diversification of the forestry/natural resources management professions nationwide.

There is little to no documentation of factors which influence African Americans to persist in careers in the forestry/natural resources management professions. However, we can look to studies performed with college students (Guillory and Wolverton, 2008; Allen and Oh, 2006; Falconer and Hays, 2006), nursing graduates (Ewens, 2003) and special education graduates (Gersten et al. 2001) to understand what factors influence graduates to persist in college and in careers after graduation. Akin et al. (2002) stated that socialization and assimilation of newly licensed nurses into the healthcare system is a pivotal event that influences the retention of nurses. The important issue to remaining in a nursing career is the quality of the transition from student to new nurse (Clare and van Loon, 2003; Ewens, 2003; and Duchscher, 2001). Banks and Bailey (2010) stated that nurses were more likely to remain employed when they were older, worked in specialized clinical areas and had more years of nursing experience.

However, the literature suggests that in order to keep a special education teacher, a number of things are needed including: 1) support; 2) mentoring; 3) staff...
Perceptions of African Americans’

development (Gersten et al., 2001); 4) work condition factors; and 5) job satisfaction. Allen et al. (2008) stated that college commitment and social connectedness affected whether a student stayed in school or not.

We sought to generate information about perspectives which influence African Americans to persist in careers in the forestry/natural resources management professions. We surveyed African American graduates of Tuskegee University’s forestry/natural resources management program.

The objectives and/or research questions were to: 1) describe the perspectives that influence African American graduates to persist in careers in the forestry/natural resources management professions; 2) identify what demographic characteristics can be used to explain variance in the perceptions; and 3) obtain preliminary data that provide insight and could inform the professions of ways to retain African American employees in forestry/natural resources management careers.

Methods

The target population included those professionals who majored in forestry/natural resources management programs at Tuskegee University (TU) and graduated, or transferred and earned the baccalaureate degree at partner universities. The sampling method was descriptive, simple random sample survey. The survey (following Dillman et al., 2009) was mailed on 13 April 2015 and the graduates were asked to complete and return the survey.

The survey instrument was developed by the authors, sub-divided into eight constructs and consisted of 64 variables. Most of the variables were of the Likert-type scale. Construct I focused on general background/demographics, construct II covered undergraduate college peer relationships, construct III consisted of professional work community life, construct IV focused on professional work organization, construct V covered your significant other and/or family life, construct VI consisted of your work achievement, construct VII focused on your work supervisor and construct VIII consisted of grand overall main factors which influence persistence in career.

Overall Cronbach’s alpha coefficient of reliability for constructs I – VIII combined was 0.49, construct II was 0.73, construct III was 0.90, construct IV was 0.60, construct V was -0.04, construct VI was 0.87, construct VII was 0.97 and construct VIII was -0.24. Content and face validity of the instrument occurred via a panel of experts and a field test of ten graduates. Slight revisions were necessary following the pilot test. Test surveys were not included in this analysis. Thirty-seven surveys were distributed randomly to TU’s forestry/natural resources management graduates. Ten surveys were returned, yielding a response rate of 27.03%. The sample size, n, was determined by use of a table to determine sample size after Krejcie and Morgan (1970). Data analysis occurred as follows: 1) descriptive statistics of means, standard deviation (S.D.), and frequencies were computed for selected variables; 2) correlation analyses examined the relationship between the overall mean rating of persistence with selected demographic variables; 3) the t-test measured the differences of each perception variable’s mean score by gender; 4) one-way ANOVA tested the different levels of perception in terms of home origin, high school enrollment size, contact with Caucasian people, and number of years employed; 5) following each solicitation, the returned questionnaires were kept separately and analyzed via t-test to see if there was a difference between the early and late respondents. This was done to control for non-response error; 6) an “omitted question”, “no answer”, “no opinion”, or “not applicable” was coded as a 10 and considered a missing case of the unanswered question only; 7) categorical analysis of means for constructs II - VIII was performed using the following scale: 1 strongly disagree (M=1.00 – 1.83); 2 moderately disagree (M=1.84 – 2.67); 3 slightly disagree (M=2.68 – 3.51); 4 slightly agree (M=3.52 – 4.35); 5 moderately agree (M=4.36 – 5.19); 6 strongly agree (M=5.20 – 6.0); and 8) Construct I’s t-value is significant at the 0.01 level. It is based upon Bonferroni’s correction 0.05/5. Construct II’s t-value is significant at the 0.008 level. It is based upon Bonferroni’s correction 0.05/6. Construct III’s t-value is significant at the 0.003 level. It is based upon Bonferroni’s correction 0.05/16. Construct IV’s t-value is significant at the 0.01 level. It is based upon Bonferroni’s correction 0.05/5. Construct V’s t-value is significant at the 0.008 level. It is based upon Bonferroni’s correction 0.05/6. Construct VI’s t-value is significant at the 0.008 level. It is based upon Bonferroni’s correction 0.05/6. Construct VII’s t-value is significant at the 0.0125 level. It is based upon Bonferroni’s correction 0.05/4.

Results

Because only ten surveys were returned, we did not test for non-response error. Thus, these statistics can be generalized only to the Tuskegee University forestry/natural resources graduates’ population. The respondents reported gender was 80.00% male and 20.00% female. Reported mean age was 49.67 years old, n=9 and S.D.=13.34. The mean years employed was 23.2 years, n=10 and S.D.=15.27. Most of the respondents, 80.00%, reported forestry as their major and 10.00% each reported soil science and fish and wildlife management. Respondents’ indicated employer was 33.33% each private industry and government, 22.22% indicated university, 11.11% indicated other.

Respondents were asked “why did you graduate from the forestry/natural resources management program.” 64.29% indicated I felt in control of my destiny, 35.71% each indicated a need to achieve and a commitment and loyalty to family, 28.57% indicated a sense of self-development and 21.43% indicated other. When respondents, 4, were asked “why did you changed your career from forestry/natural resources management,” 50.00% indicated I found my calling elsewhere, 25.00% each indicated I could not find suitable employment in
### Table 1. Mean scores, n, S.D., t-value and p-value of undergraduate college peer relationships and professional work community life. () represent n, mean, S.D. for the male respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>n(n)</th>
<th>mean(mean)</th>
<th>S.D.(S.D.)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Undergraduate College Peer Relationships</strong></td>
<td></td>
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<tr>
<td>In college:</td>
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</tr>
<tr>
<td>I found it easy to make friends.</td>
<td>2(8)</td>
<td>6.00(5.13)</td>
<td>0.00(0.83)</td>
<td>1.42</td>
<td>0.1940</td>
</tr>
<tr>
<td>I always found a study partner in non-forestry/non-natural resources management classes.</td>
<td>2(8)</td>
<td>3.50(4.00)</td>
<td>3.54(1.60)</td>
<td>-0.32</td>
<td>0.7543</td>
</tr>
<tr>
<td>I always found a study partner in my forestry/natural resources management classes.</td>
<td>2(8)</td>
<td>4.50(4.75)</td>
<td>2.12(1.28)</td>
<td>-0.22</td>
<td>0.8287</td>
</tr>
<tr>
<td>I always gained access to old course examinations.</td>
<td>2(8)</td>
<td>2.00(2.50)</td>
<td>1.41(1.60)</td>
<td>-0.40</td>
<td>0.6996</td>
</tr>
<tr>
<td>My classmates accepted me when working in teams.</td>
<td>2(8)</td>
<td>6.00(4.50)</td>
<td>0.00(1.31)</td>
<td>1.34</td>
<td>0.2165</td>
</tr>
<tr>
<td>Overall mean and S.D.</td>
<td>4.40(4.19)</td>
<td>2.17(1.62)</td>
<td></td>
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<tr>
<td>*t-value is significant at the 0.01 level. Based upon Bonferroni’s correction 0.05/5.</td>
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<tr>
<td><strong>Professional Work Community Life</strong></td>
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<tr>
<td>In my work community:</td>
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<tr>
<td>I feel comfortable in my community (a community with an adequate number of other minorities).</td>
<td>2(8)</td>
<td>6.00(5.25)</td>
<td>0.00(1.16)</td>
<td>0.87</td>
<td>0.4094</td>
</tr>
<tr>
<td>I can be who I am.</td>
<td>2(8)</td>
<td>6.00(5.25)</td>
<td>0.00(1.04)</td>
<td>0.98</td>
<td>0.3599</td>
</tr>
<tr>
<td>I always found a suitable roommate.</td>
<td>1(7)</td>
<td>6.00(4.86)</td>
<td>.107</td>
<td>1.00</td>
<td>0.3599</td>
</tr>
<tr>
<td>I always found a suitable companionship.</td>
<td>1(7)</td>
<td>6.00(4.57)</td>
<td>.127</td>
<td>1.05</td>
<td>0.3541</td>
</tr>
<tr>
<td>I always found a suitable place to live.</td>
<td>2(8)</td>
<td>5.00(4.88)</td>
<td>1.41(1.25)</td>
<td>0.12</td>
<td>0.9039</td>
</tr>
<tr>
<td>Overall mean and S.D.</td>
<td>5.75(4.97)</td>
<td>0.71(1.13)</td>
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<tr>
<td>*t-value is significant at the 0.008 level. Based upon Bonferroni’s correction 0.05/6.</td>
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</table>

(Strongly disagree = 1, moderately disagree = 2, slightly disagree = 3, slightly agree = 4, moderately agree = 5, strongly agree = 6).

### Table 2. Mean scores, n, S.D., t-value and p-value of professional work organization. () represent n, mean, S.D. for the male respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>n(n)</th>
<th>mean(mean)</th>
<th>S.D.(S.D.)</th>
<th>t-value</th>
<th>p-value</th>
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<tbody>
<tr>
<td><strong>Professional Work Organization</strong></td>
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<tr>
<td>In my work organization:</td>
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<tr>
<td>My work colleagues value my opinion as part of a work team.</td>
<td>2(8)</td>
<td>6.00(5.00)</td>
<td>0.00(1.69)</td>
<td>0.80</td>
<td>0.4468</td>
</tr>
<tr>
<td>I feel &quot;pressure to perform at work&quot; as if I was carrying the weight of or representing my race.</td>
<td>2(8)</td>
<td>2.00(4.25)</td>
<td>1.41(2.05)</td>
<td>-1.43</td>
<td>0.1894</td>
</tr>
<tr>
<td>I would recommend my work organization to a Black male.</td>
<td>2(8)</td>
<td>5.50(5.25)</td>
<td>0.71(0.71)</td>
<td>0.45</td>
<td>0.6666</td>
</tr>
<tr>
<td>I would recommend my work organization to a Black female.</td>
<td>2(8)</td>
<td>5.50(4.88)</td>
<td>0.71(1.73)</td>
<td>0.48</td>
<td>0.6416</td>
</tr>
<tr>
<td>I expected to encounter the kind of issues (isolation or race and/or gender biased people, etc.) that I encounter at work.</td>
<td>1(8)</td>
<td>5.00(4.63)</td>
<td>.200</td>
<td>0.18</td>
<td>0.8644</td>
</tr>
<tr>
<td>Includes me in a variety of projects.</td>
<td>2(8)</td>
<td>5.50(5.25)</td>
<td>0.71(0.71)</td>
<td>0.45</td>
<td>0.6666</td>
</tr>
<tr>
<td>On occasion, provides meetings and workshops on diversity.</td>
<td>2(8)</td>
<td>4.00(4.38)</td>
<td>2.83(1.30)</td>
<td>-0.30</td>
<td>0.7711</td>
</tr>
<tr>
<td>I can be who I am.</td>
<td>2(8)</td>
<td>6.00(5.38)</td>
<td>0.00(0.92)</td>
<td>0.92</td>
<td>0.3832</td>
</tr>
<tr>
<td>I always find a mentor.</td>
<td>1(8)</td>
<td>3.00(3.38)</td>
<td>.119</td>
<td>-1.09</td>
<td>0.3112</td>
</tr>
<tr>
<td>My salary and job promotions are based upon my ability to perform.</td>
<td>1(8)</td>
<td>3.00(3.38)</td>
<td>.114</td>
<td>-0.50</td>
<td>0.6308</td>
</tr>
<tr>
<td>Encourages openness regarding ethnicity.</td>
<td>2(8)</td>
<td>5.50(3.38)</td>
<td>0.71(1.60)</td>
<td>1.77</td>
<td>0.1141</td>
</tr>
<tr>
<td>Encourages openness regarding gender.</td>
<td>2(8)</td>
<td>5.50(3.63)</td>
<td>0.71(1.69)</td>
<td>1.49</td>
<td>0.1756</td>
</tr>
<tr>
<td>I consider my work organization to be diverse (regarding ethnicity).</td>
<td>2(8)</td>
<td>5.50(3.50)</td>
<td>0.71(1.93)</td>
<td>1.39</td>
<td>0.2020</td>
</tr>
<tr>
<td>I consider my work organization to be diverse (regarding gender).</td>
<td>2(8)</td>
<td>5.50(3.25)</td>
<td>1.42(2.12)</td>
<td>1.42</td>
<td>0.1925</td>
</tr>
<tr>
<td>I consider my co-workers to be race tolerant.</td>
<td>2(8)</td>
<td>5.50(4.25)</td>
<td>0.71(1.56)</td>
<td>1.05</td>
<td>0.3226</td>
</tr>
<tr>
<td>I consider my co-workers to be gender tolerant.</td>
<td>2(8)</td>
<td>5.50(4.50)</td>
<td>0.71(1.89)</td>
<td>0.79</td>
<td>0.4522</td>
</tr>
<tr>
<td>Overall mean and S.D.</td>
<td>5.03(4.37)</td>
<td>1.35(1.63)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*t-value is significant at the 0.003 level. Based upon Bonferroni’s correction 0.05/16.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Strongly disagree = 1, moderately disagree = 2, slightly disagree = 3, slightly agree = 4, moderately agree = 5, strongly agree = 6).

### Table 3. Mean scores, n, S.D., t-value and p-value of significant other and/or family life and professional work achievement. () represent n, mean, S.D. for the male respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>n(n)</th>
<th>mean(mean)</th>
<th>S.D.(S.D.)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Significant Other and/or Family Life</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I and/or my family:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel &quot;pressure to act or live in our home community&quot; as if we are carrying the weight of, or representing, our race.</td>
<td>1(7)</td>
<td>6.00(4.57)</td>
<td>1.90</td>
<td>0.70</td>
<td>0.5087</td>
</tr>
<tr>
<td>Are satisfied with our social life (friends, church, fraternity/sorority, professional organizations, etc.) in the community in which we live.</td>
<td>1(7)</td>
<td>6.00(4.71)</td>
<td>1.38</td>
<td>0.87</td>
<td>0.4710</td>
</tr>
<tr>
<td>My spouse has always found employment in the community in which we live.</td>
<td>1(7)</td>
<td>6.00(3.00)</td>
<td>1.91</td>
<td>1.47</td>
<td>0.1931</td>
</tr>
<tr>
<td>My spouse has always found &quot;full&quot; employment in the community in which we live.</td>
<td>1(7)</td>
<td>6.00(3.14)</td>
<td>2.12</td>
<td>1.26</td>
<td>0.2534</td>
</tr>
<tr>
<td>Overall mean and S.D.</td>
<td>5.00(3.77)</td>
<td>1.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*t-value is significant at the 0.01 level. Based upon Bonferroni’s correction 0.05/5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Work Achievement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My salary is similar to that of non-minorities who perform jobs similar to or at the same level as mine.</td>
<td>2(8)</td>
<td>5.50(4.75)</td>
<td>0.71(1.28)</td>
<td>0.77</td>
<td>0.4609</td>
</tr>
<tr>
<td>I have adequate opportunities to learn new skills.</td>
<td>2(8)</td>
<td>4.50(4.75)</td>
<td>2.12(0.89)</td>
<td>-0.28</td>
<td>0.7045</td>
</tr>
<tr>
<td>I have adequate opportunities for advancement.</td>
<td>2(8)</td>
<td>4.50(4.25)</td>
<td>2.12(0.89)</td>
<td>0.28</td>
<td>0.7845</td>
</tr>
<tr>
<td>My skills are utilized to their fullest.</td>
<td>2(8)</td>
<td>3.50(3.25)</td>
<td>3.54(1.91)</td>
<td>0.15</td>
<td>0.8882</td>
</tr>
<tr>
<td>My work organization encouraged job cross-training.</td>
<td>2(8)</td>
<td>3.50(4.25)</td>
<td>3.54(1.58)</td>
<td>-0.49</td>
<td>0.6374</td>
</tr>
<tr>
<td>Overall mean and S.D.</td>
<td>4.30(4.25)</td>
<td>2.11(1.41)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*t-value is significant at the 0.008 level. Based upon Bonferroni’s correction 0.05/6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Strongly disagree = 1, moderately disagree = 2, slightly disagree = 3, slightly agree = 4, moderately agree = 5, strongly agree = 6).
the forestry/natural resources management professions and I could not accept the isolation or race and/or gender biased workplace.

When asked “what gave you strength to persist in your job,” the respondents reported, 90.00%, confidence in my ability, 80.00% each reported family love and support and my faith in God and/or the goodness of mankind, 60.00% reported I need the job to support myself and family, 40.00% reported support from a Black and/or Caucasian colleague(s), 20.00% reported support of my organization’s upper management, 10.00% reported other. The respondents’ other reasons for persisting in their jobs were, 70.00% each indicated I enjoy working out-of-doors and I get an intrinsic reward from working with nature (environmental stewardship), 50.00% each indicated I get to work with people and I get to manage my work schedule and 10.00% indicated other.

All respondents reported that “my training at Tuskegee University prepared me for professional employment.” The majority of the respondents, 57.14%, indicated that “TU prepared me for the political issues I encounter(ed) in the workplace.” Most of the respondents, 78.57%, indicated that “TU prepared me for the social issues I encounter(ed) in the workplace.” The majority of the respondents, 92.86%, reported that “I would recommend forestry/natural resources management as a career to Black high school students.”

Constructs II and III variables are shown in Table 1, undergraduate college peer relationship and professional work community life, respectively. Table 2 shows the professional work organization variables of construct IV. Constructs V and VI variables are shown in Table 3, significant other and/or family life and work achievement, respectively. Table 4 shows work supervisor and grand overall main factors which influence persistence in career variables for constructs VII and VIII, respectively. The tables also shown, S.D., t-value and p-value for the variables. The t-test measured the difference between the male and female respondents’ variables’ mean scores. Not one variable of the study produced a statistically significant t-value.

Tables 5 and 6 show the Pearson correlation analyses of the undergraduate college peer relationships, professional work community life, professional work organization, significant other and/or family, work achievement, work supervisor and grand overall main factors which influence persistence in career variables for constructs VII and VIII, respectively.

<table>
<thead>
<tr>
<th>Table 4. Mean scores, n, S.D., t-value and p-value of work supervisor and grand overall main factors which influence persistence in career variables. () represent n, mean, S.D. for the male respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variables</strong></td>
</tr>
<tr>
<td>My supervisor:</td>
</tr>
<tr>
<td>Gives me helpful performance feedback.</td>
</tr>
<tr>
<td>Gives me unbiased performance feedback.</td>
</tr>
<tr>
<td>Makes me feel a part of the work team.</td>
</tr>
<tr>
<td>I am satisfied with my supervisor.</td>
</tr>
<tr>
<td>Is race tolerant.</td>
</tr>
<tr>
<td>Overall mean and S.D.</td>
</tr>
<tr>
<td>*t-value is significant at the 0.008 level. Based upon Bonferroni’s correction 0.05/6.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Grand Overall Main Factors Which Influence Persistence In Career</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatively good job security.</td>
</tr>
<tr>
<td>My ability to master the job challenges.</td>
</tr>
<tr>
<td>Positive outlook for job and salary promotions.</td>
</tr>
<tr>
<td>I enjoy environmental stewardship.</td>
</tr>
<tr>
<td>Overall mean and S.D.</td>
</tr>
<tr>
<td>*t-value is significant at the 0.0125 level. Based upon Bonferroni’s correction 0.05/4.</td>
</tr>
<tr>
<td>Overall mean and S.D. for all constructs (excluding constructs V and VIII)</td>
</tr>
<tr>
<td>(strongly disagree = 1, moderately disagree = 2, slightly disagree = 3, slightly agree = 4, moderately agree = 5, strongly agree = 6).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5. Pearson correlation analyses between selected demographic variables and, college peer relationship, work community life, professional work organization and significant other and/or family</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variables</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>CPR (n=10)</td>
</tr>
<tr>
<td>WCL (n=10)</td>
</tr>
<tr>
<td>PWO (n=10)</td>
</tr>
<tr>
<td>Gender (n=10)</td>
</tr>
<tr>
<td>Age (n=10)</td>
</tr>
<tr>
<td>Size of home town (n=10)</td>
</tr>
<tr>
<td>High school enrollment (n=10)</td>
</tr>
<tr>
<td>Highest level of education sought (n=10)</td>
</tr>
<tr>
<td>Mother’s education (n=10)</td>
</tr>
<tr>
<td>Father’s education (n=10)</td>
</tr>
<tr>
<td>GPA (n=10)</td>
</tr>
<tr>
<td>High School contact with Caucasians (n=10)</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level.

(r=Coefficient; D=Hopkins’ description; H=High; L=Low; M=Moderate; T=Trivial; VL=Very Large. CPR=College peer relationship; WCL=Work community life; PWO=Professional work organization; GPA=Grade point average).
in career with selected demographic variables. We used descriptions outlined by Hopkins (2000) to interpret the correlation coefficients. Only statistically significant moderate associations, $r > 0.30$, are discussed here. Cause and effect analyses are beyond the scope of this paper.

In table 5, significant other and/or family life and work community life showed a very large relationship, $r = 0.70^*$. Significant other and/or family life and professional work organization produced a very large relationship, $r = 0.70^*$. College peer relationships and highest level of education sought showed a very large, negative relationship, $r = -0.77^*$. College peer relationship and mother’s education produced a high relationship, $r = 0.62^*$. In table 6, grand overall main factors which influence persistence in career and work achievement showed a high, negative relationship, $r = -0.68^*$. Grand overall main factors which influence persistence in career and mother’s education produced a high, negative relationship, $r = -0.66^*$. Work supervisor and highest level of education sought showed a very large, negative relationship, $r = -0.87^*$. The one-way ANOVA produced no significantly different items when undergraduate college peer relationships, professional work community life, professional work organization, significant other and/or family, work achievement, work supervisor, and grand overall main factors which influence persistence in career were tested with home origin, high school enrollment size, contact with Caucasian people and number of years employed.

### Discussion

When asked “what gave you strength to persist in your job,” the respondents reported “confidence in my ability and reported family love and support and my faith in God and/or the goodness of mankind.” These findings agree with Jensen (2011), Allen et al. (2006), Hagedorn et al. (2006) and Nicpon et al. (2006) as they noted family background, individual skills and ability and student preparation were determinants of students’ retention in college. Also, Falconer and Hays (2006) stated that religion and/or religious or social relationships gave minority students strength to overcome career challenges and obstacles.

Respondents were asked “why did you graduate from the forestry/natural resources management program,” they indicated “I felt in control of my destiny, a need to achieve and a commitment and loyalty to family, a sense of self development, and other.” These findings agree with Banks and Bailey (2010), Nes et al. (2009), Guillery and Wolverton (2008), and Kuh and Love (2008) in that family support, mentoring, self-efficacy, social connectedness and self-discipline all impact whether an employee stays on the job or a student stays in school.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Work Achievement (n=10)</th>
<th>Work Supervisor (n=10)</th>
<th>GOMFWIPIC (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (n=9)</td>
<td>$r = 0.43$</td>
<td>$r = 0.41$</td>
<td>$r = 0.43$</td>
</tr>
<tr>
<td>Size of home town (n=10)</td>
<td>$r = -0.03$</td>
<td>$r = 0.29$</td>
<td>$r = -0.21$</td>
</tr>
<tr>
<td>High school enrollment</td>
<td>$r = 0.33$</td>
<td>$r = 0.43$</td>
<td>$r = -0.41$</td>
</tr>
<tr>
<td>Socio-economic (n=10)</td>
<td>$r = 0.24$</td>
<td>$r = 0.34$</td>
<td>$r = -0.55$</td>
</tr>
<tr>
<td>Highest level of education sought (n=10)</td>
<td>$r = 0.07$</td>
<td>$r = -0.87^*$</td>
<td>$r = 0.37$</td>
</tr>
<tr>
<td>Mother’s education (n=10)</td>
<td>$r = 0.22$</td>
<td>$r = 0.86$</td>
<td>$r = -0.66^*$</td>
</tr>
<tr>
<td>Father’s education (n=10)</td>
<td>$r = -0.10$</td>
<td>$r = 0.66$</td>
<td>$r = -0.52$</td>
</tr>
<tr>
<td>High school contact with Caucasians (n=10)</td>
<td>$r = -0.14$</td>
<td>$r = -0.09$</td>
<td>$r = -0.05$</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level.

Work supervisor and highest level of education sought showed a very large, negative relationship. One explanation is that as the relationship with the supervisor goes down, the perceived need for additional education to get ahead goes up. NEA Higher Education Research Center (2003) cites the personal benefits of higher education as: 1) increased income; 2) better working conditions; and 3) the potential for promotion.

### Study Recommendations

The forestry/natural resources management professions should: where possible, place the minority employee in a community and work unit where there are other minorities in the community and/or work unit. Encourage the minority employee to cross-train in work responsibility. Where possible, ensure there is an adequate number of willing majority mentors, if there are no other minority employees, in the work unit. Use currently employed professional minorities to help recruit and/or retain newly hired professional minority employees. Continue to teach employees the importance and values of a diverse, ethnicity and gender, workplace. Retrain and/or “weed out” ethnic and gender intolerant supervisors. Match minority employees’ skills set to the work and/or job skills requirements. Employers should base minority employees’ salary and job promotions upon minority employees’ ability and performance record.

### Recommendations for Further Research

Further research needs to be conducted in this subject, as the sample size is almost too small to draw meaningful conclusions.

### Study Limitations

Due to the limited number of unit responses, the results may be influenced by: 1) unit non-response bias; 2) self-selection bias; 3) sampling bias; and 4) undercoverage bias due to self-selection. Due to the limited number of female unit responses and the apparent unit non-response bias, the survey results cannot be generalized to the female population.
Perceptions of African Americans’

Literature Cited


An “On-The-Course” Classroom Experience for Turfgrass Majors

Christian M. Baldwin², Gaea Hock³, and Barry R. Stewart⁴
Mississippi State University
Mississippi State, MS

Abstract

Although many students enrolled in the Golf and Sports Turf Management program at Mississippi State University are well prepared for the science of turfgrass management upon graduation, skills such as crew supervision, budgeting decisions, and time/staff management are difficult concepts to effectively deliver in a classroom environment. The objectives of this experiential learning opportunity were for students enrolled in PSS 4414 (Turfgrass Management) to experience the realities of hosting a major Professional Golf Association (PGA) tour event, interact with PGA tour agronomists to learn about the agronomic decision making process, witness how a golf course superintendent manages a crew, and develop contacts within the turfgrass industry. Students volunteered at the Sanderson Farms Championship PGA event in Jackson, MS from 4-9 November 2014. Kolb’s Experiential Learning Model was used as the theoretical framework for this learning activity. Qualitative research methods were used to collect and analyze the findings related to this learning experience. Students were asked specific questions before, during, and after the event to guide their reflection. A total of five research questions were used to investigate the results and findings were reported for each question. Students were able to witness organizational strategies, how to handle disgruntle employees, and effective communication skills. Also, several students either performed or discussed with the course maintenance crew about site specific tasks implemented at the PGA event. These are all invaluable experiences students can draw upon when entering the workforce.

Introduction

Experiential learning is a concept that has been an integral part of agricultural education that dates back nearly 100 years when Stimson (1919) stated skills cannot be learned from books or observation, but also require active participation. The exact framework that defines an experiential learning opportunity varies in the literature (Bott and Cortus, 2014; Leggette et al., 2012; Parr and Trexler, 2011). However, at the core of any experiential learning activity is the action of connecting formal classroom education experiences with external personal experiences, along with a period of reflection, in order to positively impact the competency of a student in a given field of study.

Several models have been proposed regarding the theory of experiential learning. One of the most referenced models is from Kolb (1984). Based on the work of previous experiential learning models (Joplin, 1981; Dewey, 1938), Kolb (1984) proposed a model that included four components: concrete experience, reflective observation, abstract conceptualization, and active experimentation. More specifically, the cyclical nature of Kolb’s (1984) model includes students gathering information through direct experience, reflecting and internalizing the information learned, making generalizations about their experience, and testing previously developed generalizations (Roberts, 2006). Essentially, the cyclical nature of learning involves an individual experiencing, reflecting, thinking, and then acting (Kolb and Kolb, 2005).

While there have been several publications focusing on experiential learning in agriculture based majors (Pennington et al., 2015; Downey, 2012; Rhykerd et al., 2006), there are few published reports examining the impact of experiential learning for students enrolled in turfgrass management programs. Williams et al. (2013) initiated a two-day interactive learning experience for turfgrass majors (University of Florida) enrolled in a distance course (ORH 4223: Golf and Sports Turf Management). Students visited two turfgrass facilities in Florida, which included facility tours with the turfgrass management staff, facility organization discussions, land-

¹The Mississippi State University Institutional Review Board approved the study protocol and all participants provided written informed consent prior to participation in the study.
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⁴Department of Plant and Soil Science; (662)325-2725; bastewar@pss.msstate.edu
scape management techniques, and various business management practices were reviewed. At the end of the two-day experience, the authors noted students further developed skill sets that employers seek in students. At The Ohio State University, students enrolled in an advanced turfgrass management course were assigned a hypothetical golf course and charged with developing a 1-year management program, which included cultural practices and budgeting decisions (Danneberger, 1994). Over the course of completing this project, students had the opportunity to resolve conflict within groups, seek information outside of the classroom environment, and improve writing and oral presentation skills. When students who participated in this experiential learning activity graduated and obtained employment in the golf course industry, they noted this activity was a valuable experience when beginning their careers.

The turfgrass program at Mississippi State University (MSU) currently has ~40 students (spring, 2016). The majority of these students are interested in golf course management and will pursue careers as golf course superintendents upon graduation. While golf course management is complex in terms of cultural inputs to maintain year-round high quality playing conditions, the golf course profession is also complex in terms of communication with greens committees, members, owners, and/or management groups of golf courses. While turfgrass majors leave MSU with a solid agronomic foundation, students must also be competent in skills beyond turfgrass management, such as leadership ability, budget maintenance and crew supervision experience (Williams, 2013). Employers in the golf course industry continue to seek students who have a degree from a 4-year academic institution, but possess the practical skills to immediately start employment with crew supervision/leadership roles. These are all skills that are difficult to convey in a classroom environment. Therefore, conducting research incorporating experiential learning opportunities into current courses is necessary to determine if these experiences will help prepare students for professional success upon graduation. The objectives of this experiential learning opportunity was for Golf and Sports Turf Management (GSTM) majors at MSU enrolled in PSS 4414 (Turfgrass Management) to experience the realities of hosting a major Professional Golf Association (PGA) tour event, interact with PGA tour agronomists to learn about the agronomic decision making process, witness, in-person, how a golf course superintendent manages a crew and develop contacts within the turfgrass industry.

Methods
This experiential learning project was initiated during the fall, 2014 semester at MSU for students enrolled in Turfgrass Management (PSS 4414). PSS 4414 covers many golf course management techniques, including disease/weed identification and control, personnel management, mowing techniques, budgeting concepts and numerous golf course management cultural practices. The class consisted of 18 students, of which 15 were GSTM majors, while 3 were Landscape Architecture (LA) majors. With the exception of the LA students, all GSTM students have been on at least one 3-month internship prior to enrolling in PSS 4414.

The experiential learning opportunity occurred at the 2014 Sanderson Farms Championship PGA tournament held at the Country Club of Jackson in Jackson, MS from 4-9 November 2014. A typical day started at 4:30 am and ended at 8:30 pm. Each day began with a brief meeting in the morning with the golf course superintendent in order to assign tasks for the day. Once tasks were assigned, crew members gathered the appropriate gear for their tasks. The goal was to get all tasks finished on the first holes well before play started. The morning shift was usually completed by 9 am. The night shift usually began at 4 pm and ended just after dark. Utility vehicles with generators and lights were often used over the last few holes. Over the course of a typical day, students spent their time in content-specific tasks such as divot filling, bunker raking, dew removal, leaf control, mowing, observing equipment maintenance and course set-up. In addition to attending meetings and actual work on the golf course, the superintendent usually reserved one morning to talk agronomy with the students. In addition, the PGA agronomist on-site often interacted with the students about agronomic decisions he makes on a daily basis regarding tournament set-up.

Kolb’s Experiential Learning Model was used as the theoretical framework for this learning activity. The four stages of the cycle include: concrete experience, reflective observation, abstract conceptualization and active experimentation (Kolb, 1984). Qualitative research methods were used to collect and analyze the findings related to this learning experience. Students were not assigned a “grade”, but the qualitative methods were used to assess the effectiveness and perceptions held by students toward the experiential learning experience. Students were asked specific questions before, during and after the event to guide their reflection. A total of five research questions were used to investigate the results and themes were then developed related to each of the questions. The five research questions included: What were students expected learning experiences, what concepts did students identify which can be more easily learned in an experiential manner (i.e. not in a normal classroom), what were the key experiences students had in relation to this learning opportunity, what did students learn from the experience and how did this experience impact students’ career aspirations.

Student reflections were analyzed using qualitative methodology. All of the student responses to guiding questions were transcribed to a Word document. Findings for each of the research questions were developed through the use of the constant comparative method. By using this method “each stage provides guidance for the next throughout the inquiry” (Lincoln and Guba, 1985, p. 340). Findings are developed by [stimulating]
thought that leads to both descriptive and explanatory categories” (Lincoln and Guba, 1985, p. 341).

Results

Research Question #1: What were students expected learning experiences?

Students were able to identify a wide variety of activities and tasks they would possibly be asked to complete during their volunteer experience. Students were primarily anticipating golf course specific experiences “learning about different jobs that goes on a day to day basis in a golf course, seeing how a large tournament is put together and managed.” Another student anticipated “… the whole golf experience because my previous internships have been on sports fields and I’ve never had to work on a golf course before. I’m anxious to see all the different types of labor and work that goes into a course.” Additional tasks mentioned were rolling, blowing debris, cutting cups, spot pruning and replacing shrubs. Students also expected to learn “how they maintain a golf course every day and what that involves.” In addition to the maintenance tasks, students also mentioned the opportunity “… to meet and talk to other turf professionals, locally and nationally.” (i.e., networking with professionals).

Students identified several 21st Century Skills (i.e., soft skills) they would engage in while volunteering at the tournament. These included networking, dealing with employees, leadership skills, and time/staff management (Crawford et al., 2011). One student mentioned an interest in witnessing how the golf course superintendent motivates employees, “motivating guys to get up that early and do a great job.” Other students mentioned they would likely participate in organizing the staff so all volunteers and staff would be productive. In addition to the normal activities of a golf course, students recognized they would experience PGA tournament specific procedures. Specifically, preparation time needed to prepare the course for the tournament, PGA operations/organization and budgeting for the event were noted.

Research Question #2: What concepts did students identify which can be more easily learned in an experiential manner (i.e. not in a traditional lecture classroom)?

Students identified several soft skills which would be more easily learned out of the classroom. Decision making, management of employees, and time management were mentioned by several students (Crawford et al., 2011). “What kind of decisions have to be made by the superintendent?” “How to maintain a relationship between boss and worker?” Students also identified they would be more likely to learn how to manage a group of people by actually experiencing it, rather than learning it in a classroom. Students also identified key aspects of the actual tournament as more easily learned while they were completing the experience when compared to normal classroom instruction. One student wrote the following statements, “How difficult and taxing it is to run/organize a tournament. How much work it is to work at a golf course. How stressful it is to be in charge of a major event. Extremely high standards and procedure that must be met for a tournament of high caliber.” Students recognized the application to apply “scientific foundations learned in class” during their volunteering experience. Concepts discussed in a classroom that would likely be witnessed and/or discussed during the volunteer experience included: disease symptoms, overseeding bermudagrass (Cynodon dactylon L.) with perennial ryegrass (Lolium perenne L.), reel mowing, topdressing, fertilizer application/selection and pesticide applications. Finally, students recognized golf course management skills, such as repairing equipment failures, mowing techniques and identifying turfgrass related problems would be honed as they completed the volunteer experience.

Research Question #3: What were the key experiences students had in relation to this learning opportunity?

Several themes emerged related to their learned experiences. General golf course maintenance: Most students identified skills they performed during the tournament as components of courses they have completed while in their degree program. One student commented, “I took moisture readings on greens and watered according to its needs.” Students mentioned assigned tasks included mowing greens/fairways, raking bunkers, filling divots, hand watering, dew removal, rolling, and watering greens. One student specifically wrote about witnessing content taught in previous courses, “I blew off greens and dislodged leaves from wet rocks. However, I witnessed plenty of classroom related activities. Specific watering greens in spots that needed it the most. Rolling greens/squeegee and collars to absorb moisture.”

Others reflected on tasks they were not familiar with. “Rolling the collars and approaches was a new thing that I’ve never seen. I liked the use of dragging the ropes through the fairways.” “Rolled instead of mowed greens in order to maintain firmness and speed.” “I had a conversation about why we were maintaining bunkers the way we were. In classes, we talked about how in any aspect playability and safety are the goals.” “I was given the opportunity to walk mow greens and in my special topics class we discussed mowing and different types. Such as the walk behind greens mower with reels and a bedknife.” “I worked with the golf course superintendent and he had mentioned how they converted two of the tee boxes to Zoysiagrass (Zoysia matrella L.) because of its shade tolerance.

Management of crew/staff: Students recognized the difficult and unique challenges associated with managing a crew of workers. “I saw how tough it can be to manage such a large crew making minimum wage.” “Some full-time employees get lazy once they got help. It was hard working with guys that don't care about golf.” “This whole week has shown what to expect at a big
tournaments, and also how to manage a crew of guys along with volunteers." One student witnessed the hard job managers have, "Today I was able to see a worker that was lazy get fired." Other students mentioned interactions with the crew were positive and educational, "I learned just through conversation how it looks to maintain the course in everyday conversation." One student summarized the need for effective management with the following statement: "It tells me that it takes leadership to have everyone on the same page and for everyone to work together to accomplish one common goal. It takes everyone’s collaborative effort to maintain a golf course. Each job is as important as the next. Effective communication is a must as well."

Discussions with superintendents: Students had the unique opportunity to interact with the golf course superintendent and his crew to ask them specific questions. A student commented that he “learned a lot about the daily routine of the course, and how they changed it to accomplish these goals and the PGA’s goals.” Several students discussed irrigation practices with the superintendent. "Had conversations with the superintendent on the appropriate amount of water so the greens kept their firmness.” Students also inquired as to the condition of the turf with conversations about “frost causing discoloration on the turf” and the “green speed.” Another student “talked to the superintendent about how to rake bunkers the right way and why it is beneficial.” Other conversations related to maintenance included; “moisture meter readings and stimpmeter numbers,” “surface firmness, talking about soil texture” “contamination between turf species” and “why we were rolling.”

Discussions with tour agronomist: Students were able to have purposeful conversations with the tour agronomist. Students commented they learned “the way they are doing the bunkers for this tourney.” Another student commented that the agronomist checked on his watering skills, “agronomist followed me around keeping an eye on my watering technique.” Students were able to have these essential conversations and enjoyed vising with the tournament agronomist, “I just asked questions about the tasks I was given. It was good to listen to the agronomist talk about the stuff he does and looks for.”

Research Question #4: What did students learn from the experience?

Students were able to develop their technical turfgrass management skills, such as bunker raking, operating various pieces of equipment and prepping the golf course for tournament play.

“I got to use the equipment and learn different winter strategies for prepping a golf course.” In addition to the technical skills, students also gained valuable soft skills, such as personnel management. One student wrote, “I was able to see large numbers of workers managed and see the level of detail required for such an event.” Another student commented, “If I learned anything new it was the importance of advocating safety, especially to the volunteers.” Students recognized the need for volunteers in order to host such an event, “without volunteers, the tournament can’t run successfully.” Many students commented on the amount of work and pressure required by tournament staff and golf course employees in order to host a successful event. One student commented, “[I learned] how to keep up with a fast environment.”

Students were able to learn a great deal from the professionals they worked with, but they also learned practices they would avoid or change in the future. Several students made mention of maintenance practices they would have done differently, “rake bunkers teeth down” and “blow the bunkers smooth if the tournament wants them to be smooth.” Other comments related to crew management practices, “I would have given more specific times to arrive at the course at a time that we would be starting work. I know it’s hard to judge, but for my shifts I waited at least 2 hours before we went out to work.” Another student commented, “I would have made sure it was more organized. The setup and where everyone was supposed to go was completely unorganized.” Other students commented on the need to start work on time. “Start on time instead of sitting in the shop for an hour in the morning.”

Research Question #5: How did this experience impact students’ career aspirations?

After having ten days to think about the experience, students were asked if the experience impacted their career aspirations. For most students, the decision to enter this profession (golf course management) did not change from before to after the experience. “My career expectations have not changed, I plan to operate my facility to the best of my ability.” Another student commented, “I would like to work at a high end course to run an event like the Sanderson Farms Championship.” There were also students who still want to work on a golf course, but not as high of a level, “I still want to be a superintendent. Just not on the PGA tour.” A few students did not change their mind one way or the other in regards to career aspirations. “I’m indifferent. It didn’t turn me away from it. I think if the pay was there it would be worth doing. I enjoyed it, but a big tournament can make or break you so it’s a high stress environment, but rewarding if successful.” Another commented, “I would like to have the experience as an assistant or superintendent, however, one day I would like to have a more relaxed career.” Several students were able to cement the decision that this career is not what they desire. “I know what I want to do and that isn’t it.” Another student commented, “...I know for sure I don’t want to work maintenance on a golf course.”

The level of pressure put on the superintendents was a major reason students did not want to pursue this as a career. Student comments included, “No, working with professional golfers [who] were too[o] picky. After raking all the sand 4 times Saturday morning made me know I am in the right major (LA).” “No, I would
not want to work at a facility that host major events. All superintendents/assistants have tons of pressure on them from upper management down to the members and neighbors. It’s extremely long hours and it is tough to find good workers at a golf course labor’s wage. From my two internships, the most important thing I learned is I do not want to manage a golf course for the rest of my life.” Students commented on the amount of pressure the superintendents of PGA level courses must live with. “…there were some people out there that seemed like they were on pins and needles.” “No, stress level is too high and there are too many PGA guys telling you how to maintain your course.”

Discussion

Experiencing, reflecting, thinking, and then acting are core components of Kolb’s (1984) experiential learning theory. Although there are four components, due to its cyclical nature, there is no one defined starting point. In this study, students started this experiential learning activity by completing reflection questions prior to the experience. Students were primarily expecting to experience golf course operation tasks, as well as witnessing leadership, management, and crew motivation techniques. The next step for the students was to have a concrete experience. Students noted several key experiences while volunteering at the tournament, which included general field maintenance techniques, management style of crew/staff, interactions with golf course staff, and discussions with the PGA tour agronomist. The next part of Kolb’s cycle is for students to make generalizations about their experience. Overall, student answers from reflection questions during the experiential learning activity indicated students primarily learned technical and soft skills. The final stage is to test previously developed generalizations. For the most part, students enrolled in PSS 4414 wanted to become golf course superintendents prior to volunteering at the Sanderson Farms Championship tournament. Following this experience, most students still want to enter the golf course profession; however, some students noted they would not want to work at a high end, PGA tournament caliber golf course after witnessing the pressure associated with hosting tournament events.

Students had the unique opportunity to learn directly from their experiences and the professionals they worked with. Leggette et al. (2012) noted that by incorporating 3-D virtual world technology into a crisis communication course created a positive experiential learning activity because students were able to connect personal, professional, and educational experiences. The authors noted these are all very difficult skills to grasp in a classroom environment. Turfgrass majors often leave a 4-year degree program with a very good understanding of agronomic practices; however, topics such as crew management, communication with members, and pressure to produce an optimal product are challenging concepts to deliver in a classroom. Several students were able to witness the firing of an employee, organizational strategies and promoting safety to all employees. Observing and witnessing how to effectively handle these events in a “real-world” environment vs. a traditional lecture are invaluable experiences students can draw upon when entering the workforce. Bott and Cortus (2014) noted students’ knowledge and confidence in implementing their knowledge was improved after participating in an experiential learning activity (compost management).

Findings were similar in our study as several students either performed or discussed with the course maintenance crew about site specific tasks implemented at the Country Club of Jackson. These experiences either confirmed current knowledge of a particular skill set or expanded the students’ knowledge of golf course maintenance practices. Danneberger (1994) and Williams et al. (2013) demonstrated similar positive impacts of incorporating experiential learning into turfgrass related courses. However, both projects were either a hypothetical example of a golf course or visiting turfgrass facility and having discussions with the turfgrass managers. In our study, students were exposed to not only the interaction with the golf course superintendent, the assistants and PGA tour agronomist, but students actually participated in course preparation (i.e., mowing, bunker maintenance, blowing, etc…). By being an active participant in the event, students were able to form their own opinions about how they would handle a certain situation. For example, a student noted he would have given a more specific time to arrive at the course in order for the crew to be more efficient. This type of experiencing, reflecting and then forming an opinion is the cornerstone of Kolb’s (1984) experiential learning theory.

Summary

Like many classes offered at a university, there is only so much that can be accomplished in a classroom and laboratory setting. To drive home concepts learned in a classroom, a “hands-on” approach is required in order to fully grasp concepts and skills necessary to be competitive in a professional environment. Incorporating PSS 4414 into this PGA tournament was an excellent opportunity for students to witness how golf course management is handled in a time sensitive manner and how things can change on the fly when challenges arise. These are skills students can only fully understand by experiencing them in the field. It is recommended students be encouraged to seek experiential learning opportunities to strengthen their skills and competencies related to their future career. Educators can offer these experiences as a component of a course or as supplemental opportunities for students. Finally, the amount of learning that occurs in experiential settings cannot be understated and should be emphasized in all academic programs.
An "On-The-Course" Classroom

**Literature Cited**


EXAMINATIONS: MOTIVATION FOR LEARNING!

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The most important purpose of testing should be to facilitate learning. The process of testing should enable the student to discover where he stands in his progress through a given course, and at the same time uncover weaknesses that can be helped by remedial study. Through specially structured examinations, the teacher should be able, not only to determine whether the student is doing satisfactory work, but at the same time to evaluate his own degree of accomplishment as a teacher.

Throughout my tenure as a teacher, I have felt that examinations should serve as a guide in the aforementioned areas of student-teacher relationships; however, in recent years it has been necessary for me to reassess my personal situation on the effectiveness of my teaching with special concern on the testing phase.

Louisiana Tech requires some form of student-evaluation of each teacher as a part of a rather complex teacher evaluation plan. Student evaluation of my teaching, in addition to their evaluation of many other teachers in our college who have shared their evaluation results with me, indicated that the examination phase of teaching generally received the lowest rating among those points that were considered. Such points as frequency of examinations, examination questions clearly composed, examinations that enhance the understanding of the subject, examination returned and discussed promptly, were among those points used by the student in evaluating the teacher.

It has been my responsibility to teach an introductory course in animal science each academic term for more than twenty years. Needless to say our industry has changed significantly, particularly in most recent years. This has necessitated many and great changes in animal science teaching. In the past ten years the background of those enrolled as freshmen in the animal science course that I have taught has changed rather drastically from predominantly rural to a predominantly urban group. The number of women students has increased significantly. The sex ratio has changed from one to twenty female/male ratio to one to eight from 1962 to 1972. Many non-majors from various segments of the university have chosen the introductory animal science course as an elective. The calendar has also changed from a semester to a quarter system, which retains the semester credit. Such a system of instruction requires long lecture and laboratory periods. In view of the above mentioned known changes, and in all probability other changes of which I am not aware, I have found it more difficult to teach students and have the satisfaction of the same degree of accomplishment that I had felt previously. There is further evidence that all students have not been motivated to learn; teachers in advanced animal science courses have found that students do not retain very much basic information given in the first course. Many of these teachers would ask such subtle questions as “Did you cover, in the freshman class, the six basic nutrients or the general purposes for which the body uses nutrients?” My reply was “yes” after which their response would be something similar to this. “The sophomore and junior students appear to have very little factual knowledge and are even more limited in their understanding of basic nutrition as if they had not been exposed to such material previously.”

When one is placed “on-the-spot” in situations such as this it is certainly embarrassing, yet it could be a blessing in disguise. I resolved to try to do something toward encouraging greater in-depth learning and retention.

Since a student’s attitude toward an examination affects many aspects of his behavior, his test performance, his feeling toward the subject in general as well as his opinion of the teacher I have explored ways and means of preparing examinations to serve as tools to motivate, rather than test yak so.

For each of these quarters, fifty-seven-five minute examinations were administered to an introductory animal science class ranging in size from forty to fifty-five students. Each one-hundred point examination consisted of two parts: (1) short answer questions in the form of true-false, multiple choice, matching, analogy, completion, rearrangement of items, association and understanding, and (2) essay-type questions which could be answered briefly. One or two examination questions were prepared of each of the short answer types and one or two essay questions were also prepared to emphasize the same basic facts and principles.

Questions that were developed from a brief section of subject material on nutrition from the textbook entitled The Science of Animals that Serve Man by Campbell and Lasley will serve to illustrate the type of examination employed. These authors devoted six pages to a presentation on nutrition there were six basic questions relating to carbohydrates and fats among the study questions. The following is a list of those questions:

1. What are carbohydrates? What chemical elements do they contain?
2. List the main classifications of carbohydrates.
3. What carbohydrates are easily digested by animals? Which ones are not?
4. What is the major nutrient supplied by carbohydrates? How is it utilized in the animal’s body?
5. How do fats and oils differ in their chemical composition from carbohydrates?
6. Why do fats supply more energy than carbohydrates when they are metabolized?

No doubt any teacher would be pleased if all students in the class could respond with an answer that indicated a clear elemental understanding of these two nutrients based on the student’s reading the material, listening to the lecture and writing correct answers to the suggested questions. It has been my experience that many students today cannot be motivated to study and consequently learn by this traditional approach.

The following is a list of two questions, each representing several short-answer types that were prepared based upon the chapter content relating to carbohydrates and fats.

**True-False**

If the statement is true, circle the T; if the statement is false, circle the F.

1. Carbohydrates are preferred to fats as an energy yielding nutrient for livestock. **T**
2. More time is required for the complete digestion of a simple fat than for the digestion of a simple carbohydrate in the digestive tract. **F**

**Multiple Choice**

Each of the following statements is followed by five alternative answers of which only one is correct. Select the correct answer and place its number in the blank at the right.

1. The major nutrient which is the major source of energy in livestock and poultry rations is (1) fats, (2) cellulose, (3) carbohydrates, (4) molasses, and (5) corn. **(3)**
2. Plant oils such as limed oil and soybean oil contain a high proportion of (1) saturated fatty acids, (2) simple sugars, (3) unsaturated fatty acids, (4) short chain fatty acids, and (5) carbohydrates. **(4)**

Completion

In each blank to the right place the word or words that give a complete answer.

1. The nutrient that furnishes the most potent source of energy in a ration is __________.
2. The carbohydrate that is found mostly in the cell walls and woody portions of plants and utilized appreciably for food by ruminants is __________.

**Matching**

Below are two columns. For each word in column two there is a phrase that matches it in column one. Find the phrase and place its number in the blank to the right of the word it matches.

1. A nutrient containing carbon, hydrogen and oxygen with hydrogen and oxygen usually present in nearly the same proportion as in water. **Protein**
2. A nutrient that contains carbon, hydrogen and oxygen with much less oxygen in proportion to the carbon and hydrogen. **Fat**
3. A nutrient that contains carbon, hydrogen and oxygen and approximately 16 percent nitrogen. **Carbohydrates**
Analogy
There is a relationship between the terms one and two on the right. Select a fourth term whose relationship to the third term is the same as between the first two terms.
1. Nutrient : Feed Source
   Carbohydrates : Corn
   Nutrient : Feed Source
   Carbohydrates : 1

2. Nutrient : Amt. of energy yielded
   Carbohydrates : Fats
   Nutrient : Amt. of energy yielded
   Carbohydrates : Fats

Arrangement
The following represents a group of energy-yielding compounds—rearrange them in order from the most simple to the most complex chemically:
1. (a) Cellulose
   (b) Lactose
   (c) Starch
   (d) Glucose
2. (a) Acetic acid
   (b) Stearic acid
   (c) Arachidonic acid
   (d) Butyric acid

Each of the following items have something in common. Place in the space provided a word or phrase which will identify their common property.

1. (a) Glucose
   (b) Cellulose
   (c) Starch
   (d) Lactose
2. (a) Fatty acids
   (b) Phospholipids
   (c) Sterols
   (d) Waxes

Understanding
Listed are some effects of certain actions or processes. Place a word or words in the blank at the right that causes these effects.
1. Energy is released from nutrients resulting from cellular metabolism.
2. Digestion of cellulose by ruminants.

The recurrence of the same general ideas from one short-answer examination type to another appeared to broaden the student's understanding of the subject matter. This conclusion was based upon the fact that the responses to short-answer essay questions were generally concise and clear, and much improvement was noted in comparison to previous years when no such effort was made to recall information relating to basic principles when preparing short-answer questions. It was observed that all students appeared to read the questions carefully and review the examinations rather thoroughly, prior to submitting their papers. Only a few careless mistakes were noted. Students were observed to relate to a previous question or questions when making the most immediate response. It was further noted that some questions which were initially answered incorrectly were apparently changed to a correct answer as the student reflected back to a previous question. Apparently it was obvious to most students that the examinations contain the recall feature; however, it was not specifically called to their attention prior to, during, or after the examination. However, at the end of the course, more than one-half of those students unsolicitedly responded with favorable comments stating that the examinations given throughout the term stimulated them to study much more than they would otherwise have done.

The final examination for each term was designed only to test, and the reference feature from question to question was not included. Most students responded with answers ranging from acceptable to excellent on short-essay discussion questions indicating that they had learned rather well some basic information. Preliminary results indicate that students who have taken the introductory animal science course, under the examination procedure as outlined, have enrolled in sophomore and junior level courses with a broader base of retained facts and principles than was indicated prior to the initiation of the recall or reference type examination.

The time involved in the preparation of these examinations is much greater than for a conventional random-type examination; however, there is also some reward for the teacher in that it can enhance professional growth. There is a greater need for thinking through instructional objectives prior to lecturing and preparing the examinations. It is also possible that the teacher could be greater challenged to give current attention to the subject matter presented.

It is not likely that we will ever reach perfection in the teaching-learning relationship, yet we should always strive toward that goal.

No test is completely reliable and there is always a certain amount of error, even in the best test administered under ideal conditions yet both teacher and students must have some means of measuring progress. Since there is so much at stake in testing it appears that the testing phase of teaching should not be slighted and I'm convinced that we as college professors need to give test preparation more attention now and in the future than apparently we have in the past.
Adopting Teaching Strategies to Accommodate Different Learning Styles

Educators are faced with the challenge of meeting the needs of students who have different learning styles and expectations for classroom structure, content delivery, and assessment design. In an effort to have a flexible learning environment that meets the needs of diverse learners, this work examines the variety of different teaching methods and strategies that can be effectively employed to deliver content and teach concepts in ways that reach diverse learners. There are four distinct learning styles, and the teaching methods employed in classrooms are best designed when they appeal to each type of learner. Visual Learners prefer to see information and visualize relationships between ideas. Charts, graphics, and visual aids to show relationships between points are ideal for students who learn best by seeing concepts presented. Infographics are great tools to use during class. Auditory Learners desire to hear information rather than reading it or seeing it visually. Students who learn best in this way like to listen to and verbalize concepts. By repeating important information and asking students questions throughout class, educators can effectively engage auditory learners. Reading/Writing Learners absorb information best when reading and writing, as interacting with text facilitates learning more than hearing or visualizing concepts.

Assignments written in class and handwritten notes are key ways to facilitate learning for this group of students. Kinesthetic Learners are hands-on, experiential learners who learn best by doing. In-class activities that get students moving, group assignments, and problem solving exercises with specific examples work best for active learners. Teaching to all learning styles during each class can be difficult to achieve. However, there are ways to enhance course content delivery in order to reach each of the diverse learning styles of students. Effective teaching strategies include incorporating PowerPoint and other visual presentations, group discussions, guest speakers, in-class activities centered on reinforcing course content, and experiments requiring full-classroom participation to simulate a market environment.

While PowerPoint has become a standard that is expected by students and facilitates content delivery with large class sizes, it can be difficult to keep students engaged when using this tool. While Visual Learners often prefer PowerPoint notes with graphics, and auditory learners thrive when PowerPoint content is verbally discussed, Reading/Writing Learners can be engaged while writing select information that is omitted from PowerPoint slides, and Kinesthetic Learners can be reached when an in-class activity is used to teach concepts delivered via PowerPoint. To teach in the most effective way possible, provide opportunities for students in each class to see the information, draw or write down concepts, say or discuss the information, and interact with the material. Opportunities for enhanced classroom engagement include the inclusion of infographics, short readings with written questions and discussion, video clips to communicate key concepts, group work that varies in depth and duration, as well as in-class activities and experiments. While incorporating these activities in class does require additional time for implementation, group interaction promotes the use of valuable skills and facilitates increased student success in the college environment (Caruso and Woolley, 2008; National Survey of Student Engagement, 2006).

Just as content delivery is most effective when targeting diverse learning styles, assessment design that includes a variety of homework assignments that differ in requirements for completion and an exam structure comprised of multiple methods to evaluate knowledge and understanding of course content, are effective ways to assess student comprehension of course material. Exams that comprise a mix of multiple choice, fill in the blank, short answer, problem solving, and essay questions provide a diverse way for students to demonstrate knowledge.

Student feedback confirms that while employing various teaching methods enhances the learning environment, students may struggle to appropriately organize the material sequentially throughout the semester as content is presented in a variety of formats. Identifying ways to facilitate student organization of course material is essential to successfully teach to and accommodate the variety of learning styles without students feeling lost in the shuffle of the class throughout the semester. Examples to facilitate organization include easy access to materials online or in class, clear communication, and including variety with consistency throughout the semester. When the class environment includes a varied structure that accommodates diverse learning styles, enhanced learning opportunities for all students are facilitated.
Using Jeopardy Game in a Forages Course

Introduction

There are several teaching venues used in the classroom such as: traditional teaching on the board, PowerPoint presentations, interactive games, or online learning. Another active learning tool that could be incorporated into the classroom is using games to ask questions, such as in Jeopardy, to help students remember and review what was covered in previous lectures. Games have been proven useful in improving learning in classes (Schwartzman, 1997; Khan and Elzouki, 2011). Schwartzman (1997) reported that conceptualizing education as a game restores enjoyment, healthy competition, cooperation, and discipline to teaching and learning. The game of Jeopardy can also be used as a tool to review the materials that were learned in previous classes or as a pre-exam review (Grabowski et al., 2003).

Using the Jeopardy game in classroom settings is not new in academia, but there are no publications testifying of the use of Jeopardy in agricultural science courses, particularly forages classes. Thus, the objective of this note, is to introduce the Jeopardy game and explain how it was used in a forages course at Kansas State University Department of Agronomy in Manhattan, KS.

Methods

Using the Jeopardy game in class is not as hard as it sounds. The first game takes a couple of hours to put together, but after that, the first game can be used as a template for other games by simply changing the questions. First, the number of questions per game must be decided on so that the length of the presentation can be determined. Once the length is determined, the presentation can be made using Microsoft PowerPoint. Each game will need the following: a title slide, game board slide, three slides for final jeopardy, and two slides for each question and answer pair. Double jeopardy is optional and requires only one additional slide to signal which question is the double jeopardy question of the day. The title slide should have the word “Jeopardy” typed in large font with the subject of the jeopardy in smaller font as seen in Figure 1.

Pictures on this page are optional. Game boards can be made by inserting a chart onto the slide. To do this, click the charts and tables button in the middle of the slide and select the number of rows and columns desired. The top box in each column should contain a quiz topic as seen in Figure 1.

These quiz topics are chosen by dividing the lecture content into main points that the students should understand and study. The questions in each row under the quiz topic column should come from the related portion of the lecture material. Dollar amounts or point amounts should be added under the quiz topic from smallest to largest. Easy questions should be placed under smaller amounts and harder questions under larger amounts.

Once the game board is made, hyperlinks are created to facilitate movement between the game board to the question slide. Do this, highlight an amount, right click, select “Hyperlink,” and then choose the correlating slide number. “Final Jeopardy” should be placed after the game board so it is easy to access.

The first slide may contain a picture of final jeopardy or just a fun cartoon as seen in Figure 2. The purpose of this slide is to signal that it is time for the final question and to allow teams to wager their points before seeing the question. The next two slides should contain the question on the first slide and the answer on the second. Next, the normal questions and answers should be filled in. The answer slide for each question should be placed directly behind its question slide. Hyperlinks need to be added to every answer slide so the presenter can move back to the game board. The hyperlink from the answer slide back to the game board should be placed over a small picture i.e. home button, return button, cartoon, or just a fun cartoon as seen in Figure 2. The purpose of this slide is to signal that it is time for the final question and to allow teams to wager their points before seeing the question. The next two slides should contain the question on the first slide and the answer on the second. Next, the normal questions and answers should be filled in. The answer slide for each question should be placed directly behind its question slide. Hyperlinks need to be added to every answer slide so the presenter can move back to the game board. The hyperlink from the answer slide back to the game board should be placed over a small picture i.e. home button, return button, cartoon,
etc. in a corner of the slide that can be easily clicked when the presenter is ready.

In the end, it should be easy to navigate back and forth between the game board and question slides. Click the space bar to move from the question to the answer, and then use the home button to return back to the game board. Questions and answers should be added into their respective slides to finish making the game (Figure 3).

**Jeopardy Game Uses in Forages Course**

Jeopardy games can be used as a form of classroom review, to increase student interaction, and to track comprehension. The objectives of using the Jeopardy game quizzes in the forages class were: 1) to remind the students what they learned and what they need to know, 2) to make sure they understand the content taught in the class, and 3) to have students build teamwork skills via the Jeopardy game in the forages class. Reviews using Jeopardy games can be held either directly after the lecture or at the beginning of the next class period. Rewards for winning, such as extra credit, encourages students to pay more attention in class.

Before starting the review, the class should be divided into manageable groups. As they play through the game, the professor or teaching assistant should keep track of the points accumulated by each team. All questions, other than the final Jeopardy question, should be answered by the individual who received it, with no discussion within the teams.

During the game, the instructor has the option of explaining or adding details after the answers have been given. The game also encourages students to communicate, particularly for their Final Jeopardy question which can sometimes determine who wins the game.

At the end, before the final Jeopardy question is asked, teams should discuss how many points they wish to wager on the final question. They may wager any amount up to the amount they have earned so far. Once the wagers have been relayed to the score keeper, the final question should be displayed. The teams should be given a short amount of time to discuss the answer within their groups and submit their answer on paper to the score keeper. If the team answers correctly, the amount of points they wagered is added to their total score. If they answer incorrectly, the same amount is subtracted from their score. The team with the most points at the end of the game wins. Rewards can either be given at the end of each game or as an accumulation of points over the semester.

The majority of students participated in a Jeopardy-game formatted quiz for the first time at K-State in forages class. Five categories were given with five sub-questions under each category plus one Final Jeopardy question. Each team earned points (i.e., 1st place: 5, 2nd place: 4, 3rd place: 3, and 4th place: 2) and these extra points were added to their total points. In each Jeopardy game, points were accumulated to give extra credit points to the students. I divided the class into four groups (A, B, C, and D). Each group consisted of nine students with one student from each group being selected as the group captain. Jeopardy games can also be used outside of the classroom. Once the review has been done in the classroom, it can be posted to the class webpage as a study resource for the students. With the games posted online, students can access them at any time to help them study and review for exams. The main purpose of using the Jeopardy game in the Forages class was to encourage students to engage in class, learn together, and have fun in the classroom.

**References**


Once they have gathered these data, students are asked to reflect upon their perceptions of the organization and how those perceptions may have changed as they learned more about how the organization operates. Students are also asked to gather and reflect upon data from the websites of both compulsory and non-compulsory regulatory agencies such as the Internal Revenue Service, GuideStar, and Charity Navigator. These agencies and data sources are discussed in lectures and activities throughout the course. Estimated time: 30-60 minutes.

**Variation #2: Discovering Policy Using Library Resources**

The process for this activity is as follows: Instructor collaborates with a subject specialist librarian to discuss resources needed ahead of the activity. Students meet at the library computer lab and work in pairs to “collect” the information they need to complete a worksheet. The librarian provides an orientation of online library resources and shows students how to access relevant materials that enable them to answer the questions; the instructor circulates to answer content questions. The librarian also directs students to their specialist webpage that compiles resources from scholarly and government agencies (Royster, 2016). This assignment is challenging and keeps students’ attention. Students learn about new databases, locate research articles and reference them in APA format and start learning about policy processes as they explore government sources. This fast-paced, 50-minute activity requires focus and the ability to work quickly. Reflection and discussion take place later, but could be added if time permits. This format works because students benefit from displaying vested interest.

Not only is the activity graded, but it also provides the building blocks for their final project. Students learn how to search library databases for articles on a policy topic, access the Congressional and State Legislature websites to find legislation to examine for their paper, and identify excellent, trusted organizations that provide statistical information on their issues (e.g., Centers for Disease Control and Prevention). The final question of the scavenger hunt asks students to synthesize and apply what they have learned by explaining the steps they would go through to examine and report on a particular policy. Estimated time: 50 minutes.

**Assessment of Benefits**

Our experience is that, if carefully structured with learning objectives and follow-up classroom discussions, the scavenger hunt can be socially engaging and cognitively challenging (see McCain, 2007). Although our observations need to be corroborated by research, we have found several benefits of using scavenger hunts for instruction and learning purposes. One benefit is that this is an active learning strategy that can be employed at the beginning of a course or module and set the tone for an active, engaged classroom environment.

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**The Scavenger Hunt as an Active Learning Technique**

**Introduction**

Scholars have found that active learning techniques such as problem-solving exercises and case studies can improve students’ retention and understanding of course material (Carr et al., 2015; Chi, 2009; Myers and Jones, 1993; Prince, 2004; Scott et al., 2009). Active learning techniques are often focused on the application of information and, consequently, are frequently used after the student has been exposed to at least some amount of course material.

One active learning technique that can be incorporated at the beginning of a course or module, even before the student has been exposed to any material, is the scavenger hunt. In an academic version of this popular childhood game, students must search for information, resources, or experiences pre-identified by the instructor. Depending on the material being taught, the hunt can be conducted online, in a library, in a department, or even in the community (see, for example, McCain, 2007; Sergist and Nordstrom, 2007; Virgin, 1996).

The focus of this Teaching Tip is scavenger hunts for online resources. We describe two different applications of the technique and then assess what we have found to be the pedagogical benefits.

**Variation #1: Investigating the Management of Nonprofit Organizations**

The scavenger hunt has been used successfully as the first assignment in an undergraduate, upper division course on the fundamentals of nonprofit management. This version of the scavenger hunt is conducted electronically, appearing on the online learning platform in the form of a quiz. Students open the quiz and are directed to visit specific websites and to retrieve specific information related to material that will be covered during the semester. For example, students are asked to review a list of types of nonprofit organizations and to identify one type of organization they find surprising. They then must go to two different websites, research that organization further, and answer a series of questions about the organization (e.g., mission of the organization, number of staff members, annual revenues and expenses, etc.).

Once they have gathered these data, students are asked to reflect upon their perceptions of the organization and how those perceptions may have changed as they learned more about how the organization operates. Students are also asked to gather and reflect upon data from the websites of both compulsory and non-compulsory regulatory agencies such as the Internal Revenue Service, GuideStar, and Charity Navigator. These agencies and data sources are discussed in lectures and activities throughout the course. Estimated time: 30-60 minutes.

Variation #2: Discovering Policy Using Library Resources

The process for this activity is as follows: Instructor collaborates with a subject specialist librarian to discuss resources needed ahead of the activity. Students meet at the library computer lab and work in pairs to “collect” the information they need to complete a worksheet. The librarian provides an orientation of online library resources and shows students how to access relevant materials that enable them to answer the questions; the instructor circulates to answer content questions. The librarian also directs students to their specialist webpage that compiles resources from scholarly and government agencies (Royster, 2016). This assignment is challenging and keeps students’ attention. Students learn about new databases, locate research articles and reference them in APA format and start learning about policy processes as they explore government sources. This fast-paced, 50-minute activity requires focus and the ability to work quickly. Reflection and discussion take place later, but could be added if time permits. This format works because students benefit from displaying vested interest.

Not only is the activity graded, but it also provides the building blocks for their final project. Students learn how to search library databases for articles on a policy topic, access the Congressional and State Legislature websites to find legislation to examine for their paper, and identify excellent, trusted organizations that provide statistical information on their issues (e.g., Centers for Disease Control and Prevention). The final question of the scavenger hunt asks students to synthesize and apply what they have learned by explaining the steps they would go through to examine and report on a particular policy. Estimated time: 50 minutes.

Assessment of Benefits

Our experience is that, if carefully structured with learning objectives and follow-up classroom discussions, the scavenger hunt can be socially engaging and cognitively challenging (see McCain, 2007). Although our observations need to be corroborated by research, we have found several benefits of using scavenger hunts for instruction and learning purposes. One benefit is that this is an active learning strategy that can be employed at the beginning of a course or module and set the tone for an active, engaged classroom environment.
In addition, if instructors are organized and strategic, the data students are assigned to gather becomes content that can be referred to throughout the semester and these connections are likely to increase students’ overall comprehension. Also, content and skills from the scavenger hunt can prepare students to complete later assignments by taking them through previously unexplored databases and reliable and reputable websites. Finally, scavenger hunts can expose students to new sources of information they can use in other classes, as well as help them develop knowledge and skills for use in their later professional work.

References

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Increasing Student Engagement with Technology and a TA: Connecting On-Campus and Distance Learners

Introduction
The degree to which students engage in their course material is a strong predictor of student performance (National Survey of Student Engagement. [2014]. Bringing the Institution into Focus—Annual Results 2014. Bloomington, IN: Indiana University Center for Post-secondary Research). Individual student’s interactions with instructors and peers is one important indicator of student engagement. Many of today’s college students are comfortable using web-based technology in all areas of their life and have come to expect the use of technology in their academic programs. Instructors of online courses often struggle with how to better engage the students they rarely or never see in person. We introduced popular and easy-to-use web-based tools into our online general education nutrition course to provide regular opportunities for online students to interact with instructors and peers in real-time.

Google Hangouts on Air and YouTube were used to broadcast lectures being delivered to students in a traditional on-campus section of the course to students in the on-line section. In addition to the live broadcast, a teaching assistant (TA) hosted an online chat during the live-broadcast lecture and at another designated time each week. By using the live chat feature, students were encouraged to ask questions that the TA would then answer in real time in the on-line environment. If the TA felt it was appropriate, she would deliver the question to the instructor who would pose and answer the question for all students to hear.

Procedure
The online course was delivered to students using Canvas, a learning management system. We used Google Hangouts on Air (https://www.youtube.com/channel/UC4R8Dwom7CaWx8_LjQHig) as our platform for the live and archived lectures and virtual office hours. Google Hangouts on Air recently renamed YouTube Live is a free broadcasting tool that allows Google and YouTube users to host and broadcast live through YouTube. For the live broadcast lectures, a YouTube link was embedded in a designated space within the Canvas course and shared with online students prior to the lecture. Students were not required to have a Google or YouTube account to be able to access the YouTube link and the YouTube link was accessible via any web-enabled device. The broadcast link included a visual feed of the screen that was being shown and an audio feed of the screen being shown in the live lecture.

The standard chat tool within Canvas was chosen for the online chat during the live broadcast lectures. Using this chat tool, online students could interact with the teaching assistant in real-time. The TA, who was physically present in the classroom as the lecture was being broadcast, monitored and answered questions...
Teaching Tips/Notes

from online students and alerted the instructor to respond to questions and requests from online students when appropriate. When the lecture was over, it was recorded and saved automatically through YouTube My Channel. The link for the recorded lecture then became available to both the online and the on-campus students.

YouTube Live was used for weekly virtual TA office hours. Like the live broadcast lectures, the link was sent through Canvas prior to the designated start time of the office hours. The link was made available to both on-campus and online students, and it included a review of the previous lecture as well as an open discussion period where students could ask questions and other students or the TA could respond with answers. Students communicated with the TA and other peers by using either the Q&A feature on YouTube Live, or if they were not a Google+ or YouTube user, the chat tool within Canvas. The TA received questions from distance students via the web-based tools and answered the questions verbally over the YouTube Live broadcast as described. The TA and instructor then met weekly to discuss the commonly asked questions and comments from students during the virtual TA office hours so that the instructor would know what concepts needed to be clarified or discussed further during the next week’s lecture.

Assessment

We assessed student satisfaction and learning performance by comparing student course evaluations and final grades earned in the course from spring of 2016 (n=137), which was the semester we implemented these changes, to spring of 2015 (n=99). The course was taught as usual during spring of 2015. Lectures were recorded for students, but there was no structured opportunity for online students to engage with instructors, TAs, or other students outside of email. IDEA course evaluations were collected and evaluated. IDEA course evaluations are on a 5-point scale with 1 being the most unfavorable response and 5 being the most favorable response. The same instructor taught the course both spring of 2015 and 2016. During the spring 2016 semester, 14% of students accessed the Google Hangout broadcast, archive, or chat sessions.

It required 2-3 hours of time each week for the teaching assistant to facilitate the lecture and office hour sessions. The raw IDEA scores for being an “Excellent Teacher” and an “Excellent Course” were higher in the spring of 2016 than they were in the spring of 2015 (4.4 vs. 3.9 and 4.3 vs. 3.8, respectively). The converted averages of these scores were in the category of higher than those from all classes in the IDEA database in 2016 and similar to those from all classes in the IDEA database in 2015.

Although there was no difference between the mean final grade earned in the spring 2016 and spring 2015 classes, the distribution of scores shifted. In 2016 more students earned As and Bs and fewer students earned Cs and Ds than they did in 2015 (p=0.045).

Google+ and YouTube are familiar and easy to use as social media platforms, but are rarely used in collegiate classrooms. The novel use of these tools with facilitation from a teaching assistant may be used to provide online students with opportunities to connect and communicate with the instructor, teaching assistant, and other students. These interactions may have contributed to the observed improvement in student satisfaction and performance in the course and required little time from the teaching assistant and no additional time from the instructor.

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