Serving in Agriculture: Increasing Agriculture Students' Self-Efficacy Through Service-Learning

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Abstract

Service learning is a form of experiential learning that helps students be able to both apply concepts and provide a benefit to an organization, individual, or group other than the learner. The lack of efficacy of our students with the complex skills learned in many agriculture courses brings about a sense of fear and trepidation in students that can cause them to either not engage with the material/skill or do so in an ineffective manner. Service learning was used in a course that has had low levels of efficacy associated to help motivate students to learn and practice the skills being taught. Students in an agricultural mechanics course engaging in activities with Habitat for Humanity progressed through Bandura's four types of learning experiences integral to the efficacious establishment of a behavior in two directions. Using Constant Comparative method to analyze the reflections of the students it was determined that they progressed through the activity from the perspective of students, moving from the least to most efficacious. They then, with no prompting, reflected backwards from the perspective of most to least efficacious as they began to reflect on how they would facilitate communicating or teaching these same concepts to novices.

Keywords: skills, agricultural mechanics, experiential, Habitat for Humanity

In agricultural skill development, it has been widely reported that "shop" skills, known collectively as agricultural mechanics (Albritton & Roberts, 2020; Burris et al., 2005; Hainline & Wells, 2019; Shultz et al., 2014), are regarded as one of the most in demand skill areas (Blackburn et al., 2015; Burris et al., 2005; Duncan et al., 2006; Tricket et al., 2023; Saucier & McKim, 2011) and least efficacious areas of most programs (Burris et al., 2005; McKibben et al. , 2022; Rudolphi & Retallick, 2015, Tummons et al., 2017). These have been perennial problems in the development of agricultural educators and outreach officers recognized a century ago (Smith, 1925). The skills associated with agricultural mechanics have been identified as one of the foundational pillars of agricultural development (Burris et al., 2005; Smith, 1925; Valdez & Johnson, 2020). Demand for those skilled in agricultural mechanics is at a high (Tricket et al, 2023) and agricultural mechanics has a higher discrepancy between reported abilities and self-efficacy (Blackburn et al., 2015; Granberry et al., 2022; Tricket et al., 2023). Scholars propose that increasing opportunities for students to engage in agricultural mechanics could potentially reduce the gaps between efficacy and ability, (Blackburn et al., 2015; Croom et al, 2023; Granberry et al., 2022; Tricket et al., 2023). Concurrently, there has been a notable decline in the opportunity for experiences that training centers require for agricultural professionals to obtain certification (Tricket et al., 2003).

Experience is foundational to education and the intentional use of experience is needed to ensure deep learning and resulted in several models being developed that focus on

experiential learning (Baker et al, 2012; Dewey, 1938; Kolb, 1984; 2015, Roberts, 2006). Expounding on this work, Kolb (1984, 2015) developed a robust model for experiential learning. Bandura (1986) suggested that experiences and the resulting learning is mitigated by an interaction between the student and the environmental factors that influence the learning. This is cited as the principle of interaction in the service-learning literature (Gyles & Elyer, 1994). Those engaged in these experiences, and thus the learning that results, are influenced by elements that are both internal and thus specific to the student, and those that are external and more objectively part of the environment (Carver, 1997).

Incorporating service-learning into courses provides opportunities to develop both hard and soft skills while working on a broad range of competencies, such as social and interpersonal skills and emotional processes, all in a real-world setting (Andreu, 2020; Jones et al., 2013; Kuh, 2008; Staffor et al, 2003b). Service learning, a form of experiential learning, has been listed as one of the ten high impact practices that students can participate in to provide substantial links to the working world back (Kuh, 2008). Service-learning experiences can promote the development of hard skills in agricultural mechanics, which will increase comprehension of skill application. Along with the development of hard skills, service learning promotes the development of soft skills and related competencies in an authentic way (Stafford et al, 2003a). The skills and competencies developed through service-learning experiences increase self-efficacy and skill level for agriculture students in agricultural mechanics courses.

According to Bringle and Hatcher (1997) and Andreu et al. (2020), service-learning is an educational opportunity for students in the context of a credit bearing course that fulfils an identified need in the community. Service-learning is grounded in experiential learning theories as posited by Dewey and Lewin and incorporated into the myriad of programming developed by Hahn (Carver, 1997). As with most other forms of experiential learning, a reflective activity is needed to "gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility" (Bringle & Hatcher, 1995, p. 112). Reflective activities strengthen learning comprehension by "connecting service activities to the course content" and serves to establish a stronger foundation of content comprehension to build additional skills on (Bringle & Hatcher, 1999, p. 179). Service-learning incorporates social responsibility and growth by embracing the development in both content and process knowledge, (Andreu et al, 2020; Bringle & Hatcher, 1999). Service-learning is marked by clearly identified learning objectives and incorporation of the service within the lesson experience with student reflection (Kraft, 1996). The blending of concrete experience with service enhances learning (Bear & Hoerner, 1986; Carver 1997). The use of application experiences has been suggested to support the development of agriculture professionals ready to facilitate agricultural mechanics (Burris et al., 2005; McKibben et al, 2023). The inclusion of a post activity reflection is considered best practice in the use of service as a high impact experience (Andreu et al, 2020). Immediate post only reflections have been shown to result in the highest levels of student development (Stafford et al, 2003a).

It is with this belief and understanding that agricultural mechanic students would benefit from participating in an experiential learning-based service-learning project with Habitat for Humanity with the goal of increasing self-efficacy in relation to hard and soft skills. Habitat for Humanity, a non-profit faith-based organization provides housing to those below typical means for home ownership by building or renovating houses for persons in need (Habitat for Humanity, n.d.). The work is done predominantly by volunteer workers with little to no skill (Hays, 2002) guided by professionals. Volunteers have reported that part of the desire to participate in Habitat for Humanity is to work outdoors, participate in physical activity, and learn or hone underdeveloped skills (Stoddart & Rogerson, 2004).

Theoretical Framework

This study used social cognitive theory (Bandura, 1986) to understand the interdependent relationship between personal, behavioral, and environmental determinants during a service-learning experience. Bandura's theory provides a basis for understanding human interaction as a reciprocal and triadic relationship, between people, their immediate environment, and their behaviors. By viewing personal characteristics, being affected by both environments and behaviors, people can be viewed as creators of and results of their experiences. Researchers can then use individual participants' thoughts and feelings to understand the participants' unique approach to the world (Bandura, 1986). Bandura described four types of learning experiences integral to the efficacious establishment of a behavior: a) mastery, or the completion of a given task or behavior to a given level, b) vicarious, or observation of another achieving or perceived to be achieving mastery, c) social persuasion, or the effect of outside stimuli on self-efficacy and, d) physiological and emotional states, or the effect of internal stimuli on the learner's ability (Bandura, 1986). Because the focus of this study was to understand student learning, the types of learning experiences associated with self-efficacy (personal) were conceptualized as the product of a service-learning experience (environmental) and the resultant student reflections (behavioral). This can be represented in equation form: the sum of environmental and behavioral equal personal (E + B = P). This equation provides a framework for the evaluation of multidimensional human interaction. This is not intended to over-simplify or downplay Bandura's theory, rather, to provide a general guide for a more nuanced understanding.

Perceived self-efficacy is an additional cognitive process that plays an influential role in personal motivation to attempt and complete tasks. According to Bandura (1997) perceived self-efficacy is an individual's belief about their ability to perform a skill or complete a given task bound by a situation. Bandura (1997) states, "perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Individuals choose tasks and/or challenges based on predetermined self-assessments, including how much effort

and time to invest (Bandura, 1986). Perceived self-efficacy has the potential to push individuals to attempt a challenge or to enhance and sustain motivation for future tasks (Bandura & Cervone, 1986). It can be assumed that students who perceive themselves to be capable likely attempt and complete tasks better than students who perceive themselves as less capable (Williams et al., 2002).

Methods

The purpose of this study was to describe elements of student self-efficacy following a service-learning experience. Data were collected from (N =19) students enrolled in an agricultural mechanics course following a service-learning activity with Habitat for Humanity imbedded in a required agricultural mechanics course. All students were undergraduates in the college of agriculture, in their junior or senior years, all majoring in agricultural education and working toward obtaining a teaching license.

Student reflection is fundamental to the learning process and used in this study to describe the internal perspectives of students (Alcoff & Potter, 2013; Hatcher & Bringle, 1997). Following the service-learning activity, students were asked to reflect on the overall experience for a completion grade by "recall the event, write about what they did, and record their thoughts about their contribution to the event". They were given formatting parameters, 12-point font, double space, and one-inch margins. Students were given a two-page length expectation. Submissions were made using learning management software in an online format. Students were told both in writing and verbally that their submissions would not be graded based on content and they should feel free to answer the prompt as they saw fit. Reflections were initially examined by case and one hundred and thirty-nine individual excerpts were deemed significant for additional analysis (Lincoln & Guba, 1985). Multiple researchers individually coded excerpts according to Bandura's (1986) elements of self-efficacy (mastery, vicarious, social persuasion, and physiological and emotional states). Researchers also noted the relative position of the excerpt in the overall reflection of that individual. The constant comparative method was then used to compare incidents, form initial categories, and develop themes (Lincoln & Guba, 1985).

Trustworthiness has been considered and established using the techniques suggested by Lincoln and Guba (1985). The three techniques of establishing credibility were used, prolonged engagement, persistent observation, and triangulation (Lincoln & Guba, 1985).

Results

Using Bandura's concepts of self-efficacy (1986) researchers identified 72 occurrences of physiological and emotional state experience, 29 occurrences of vicarious experience, 25 occurrences of social persuasion experience, and 13 occurrences of mastery experience in the students' reflections. Further analyzing and coding these experiences led to the emergence of two major themes: students reflecting about their experiences in the form of "Student as Student" or "Student as Communicator". These two major themes both contained all four experience types.

The theme of "Student as Student" is used to describe students experiencing various physiological and emotional states. Through reflection, the student confronted or succumbed to social persuasion, vicariously learned from their peers, and mastered skills through hands-on application as would be suggested by Bandura (1986). Student A17 exemplified the theme "Student as Student" with the quote, "[I am] proud to be a part of a group where classmates can get together and work so diligently towards a goal that does not benefit them personally." Examples of this theme were most often seen in the beginning of the reflection pieces, showing that they began the exercises or activity as a student. For a more in depth breakdown of "Student as Student" experiences found throughout the data see Table 1.

The theme of "Student as Communicator" describes a significant change of perspective where students began to view themselves as communicators/teachers (the ultimate end of their degree plan). The theme is used to describe students processing and formulating plans on how to deal with unknown students in various physiological and emotional states in a future tense. Students reflected on their process with the effects of social persuasion. They discussed taking advantage of vicarious learning and developing mastery experiences. Student A4 exemplified the theme "Student as Communicator" through their quote, "…I felt like this was a good example of the lesson we discussed in class about how we need to teach our students to work in proximity to each other but also know how to work independently." For a more in-depth breakdown of "Student as Communicator" experiences found throughout the data see Table 2. This category of "Student as Communicator" reflects a deeper and more profound understanding of the concepts being advocated for in their later academic programing and should be considered an elevated or preferable response to the activity.

Discussion

During their learning process, agriculture students engaged with agricultural mechanics content, an area with historically had high levels of apprehension and fear, using a service-learning activity. As part of best practice with experiential learning, reflections were part of the assignment and structure of the learning. Within the reflections students were determined to be progressing through Bandura's four experiences of learning. Within each experience type, reflections could be associated with a particular perspective of student or communicator and provided insight into the level of self-efficacy students felt toward the activity. Additionally, trends developed that appeared to indicate students' progress "through" themes in a very ordered manner. They tended to move from psychological and emotional states to a state of social persuasion, through a state of vicarious learning, and finally to mastery. Students then reversed the order as they moved from reflecting as a student and began reflecting as a communicator.

As they progressed through the reflection process, their reflections opened by speaking about themselves in the role of a student. They wrote from a place of the unknown and

Table 1

Examples of Student as Student Experience Identifiers

Theme	Experience Identifier	Examples
Student as Student	Mastery	"[Through] this experience I was able to apply some of the skills we learned in class like measuring and cutting materials to the house we were working on."- [A5]
	Vicarious	"It was a cool visual experience and I enjoyed watching it go from what looked like a construction site, to what looked like a home."- [A8]
	Social Persuasion	"[At the beginning] it wasn't completely efficient, my classmates suggested we formed a better assembly line. Eventually…it was more efficient."- [A16]
	Physiological and Emotional State	"I will never look back on this activity as just an early morning for a class assignment, but instead as a day where we were able to make a difference, although just a small one, in someone else's life." - [A17]

Table 2

Examples of Student as Communicator Experience Identifiers

Theme	Experience Identifier	Examples
Student as Communicator	Mastery	"Knowing how to stay focused and keeping other people focused is essential to management."- [A9]
	Vicarious	"By doing something as simple as laying down floors in a home, you can open opportunities for your students to be generous members of the community."- [A5]
	Social Persuasion	"Service learning give your students the opportunity to grow personally, socially, and intellectually, gain citizenship skills and prepare them for the workforce."- [A5]
	Physiological and Emotional State	"In ag mechanics classes specifically, student are taught real-world skills that they can immediately apply to their lives or future careers. As instructors, we should teach them how to use these skills for good..."- [A7]

fear of the misunderstood, fear of the tasks, presuppositions of personal failure in the tasks, and of the deeply emotional nature of the service work. The students then focused their reflections on the vicarious success of peers. They began to speak about others overcoming fears of being hurt and failure, they noticed that their own fears were not being borne out by their peers. As they noticed the success, the students began to mimic the more successful participants, freer of the fear they had started with, until personal mastery was achieved. Once mastery was achieved, with ever decreasing frequency, students proceed back though the levels in a reverse order, reflecting now through the lens of a communicator. Students began to consider how they might frame their mastery into lower-level or more accessible experiences and guide their future students through something similar. They thought how they would guide or provide the actions to mimic and how those who mimicked would be the same ones who provided the vicarious success to new participants entering the system from an initial state of emotion and fear. We considered this a positive outcome since these students were on track to become communicators, teachers, development officers, or extension agents. It would be hoped that they would begin to see their own experiences using the lens of how to translate that experience to their future students and participants.

While this population was specifically training to become communicators, teachers, development officers, or extension agents their movement from reflecting as student to reflection as communicator could provide a model of advancement in understanding from a consumer of information to a curator of information to ultimately a creator of information, as agriculturists across all subfields of agriculture are called to do. We hesitate to draw direct causality from the service-learning activity to a specific progression through Bandura's model based on this qualitative inquiry, however the appearance of these results is promising for the use of service learning in this way.

Summary

The findings of this study shed light into the changes seen in agriculture students during a service-learning activity as they appear to have progressed through the levels of self-efficacy. The course they were participating in has historically high apprehension for these high functioning students who are not accustomed to low levels of efficacy in a school setting. According to the course evaluations, this course is often the first course in these students' entire school career focusing on physical skills. Understanding the structure whereby students' progress from cautious neophytes and begin to master skills may provide a framework to explore the role of self-efficacy in developing agriculturists.

It was found that students were able to begin to move

through the framework suggested by Bandura in order, first from the lens of a student, then reverse order from the lens of someone who has to communicate complex agricultural concepts and tasks to novices. Future research should explore the process of implementation of both service-learning and reflections to develop efficacious and competent students for those focusing in other subfields of agriculture.

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