

Mississippi Extension Undergraduate Apprenticeship Program: A Model for Critical Reflection through Community-Engaged Research and Outreach

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Abstract

The Mississippi State University Extension Undergraduate Apprenticeship Program was implemented in 2017 to give undergraduate juniors and seniors the opportunity to work one-on-one with an Extension mentor and explore careers in agriculture, natural resources, family and consumer sciences, community resource development, or youth development, while participating in research and outreach activities that directly benefit Extension programs and community stakeholders. The program is rooted in the principles of mentoring adult learners in an organizational context. Kolb's Experiential Learning Model and the DEAL Model for Critical Reflection serve as the conceptual framework, whereby students engage in critical reflection to enhance their integrated research-and-outreach learning experience. An evaluation of the first two student cohorts (n=19) revealed a significant production of scholarship, an increase in discipline-specific knowledge, enhanced critical thinking and problem-solving skills, a greater understanding and appreciation for Extension, and a desire to pursue related graduate studies.

Keywords

undergraduate, apprenticeship, mentoring, integrated research, extension

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Introduction and Problem Statement

There is a need for Extension personnel qualified in the subject-matter most relevant to the identified needs of respective stakeholders in a county or region (Cooper & Graham, 2001). Very little research on training costs for non-profit and educational organizations exists, but studies in the for-profit sector indicate it may cost as much as six to nine months of a new employee's salary -- entry-level equivalent of \$30,000 to \$40,000 -- for orientation and training (Bliss, n.d.). These costs include on-the-job training costs by supervisors and colleagues, lost productivity costs over the first few months of employment, and several intangible costs. Although subject matter may be taught on the job, the cost to an Extension organization to train an employee to a level at which he/she can most effectively address clientele needs is extensive and can be reduced simply by hiring employees that already have a technical background in a particular programmatic area. Extension has not done a good job of marketing itself as a career opportunity to undergraduate students earning technical degrees, and there is steep competition from the private job sector, which often can afford to offer higher starting salaries and other attractive amenities.

The Mississippi Extension Undergraduate Apprenticeship Program was implemented in 2017. Participating students gain direct experience conducting research and assisting in the analysis and translation of that research into a related Extension process or product, such as an Extension publication, presentation, or educational curriculum. Additionally, they learn more about the mission of Extension and have the opportunity to consider the possibilities of applying their undergraduate degree to an Extension career upon graduation. Finally, students are exposed to additional opportunities for graduate studies and ongoing research.

This paper seeks to briefly summarize the existing research supporting the need for undergraduate experiential opportunities such as this one and review the literature regarding mentoring of adult learners and critical thinking and problem-solving skills for college-educated young adults entering the workforce. Next the Mississippi Extension Undergraduate Apprenticeship Program model and how it is based on the DEAL Model for Critical Reflection is described. Finally, lessons learned from the first two years of this program are provided, with implications that may be informative for other Extension systems or institutions of higher learning interested in implementing a similar model.

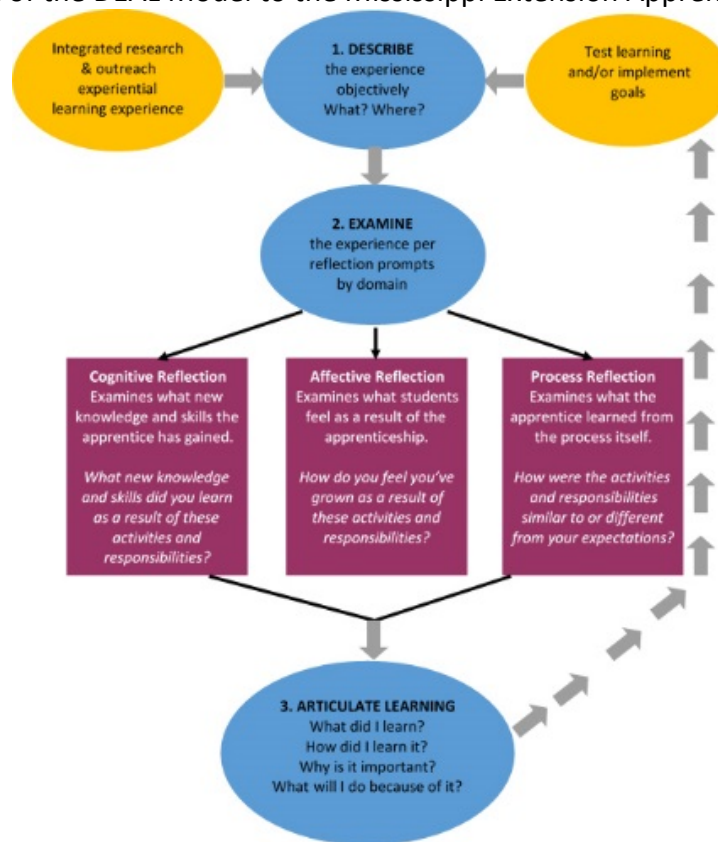
Theoretical and Conceptual Framework

This apprenticeship program attempts to bridge the perceived research-practice divide by engaging the student in a fully integrated research and outreach experiential learning experience. It is rooted in the principles of mentoring adult learners in an organizational context. Kolb's (1984) Experiential Learning Model and the DEAL Model for Critical Reflection (Ash & Clayton, 2009) serve as the conceptual framework for the program. Kolb's theory utilizes a holistic perspective on learning which incorporates experience, perception, cognition, and behavior. The DEAL Model for Critical Reflection promotes and assesses student learning in

applied and experiential learning approaches such as service-learning, internships, practica, and study abroad courses. The DEAL Model is a process that scaffolds learners as they describe, examine, and articulate learning.

Figure 1 is an adaptation of Ash and Clayton’s (2009) DEAL Model for critical reflection to the Mississippi Extension Apprenticeship program and illustrates the collective framework for this program. This three stage critical reflection model provides programmatic structure and guidance to both the students and mentors to help them engage in a meaningful experience. Description of this conceptual model is woven into the description of the program model to follow.

Figure 1. Alignment of the DEAL Model to the Mississippi Extension Apprenticeship Program



Each apprentice has a faculty specialist or Extension associate mentor who facilitates the student’s opportunity to experience the research process and its extension application at a county, regional, and/or statewide level. The student’s experience with the Extension mentor is an intense, research-to-extension process over the summer months. The student travels extensively, actively participates with the mentor in field visits, consultations, camps, workshops/presentations, etc., and assists with new or ongoing research (e.g. field trials, surveys), while interacting with and assisting county Extension agents in their roles with a diversity of stakeholders and clientele. Students interact with multiple Extension personnel and

industry stakeholders during this process so that they receive a broad, diverse experience of Extension, rather than a single, and possibly biased, perspective.

The Extension mentors are expected to conduct periodic guided reflective conversations with their apprentices. It is recommended that these conversations occur at regular intervals throughout the summer. These reflective conversations incorporate the first two stages of the DEAL model. The first stage of the model, *Describe*, requires students to provide an objective and detailed description of the learning experience. To capture this, the mentors ask their apprentice to describe what main project(s) they have been working on and to identify their primary activities and responsibilities. The second stage, *Examine*, requires that the students analyze the experience in such a way as to generate important learnings across three reflection domains (i.e. cognitive, affective, and process). Each domain includes multiple questions which were adapted from Ryerson University (2009).

The cognitive reflection prompts the student to examine what new knowledge or skills he/she has gained during the apprenticeship. The primary cognitive reflection question is “what new knowledge or skills did you learn as a result of these activities and/or responsibilities?” The affective reflection questions encourage the student to examine how they feel as a result of the apprenticeship experiences. For instance, students are asked “how do you feel you have grown as a result of these activities and/or responsibilities?” Finally, the process reflection requires the student to consider what he/she has learned from the process itself. A sample process reflection question is “how were the activities and/or responsibilities similar to or different from your expectations?”

The third stage of the model, *Articulate Learning*, encourages students to set goals for future action that will allow them to apply this learning in future situations. The articulate learning stage is structured according to four guiding questions: (a) What did I learn? (b) How, specifically, did I learn it? (c) Why does this learning matter, or why is it significant? and (d) In what ways will I use this learning or what goals will I set in accordance with what I have learned in order to improve myself, the quality of my learning, or the quality of my future experience? (Ash, Clayton, & Atkinson, 2005). This stage of the critical reflection was captured through a weekly apprenticeship reflective journal that each student was required to complete. Responses to these questions or corresponding prompts (i.e. “I learned that...”, “I learned this when...”, “this learning matters because...” and “in light of this learning...”), can be compiled into articulated learning statements. The articulated learning process allows students to recognize what they have learned through reflection on the experience, place it in context, and express it concisely supporting them in thinking critically about their own learning (Ash & Clayton, 2004). The articulated learning statements are used for both formative and summative assessment of the apprenticeship program.

The four guiding questions and corresponding writing prompts from the Articulate Learning stage of the DEAL model were mapped to Kolb’s (1984) Experiential Learning Cycle of action and reflection. Initially when we mapped Kolb’s four stages to the four questions/writing prompts of the Articulate Learning stage of the DEAL model, we mapped the first stage in Kolb’s

model (i.e. concrete experience) with the first prompt in the DEAL model (“I learned this when...”), the second stage of Kolb’s model (i.e. reflective observation) to the second prompt in the DEAL model (“I learned that...”), and so on. However, upon analysis of the first cohort of apprentice journals, we recognized that the “I learned this when...” prompt elicited descriptions of the learning experience whereas the “I learned that...” prompt evoked an interpretation of what was learned during the experience. Therefore Table 1 provides an overview of how Kolb’s stages were mapped to the DEAL Model reflective writing prompts. Although the reflective writing prompts are presented in the table in the order in which they align with Kolb’s stages, the first two prompts are presented to the students in reverse order when the students access their online reflection journals.

Table 1

Kolb’s Experiential Learning Cycle Stages Mapped to DEAL Model Reflective Prompts

Kolb’s Experiential Learning Cycle Stages	Description of Stage	DEAL Model Reflective Writing Prompt	Application of DEAL Reflective Prompts to Kolb’s Model
Concrete Experience	Doing/having an experience	<i>2. I learned this when...</i>	Description of the concrete learning experience.
Reflective Observation	Reviewing/reflecting on experience	<i>1. I learned that...</i>	Interpretation of what was learned during the concrete experience.
Abstract Conceptualization	Concluding/learning from the experience	<i>3. This learning matters because...</i>	Initiation or modification of an existing abstract concept that has been learned through the concrete experience.
Active Experimentation	Planning/trying out what you have learned	<i>4. In light of this learning...</i>	Application of this learning to other situations and/or contexts.

Purpose

Undergraduates are paired with an Extension faculty or associate for approximately ten to twelve weeks in the summer months. The faculty or associate serves as a professional mentor for the student apprentice. Together, the mentor and apprentice establish learning objectives, set anticipated project outcomes, and lay out a plan of action for the direction of the apprenticeship. Additionally, the pairs identify potential academic conferences or industry meetings at which the apprentice can present their research as a poster or oral presentation.

There are several goals of the Mississippi Extension Apprenticeship Program:

- 1) Raise students’ awareness of Extension and Extension careers;
- 2) Positively influence students’ decision to pursue graduate studies and/or enter a career field that ultimately benefits Extension and one or more of the US Department of Agriculture’s (USDA) priority areas;

- 3) Enhance students' critical thinking and problem-solving skills; and
- 4) Garner support for Extension's mission as a non-biased, research- and evidence-based source of information.

Methods

The first step for this apprenticeship program is an invitation to Extension specialists and associates to submit an apprenticeship proposal. Proposals must meet specific criteria, including discreet learning objectives and demonstration of benefit to the Extension personnel's research and/or Extension efforts. Apprenticeship opportunities are chosen based on the quality of the proposals and final approval by the Program Director and Mississippi Extension administration. Extension personnel whose proposals are accepted are required to submit a letter of commitment as a mentor to the undergraduate apprentice.

Students electronically submit an application packet to the Program Director via Qualtrics. Applicants identify for which project(s) they are applying. Extension mentors select the final applicant(s) for their respective integrated project.

Prior to the start of the summer apprenticeships, Extension mentors complete an assessment to determine their perceived level of efficacy as a mentor (Denny, 2017). The assessment was developed for use with Extension faculty, agents, and other personnel as part of a professional development curriculum on mentoring based on six constructs, or functions — relationship building, information delivery, facilitation, confrontation, modeling, and vision (Denny, 2016). The *Adult Mentoring Assessment for Extension Professionals* helps mentors develop an accurate profile of their mentoring style with adult learners (Denny, 2017). The scores on the various constructs help mentors identify specific proficiencies to maintain or strengthen and deficiencies to overcome. The overall score on the assessment is a general indicator of competence as a mentor of adult learners. By completing the assessment prior to starting a formal mentoring relationship, mentors should have a better understanding of how they can best contribute to the success of their mentees. In spite of difference among mentors and mentees, a structured mentoring plan was developed to provide the necessary training and guidance to both parties. This also helps ensure consistency in how apprentices were being mentored.

Findings

Since the summer of 2017, the Mississippi Extension Apprenticeship Program has provided undergraduate juniors and seniors the opportunity to explore Extension-related careers in agriculture and natural resources, family and consumer sciences, community resource development, or 4-H youth development, while participating in research and experiential learning opportunities that directly benefit Extension outreach to local communities. There were eight (8) paid apprenticeship opportunities in 2017 and nine (9) more in 2018. The primary mentor for each apprentice is a faculty member or staff with an Extension appointment, selected based on project proposals submitted to a review panel each year. The selected Extension personnel offered an integrated research and Extension experience for the

apprentices and mentored the apprentices to conduct new or ongoing research, assist in Extension activities at the county or regional level, and develop a related process, program or training tool. In 2017 and 2018, the apprenticeship program ran for twelve (12) weeks during the summer semester, paid a weekly stipend of \$500, and provided a budget for travel and other material costs on the part of both the students and mentor.

Regardless of the Extension programmatic area or the research in which the students will participate as part of the apprenticeship experience, all apprentices are expected to achieve certain student-centered learning outcomes. As a result of participating in this program, students will be able to (a) summarize the significance of research-based outreach and education; (b) give examples of how their work contributed to the Extension mission; (c) demonstrate the way(s) in which target clientele can use/benefit from the research conducted during their apprenticeship experience; and (d) evaluate the effectiveness of a particular educational activity or tool as part of a larger Extension program. Table 2 describes the various assessment methodologies identified for each student-centered outcome.

Table 2

Assessment Methodologies Employed for Targeted Student-centered Outcomes

Student-centered outcomes	Assessment methodology
Summarize the significance of research-based outreach and education	Periodic reflective discussions between the student and his mentor; Analysis of the students' reflective journals
Give examples of how their work contributed to the Cooperative Extension mission	
Demonstrate the way(s) in which target clientele can use/benefit from the research conducted during their apprenticeship experience	Student poster or oral presentation at a professional meeting/conference; Contribution to development of Extension publication(s)
Evaluate the effectiveness of a particular educational activity or tool as part of a larger Extension program	Development of an evaluation tool and/or analyzing and interpreting data

In order to complete the requirements of the program, each apprentice must: a) successfully meet the learning objectives identified by and with the Extension mentor for their specific apprenticeship experience; b) maintain and submit a weekly electronic critical reflection journal; and c) develop and present a poster or presentation at an industry-related conference or meeting identified by the Extension mentor. Additionally, the apprentices are expected to work with Extension personnel to coordinate research and implement related outreach activities; participate in meetings where local issues are identified and prioritized, and program

results and plans are discussed; assist in preparations for planned events and activities; and conduct teaching, training or other Extension program presentations, as appropriate.

As the apprentices travel with their mentor and other Extension personnel, they will inevitably interact with individuals that represent the industries, commodities or communities that Extension research and outreach are intended to impact. Observational visits, as part of an apprenticeship -- to existing or potential clientele -- can stimulate innovative ideas through the sharing of tacit knowledge (Leonard & Sensiper, 1998). While these types of interactions are not tracked formally through this program, it is expected that the students contemplate and write about them in their reflection journals as meaningful experiences.

Additionally, the Program Director regularly monitors student progress through site visits, observations, and informal discussions with the faculty mentors. Although this process is limited because of its potential subjectivity, the lack of formality may encourage more honest and open feedback that will contribute to strengthening the program for the future. In order to determine the long-term impacts and possible correlations between the apprenticeship experience and career and/or graduate school decisions, student participants are contacted up to a year after completion of their apprenticeship to track their current job and/or educational status and future plans.

The Mississippi Institutional Review Board deemed an evaluation of the 2017 and 2018 cohorts to be exempt from review. An analysis of the first two years of the program revealed the following positive outputs and outcomes (Denny & Hardman, 2018). In collaboration with their respective mentors, apprentices produced fourteen poster presentations and six Extension publications, gave eight oral presentations at professional conferences – one international, and co-authored two journal manuscripts. Fifty-three percent (n=9) will “likely” pursue an Extension career as a result of their experience as an apprentice. Sixty-eight percent (n=13) reported that they are “likely” or “extremely likely” to pursue a graduate degree related to agriculture, natural resources, family and consumer science, youth development, community resource development, or human sciences as a result of the apprenticeship.

Students agreed or strongly agreed they had an increase in: knowledge of their discipline of study (74%, n=14), ability to interact and work with people of different disciplines (79%, n=15), and skills in critical (63%, n=12), problem-solving (84%, n=16), teamwork (74%, n=14), written (63%, n=12) and oral (74%, n=14) communication. To date, three (38%) of the seventeen students have chosen to pursue an agriculture- or extension-related graduate degree as a direct result of their apprenticeship experience. All but one student said they would share their experience with others.

Mentors reported a positive experience with their respective undergraduate apprentice. Six of the eight Extension mentors in 2017 submitted applications for 2018. Of those, four were again selected to mentor students in 2018. Total Mississippi faculty submissions of applications for the 2018 round of undergraduate apprenticeships increased by 16%.

Based on faculty and student feedback to date and a process evaluation of the overall program after Year 1, minor changes were made for the 2018 cohort to enhance the efficacy of the program and the students' and mentors' experience. These include moving the reflective journals to an online, Qualtrics-based survey format; providing more guidance to faculty about their roles and expectations as mentors to the students throughout the summer, rather than just at the beginning; and providing more opportunities for the students and faculty to communicate and share ideas as a true cohort throughout the summer, rather than function as separate mentor-mentee pairs.

An additional bank of questions aimed at determining the students' perceptions of their mentor's effectiveness on several key criteria were added to the follow-up surveys administered to the nine students that participated in Year 2, the summer of 2018. The students reported that their mentors were either "Very Effective" or "Extremely Effective" at helping them: find and understand information (56%, n=5); understand the relationship between Extension and research (89%, n=8); think critically (89%, n=8); solve problems (89%, n=8); articulate their learning (89%, n=8); work independently (89%, n=8); engage in teamwork (78%, n=7); take strategic risks in their learning (67%, n=6); and take responsibility for their learning (89%, n=8). From this, the authors determine that the mentor relationship with the student apprentices are generally effective, though there is always room for improvement via additional mentor training and formative evaluations of the mentor-mentee relationship.

Conclusions, Discussion, and Recommendations

As this program continues, there will be some major changes to the program process. First, in light of complications with 2017 and 2018 students' academic schedules and issues with non-Mississippi students' ability to obtain housing after July, the apprenticeships will be reduced from 12 weeks to 10 weeks, starting after May 1st (to accommodate students' various spring semester schedules) and ending by July 31st of each year.

Second, rather than send a blanket request for proposals from all specialists and associates with Extension appointments, the Program Director will communicate with Mississippi Extension administration to identify specific personnel with Extension research and education programs that are critical to the needs of Mississippi stakeholders but are at risk of ending because of retirements, attrition, reduced budgets and resources, and/or limited staff. These individuals will be asked to submit integrated research and extension project proposals that can start the process to train students in their area(s) of specialization, in the hopes that these students will carry on these Extension research and outreach programs and/or pursue graduate studies in support of them in the future.

Finally, selected individuals will be allowed to mentor more than one student at a time, if desired. This hopefully will encourage the students to learn from and build relationships with not just the mentor, but each other. When asked what they would change about the program, the apprentices commented that opportunities to work more cohesively as a student cohort,

rather than solely with individual mentors, would have enhanced their overall experience. Allowing a single Extension personnel to mentor multiple students simultaneously will allow students the opportunity to work with one another.

From a practical perspective, the integrated approach of the Mississippi Extension Undergraduate Program of engaging students in the various aspects of Extension research, program planning and development, implementation via outreach, and evaluation embody Nancy Franz's (2009) Engaged Scholarship Model. Extension administrators expressed a desire to improve awareness of Extension and recruitment of potential candidates for Extension careers in Mississippi, after noticing a growing trend of higher turnover and fewer applicants for open positions. The initial design of the overall program was proposed with the intent to address this issue, or *discovery of new knowledge*. A U.S. Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA) Education and Literacy Initiative (ELI) Research and Extension Experiences for Undergraduates (REEU) Fellowship Program grant enabled the *development of new knowledge* via the implementation of the apprenticeship program for two years. The tangible outputs developed by the students in the form of journal manuscripts, scientific posters, Extension publications, and direct teaching based on related research represent a *dissemination of new knowledge*. Finally, the program evaluation data has revealed a significant *change in learning and behavior*. Since the authors received a five-year renewal grant to continue this program through 2023, there is the expectation of evidence of a *change in condition*, such as sustained administrative support and funding beyond the grant period, buy-in from Extension faculty and other personnel to support and engage students in undergraduate research, and a broader audience of stakeholders that understand and value the Cooperative Extension system.

Acknowledgements

This research was supported by the FY16 USDA NIFA AFRI ELI REEU Fellowships Program of the NIFA, USDA, Grant #2017-67033-26015.

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