

An Exploration of College of Agriculture Students' Beliefs in Evolution

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Evolution, at its core, is the process by which genetic information is passed and changed over the course of many generations, which is commonly referred to as descent with modification in the scientific community (University of California, Berkley, 2020). Evolution is often discussed through three different lenses: macroevolution, microevolution, and human evolution.

Macroevolution is the process by which taxonomic groups came to be, while microevolution is the process in which species evolve over time (Hautmann, 2020). Human evolution focuses on specifically the *Homo sapiens* species and its changes over generations. These three facets of evolution all share the same mechanisms: natural selection, mutation, genetic drift, gene flow, and non-random mating (Pavitt, 2025). Within the context of agriculture, the evolutionary processes are typically referred to as selective breeding, or the intentional breeding of two organisms to produce or enhance a particular genetic trait, further shaping the gene pool of the population (Singha & Singha 2024). Agriculture is the human practice of evolution; breeding for better quality, taste, size, and shape are all examples (Singha & Singha 2024). While these evolutionary mechanisms may provide the basis for all biology, including agriculture, students in university-level biology courses have historically demonstrated fundamental misunderstandings of evolution (Hsu et al., 2024; Nadelson & Southerland, 2012). In fact, 46% of American adults do not accept the theory of biological evolution (Miller et al., 2022). Further compounding the problem is the fact that educators have also reported facing difficulties when teaching evolution, explaining that they fear backlash from the community and even losing their jobs (Borgerding et al., 2015; Goldston & Kyzer, 2009; Tolman et al., 2021). The southern U.S., colloquially known as the "Bible Belt", has been historically vulnerable to these discussions of teaching evolution related to the presence of religion in the classroom (Onion et al., 2025; Rosenberg, 2014). If students are struggling to understand the mechanisms of evolutionary science (Hsu et al., 2024; Nadelson & Southerland, 2012), there could be lasting impacts on agricultural literacy in the future. To help inform agricultural education related to teaching these fundamental principles of evolution, the purpose of the research was to explore University of Tennessee, Knoxville (UTK) students' educational experiences, religious beliefs, and theory of biological evolution beliefs.

Conceptual Framework

Cognitive dissonance, or the mental discomfort that occurs when individuals hold conflicting information or knowledge, served as the conceptual framework for this research (Festinger, 1957). As a major research institution located within the Bible Belt (Rosenberg, 2014), we expect UTK students may experience cognitive dissonance related to their beliefs in evolution as they try to balance their religious and cultural upbringing with the information they are learning at the university, particularly those in the college of agriculture. Researchers have found that to lessen the mental discomfort associated with conflicting knowledge, individuals must mentally discard, or even devalue, one of the pieces of information (Festinger, 1957; Cooper, 2007). However, students will likely find it difficult to resolve mental conflict between their religious beliefs and scientific theories, like evolution, that serve as the cornerstone for biology. Educators need to be able to engage students in these discussions in ways that do not cause additional tension or anxiety, thus maintaining an emotionally safe learning environment while promoting science literacy (Borgerding et al., 2015; Goldston & Kyzer, 2009; Tolman et al., 2021).

Methods

In order to fulfill the purpose of this study, quantitative data were collected through an online survey instrument distributed in August 2025. An anonymous survey link was distributed to a 200-level, online general education class of 48 students in the Herbert College of Agriculture at

UTK. No members of the research team were directly involved with the class at any level, and students were offered extra credit points as an incentive for their participation. A total of 32 students participated in the study ($n = 32$; 66.7% response rate). Multiple choice questions analyzed for this study asked students to select what college they belonged to, where they had previously learned about the theory of biological evolution, and their religious affiliation. Four constructs were also asked to measure strength in religious faith, and beliefs in micro evolution, macro evolution, and human evolution. The beliefs in evolution constructs were measured through three, 8-item, 5-point Likert-type scales adapted from Nadelson and Southerland (2013) to measure beliefs in micro, macro, and human evolution. The scale for each ranged from 1 = *strongly disagree* to 5 = *strongly agree*. Strength in religious faith was also measured with an established 10-item, 5-point Likert-type scale (Plante, 2010) – all constructs were reliable with a Cronbach’s alpha greater than .70 (Field, 2013). Data were analyzed in SPSS, and the average of the items for each of the four constructs were calculated to create the indexes. Frequencies, means, and standard deviations for the variables of interest are reported.

Results

Approximately half (53.1%) of respondents belonged to the college of agriculture and 31.1% college of arts and sciences. The remaining respondents belonged to other colleges, like architecture and design or business. The majority (68.8%) of respondents reported learning about biological evolution in their high school classes, while 71.9% responded reported having learned about biological evolution in their college courses. When asked about religious affiliation, 68.8% indicated they were Christian, followed by 18.8% being agnostic. The remaining respondents affiliated with a non-Christian religion or identified as atheists. Overall, respondents possessed a positive strength in religion ($M = 4.08$; $SD = 0.97$). Regarding beliefs in biological evolution, respondents most respondents agreed with microevolution ($M = 4.06$; $SD = 0.73$) and macroevolution ($M = 3.62$; $SD = 0.82$). The lowest level of level of agreement was for human evolution, which reflected neutral perceptions of agreement ($M = 3.57$; $SD = 1.00$).

Conclusions, Implications, and Recommendations

There is a need to strengthen science literacy and education in school systems as college students are reporting a lack of acceptance of biological evolution (Hsu et al., 2024; Nadelson & Southerland, 2012). The majority of respondents in this sample had previously learned about evolution in high school or college-level biology classes, but there appeared to be potential differences across beliefs in micro, macro, and human evolution concepts with large standard deviations for each variable. These differences may be attributed to different religious ideologies in the U.S. (Nadelson & Hardy, 2015). The majority of this sample identified as Christian and reported a positive strength in religious beliefs. However, respondents possessed neutral beliefs in human evolution despite positive beliefs for the other evolution concepts. This apparent divergence in religious beliefs and human evolution beliefs represents the potential for students to be experiencing cognitive dissonance when discussing human evolution concepts (Festinger, 1957). When teaching the theory of biological evolution, educators should start with discussion of microevolution to minimize the potential feelings of cognitive discomfort for students whose religious beliefs do not support the theory evolution, thus reducing the chance they reject the information all together (Festinger, 1957). The study provides preliminary insights into southern university students’ beliefs in evolution but cannot be generalized; therefore, future research should expand to a larger population of students. Additionally, qualitative research should further explore students’ cognitive dissonance when exposed to concepts of biological evolution as well as how students connect this information to agricultural concepts.

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