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Presented at

Virginia Tech in Blacksburg

June 25-29

NACTA Journal Awards Background

Selection Process

Each year NACTA recognizes outstanding contributions to the NACTA Journal. Members of the NACTA Journal Awards Committee read and evaluate each article published in the NACTA Journal during the year. Then, a ballot is submitted to the Chair in January with the top eight articles ranked. The Chair tabulates results. In early February, participating committee members rank a second ballot containing the few leading candidates. The final tabulation determines the award recipients.

E.B. Knight Journal Award

Award established by the NACTA Executive Committee after Knight's death in 1965, in recognition of his outstanding contributions to NACTA. E.B. Knight received his graduate degrees from the University of Missouri. He taught 1939-1949 at the University of Tennessee and 1949-1964 at the Tennessee Polytechnic Institute. E.B. Knight was a charter member of NACTA, served as first President 1955-56, was Editor of the Journal from 1958-1960, and author of numerous articles published in the NACTA Journal.

Jack Everly Journal Award

Award established by the NACTA Executive Committee in recognition of Jack's outstanding contributions to the NACTA Journal. Jack C. Everly taught at the University of Illinois. In 1971, he received the E.B. Knight Journal Award and received the NACTA Distinguished Educator Award in 1984. Jack served 25 years as Associate Editor (1971-74) and Editor (1974-96) of the NACTA Journal.

NACTA Journal Award Honorable Mentions: This award was started in the 1980s by former Chair Bob Sorenson to recognize outstanding paper(s) that contended for an award, but lacked the necessary votes. One, to rarely three awards are presented, at discretion of the Chair.

E.B. Knight Award

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An Experiential Learning Model of Faculty Development to Improve Teaching

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Abstract

This article introduces a model for faculty professional development. The National Research Council (2009) indicated that graduates of colleges of agriculture must be prepared to work in a complex world using skills such as critical thinking, problem solving, teamwork, and leadership. However, critics of higher education have insisted that many college graduates do not possess these desired skills and are increasingly underprepared to enter the workforce. To help better prepare students, instructors should focus on effective teaching strategies that engage students and promote learning. However, most faculty members are hired for their expertise in research and have little preparation in pedagogical techniques. Therefore, faculty development programs that teach instructors effective instructional methods are necessary. This article proposes an experiential learning model of faculty development, which consists of three stages, including planning, delivery, and evaluation. The model utilizes field experiences, reflection, and peer observation to help college instructors learn how to implement and use various instructional methods. The experiential learning model presented in this paper could help college of agriculture instructors become more effective in their teaching, thus meeting the call to improve undergraduate learning.

Introduction

The world around us is rapidly changing. Increasing globalization of businesses, constantly changing technologies, and a continually growing world population are a few of the issues we face (National Research Council, NRC, 2009). Moreover, in the midst of these concerns, we face the unique challenges of climate change, creating renewable energies, and feeding the increasing population (NRC, 2009). To combat these and other issues, we will need highly educated leaders, scientists, and a workforce capable of thinking critically and solving the complex problems faced by society.

The burden of preparing this next generation of leaders, scientists, and workers for the challenges that lie ahead rests on the shoulders of America's colleges and universities (NRC, 2009). The key to solving society's problems will be the human capital that colleges and universities produce, that is, graduates entering the workforce (NRC, 2009). The Kellogg Commission (2000) dubbed this "the promise of American public higher education" (p. 9). Namely, higher education has an obligation to serve as the bridge between the public and the knowledge needed to solve complex issues (Kellogg Commission, 1999). Therefore, the question that must be asked is, are college graduates being adequately equipped for the challenge?

Many believe college graduates are not prepared for the future and have insisted on changes in undergraduate education (Barr and Tagg, 1995; Bok, 2006; Boyer, 1990; National Commission on the Future of Higher Education, 2006; NRC, 2009). The NRC (2009) called for changes in the way undergraduates are taught, citing specifically global integration, new science, consumer influence, environmental concerns, and demographic and political shifts as factors contributing to this need. In 2006, The National Commission on the Future of Higher Education suggested that American college students are receiving a substandard education, while Bok (2006) opined that universities cannot continue to rely on methods that have worked in the past, but need to place greater importance on innovation and educational quality. Both the National Commission on the Future of Higher Education (2006) and the Association of American Colleges and Universities (2002) proposed that graduates are underprepared for the workforce, lacking skills such as writing, critical

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thinking, and problem solving. These claims are compelling and highlight the need to change the way undergraduates are educated.

The most appropriate place to start looking at how to transform undergraduate education is to examine teachers. McLaughlin et al. (2005) argued that teachers are the link between the student and the content to be learned. What is more, the teacher's primary role is to engage students with the information they are learning (Smith et al., 2005). Effective postsecondary instructors have been found to utilize techniques to help students engage with the material and reach higher levels of achievement (Pascarella and Terenzini, 1991). Research has shown that student-centered teaching strategies, such as use of active and experiential learning activities, are critical to student learning in the classroom (Barr and Tagg, 1995; Chickering and Gamson, 1987; McKeachie, 2002). Therefore, it is important to focus on the quality and type of teaching strategies to help improve the learning of undergraduates.

In light of this, one may suggest that the solution to the problem is to hire professors who are highly qualified in their teaching. However, this proves problematic as the majority of faculty members at colleges and universities are hired on the basis of their proficiency in research as opposed to teaching (Adams, 2002; Harder et al., 2009). Boyer (1990) proposed that teaching is typically viewed by most in universities as a simple routine task that can be easily mastered. As a result, most faculty members are hired into positions where the tenure and promotion policy hinges on research performance while placing little consideration to the teaching aspect of the profession (Harder et al., 2009). The irony is that institutions of higher education are meant to be places of learning, but there has been a lack of emphasis on teaching (Harder et al., 2009).

Consequently, faculty professional development programs in the area of teaching are a necessity in colleges and universities (Myers and Roberts, 2004). Brent et al. (1999) agreed that professional development programs are a sufficient way to help newer faculty transition into the professorial role. Supovitz and Turner (2000) summarized the need for faculty professional development in teaching, stating "The implicit logic of focusing on professional development as a means of improving student achievement is that high quality professional development will produce superior teaching in classrooms, which will, in turn, translate into higher levels of student achievement" (p. 965). To bring about these types of changes, faculty development programs must be effectively implemented. In line with this, the Association of Public and Land-grant Universities (2009) suggested that programs need to be based on research in teaching and learning to improve the effectiveness. The Kellogg Commission (1999) additionally suggested that faculty development programs need to be implemented using active learning strategies. Finally, Schlager and Fusco (2003) stated that faculty professional development must be context-specific, learner-focused, and have practical applications for teachers.

Purpose

The purpose of this philosophical article was to propose a solution to the aforementioned problems by creating a faculty professional development model based on the experiential learning process that could be implemented by faculty professional development organizers. This model specifically focuses on a method to promote the development of effective teaching among university faculty members.

Theoretical Framework

The overarching theoretical framework for this study was constructivism. Constructivist theory posits that people learn through a process of constructing meaning utilizing their prior knowledge combined with their experiences (Merriam et al., 2007). Differing views of constructivism exist; however, there are three analogous tenets among the various views (Doolittle and Camp, 1999). The first of the three tenets is that active cognitive processing is required by the learner. McLaughlin et al. (2005) posited that learners must be actively, mentally engaged in the learning process for meaningful learning to occur. Secondly, all knowledge construction requires an interpretation of reality (Doolittle and Camp, 1999), whether knowledge construction is adherence to existing realities, creation of realities by the learner, or socially constructed realities. Lastly, experiences are a key element of constructivism. Roberts (2006) indicated that student engagement in experiences plays a vital role in students' knowledge construction. The combination of the three aforementioned tenets of constructivism provides a good base for experiential learning, which will be discussed in the next section.

Conceptual Framework

Many theorists have suggested that all learning begins with an experience (Dewey, 1938; Jarvis, 1987; Kolb, 1984). This process of learning from experiences is typically referred to as experiential learning and is epistemologically linked to constructivism because experiences provide the foundation for knowledge

construction (Roberts, 2006). Beard and Wilson (2006, p. 2) defined experiential learning as "the sense making process of active engagement between the inner world of the person and the outer world of the environment," while Kolb similarly called experiential learning "the process whereby knowledge is created through the transformation of experience" (1984, p. 41). Additionally, Dewey argued people learn best when experiences are meaningful and directed. Experiential learning theorists agree that experiences are central to the learning process.

As a result, Roberts (2006) examined several existing experiential learning theories to create the Model of the Experiential Learning Process (Figure 1). In his model, Roberts posited the experiential learning process is cyclical and starts with an initial focus leading to an initial experience. After learners have their initial experience, the second phase is reflection, where through active cognitive processes learners reflect on their initial experience. Generalization is the third step in the experiential learning process, whereby learners must make an interpretation of the newly learned material and decide how this information fits with previously learned information. The cycle then comes full circle back to experience, where learners can experiment with the newly learned material.

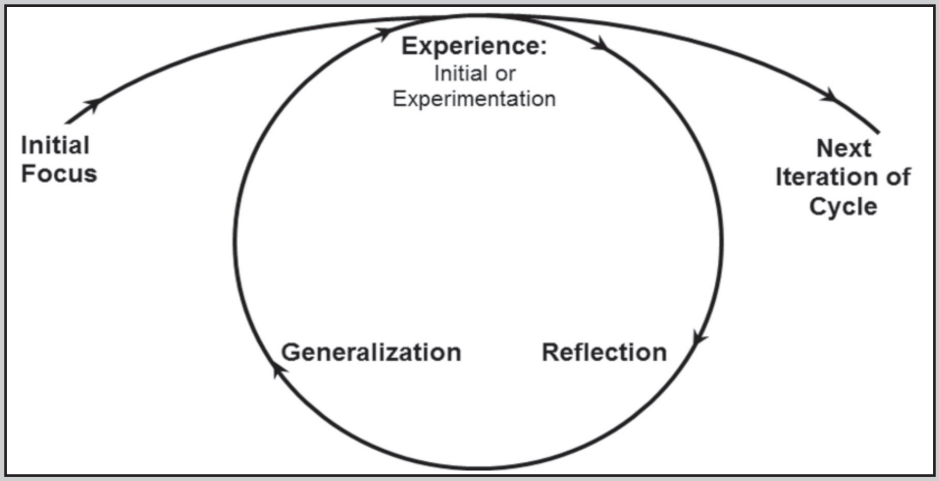

Figure 1. Model of the Experiential Learning Process (Roberts, 2006, p.22).

Development of the Experiential Learning Model of Faculty Development in Teaching

For the purpose of this article, which was to create a model for faculty professional development based on the experiential learning process, Roberts' (2006) Model of the Experiential Learning Process was merged with the Adult Learning Model for Faculty Development developed by Lawler and King (2000). The resulting faculty development model was named the Experiential Learning Model of Faculty Development in Teaching.

Because student engagement and achievement depend upon effective teaching strategies (McKeachie, 2002), the purpose of the Experiential Learning Model of Faculty Development in Teaching is to introduce instructional methods to faculty members who are inexperienced and/or desire to improve their classroom instruction. Understanding instructional strategies and methods is an important part of improving classroom instructional performance. In fact, Wilkerson and Irby (1998) argued that instructional skills should be introduced before instructional theories. The purpose of this is so faculty members can hone their skills, thus giving them a practical base on which they can connect the theory. More importantly, Myers and Roberts (2004) argued that faculty professional development should model the teaching methods being taught, because, as Richardson (1990) suggested, teachers tend to model their teaching behaviors after the way they were taught. It is for this reason that experiential learning was chosen as the conceptual framework for this model. Experiential learning provides faculty members with opportunities to experience and experiment with different teaching methods, which according to Richardson, should lead to greater skill development in teaching.

Along with Roberts' (2006) model, the Lawler and King (2000) model was chosen as a component of the Experiential Learning Model of Faculty Development in Teaching, as it provides a good complement to experiential learning. Lawler and King believed that individuals responsible for faculty development seldom view faculty members as adult learners. Therefore, Lawler and King (2000) framed their Adult Learning Model for Faculty Development around the following six principles of adult learning: "create a climate of respect; encourage active participation; build on experience; employ collaborative inquiry; learn for action; and empower the participants" (p. 21-22). These principles in Lawler and King's model align well with the precepts of constructivism and experiential learning, thus making their model a logical choice.

In addition to being constructed around adult learning principles, the Lawler and King (2000) model also contains four stages, consisting of preplanning, planning, delivery, and follow-up. Lawler and King created a list of pertinent questions for the professional

development organizer to ask at each stage of program development. The questions are designed to help guide the creators of the professional development program through the planning process.

The first stage of Lawler and King's (2000) model is the preplanning stage. Here, the goals, needs, and climate of the organization are accounted for and the direction of the faculty development is determined. The pertinent questions posed by Lawler and King for the preplanning stages are:

• What overall purpose does faculty development serve?

• What purpose does this specific faculty development program serve?

• In what ways does the institution's mission align with this faculty development?

• Are there existing resources to support faculty development?

These four questions should help guide the organizers of faculty development in shaping the purposes and direction of their professional development program.

Lawler and King's (2000) second stage is the planning stage, which deals with the logistics of faculty development. The pertinent questions associated with the planning stage are:

• What steps will this faculty development project require?

• What personnel will be needed?

• How will the support, delivery, scheduling, and marketing for the faculty development be organized?

These questions should help planners with the organizational and logistic aspects of planning faculty professional development.

The third stage of the Lawler and King (2000) model is the delivery stage. This stage is concerned with the actual implementation of the professional development program. There are four questions Lawler and King posed pertaining to this stage:

• Does the delivery stage build upon the preparation?

• What means of promoting the program are most useful?

• Does our faculty development align with adult learning principles?

• What method of monitoring the faculty development will be used?

Finally, the last stage of the model is the follow-up stage. This stage is where concerns are addressed, considerations for future faculty development are made, and reflection on the entire process is conducted. Pertinent questions for planning this stage include:

• What is the plan for evaluating the faculty development program?

• How will ongoing support be provided to sustain the learning?

• What can be gained from reflecting on our role in the faculty development?

The Experiential Learning Model of Faculty Development in Teaching (Figure 2) utilizes Lawler and King's (2000) model to frame the programming aspects of the faculty development, while Roberts' (2006) experiential learning model is implemented during the delivery portion. The remainder of this article will discuss in detail the Experiential Learning Model of Faculty Development in Teaching.

Planning Stage

The first phase of the Experiential Learning Model of Faculty Development in Teaching is the planning stage. For this portion of the model, the preplanning and planning stages of the Lawler and King (2000) model have been condensed. The reason for this is that the context of the experiential learning model

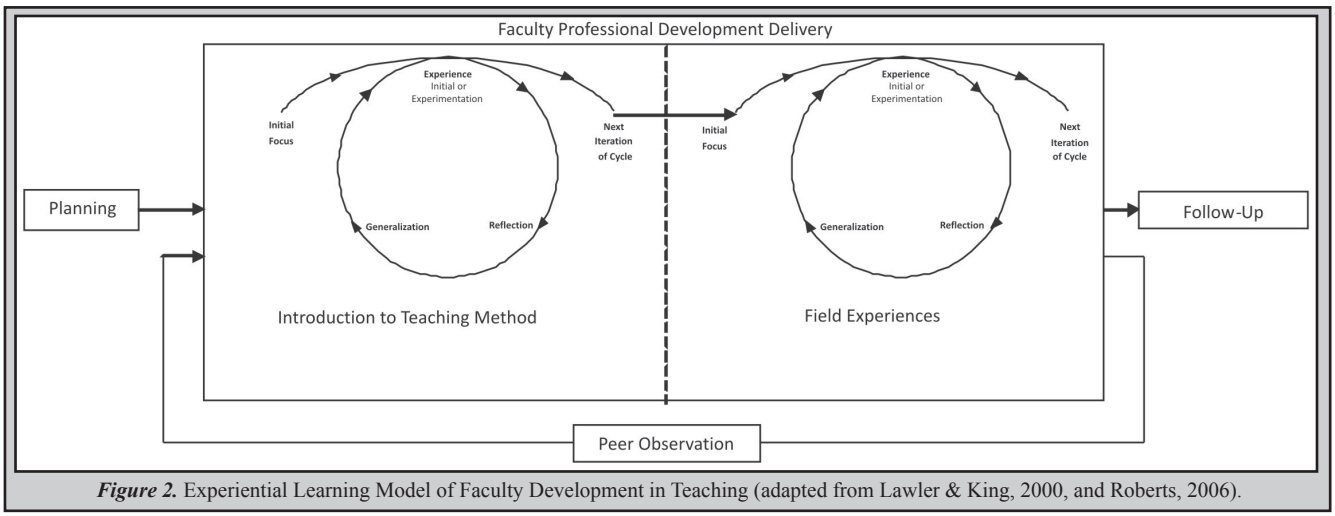

Figure 2. Experiential Learning Model of Faculty Development in Teaching (adapted from Lawler & King, 2000, and Roberts, 2006).

(e.g. teaching and learning) answers the first two preplanning questions, thus eliminating the need for the preplanning stage. What is more, the concept of teaching improvement in a university should address the third question concerning the mission of the organization. The last preplanning question in relation to resources is important and should be considered very early in the process, because resource availability will guide many later decisions. Likewise, the three additional planning stage questions of what will happen, who will be involved, and how to organize are important to the planning process. However, the answers to these questions will be institution specific, depending on the direction of the faculty professional development.

Delivery Stage

The second stage of the Experiential Learning Model of Faculty Development in Teaching is the delivery portion. This is where Roberts' (2006) Model of the Experiential Learning Process is implemented. The delivery phase is designed with the intent of the experiential learning component taking place over several sessions as opposed to one long session. This provides the faculty development participant multiple experiences and experimentation with specific teaching methods, congruent with the cyclical nature of Roberts' (2006) model. Moreover, research has shown that professional development is more effective if it takes place over a longer duration (Birman et al., 2000; Garet et al., 2001; Supovitz and Turner, 2000).

During the delivery stage, the specific instructional methods taught will be determined by the faculty development planners, and the instruction should be planned to fit the desired learning outcomes. Loucks-Horsley et al. (1996) argued that experiential, learner-centered methods of instruction allow participating faculty members to actively discover and implement the information being taught leading to a deeper understanding. For this reason, learner-centered experiential instructional approaches to professional development are more effective than the traditional teacher-centered approaches (Myers and Roberts, 2004). Keeping this in mind, three strategies which can help deepen the learning by faculty participants are field experiences using different teaching strategies, reflection on field experiences, and peer observation. A description of each of these strategies will be provided in the following sections.

Field Experiences

Field experiences are effective ways to enhance a faculty teaching development program. Richardson (1990) posited that field experiences are an important part of the "learning-to-teach process" (p. 12), and Kaufman (1996) further opined that field experiences improve teacher learning through hands-on, minds-on experiences. Additionally, Knowles' (1984) andragogy theory stated that experiences play an important role in teaching adults and, Roberts' (2006) Model of the Experiential Learning Process, which served as the framework for the delivery portion of this model, exerted that experiences are key to the learning process. The use of field experiences in the model at hand provides an outlet for experimentation by faculty learners.

Therefore, a typical faculty field experience should mirror Roberts' (2006) experiential learning cycle. First, participants in the faculty development should be taught certain instructional techniques such as inquiry-based instruction, cooperative learning, or other various active learning strategies as the initial experience portion of the process. Instruction in these methods should utilize modeling of the particular method being taught (Myers and Roberts, 2004). Depending on the timing of the program, many faculty members will be teaching courses while participating in faculty development, so the next step would require participants to use each method in their own classroom, which would constitute the field experience. Accommodations such as teaching to peers or guest lecturing could be made for faculty members who do not teach a class during the course of the faculty development program, or perhaps professional development organizers might wish to limit participation to faculty members with teaching appointments.

Reflection on Field Experiences

After the experience, the next major component of experiential learning is reflection (Kolb, 1984; Myers and Roberts, 2004; Roberts, 2006). Reflection on a field experience is more than determining whether or not a particular teaching method was effective. Adler (1991) suggested that reflection requires teachers to study, evaluate, and respond to their individual teaching situations to enhance their skill development. In addition, Gore (1987) expressed reflection as an important factor in the continued growth of teachers as a means of developing open-mindedness to looking at new ways of teaching. Reflection should help faculty members develop an understanding of why certain methods work. Examples of reflection activities in a faculty development course could be reflection journals, self-reported evaluation based on video self-observation of teaching, and group discussions about

the effectiveness of certain instructional methods. Additionally, organizers of faculty development might use guided questions as one way of helping faculty members reflect upon their teaching. A few sample guided questions could include: (a) what aspects of your teaching went well, (b) what aspects of your teaching might you change (c) why do you think this activity went/did not go well, and (d) how did your students react to this activity? These are only a few examples of guided questions; faculty professional development organizers could create a list tailored to their situation.

Peer Observation

Learning occurs in social contexts (Vygotsky, 1978); therefore, peer observation should prove useful in helping faculty members develop a deeper knowledge about teaching strategies. Kaufman (1996) posited that peer collaboration should be used when training teachers because it helps them with their learning as well as contributing to the learning of others. Sparks (1986) found that peer observation of teaching significantly improved teaching performance in three ways. First, peer observation helped improve morale and ushered in a sense of team spirit. Second, evaluation of others may have helped teachers see their own faults, and third teachers were able to receive new ideas from watching others in the classroom.

A faculty development course based on the Experiential Learning Model of Faculty Development in Teaching would require faculty participants to observe and evaluate a colleague's classroom teaching followed by a debriefing session between the evaluator and their colleague about the experience. This would serve two purposes for the faculty development participant (evaluator). First, it would help them generalize the knowledge learned in the faculty development course because they would see the teaching methods used in different contexts. This step aligns with Roberts' (2006) model, as generalization follows reflection in the experiential learning process model. Additionally, it would help evaluators reflect on their own teaching practices.

Follow-up/Evaluation

The last phase of the Experiential Learning Model of Faculty Development in Teaching is the follow-up/evaluation stage. Myers and Roberts (2004) argued evaluation is an essential component of faculty professional development. Kirkpatrick (1998) offered three reasons that substantiate the need for evaluation: (a) evaluation provides justification for the program and personnel involved; (b) evaluation shows the needs for future faculty development; and (c) the effectiveness of the program can be measured along with suggestions for improvement. In addition, Kirkpatrick suggested that evaluation should occur at four levels, the first of which is participant reaction. Participant reaction provides professional developers information concerning participants' thoughts about the faculty development. The second level of evaluation suggested by Kirkpatrick is actual learning, which tells professional developers what skills and knowledge were acquired as a result of the faculty development. The third level of evaluation examines behavior changes as a result of the faculty development, while the last level of evaluation, results, seeks to determine the actual impact of the faculty development. Evaluation can occur in a variety of ways; however, evaluation should be included in faculty development programs as a means of assessing effectiveness.

Conclusion

Societal changes, including growth in technology, population, and globalization, have prompted the need for improvements in the way undergraduates are equipped for the workplace (NRC, 2009). Research shows a need to improve classroom instruction, with faculty professional development as the means to accomplishing this (Myers and Roberts, 2004). Adhering to adult learning, constructivist, and experiential learning theories, faculty professional development should engage the participants and provide them learning experiences from which to construct their knowledge. Effective faculty professional development programs focus on the faculty learner, providing practical, context-specific experiences that can help teachers increase their repertoire of instructional methods (Myers and Roberts, 2004; Schlager and Fusco, 2003). Additionally, faculty development experiences should utilize the instructional methods being taught (Myers and Roberts, 2004) because as Richardson (1990) suggested, teachers' teaching behaviors tend to model the way they were taught.

Roberts' (2006) Model of the Experiential Learning Process was merged with Lawler and King's (2000) Adult Learning Model for Faculty Development to create the Experiential Learning Model of Faculty Development in Teaching. This new model combines the programmatic aspects of Lawler and King's model with an experiential learning based delivery. The three stages included in the model are planning, delivery, and follow-up/evaluation. In the planning stage, the purpose and logistics of the faculty development are determined, and during the delivery stage participants

are instructed on how to use various teaching methods. Three specific strategies that correspond to Roberts' (2006) experiential learning process were introduced in the delivery stage to help reinforce the teaching of instructional methods. These three strategies were field experiences, reflection on field experiences, and peer observation. The final stage of the model, the follow-up/evaluation stage, is where the "success" of the program is determined. Participant reactions, actual learning, behavioral changes, and impacts can be measured during the last stage to determine the overall effectiveness of the faculty development program.

The Experiential Learning Model of Faculty Development in Teaching should be beneficial in helping organizers of faculty development arrange and implement faculty professional development programs. Recommendations for the model would include, introducing the model to faculty development organizers, as well as testing the efficacy of the model in designing and implementing faculty professional development. Implications are that campus teaching centers may benefit from the model. Campus teaching centers typically provide support for teaching to faculty members, and this model may offer one method for teaching centers to provide faculty professional development.

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Identifying Faculty's Knowledge of Critical Thinking Concepts and Perceptions of Critical Thinking Instruction in Higher Education[1]

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Abstract

This study was done to identify patterns in college of agriculture and life sciences faculty's understanding of basic critical thinking concepts and person perceptions of critical thinking instruction. The objectives of this study include, identifying patterns in faculty's knowledge of critical thinking concepts and identifying patterns in faculty's perceptions of critical thinking instruction in higher education. This quantitative study was performed to analyze patterns in responses of faculty participants. The participants included 61 self-selected faculty with teaching appointments in a college of agriculture and life sciences at a southern land grant institution. The data was collected using a compilation of three instruments: a critical thinking basic skills test, a "perceptions of critical thinking instruction" questionnaire, and a short demographic segment. The online data collection software, Qualtrics, was used to collect the data. The overall conclusion was that faculty's knowledge of perceptions and concepts of critical thinking is severely lacking. Not one question, in any section, was answered completely correctly. It is recommended that faculty participate in further education to understand the concepts of critical thinking.

Introduction and Theoretical Framework

Thinking is a natural process, but when left to itself, can often be biased, distorted, partial, uninformed and potentially prejudiced; excellence in thought must be cultivated (Duron et al., 2006). Students are able to think critically on their own, but this skill needs to be strengthened and reinforced by teachers. Furthermore, the way material is presented has a large effect on whether or not critical thinking takes place. Most teachers use a lecture format in their classrooms, but this popular approach does not encourage critical thinking by the students (Duron et al., 2006). To encourage critical thinking, the passive receipt of information must change, teachers must give up the perception that students cannot learn unless a teacher covers the material (Choy and Cheah, 2009). This being said, it is important to consider how much influence a teacher's perception of critical thinking has on the student's ability to learn and think critically.

In 2004, higher education associations and leaders of institutional accrediting bodies decided that critical thinking was one of the six major intellectual and practical skills students should understand (AAC&U, 2004). However, Lauer (2005) claimed that, "teachers may not know how to incorporate critical thinking into their lessons." Yet, based on traditional methods, faculty lean too heavily on traditional lecture and PowerPoint; this may be the reason teachers have difficulty incorporating critical thinking into their classes. Research has shown that the nature of the discipline does not matter and that students have to learn to read deeper into topics and think critically about the knowledge given (Rhoades et al., 2008). Without the correct concepts and perceptions of critical thinking, the teacher may believe they are encouraging or teaching critical thinking when they are not. This study was developed to determine the extent of knowledge faculty members, with teaching positions, have about critical thinking, as well as their current perceptions about critical thinking instruction.

[1]The University of Florida Institutional Review Board approved the study protocol and all participants provided written informed consent prior to participation in the study.
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Critical thinking is defined by Facione (1990) as "purposeful, self-regulatory judgment, which results in interpretation, analysis, evaluation, and inference, as well as explanation of evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based." Another definition of critical thinking, in regards to agricultural education, is by Rudd et al. (2000), and states, "critical thinking was a reasoned, purposive, and introspective approach to solving problems or addressing questions with incomplete evidence and information and for which an incontrovertible solution is unlikely."

Whittington and Newcomb (1993) found that although teachers have positive attitudes and aspirations to teach at higher, critically thinking levels, they may not actually be doing so. One reason behind this incongruence is that teachers may not understand how to teach at higher levels or even what strategies teaching at a higher level may include. Intentionality is the power of minds to be about, to represent, or to stand for, things, properties and states of affairs (Jacob, 2010). Intentionality comes into play with the idea that teachers may not teach what they do not think they can explain. Their intention may be to teach at a higher level, which would include critical thinking, when really, the perception of the knowledge they have of this subject is incomplete.

There is little information empirically established to determine not only the perception of faculty about critical thinking instruction, but also the actual knowledge faculty has about critical thinking concepts. This is an important step in beginning the process of determining a model of assisting faculty in providing the best quality critical thinking instruction in their classrooms.

Purpose and Objectives

The purpose of this research was to identify patterns in college of agriculture and life sciences faculty's understanding of basic critical thinking concepts and personal perceptions of critical thinking instruction.

The following objectives provided a foundation for the study and were to:

1. Identify patterns in faculty's knowledge of critical thinking concepts and
2. Identify patterns in faculty's perceptions of critical thinking instruction in higher education.

Methods

To accomplish the objectives and fulfill the purpose of the study a mixed-methods approach was utilized. Quantitative methods were used to collect responses and qualitative, content analysis methods were used to analyze patterns in responses of faculty participants. The researchers determined that this approach was appropriate for this study, considering its developmental nature.

Responses, collected through an online assessment, were recorded for 61 self-selected faculty with teaching appointments within the college of agriculture and life sciences at a southern land grant institution. The participants were identified through email requests of faculty with teaching appointments. There is a total of 376 faculty with teaching appointments who represent 17 academic departments, with emphases in both social and bench sciences at the institution. Upon initial review of the data four responses were determined to be unusable, resulting in a total of 56 usable responses.

The assessment used in the study was a compilation of three instruments, a critical thinking basic skills test (Elder et al., 2007), a perceptions of critical thinking instruction questionnaire (revised from Choy and Cheah, 2009), and a short demographic segment. Using the Qualtrics online data collection software, the researcher set parameters for each section of the assessment.

The first segment was specifically designed to measure an individual's knowledge of basic critical thinking concepts as designed by Elder et al. (2007). The International Critical Thinking Basic Concepts and Understanding Test included three parts with a total of 26 questions. Part one, On the Nature of Critical Thinking, had ten true/false questions designed to gauge an individual's familiarity with specific critical thinking statements. The second part, On the Nature of Critical Thinking II, included six multiple-choice questions to determine the accuracy of an individual's knowledge of critical thinking. Part three, On Recognizing Important Distinctions in Critical Thinking, utilized a matching technique, whereby respondents had to match statements with terms related to critical thinking. There were a total of ten terms to match with six statements, including "none of the above." Examples of questions are provided in Table 1. A key was provided to determine the accuracy of each response.

The second segment was revised from a list of questions first proposed by Choy and Cheah (2009). The original list contained eight open-ended questions to gauge faculty's perceptions of critical thinking and critical thinking instruction. The revised questionnaire was comprised of 15 Likert-type questions using a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). The instrument, which was reviewed by content

Table 1. On the Nature of Critical Thinking

Statement	True	False
Critical thinking is useful only in Western Cultures (False)	1 (1.8%)	5 (98.2%)
As people grow older they naturally develop as critical thinkers (False)	18 (40%)	27 (60%)
Critical thinking is self-disciplined (True)	36 (80%)	9 (20%)
Critical thinking enables one to think more deeply	46 (82.1%)	9 (16.1%)
One should not analyze sympathetically points of view that are disgusting and obviously false (False)	3 (5.4%)	53 (94.6%)
If a statement is unclear we benefit by asking what our purpose is in saying it (True)	54 (96.4%)	1 (1.8%)
Implications are conclusions you come to in a situation (False)	18 (40%)	27 (60%)
Critical thinking is important in learning to read well (True)	40 (91%)	5 (9%)
Critical thinkers use subjective standards to assess thinking (False)	16 (35%)	29 (65%)
Critical thinkers learn to ignore their emotions when making important decisions (True)	24 (53%)	21 (47%)

experts for face validity, was analyzed using statistical software for internal reliability, as well. Questions included in this segment were analyzed and found to have a Cronbach's Alpha Coefficient of .70. This coefficient was determined sufficient due to the developmental nature of this segment as addressed by Penfield (2002).

Content analysis includes collecting data and using classifications to identify patterns and frequencies among the respondents. Concepts from each piece of the assessment were reviewed by the researchers for pattern in response and theme. Each concept was identified individually by the researchers and then discussed to determine consistency between the researchers. The questions of the assessment served as the codes in which patterns of responses were identified.

Findings of the content analysis are provided for each of the research objectives outlined for this study. Because of the developmental nature of the research, the findings are in no way intended to be generalized beyond those individuals participating in the study.

Findings

Objective 1

Objective 1 was to identify patterns in faculty's knowledge of critical thinking concepts. This was accomplished through a systematic review of individual responses on the 3-part International Critical Thinking Basic Concepts and Understanding Test (Elder et al., 2007).

The first section of the International Critical Thinking Basic Concepts and Understanding Test included 10 true/false questions regarding "On the Nature of Critical Thinking." Of the ten questions, there was not a single question in which all respondents answered correctly; however, there were consistencies in which questions were answered among all respondents. The statements and responses are shown in Table 1.

There were 21 respondents who incorrectly answered false to the statement, "Critical thinkers learn to ignore their emotions when making important decisions." Similarly, 18 responded true to the statement, "Implications are conclusions you come to in a situation" which was incorrect. For the statement, "As people grow older they naturally develop as critical thinkers," 18 responded true when in fact the statement is false. Lastly, 16 respondents who believed "Critical thinkers use subjective standards to assess thinking" was a true statement when it is false.

In the next section of the assessment, there were a total of six questions to determine familiarity with critical thinking concepts when presented with alternative responses. Again, there was not a single question where the all respondents answered correctly; however, there were some general patterns in response. The statement, "It is important to clarify thinking whenever," had the most consistency in response with 50 respondents identifying correctly that the statement referred to all provided options ("You are explaining something to someone," "Whenever someone is explaining something to you," You are analyzing an article or chapter"). The next question which had the least varying amount of response related, "Fair-minded thinking is" to "Integrally connected with intellectual empathy" where 40 of 54 respondents answered it correctly. The other respondents varied in answer. There were 40 of 53 respondents who answered, "Depth in reasoning best relates to" correctly with "All of the above" ("Complexities in the issue," "Logical interpretations," "Clarifying the issue").

The remaining two questions were answered with a larger degree of variation. There were 31 respondents who answered, "One main requirement of fair-minded critical thinking is" correctly as, "To analyze thinking into its most basic components." Yet, there were 16 who responded, "To identify every aspects of one's thinking." The last statement of this section, "Critical thinkers assess thinking in order to" had 26 respondents who answered correctly, "Determine what thinking to accept and what to reject;" however, 18 responded, "Take their thinking apart and examine it."

The third section of the basic concepts assessment

analyzed respondents' ability to correctly identify the basis of critical thinking terms. Respondents were provided with six choices to relate to ten different terms. The idea that there are specific concepts identified as "An important obstacle to critical thinking" had the greatest number of correct responses. The following terms were correctly identified, "Close-mindedness" (50/50), "Self-deception" (44/48), "Distrust in reason" (40/50), and "Fixity of belief" (39/50). "Bias in thinking" also, "An important obstacle to critical thinking" was correctly identified by 37 of 50 respondents; however, nine identified the statement as, "A basic component of thinking that we need to identify in understanding the structure of thinking." "Point of view" a statement correctly identified as, "A basic component of thinking that we need to identify in understanding the structure of thinking" by 25 of 49 respondents was incorrectly identified 24 responses, with six respondents selecting either, "An important ability for thinkers to develop in learning to think critically" or "None of the above." Likewise, there were 11 of 49 respondents who identified "Math puzzles" as "An important ability for thinkers to develop in learning to think critically" when in reality it did not relate to any of the provided statements.

The last group of statements showed the greatest variability in answer by respondents. There were 23 of 51 respondents who identified, "Clarity" as "An important ability for thinkers to develop in learning to think critically," 11 who selected, "An important trait for thinkers to develop to become reasonable and fair," and 8 who selected, "A basic component of thinking that we need to identify in understanding the structure of thinking." The correct answer, "An important standard that helps us judge the worth of thinking" was only selected by nine participants.

The term "Liberalism" was correctly identified by 22 respondents as "None of the above," yet, 12 responded "An important obstacle to critical thinking" and six "An important trait for thinkers to develop to become reasonable thinkers" with the two incorrect responses being in opposition to one another. The last concept, "Contrasting" was correctly identified by only one respondent, as "None of the above," with incorrect responses ranging from, "A basic component of thinking that we need to identify in understanding the structure of thinking" (11/47), to "An important trait for thinkers to develop to become reasonable and fair" (14/47), and "An important ability for thinkers to develop in learning to think critically" (20/47).

Researchers identified patterns existing specifically with the complexity of concepts related to critical thinking. In that, the more complex the concept the more likely a respondent would incorrectly identify the answer. Additionally, the more likely a concept was identified as congruent with beliefs, "Liberalism" the more likely they would identify with term with that mindset. Also, if a term could be defined or was associated with a variety of concepts like, "Clarity" the more difficulty respondents had in identifying it as associated with critical thinking.

Objective 2

The second objective of the study was set to identify patterns in faculty's perceptions of critical thinking instruction in higher education. Six statements showed respondents either "Agreed" or "Strongly Agreed" with its intent. These are summarized in Table 2. Eight individual statements indicated respondents showed a greater range of response, those are summarized in Table 3. One statement was split, but with the majority (38/51) "Agreeing" or "Strongly Agreeing" – "It is my responsibility to thoroughly cover all course material with students in order for them to learn the subject matter."

Patterns in responses for this section of the study

Table 2. Statements with "Agree" or "Strongly Agree"

Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
Critical thinking engages students' higher order thinking (analysis, synthesis, and evaluation)	35 (69%)	16 (31%)	0	0	0
Critical thinking encourages students to become independent thinkers	33 (65%)	17 (33%)	1 (2%)	0	0
Critical thinking encourages students to become active learners	31 (62%)	19 (38%)	0	0	0
Critical thinking can be used to achieve better learning outcomes	31 (61%)	19 (37%)	1 (2%)	0	0
Critical thinking will allow students a better understanding of course topics	27 (53%)	22 (43%)	2 (4%)	0	0
I believe that it is my responsibility to promote critical thinking in my courses	20 (39%)	27 (53%)	4 (8%)	0	0

[z]note 48 of 51 responses were usable

Table 3. Statements with Varying Responses

Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
Critical thinking is a method of thinking which would help students enjoy the learning process	17 (34%)	23 (46%)	9 (18%)	1 (2%)	0
Critical thinking should always include a reflective component	18 (35%)	22 (43%)	8 (16%)	2 (4%)	1 (2%)
I am aware when students use critical thinking in my courses	7 (14%)	31 (61%)	12 (24%)	1 (2%)	0
I look for specific evidence of critical thinking by students in my courses	8 (16%)	28 (57%)	12 (24%)	1 (2%)	0
I have the skills necessary to promote critical thinking by students in my courses	7 (14%)	27 (53%)	11 (22%)	6 (12%)	0
I think that students have barriers to critical thinking, regardless of the strategies I use	8 (16%)	25 (49%)	12 (24%)	6 (12%)	0
If required, I could implement critical thinking into my courses	12 (24%)	27 (53%)	10 (20%)	2 (4%)	0
In order for me to fully implement critical thinking into my courses I would need additional support	8 (16%)	25 (50%)	10 (20%)	6 (12%)	1 (2%)

[y]note 48 of 51 responses were usable

showed that participants held more favorable opinions on the statements which were most closely associated with student's development of critical thinking. However, when the statement was focused more closely on the faculty member's role in critical thinking instruction there was greater variance in response

Conclusions, Implications and Discussion

Based on the information in the findings section, faculty tested in this study are lacking knowledge about critical thinking. This reinforces Lauer's (2005) statement purporting that faculty may not have all the tools necessary to incorporate critical thinking into their courses. When taking into consideration that none of the questions in the survey were answered correctly by all participants, one may believe that faculty need more instruction when it comes to critical thinking. In both objectives there were different consistencies in the answers. One statement in section one of objective one "Critical thinking enables one to think more deeply," was answered false when it is actually true. Statements like this were often answered incorrectly. There are many reasons why this could happen. Faculty may have assumed that the answers were more difficult than they really were. Likewise, the perception of critical thinking is often different then what is actualized and this is reflected in Rhoades et al. (2008) comment that every teacher thinks they are teaching critical thinking. Another reason is that the study was not taken completely seriously. Finally, teachers may not have had formal education themselves when it comes to critical thinking.

When faculty do not understand critical thinking, it is almost impossible for them to teach their students to think critically. It is important to teach students critical thinking skills so they can excel in education. Critical thinking is an important component to post-secondary education.

To address the problem of lack of knowledge by faculty, there are steps that can be taken to educate them. Osborne (2011) provided the challenge catalyzing the need to further investigate the extent to which faculty developmental interventions work in improving the teaching and learning process. With this baseline research, the conversation can continue to grow and seminars based on critical thinking instructional strategies may be developed. Encouraging faculty to include critical thinking components into their lectures will help educate both faculty and students about the value of critical thinking.

With this being said, the outcome of this study shows that faculty's critical thinking knowledge is lacking. Future studies should further investigate critical thinking knowledge in faculty. Specific tests of faculty critical thinking disposition and skill will assist in determining how faculty are prepared to teach critical thinking, beyond what their current knowledge level is. Also determining the current strategies faculty are using to teach critical thinking in the classroom may assist with identifying the quality of critical thinking instruction. This paired with the perceptions of students about the strategies will give a much more robust picture of the state of critical thinking instruction in higher education.

As the needs of students change along with the needs of industry, so will the transferrable competencies that are taught. This initial look at critical thinking basic skill and current perceptions will allow for a

more targeted approach when designing workshops and literature for critical thinking instruction. The better the teaching strategy, the better the outcome; understanding how to bridge these two ideas will determine the how successful faculty are at teaching important transferrable competencies.

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Engaging Under-Represented Youth in Food, Agriculture and Natural Resources through Pre-College Residential Summer Programs[1]

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Abstract

Since 1982, the College of Agriculture and Natural Resources has offered pre-college, residential summer programming to increase the number of under-represented students pursuing post-secondary education and earning degrees in food, agriculture and natural resources (FANR). In 2003-2008, pre-and-post surveys were conducted for participants in the one-week Agriculture and Natural Resources Institute for Multicultural Students (AIMS) Program and the six-week Multicultural Apprenticeship Program (MAP) to assess (1) each program's effect on participants' perceptions of (a) higher education and (b) FANR and (2) to assess whether the programs differed in their effect on students. A pre-survey was administered to explore perceptions that parents of under-represented students have about FANR. The AIMS participants gained an enhanced understanding of what it is like to be in college and greater understanding that careers in FANR extend beyond working on a farm. The MAP participants gained an increased understanding of those areas, but also grew in their understanding of (a) courses needed for college; (b) the college experience; and (c) their general understanding of FANR. While both programs positively influenced students, the influence was greater in the longer, more intense program. Overall, parents encouraged their students' interests in FANR.

Introduction

Increasing the number of under-represented students in food, agriculture and natural resources (FANR) has been a concern of the College of Agriculture and Natural Resources (CANR) at Michigan State University (MSU) since the early 1980's. Changing U.S. demographics and employment needs in the food, agriculture, and natural resources system (FANRS) heighten the need to recruit students from all racial and ethnic segments of the U.S. population and to increase recruitment of women (APLU, 2009; Hill et al., 2010; Goecker et al., 2010; National Research Council, 2009). Historically, minorities and women have been under-represented in these disciplines and that remains unchanged today (APLU, 2009; Foster and Henson, 1992; Hill et al., 2010; Moss, 2011; National Research Council, 2009; Warren and Alston, 2007).

Estimates indicate that between 2010 and 2015 there will be approximately 54,400 annual job openings in the U.S. FANRS for new graduates (Goecker et al., 2010). Only 53,500 graduates are expected to be available annually for these positions, and only 55% of those graduates are expected to have earned degrees from colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine (Goecker et al., 2010). Allied disciplines like biological sciences, engineering, health sciences, business, and communication are expected to provide the remaining 45%, although employers prefer graduates from the colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine, because they tend to have stronger interests in FANRS and greater work experience in these disciplines (Goecker et al., 2010).

A National Research Council (2009) report presented several recommendations for achieving diversity and for increasing student numbers in agricultural education. One encouraged colleges and universities with agricultural programs to reach out to K-12 students and teachers to expose them to

[1]The authors acknowledge and thank the College of Agriculture and Natural Resources for its continued support of pre-college programming, the College of Veterinary Medicine for its equal partnering with CANR for financial support of pre-college programming, Dr. Murari Suvedi for statistical analysis of the data, and the MSU Office of Inclusion and Intercultural Initiatives for its initial funding of the Kaplan ACT program.
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agricultural topics and careers. The need is two-fold: to increase the number of under-represented students who enroll in and graduate from college and to increase the number who study disciplines in FANRS. Many pre-college programs seek to address college recruitment of under-represented students (Harkness et al., 2011; Perna, 2002, 2006; Perna and Titus, 2005; Strayhorn, 2010, 2011; Walsh, 2011) and some programs have the added emphasis of exposing students to agriculture (Esters, 2007; Gale, 2002; Larke and Talbert, 1993; Reese, 2005).

Objectives

The objectives of this study were to:

(1) Assess the effect of AIMS and MAP on perceptions that under-represented students had about (a) higher education and (b) food, agriculture and natural resources (FANR).

(2) Assess whether or not the MAP and AIMS programs differed in their effect on student perceptions about higher education and/or FANR.

(3) Explore attitudes that parents of under-represented students had about FANR.

Theoretical Framework For Recruiting Under-Represented Pre-College Students to Higher Education and FANR

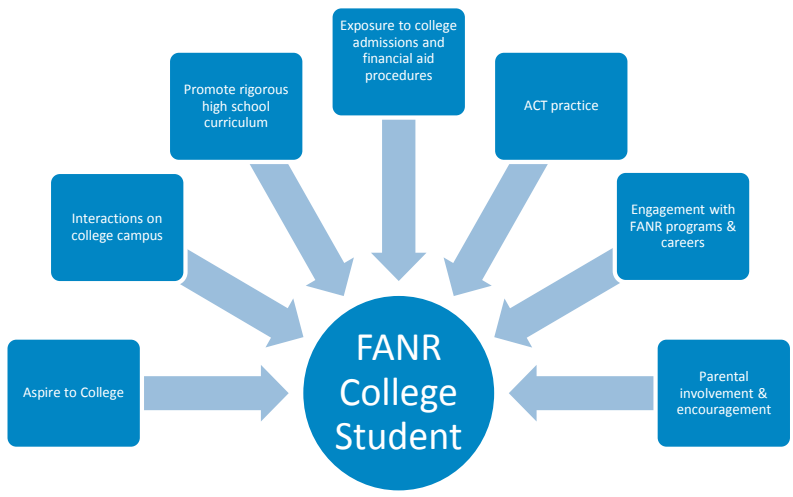
Perna (2002) identified 11 critical predictors for college enrollment for under-represented students, the first five of which were addressed by a fourth of pre-college programs: (1) developing student desire to attend college; (2) fostering college tours, visits or fairs; (3) promoting a rigorous high school curriculum; (4) including parental involvement "to facilitate predisposition and choice;" (5) initiating involvement with students by the 8th grade in order to attract students early in their K-12 experience; (6) promoting college awareness or exposure with regard to admissions processes and financial aid; (7) development of academic skills; (8) promoting parent college awareness; (9) providing parent FAFSA (Free Application for Federal Student Aid) information and participation using the form; (10) SAT/ACT training; and (11) providing tuition or scholarships. Many of the preceding critical components also were identified by other research (Choy, 2002; Harkness et al., 2011; Perna, 2006; Perna and Titus, 2005; Reese, 2005; Strayhorn, 2010b, 2011).

The important role of parental involvement and encouragement is stressed by Strayhorn (2010a) with regard to math achievement by Black high school students, Perna and Titus (2005) with regard to the effect that different types of parental involvement have on college enrollment depending upon ethnic/racial groups, and Strayhorn (2010b) with regard to the effect of parental involvement and encouragement on college enrollment of under-represented students.

Lynch (2001) reported personal decision (83%), former teachers and a college faculty member (55%), and parents (53%), as the three most influential factors affecting a minority student's decision to select a major in agriculture at Virginia Tech. Additionally, 46% of the participants previously had been in a high school or college summer agricultural intern program. Prior experience in agriculture was identified by Wildman and Torres (2002) as the most influential reason for selecting a major in agriculture. Esters (2007) reported that high school grade point average and influence of the female guardian were the most important determining factors of whether or not urban agricultural education students enrolled in a post-secondary agriculture program. An agriculture summer research internship program for minority high school and college students at Iowa State University (Gale, 2002) resulted in encouragement of 49% of the 60 students to pursue careers related to agriculture. Study of a four-week residential high school summer enrichment and agricultural literacy program for gifted and talented students at Virginia Tech (Cannon et al., 2006) indicated that students gained in knowledge and perceptions of the agricultural industry, but the program did not influence participants' career choices. Medicine/physician was the career choice most selected by participants.

The theoretical framework for this study (Figure 1)

Figure 1. Schematic of theoretical framework upon which the research is based.



was grounded in the concept that the following factors influence under-represented pre-college students to pursue higher education and/or FANR careers: (1) developing student desire to attend college; (2) fostering visitation of and interaction with various MSU programs; (3) promoting a rigorous high school curriculum; (4) promoting college awareness and exposure to admissions and financial aid procedures; (5) providing ACT practice; (6) providing interaction with food, agriculture and natural resources programs and careers; and (7) parental attitudes about FANR (Perna, 2002; Lynch, 2001; Perna 2002; Perna and Titus, 2005; Strayhorn, 2010b; and Wildman and Torres, 2002).

Program Description and Methods

The Michigan State University Institutional Review Board approved the study protocol and all participants and their parents or guardians provided written informed consent prior to participation in the study.

Interchangeable Use of Terms FANR and ANR

The Department of Food Science and Human Nutrition, which contains the disciplines of food science and dietetics, is part of CANR. Additionally, key disciplines in CANR such as crop and soil sciences; animal science; horticulture; and agriculture, food, and resource economics are intricately linked to food production, storage, distribution, processing, and/or utilization. Food science, the key disciplines, and the natural resources disciplines at MSU historically have been referred to collectively as agriculture and natural resources (ANR). Consequently, AIMS and MAP participants were exposed literally to careers in food, agriculture, and natural resources. The term food, agriculture, and natural resources (FANR or its variants) has increased in usage nationally since 2009 (APLU, 2009 and National Research Council, 2009). Thus, ANR and FANR are used interchangeably in this paper, even though ANR was used when the research was initiated in 2003. The term FANR is preferred, because it more visibly communicates the inclusion, in this study, of the food-related disciplines. Tables in the text refer to ANR, since that wording was used when the surveys were conducted.

Multicultural Apprenticeship Program (MAP)

The MAP, previously known as Minority Apprenticeship Program, began at MSU in the summer of 1982. The program was designed to (1) introduce under-represented pre-college students to careers in FANR, (2) inform participants about the MSU admissions process and college preparatory coursework, (3) introduce participants to college life, and (4) recruit participants into majors in the CANR. After passage of proposal 2 in Michigan in November 2006 prohibiting recruitment on the basis of race, ethnicity or gender, item number one above was changed to attracting students from urban areas. This six-week residential program paired students with mentors in CANR, the Michigan Department of Agriculture, and/or Michigan Department of Natural Resources to work on research projects and interact with faculty, staff, and students from the mentor's unit from 8:30 a.m. to 4:00 p.m. each weekday. Participants attended interactive evening workshops and seminars on leadership development, FANR careers, personality styles assessments, admission to MSU, financial aid, and instructions on giving PowerPoint presentations. Students took field trips to the forest and bird sanctuary at the Kellogg Biological Station, a MSU research field station with a focus on fundamental and applied research in ecology and agriculture.

Recreational activities included canoeing; picnics; local amusement venues; and attending the campus Pow Wow, a gathering of American Indians that involved traditional dance and singing, socializing, and honoring Native culture. Since the inception of MAP, students have earned weekly stipends of $45 to $75 and within the last eight years have been required to save 50% of the summer stipend in a bank account. At the closing event for the summer program, each participant gave a five-minute oral presentation before peers, mentors, and parents explaining their MAP experience; research projects, findings and research skills acquired; seminars they valued the most; field trips; and social activities throughout the summer.

Application to the program included a transcript, two letters of recommendation, and completion of six essay questions. Students were selected by a committee of CANR faculty, staff, and administrators and the program was coordinated by the CANR Office of Academic and Student Affairs. Approximately, 25 students per year were selected from a national pool of students, although most applicants were from Michigan and were entering grades 10 through 12.

ANR Institute for Multicultural Students (AIMS)

Initiated in 1994, AIMS (previously known as ANR Institute for Minority Students) was a one-week residential program that gave high school students a broad exposure to FANR. Participants engaged in

demonstrations, FANR-related field trips, and other hands-on activities that introduced them to careers in FANR and college life. Interactive evening seminars educated students about high school college preparatory course work, MSU admissions requirements, and information about the FAFSA process. Approximately, 15 students in grades 9 through 12 were selected each year based upon an application process very similar to that of MAP.

The ACT Test

The ACT program was initiated as an additional tool to assist participants in gaining admission to college, preferably MSU. In summer 2004, year-long access to online ACT preparatory programs became available to students in AIMS and MAP Students in MAP were required to spend six hours each week on the ACT, and AIMS students spent one hour each night of their campus stay. Both MAP and AIMS participants were encouraged to use the program regularly throughout the ensuing school year. The Kaplan online ACT program was used the first year, but Bridges Test Gear has been used since 2005. Mention of programs does not constitute endorsement.

Procedures

The study was conducted from 2003-2008 and included AIMS and MAP students and their parents. Pre- and post- survey data were collected from students and pre-survey data from parents. All pre-survey data were gathered at the close of orientation sessions of AIMS and MAP. Post-survey data were collected at the completion of each program. Student pre-and post-surveys consisted of three sections (1) five questions on students' knowledge and perceptions of college, (2) eight questions about FANR, and (3) a demographic section including gender, academic level, ethnic/racial group, information about residential locale, and level of diversity in their home community. A five-point Likert scale including (1) strongly agree, (2) agree, (3) undecided, (4) disagree, and (5) strongly disagree was used for the first and second sections of the student surveys and for the parent survey.

The survey instruments were developed by the AIMS and MAP program director along with the associate dean for undergraduate programs in the college. Survey questions were based upon goals the college set for the programs and were not tested prior to initial administration of the survey. Cronbach's alpha analysis was conducted (Garson, 2011; Santos, 1999) to assess reliability of the survey instrument. The Cronbach's alpha of 0.62 for student survey questions about higher education, and 0.73 for student survey questions about FANR suggested that the instruments were valid (Garson, 2011; Santos, 1999), but the alpha of 0.53 for the parent survey is lower than the normally accepted value of 0.60.

All participants in the programs, a total of 207 during the survey period, were asked to participate in the pre- and post-surveys. Parents or guardians (N = 165) accompanying participants to the orientation programs each year were asked to complete a survey during the orientation for each program.

Statistical Analysis

Data were analyzed by IBM SPSS Statistics 19, formerly named Statistical Package for the Social Sciences. The Independent Samples T-Test was utilized when comparing two means. One-way ANOVA was utilized when comparing more than two means, followed by Tukey B mean analysis when the F value was significant at $P \leq 0.05$. Using SPSS, composite scores were calculated for the sections "perceptions of higher education" and "perceptions of FANR" by averaging the mean response for each item in that section and composite scores were analyzed as the other data. In order to complete the objectives of the study, student survey data were analyzed across programs, between programs, and within programs. Since no post-surveys were given to parents, standard deviation is indicated for parent pre-survey responses.

Results and Discussion

Demographic Profile of AIMS and MAP Students

Both programs were successful in attracting under-represented students (Table 1): 68 and 11%, respectively, African American and Hispanic/Latino students in MAP and 75 and 6%, respectively, African American and Hispanic/Latino students in AIMS. Attracting under-represented students is not unusual for programs that target this group (Gale, 2002; Larke and Talbert, 1993; Moss, 2011). However, it is significant that MAP and AIMS maintained their ability to do this after passage of Michigan's Proposal 2, which some feared would decrease inclusion of under-represented groups in university-related programs.

The majority of participants in both programs were females (Table 1), similar to other pre-college programs (Anderson and Kim, 2009; Gale, 2002; Moss, 2011; and Warren and Alston, 2007). Although Perna (2002) recommended initiating involvement with students by their 8th grade year, the majority of MAP and AIMS students were entering the 11th and 12th grades (Table 1), as is often the case with agriculturally-related pre-college programs (Gale, 2002; Larke and Talbert,

Table 1. Description of participants in MAP and AIMS summer pre-college programs. 2003 – 2008. otal N = 119 for MAP and 88 for AIMS.

Characteristic	MAP N	AIMS N
Ethnic/Racial Category		
African American/Black	81	66
Asian American/Pacific Islander	6	2
Hispanic/Latino	13	5
Native American/American Indian	6	1
White/Caucasian	6	7
Mixed/Biracial	4	5
Other	3	1
Unreported	--	1
Gender		
Female	71	59
Male	48	29
Grade Level		
9th	--	8
10th	19	27
11th	45	31
12th	54	22
Unreported	1	1
Diversity of Home Community		
All from same race as you	9	13
Mostly the same race as you	48	35
Mostly from different racial/ethnic background than you	38	20
Almost all from different racial/ethnic background than you	24	19
Unreported	--	1
Home Community		
Rural/Country	6	8
Suburban/Town	40	27
Urban/City	72	52
Unreported	1	1

1993). Approximately 50% of students came from diverse communities, and the majority were from urban areas (Table 1). The programs succeeded in attracting students who normally may not have been exposed to FANR.

Perceptions of Higher Education

When pre- and post-survey data were analyzed across programs (Table 2), there was a significant increase in student understanding of the process for applying to college and of what it is like to attend college. Further analysis indicated that post-survey changes in these areas were due primarily to perceptual changes by students in MAP (Table 2). After participation in MAP (Table 2), students were more knowledgeable about high school course work needed for college preparation, the college application process, and college life. In comparison, AIMS helped students learn more about college life, but had no significant effect in other areas (Table 2). Students expressed a strong desire to attain post-secondary education at the outset in both programs and that remained unchanged.

Post-survey composite scores were significantly different for perceptions of higher education across programs (Table 2) and for MAP (Table 2). Although both AIMS and MAP students believed they had the knowledge and ability to attend post-secondary education, the AIMS students were less certain than MAP students in pre- and post-surveys (Table 3). The data suggest that MAP students had a greater change in their perceptions of higher education than AIMS students in all areas except desire to attend college and knowledge about the process of applying to post-secondary institutions (Table 3). The MAP students were on campus five weeks longer than AIMS students and worked more intensely with the ACT preparation program, possibly accounting for some of the differences in post-survey results between the two programs.

Perceptions of Food, Agriculture and Natural Resources

Across programs, students gained a greater understanding that working on a farm is only one aspect of ANR (Table 4), having a career in ANR does not mean working for low wages or salaries, wildlife management is part of ANR at MSU, and concluded that learning about ANR is not boring. However, pre- and post-survey analyses within programs (Table 4) showed that the overall change was primarily because of changed perceptions by MAP students (Table 4) where significant differences existed between pre- and post-responses for five of the seven items in this section and for composite data. In contrast, the only

Table 2. Pre- and post-survey responses regarding perceptions of higher education by MAP and AIMS students. 2003 – 2008.
Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Perceptions of higher education	Across Programs		MAP		AIMS	
	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey
	N = 207	N = 172	N = 119	N = 92	N = 88	N = 80
I plan to attend college or vocational school	1.07	1.05 NS	1.07	1.00 NS	1.07	1.10 NS
I have the knowledge/ability to attend college or vocational school	1.23	1.19 NS	1.17	1.12 NS	1.32	1.27 NS
I know the classes to take in high school to prepare for college or vocational school	1.68	1.55 NS	1.62	1.34***	1.76	1.80 NS
I know the process of applying to college or vocational school	2.05	1.76***	2.03	1.66***	2.07	1.88 NS
I know what it is like to be in college	2.33	1.47***	2.29	1.34***	2.40	1.63***
[z]Composite score	1.68	1.48***	1.63	1.35***	1.75	1.62 NS

NS, *** Indicates non-significance or significant difference for means between columns across programs or between columns within a program at P ≤ 0.001, respectively, according to Independent Samples T-test.

[z]Composite scores were calculated by averaging the mean of all responses in each column.

Table 3. Comparison of pre- and post-survey responses between MAP and AIMS students, regarding perceptions of higher education. 2003 – 2008.
Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Perceptions of higher education	MAP	AIMS	MAP	AIMS
	Pre-Survey		Post-Survey	
	N = 119	N = 88	N = 92	N = 80
I plan to attend college or vocational school	1.07	1.07 NS	1.00	1.10 NS
I have the knowledge/ability to attend college or vocational school	1.17	1.32*	1.12	1.27*
I know the classes to take in high school to prepare for college or vocational school	1.62	1.76 NS	1.34	1.80***
I know the process of applying to college or vocational school	2.03	2.07 NS	1.66	1.88 NS
I know what it is like to be in college	2.29	2.40 NS	1.34	1.63**
[z]Composite score	1.63	1.75	1.35	1.62***

NS, *, **, *** Indicates non-significance or significant difference for means between columns comparing programs for pre- or post-surveys at P ≤ 0.05, P ≤ 0.01, or P ≤ 0.001, respectively, according to Independent Samples T-test.

[z]Composite scores were calculated by averaging the mean of all responses in each column.

significant change for AIMS students with regard to ANR perceptions was the increased understanding that working on a farm is only one facet of ANR (Table 4). The longer, more involved experiences of MAP appeared to help students develop a more positive perception about ANR. Fortunately, both MAP and AIMS students entered the programs with the understanding that protecting the environment is valuable and that ANR is science-based.

Perceptions as Affected by Grade Level, Gender and Type of Residential Community

Only a few pre- or post-survey responses varied by grade level, gender, or type of residential community (Table 5), similar to findings by Newsom-Stewart and Sutphin (1994) regarding lack of gender differences. Initially, 9th graders were less confident than other students that they had the knowledge or ability to attend college, but 9th graders' response did not differ from the response of students in other grade levels by the conclusion of the programs. Females were less confident about having the knowledge or ability to attend college than were males and this did not change by the end of the programs (Table 5). Given current information, it is not possible to tell if a greater number of female mentors would have changed the view of female participants. The AIMS and MAP program staff were approximately 50% female and included individuals from various racial backgrounds as was the case with many of the evening seminar presenters. However, departmental faculty and graduate students who served as mentors were almost all white males, a constraint that was beyond the control of the director of AIMS and MAP. Palmer et al. (2010) credited the racial composition of historically Black colleges and universities as being important in helping facilitate academic achievement of black males, citing role models as an example. Hill et al. (2010) cited instances where girls thought boys were better at specific tasks than they and offered suggestions that may be categorized as changing the climate for girls.

Students from rural communities initially indicated significantly less knowledge about the process for applying to college or vocational school than did urban or suburban youth, but the gap closed by the end of the programs (Table 5).

It is important to understand student perceptions of FANR and to document practices that change any misperceptions that dissuade career interest in FANR. Both programs positively influenced the perceptions

Table 4. Pre- and post-survey responses of MAP and AIMS participants regarding perceptions of agriculture and natural resources. 2003 – 2008.
Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Perceptions of higher education	Across Programs		MAP		AIMS	
	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey
	N = 207	N = 172	N = 119	N = 92	N = 88	N = 80
A job in agriculture or natural resources means working on a farm	3.71	4.16***	3.71	4.30***	3.69	4.01*
It does not take much knowledge/ability to work in agriculture or natural resources	4.01	4.12 NS	3.98	4.27*	4.06	3.94 NS
Actions to protect the environment waste time and money	4.37	4.43 NS	4.34	4.38 NS	4.41	4.49 NS
People in agriculture and natural resource jobs earn less money	3.72	3.98*	3.76	4.11***	3.68	3.84 NS
Agriculture and natural resources are not science based	4.24	4.36 NS	4.27	4.41 NS	4.21	4.29 NS
Managing wildlife is not part of agriculture and natural resources	4.18	4.37*	4.12	4.36*	4.25	4.39 NS
Learning about agriculture and natural resources is boring	3.72	3.92*	3.67	4.00*	3.79	3.82 NS
[z]Composite score	4.00	4.19***	3.99	4.26***	4.02	4.10 NS

NS, *, *** Indicates non-significance or significant difference for means between columns across programs or between columns within a program at P ≤ 0.05 or P ≤ 0.001, respectively, according to Independent Samples T-test.

[z]Composite scores were calculated by averaging the mean of all responses in each column.

Table 5. Pre- and post-survey responses by grade level, type of residential community, and gender. 2003 – 2008. Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

"I have the knowledge/ability to attend college or vocational school"

	Pre-Survey		Post-Survey	
Grade Level	**N**	**Mean**	**N**	**Mean**
12th	76	1.20 b*	58	1.26 NS
11th	76	1.20 b	63	1.14
10th	48	1.26 b	41	1.12
9th	8	1.75 a	7	1.43
Gender				
Male	77	1.14 b*	58	1.14 b*
Female	130	1.39 a	112	1.28 a
Type of Community				
Urban/City	122	1.98 b**	101	1.71 NS
Suburban/Town	67	2.00 b	58	1.81
Rural/Country	14	2.79 a	11	1.91

NS,*,**Nonsignificant difference or means followed by different letters indicate significant difference within columns at $P \leq 0.05$ and $P \leq 0.01$, respectively, according to Tukey B.

that under-represented students had about FANR, but MAP had a more pronounced effect than AIMS.

Parent Perceptions of Food, Agriculture and Natural Resources

Since parents play a major role in a child's selection of a course of study in college (Esters, 2007; Lynch, 2001), the survey sought to explore parental knowledge and attitudes about FANR. Parents expressed a positive attitude (Table 6) towards supporting their child's decision should the child choose to pursue a career in ANR, although they were less certain that their children had such an interest. Parents agreed that AIMS and MAP provided more than a "camp" experience, interpreted to mean AIMS and MAP were more than an experience away from home for their children, and parents asserted they would refer other parents to AIMS or MAP. Parents had little knowledge about academic programs in ANR. Parents were undecided about the statements that ANR had low paying jobs, that there were not many jobs in ANR, and that agriculture deals mainly with farming. Given the influence parents have in selection of students' college career choices (Esters, 2007, Lynch 2001, Perna and Titus, 2005), it is crucial to help parents better understand career opportunities in FANR.

Parental comments to open-ended questions were extremely positive for AIMS and MAP (Table 7) and provided excellent information for use in marketing and recruiting students for these programs. Such information is vital as ANR competes, for outstanding students, with other disciplines often considered to be more "prestigious." Comments demonstrated that parents encouraged their children to explore careers in ANR, even though the parents were not familiar with these careers and that parents wanted the college exposure for their children and the opportunity for them to prepare for the ACT test. Future research should ask more specific questions concerning parental perceptions of FANR, inquire where the parents obtained their knowledge about FANR, and inquire about their preferred method of obtaining additional information about FANR if desired. Likewise, future research needs to assess parental attitudes towards higher education, an aspect that was lacking in this study.

Table 6. Perceptions of higher education and of agriculture and natural resources by parents of students in the MAP and AIMS . 2003 – 2008. Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Question	Mean	S.D.
Would support child's decision to pursue career in agriculture or natural resources	1.38	0.61
I am knowledgeable about different academic programs in agriculture and natural resources	2.64	0.98
My child is interested in pursuing a career in agriculture or natural resources	2.48	0.86
The program is more than a camp experience for my child	1.39	0.78
Careers in agriculture offer low paying jobs	3.69	0.84
Careers in natural resources offer low paying jobs	3.71	0.84
There aren't many jobs available in agriculture	3.84	.088
There aren't many jobs available in natural resources	3.84	0.90
Agriculture deals mostly with farming	3.81	0.94
I would refer other parents to this program	1.43	0.77

Table 7. Examples of parental responses to open-ended pre-survey questions about AIMS and MAP.

Question: "Why did you choose this program for your child?

Year	Program	Response
2004	AIMS	"I had another child participate in the AIMS program. After her week here she decided she wanted to attend college."
2006	MAP	"I was part of this program many years ago. It was a wonderful program and I thought he would get a lot out of this program."
2008	MAP	"We chose this program because my child is dedicated to study of agriculture and natural resources and animal science. Her dream is to attend 'MSU'. She loves this school and what they have to offer."
2008	AIMS	"How she needs to plan better in high school, i.e. classes, grades, test scores and to know what colleges are looking for and what she needs to do."
2008	AIMS	"Highly recommended by a friend."
2008	AIMS	"Loves sciences, animals, wildlife, and wanting exposure to degrees. MAP? next year" (sic)

Question: "What do you expect your child to gain from this program?"

Year	Program	Response
2006	MAP	"I want her to come out of this experience knowing more about agriculture as well as experiencing how students live and learn at college."
2008	AIMS	"Knowledge in all areas and degree opportunities here at MSU. ACT advancement. Social experience."
2008	MAP	"I expect for him to prepare himself for the ACT exam. I expect for him to learn about different fields in agriculture and natural resources."

The AIMS and MAP incorporated five of the 11 critical components proposed by Perna (2002): students' aspirations to attend college; visits to various CANR and MSU programs, centers, and institutes; promoting rigorous course work in high school; promoting college awareness with regard to admissions and financial aid processes; and providing practice for the ACT exam. Efforts to affect decisions about careers in FANR included multiple exposures to FANR careers and disciplines, close interaction with faculty and/or graduate students, and exploration of parental attitudes about FANR (Cannon et al., 2006; Esters, 2007; Gale, 2002; and Lynch, 2001).

Summary

Both AIMS and MAP positively affected student perceptions of higher education and FANR, but MAP had a more pronounced effect than AIMS. Students in the shorter-length residential program (AIMS) had an increased knowledge of what it is like to be in college and recognized that careers in FANR are not limited to working on a farm. Students in the six-week residential program (MAP) had an increased understanding of what classes are needed in high school to prepare for college and the process for applying to college, and had a clearer understanding of what it is like to be in college. The MAP participants understood that a career in FANR means more than working on a farm and that a great deal of knowledge and ability are needed to work in FANR. Additionally, MAP participants understood that careers in FANR are not low paying jobs, that wildlife management was part of FANR, and thought that learning about FANR was not boring. Parents were positive in their attitudes towards AIMS and MAP and towards encouraging their children if they were interested in FANR, but parents had limited information about career opportunities in FANR. There is an urgent need to recruit a larger and more diverse pool of students to meet workforce demands in FANR. Results suggest that pre-college programs such as AIMS and MAP have the potential to play an important role in helping to address that need and in promoting higher education for participants from under-represented groups. This held true even in the environment created by Proposal 2, an environment which could have limited the inclusion of under-represented groups. Results also suggest that six-week programs are more effective than one-week programs in accomplishing these goals.

Recommendations

This research is only one step in an important process to assess the impact that pre-college programs in FANR may have upon the pursuit of higher education and on the pursuit of careers in FANR by under-represented students. The MAP and AIMS programs have existed long enough to provide excellent data to determine the extent to which their alumni have graduated from post-secondary institutions and/or studied FANR. Future studies should assess the number of AIMS and MAP students, beginning with 1982 participants, who (1) have graduated from majors in the CANR at MSU, (2) have graduated from other majors at MSU, (3) have matriculated at and/or graduated from other post-secondary institutions throughout the nation, (4) have earned graduate or professional degrees, and/or (5) are currently enrolled in post-secondary education. Future work also should compare ACT scores of AIMS and MAP students at the beginning of the summer, end of the respective program, and end of the year-long ACT access period. These additional research components are essential in helping to assess whether these pre-college residential programs have achieved the ultimate goal of recruiting, retaining, and graduating under-represented students in FANR.

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Tips for Teaching Adult Students

With the number of nontraditional students growing, many educators have discovered that adult learners are fundamentally different than their younger counterparts in many ways. Yet, most instructors have been left to their own devices to figure out how best to reach these students who come to class with an entirely different set of challenges, demands and expectations, and generally at a much different level of maturity.

How can instructors better accommodate and encourage adult student success in a classroom setting? Here are a number of ways to create a better environment for adult learners, no matter what the subject material.

Treat them like the adults they are. Adult learners are generally more sophisticated and experienced than their younger counterparts and they benefit from realistic examples of skills they can use in "real life." Adult learners will be empowered as they discover they have a great deal to teach their younger classmates, and the dynamic is mutually beneficial. Incorporate intergenerational discussions on issues that otherwise have a generational divide as appropriate for the subject matter to engage learners of all ages.

Be aware that their classroom skills may be rusty. Some adult learners have not been in a classroom for 30 years, so you may need to remind them of basic rules and etiquette, such as raising a hand if you have a question. At the same time, reassure them that, as the instructor, you will not be judgmental of their life experiences or their perspectives, and that they will be evaluated only on their mastery of the content.

Be generous when it comes to formatting issues such as APA writing guidelines. Instead, focus on content. Adult learners are often self-conscious, even apologetic, when it comes to being in the classroom. They might even exhibit some shame because they feel decades behind their classmates. The more you can break down these walls of insecurity, the better.

Consider and acknowledge the technology gap. Students in their 50s and 60s are generally not nearly as tech savvy—or tech dependent, as some would argue—as 18 or even 30 year olds. Assess each student's level of proficiency as it relates to class requirements and compensate. Provide help so adult learners can "catch up somewhat with the technology. Even if they are skilled with technology, adult learners tend to have dramatically different habits. While younger students may be tethered to technology, adults have longer attention spans and traditional classroom approaches appeal to them. This does not mean you can lecture to them for three hours, but you can expect the older learner to concentrate on complex material without feeling "withdrawal" of from a technology device.

Be efficient with lessons and activities. Move fast and don't waste anyone's time. Adult students have jobs, sometimes children and tons of responsibilities, so pack every class with information and useful activities. Consider balancing instructional time with "lab" time, giving students an opportunity to do modeling work or homework in class to give them a better chance of accomplishing all the requirements on time. Consider being "strictly flexible" — diligent in your expectations, yet understanding about busy lives, illness and working late. Like any job, it's not to be abused, but as grownups, they have priorities that sometimes take precedent over finishing assignments. Build in safety nets that allow a limited number of late assignments to maintain flexibility, accountability and expectations of excellent work.

Be creative. Use the unique vibe or personality of each class to teach the lesson and choose activities that engage, and even entertain to some degree. Pair highly motivated students with those less skilled on projects to create peer encouragement and mentoring. This strategy keeps students interested, attendance high and motivation strong.

Emphasize personal growth. While younger students are encouraged to do well on standardized tests and accustomed to being compared to their peers in this way, adult learners are challenging themselves. Consider making personal growth in ability and skills part of the actual grade; for example, compare first assignments with more recent ones to determine how they are personally improving. It helps build confidence and give tangible areas for improvement. School is hard enough. We should point out the positives.

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