

## **A Review of Literature on Capstone Courses in Agriculture**

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## **Introduction**

Capstone courses are transformative learning experiences that, historically, focus on career preparation and serve as a bridge to the world of work after graduation. In the twenty-first century classroom, these courses are high-impact academic experiences that address an array of critical educational processes and outcomes related to the application of learned skills. Capstone courses integrate theoretical knowledge and practical skills gained throughout their academic journey to prepare them for their future careers while providing a comprehensive overview of their chosen areas of interest or career fields. The ideal environment of a capstone course is a combination of intellectual challenge, academic support, and collaborative opportunity (Hauhart & Grahe, 2015). Capstone courses are organized and implemented in various ways but have not resulted in a widely accepted definition. Literature has identified capstone courses as a means to successfully test a students' employable skills and career readiness (Rinker et al., 2017).

The integration of capstone courses into departmental curriculum is a way to assess a students' ability to articulate their learned skill set. In capstone courses with projects or immersive experiences, students are encouraged to make management decisions and direct their own learning. Capstone courses are expected to integrate, build on, and develop academic knowledge and skills while also developing a wide range of personal and professional capabilities that connect students to their future career paths (Lee & Loton, 2019). As capstones continue to gain popularity, a clear understanding of which components are most important will be critical to design. There is limited understanding and empirical data that identify which areas of capstone design are most important (Lee & Loton, 2019; Melonçon & Schreiber, 2018).

## **Research Question**

Our literature review explores the characteristics of agriculture capstone courses presented in research. The goal of this study was to identify the approaches by synthesizing the various aspects of capstone courses and related experiences. This review of literature was guided by the following research questions:

1. What are the significant features of the included studies such as university size, location and undergraduate major?
2. What are the methodological features of the included studies such as sample size, type of study, and methods used.
3. What are the characteristics of effective capstone courses in agriculture for undergraduate students?
4. What is the impact of capstone courses on students' learning outcomes in undergraduate agricultural majors.

By investigating the characteristics, outcomes, and effectiveness of these courses, the review allows understanding of the role/impact of capstone projects in agricultural education.

## **Methodology**

To obtain a comprehensive overview of how capstone courses are generally organized, relevant research articles were searched. This scoping review was conducted using JBI Scoping Review Framework (Peters et al., 2020). Scoping reviews clarify working definitions and conceptual boundaries of a topic or field and are useful when a body of literature has not been comprehensively reviewed (Peters et al., 2020). The PRISMA-ScR (Tricco et al., 2018) checklist guided the reporting. First, objectives and research questions were defined. Second, inclusion criteria were developed to support the research questions. Third, a plan was created for finding, selecting, coding and presenting the evidence. Fourth, databases and journals were searched for appropriate literature. Fifth, studies that fit the inclusion criteria were selected. Sixth, relevant information was taken from the studies. Seventh, data taken from the studies was analyzed. Finally, results were presented along with future research directions.

Databases covering the disciplines of agriculture and education were searched including AGRICOLA (EBSCO), JSTOR, Education Source (EBSCO), Web of Science and ERIC (EBSCO). Two core concepts supported the research question: capstone course and agriculture. Preliminary searches were conducted on these databases to verify research articles would use the word “capstone” and its synonyms when describing project courses in agricultural programs. The synonyms and subject terms were joined with “or” to create a concept cluster and the two concept clusters were joined with “and” (Xu et al., 2023). Literature selected for review met the following inclusion criteria: studies examined the effect capstone courses had on agricultural majors, were published in peer reviewed journal or as a conference proceeding or a dissertation from January 2000 to June 2023, assessed the impact of capstone courses on agricultural majors, reported detailed information on the effect capstone courses had on agricultural majors, and were studies conducted in agricultural majors at undergraduate colleges or universities. In total, 38 articles were selected for review through the inclusion criteria.

## **Findings & Conclusion**

In a descriptive study by Iowa State University, researchers determined that Agricultural Education majors found real world agricultural problems more impactful than hypothetical case studies found in other classes (Trede & Andreasen, 2000). In a more recent study conducted at Virginia Tech, researchers collected similar responses (Hall et al., 2017). It is important when comparing these studies to note how different each capstone experience is designed. These are two studies of many that report the same results while using different design methods. Through this review, we identified factors important to course design, what indicates assessment as most effective, and what measurements are necessary to evaluate a capstone course. The resulting findings provide educators with an effective tool for planning and implementing their own capstone courses. Exploring the relationship among factors influencing capstone courses allow methods to be refined and duplicated; thus, providing educators a roadmap.

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