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Entrepreneurial Competencies in High School Agricultural Education: Assessing Educator Perceptions, Gender Differences, and Professional Development Needs

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Abstract

School-based agricultural educators play a critical role in building students' entrepreneurial and employability competencies by shaping learning experiences and supervising entrepreneurship projects. However, many educators do not receive formal preparation in entrepreneurship during their training. This *ex post facto* quantitative study investigates agriculture educators' perceived entrepreneurial competencies, including differences between male and female teachers, regarding the perceived importance of entrepreneurial competencies in their role. A total of 301 agricultural educators in Missouri responded to the survey. Despite limited formal entrepreneurship education, most educators *agreed* they possessed 11 of the 12 assessed entrepreneurship competencies. The top four entrepreneurship competencies were independence, leadership skills, opportunity assessment, and resilience, while social networking received the lowest score. These data raise questions about the possible relationship between entrepreneurial competencies and competencies needed of agricultural educators, and to what extent teaching agriculture attracts or develops entrepreneurial competencies. Researchers recommend investigating what autonomous or entrepreneurial components of agricultural education may contribute to developing educators' entrepreneurial competencies. Researchers propose incorporating entrepreneurship training in teacher preparation programs and professional development, emphasizing social networking skills to promote their social capital and professional networks for information sharing, increasing their visibility and career growth.

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Introduction and Problem Statement

Agricultural educators play a pivotal role in building human capital for the agricultural sector by preparing students for higher education or entry into the workforce (Barrick, 1992; Phipps et al., 2008). Educators leverage their interdisciplinary expertise and in-depth knowledge to guide and mentor students in applying abstract concepts to real-world situations, both inside and outside the classroom (Mukembo et al., 2023). Entrepreneurship is a critical aspect of the school-based agricultural education (SBAE) curriculum, especially within students' supervised agricultural experience (SAE) Program (Brown & Knobloch, 2022; Phipps et al., 2008). One in three United States SBAE students with an SAE have an ownership component, where students can create real-world entrepreneurial ventures. The agricultural educator is often the primary (and only) business advisor for students (Hanagriff, 2024; Heinert & Roberts, 2018).

Agricultural educators need unique entrepreneurship knowledge and competencies to effectively guide students in their entrepreneurial endeavors (Mukembo, 2017). Regrettably, many educators receive minimal or no training in entrepreneurship during their teacher preparation (Tummons et al., 2023). A recent survey conducted by the authors in 2023 revealed that 79% of educators in Missouri received no training in entrepreneurship during their teacher preparation programs. Lack of training may hinder an educator's ability to provide effective guidance to students pursuing entrepreneurial endeavors. Despite the integration of entrepreneurship into the high school agricultural curriculum (Heinert & Roberts, 2017, 2018), limited research explores entrepreneurial competencies possessed by agricultural educators, or how they acquire these competencies to fulfill their role as entrepreneurship advisors. Further, although numerous studies have documented gender differences in entrepreneurial competencies and aspirations, finding that males are more likely to pursue entrepreneurial ventures than females (Abbasianchavari & Block, 2022; Cowling & Taylor, 2001; Koellinger et al., 2008, 2011; Mukembo et al., 2020; Revell-Love & Revell-Love, 2016; Shahriar, 2018), no research has explored this phenomenon in the context of agricultural educators. Identifying gaps in entrepreneurial competency impacting teachers' ability to foster student entrepreneurial projects could allow for professional development in deficient areas, contributing to Sustainable Development Goal #4, ensuring inclusive and equitable Quality Education, including opportunities for lifelong learning.

Theoretical and Conceptual Framework

Researchers integrated the human capital theory (Becker, 1993; Schultz, 1961, 1972) to guide this inquiry. Human capital theory is a grand theory which posits individuals can enhance their knowledge, skills, and abilities through education and professional development, ultimately boosting their self-efficacy, productivity, and incomes (Hartog & Van den Brick, 2007). Investments in human capital through education bring about positive returns to both the individual and society (Becker, 1993; Sweetland, 1996). Human capital investments have transformative potential; differences in wealth and economic development among nations has been attributed to investments made in their human capital (Schultz, 1961, 1972).

Furthermore, since this study involved evaluating teacher's entrepreneurial competencies, we also integrated the substantive competency-based theory (CBT). CBT theorizes specific competencies can be identified and measured based on an individual's behaviors and actions (Klein-Collins, 2013; Makulova et al., 2015). Entrepreneurship competencies and actions are reflected in the individual behavior of teachers as they work to guide students on their entrepreneurship projects. The CBT also suggests individuals can receive training to improve their personal competencies within a specific field, such as entrepreneurship, to achieve specific goals and tasks (Morris et al., 2013; Schenkel et al., 2022), thereby enhancing their human capital (Venesaar et al., 2022). Building an individual's entrepreneurial competencies contributes to their human capital, so integrating these two theoretical approaches allowed researchers to conduct a holistic assessment of the survey data and develop appropriate recommendations for research and practice.

Purpose

The purpose of this study was to investigate the entrepreneurial competencies of agricultural educators and their perceived importance of entrepreneurship in the context of SBAE. This report is part of a larger study which aimed to explore teachers' entrepreneurial competencies, and the role played by these competencies in building a competent and innovative workforce to address the wicked problems in agriculture as well as economic development challenges. Four objectives undergirded this study:

1. Describe agricultural educators' self-perceived entrepreneurial competencies.
2. Explore educators' perspectives regarding the significance of entrepreneurship knowledge in their work.
3. Determine differences between male and female agricultural educators regarding the importance of entrepreneurship knowledge in their work.
4. Describe the perceived need for entrepreneurship professional development among agricultural educators.

Methods

This *ex post facto* quantitative study was approved by the Institution's Review Board. Data were collected through an online Qualtrics survey. Researchers utilized two existing instruments (Morris et al., 2013; Mukembo, 2017) to measure teachers' self-perceived competence across 12 entrepreneurial constructs. Because of the adaptations made to the original instruments, researchers conducted a pilot test with student teachers from the Department of Agricultural Education, Communication & Leadership at Oklahoma State University; feedback from the pilot was used to improve readability and construct reliability on the final instrument. The final survey instrument had 60 Likert-type prompts to measure the 12 entrepreneurship competence constructs of creative problem-solving, independence/autonomy, innovativeness, leadership, opportunity assessment, opportunity recognition, opportunity exploitation, resilience, risk-taking, social networking, tenacity/perseverance, and being visionary. Other single-item rating statements were used to measure the importance of entrepreneurship knowledge to the agriculture teachers' work, including the need for professional development

in this area. These items were anchored as *Strongly Disagree* (1), *Disagree* (2), *Neither Agree nor Disagree* (3), *Agree* (4), and *Strongly Agree* (5) (Boone & Boone, 2012; Joshi et al., 2015; Lindner & Lindner, 2024). To guide our interpretation of the scores, we set *a priori* and adopted the true scale limits as *Strongly Disagree* (1 – 1.5), *Disagree* (1.51 – 2.5), *Neither Agree nor Disagree* (2.51 – 3.5), *Agree* (3.51 – 4.5), *Strongly Agree* (4.51 – 5) (Linder & Linder, 2024).

Researchers estimated instrument reliability using Cronbach's alpha instead of relying on previously published reliability data, which did not reflect the population for this study (Tavakol & Dennick, 2011). The final reliability estimate for each construct was: creative problem solving (α = 0.83), innovativeness (α = 0.79), leadership (α = 0.72), resilience (α = 0.82), networking and social (α = 0.80), visionary and futuristic orientation (α = 0.81), risk management techniques (α = 0.73), opportunity recognition competencies (α = 0.83), opportunity exploitation (α = 0.86), and opportunity assessment competencies (α = 0.73), independent or autonomous (α = 0.65), and tenacity and perseverance (α = 0.69). These Cronbach's alpha reliability estimates are deemed acceptable within the social sciences (Berthoud, 2000; Field, 2013; Murphy & Davidshofer, 2004; Nunnally, 1967; Tavakol & Dennick, 2011).

The instrument was also assessed for content and face validity by a panel of experts from entrepreneurship and agriculture education (Clark et al., 2021; Creswell, 2014). After researchers modified the instrument based on feedback from the panel and pilot, the survey was distributed to a population of 535 agriculture teachers in Missouri via Qualtrics, during the months of March and April 2023 with three weekly follow-up email remainders to nonrespondents. To encourage participation, we offered an incentive of entering participants names into a raffle for a chance to win one of the 10 Amazon gift cards, each valued at $50. A total of 301 teachers (56.26%) responded to the survey, adequately representing the target population (Krejcie & Morgan, 1970). Data were cleaned, and in the process, we removed 44 empty responses that were submitted. This left us with 257 valid responses for analysis which still met the threshold for acceptable sample size for a population of 535 (Krejcie & Morgan, 1970). Data analysis was performed using SPSS, including a t-test to determine differences based on reported sex.

Findings

Participant Demographics

Almost an equal number of participants self-identified as females (*f* = 50.6%) and males (*f* = 49.4%) respectively. An overwhelming majority (*f* = 89.5%) of participants identified as being White. Respondents had an average of 12 years of teaching experience, and 53% indicated that they had or were pursuing a graduate degree. The modal age rage was between 35-44 years (27.6%), followed by 25-34 age range (25.7%). One hundred and eighty-four teachers (78.30%) had not received entrepreneurship training, whereas 51 teachers (21.70%) had received training.

Objective #1: Describe Agricultural Educators' Perceived Entrepreneurial Competencies

For objective one, teachers rated their perceived entrepreneurship competence based various Likert item statements on a scale of *Strongly disagree* (1) to *Strongly agree* (5). The 60

statements were aggregated into 12 entrepreneurship constructs and analyzed as interval data. Based on the established true limits of the scale, teachers *agreed* (3.51 – 4.5) they possessed 11 of the 12 entrepreneurial competencies, including independence (*M* = 4.35, *SD* = 0.52), leadership skills (*M* = 4.07, *SD* = 0.42), opportunity assessment (*M* = 4.07, *SD* = 0.47), resilience (*M* = 4.00, *SD* = 0.46), visionary, opportunity exploitation (*M* = 3.85, *SD* = 0.57), creative problem solving (*M* = 3.81, *SD* = 0.65), risk management (*M* = 3.65, *SD* = 0.56), opportunity recognition (*M* = 3.62, *SD* = 0.64), and innovativeness (*M* = 3.55, *SD* = 0.6). The teachers neither *agreed nor disagreed* about possessing social and networking competencies (*M* = 3.27, *SD* = 0.77); see Table 1. None of the educators *strongly agreed*, *disagreed*, or *strongly disagreed* about possessing any of the 12 entrepreneurship competencies.

Table 1

Agricultural Educators' Perception of the Various Entrepreneurial Competencies (N = 235)

Entrepreneurship Competency Ranking[a]	*Overall mean (SD)* *N* = 235	No training[b] *n* = 184		Training[c] *n* = 51	
		Female *n* = 96	Male *n* = 88	Female *n* = 23	Male *n* = 28
Independent or autonomous	4.35 (0.52)	4.34 (0.53)		4.38 (0.50)	
		4.29 (0.55)	4.38 (0.49)	4.26 (0.51)	4.48 (0.48)
Leadership skills	4.07 (0.42)	4.07 (0.42)		4.06 (0.43)	
		4.08 (0.40)	4.05 (0.44)	4.06 (0.42)	4.06 (0.43)
Opportunity assessment	4.07 (0.47)	4.06 (0.46)		4.07 (0.48)	
		3.99 (0.44)	4.14 (0.48)	4.02 (0.54)	4.11 (0.42)
Resilience skills	4.00 (0.46)	4.00 (0.46)		4.02 (0.48)	
		3.98 (0.44)	4.02 (0.50)	3.98 (0.54)	4.06 (0.42)
Visionary	3.93 (0.53)	3.92 (0.53)		3.97 (0.49)	
		3.92 (0.49)	3.91 (0.58)	4.17 (0.50)	3.79 (0.45)
Opportunity Exploitation	3.85 (0.57)	3.82 (0.61)		3.93 (0.41)	
		3.86 (0.58)	3.78 (0.65)	3.90 (0.40)	3.96 (0.41)
Creative Problem Solving	3.81 (0.65)	3.79 (0.65)		3.89 (0.62)	
		3.76 (0.66)	3.81 (0.64)	3.76 (0.61)	3.99 (0.63)
Tenacity/ Perseverance	3.68 (0.54)	3.65 (0.57)		3.79 (0.40)	
		3.66 (0.54)	3.65 (0.61)	3.70 (0.45)	3.87 (0.35)
Risk management techniques	3.65 (0.56)	3.62 (0.58)		3.73 (0.49)	
		3.50 (0.57)	3.74 (0.57)	3.67 (0.63)	3.79 (0.35)
Opportunity recognition	3.62 (0.64)	3.60 (0.65)		3.69 (0.55)	
		3.61 (0.67)	3.57 (0.64)	3.54 (0.61)	3.82 (0.47)
Innovativeness	3.55 (0.60)	3.50 (0.62)		3.72 (0.51)	
		3.41 (0.60)	3.60 (0.63)	3.58 (0.55)	3.82 (0.46)
Social Networking	3.27 (0.77)	3.19 (0.79)		3.55 (0.63)	
		3.16 (0.76)	3.22 (0.81)	3.49 (0.67)	3.60 (0.61)

Note: [a] *a priori* true scale limit was used and anchored as *Strongly Disagree* (1 – 1.5), *Disagree* (1.51 – 2.5), *Neither Agree nor Disagree* (2.51 – 3.5), *Agree* (3.51 – 4.5)*, Strongly Agree* (4.51 – 5). The ranking of the entrepreneurial competencies is based off the overall mean scores for the two groups, i.e., those that received training and those that did not. Scale *Strongly disagree* (1), *Disagree* (2), *Neither Disagree or Agree* (3), *Agree (*4), *Strongly Agree* (5). [b]No training ranking includes educators who indicated not having received entrepreneurship training/course work during their teacher preparation course work. [c]Training refers to educators that received training/coursework in entrepreneurship during their teacher preparation course.

Objective #2: Explore Educators' Perspectives Regarding the Significance of Entrepreneurship Knowledge in their Work.

A large majority of respondents (*n* = 247, 96.1%; see Table 2) *strongly agreed* or *agreed* entrepreneurship knowledge was relevant to their teaching. Only 1.2% (*n* = 3) *strongly disagreed* or *disagreed* entrepreneurship was relevant to their teaching, and 2.7% (*n* = 7) neither agreed nor disagreed with this statement (see Table 2).

Table 2

Educators' Perceptions Regarding the Importance of Entrepreneurship Knowledge to their Work. (N = 257).

Entrepreneurship is relevant to my work as an agriculture teacher	*n*	*%*
Strongly Agree	126	49.0%
Agree	121	47.1%
Neither Agree nor Disagree	7	2.7%
Disagree	1	0.4%
Strongly Disagree	2	0.8%

Objective #3: Determine Differences between Male and Female Agricultural Educators Regarding the Importance of Entrepreneurship Knowledge in their Work.

For objective three, researchers utilized an independent samples t-test to determine whether differences existed between males and female educators' perception regarding the importance of entrepreneurship knowledge to their work. The 116 male respondents (M = 4.46, SD = 0.59) were not significantly different from the 119 female respondents (M = 4.43, SD = 0.71) in the reported relevance of entrepreneurship to their job as agricultural educators $t(233) = 0.364$, $p = 0.358$. The test for differences between sex on perceived relevance yielded a *medium* effect size $d = 0.66$.

Objective #4: Ascertain the Perceived Need for Entrepreneurship Professional Development among Agriculture Educators.

For objective four, over nine in 10 educators (*n* = 237, 92.2%) *strongly agreed* or *agreed* educators needed training in entrepreneurship to help them be effective working with students SAE - entrepreneurship projects. Sixteen teachers (6.2%) neither agreed or disagreed with the need for educators' entrepreneurship professional development, whereas 1.6% (*n* = 4) disagreed or strongly disagreed with the need to provide professional development for educators in entrepreneurship (see Table 4). Of teachers who responded to this question, 79% (*f* = 203) did not receive entrepreneurship training in their teacher preparation coursework.

Table 4

Perceived Need for Entrepreneurship Professional Development among Agricultural Educators (N = 257).

Item	*n*	*%*
Strongly Agree	81	31.5%
Agree	156	60.7%
Neither Agree nor Disagree	16	6.2%
Disagree	3	1.2%
Strongly Disagree	1	0.4%

Conclusions, Discussion, and Recommendations

Based on these data, researchers conclude agricultural educators *agree* they feel competent in 11 of the 12 entrepreneurship competencies. The only entrepreneurship competency where teachers were uncertain and fell below the true limits of the scale was about their competence with social networking skills. None of the educators *strongly agreed*, *disagreed*, or *strongly disagreed* about possessing any of the 12 entrepreneurship competencies.

These data left researchers searching for explanations on the source of teacher entrepreneurial competence, despite most lacking formal entrepreneurship education during their teacher preparation. One potential explanation could be the relatively autonomous structure of secondary agricultural education programs, where teachers manage various learning laboratories, such as greenhouses, mechanics, and meat processing laboratories that often operate as small entrepreneurial ventures. These small enterprises may require teachers to develop and utilize competencies parallel to the skills of entrepreneurs. Also, questions arose about how on-the-job learning, years of experience, and educators' own background as agriculture students contribute to acquiring entrepreneurship competencies.

The researchers recommend investigating if years of experience and laboratory management are predictive of teacher entrepreneurial competency. A second explanation for high levels of entrepreneurial competence is many agriculture educators were former agriculture students themselves; did these educators gain entrepreneurial competencies through their own high school entrepreneurship projects? Do the agriculture educators who farm outside of school or have a "side hustle" have different levels of entrepreneurial competence? The researchers recommend further investigation into how high school and SAE supervision experiences contribute to the development of entrepreneurial competencies. Perhaps individuals with high entrepreneurial competencies are drawn to careers teaching agriculture. We recommend further research on the genesis of agriculture educator entrepreneurship competencies.

Our research revealed that educators were uncertain about social networking competencies, despite the assumption agricultural teachers needing social networking skills for their professional success as agricultural educators. Social networking encompasses the ability to

interact effectively, comprehend social contexts, and cultivate both personal and professional relationships with peers. Despite uncertainty about their abilities, social networking skills are vital for educators to enhance their collaboration, foster professional development, enhance student engagement, and facilitate effective communication (Baker-Doyle, 2011; Kaihoi et al., 2022; Marcelo-Martínez et al., 2024). Social networking can also help educators manage stress, promote emotional well-being and reduce attrition (Baker-Doyle, 2011; Kaihoi et al., 2022). Further, social networking competencies enable educators build and maintain a sense of community within their classrooms and schools while also strengthening interactions between parents and the broader community. Proficiency in social networking allows educators to build valuable social capital and professional networks, essential for information sharing, increasing professional visibility, and promoting career growth and well-being (Baker-Doyle, 2011; Staudt Willet, 2024). And, in an increasingly digital world, these competencies can help educators stay relevant and better prepare students for future challenges and opportunities.

Given the crucial nature of these competencies, we strongly recommend educators actively work on enhancing their social networking competencies. This can be achieved through various means, including joining professional networking organizations specific to education and building communities of practice where they can connect with peers and share relevant resources (Baker-Doyle, 2011; Staudt Willet, 2024). Attending conferences and webinars provides excellent opportunities to engage with like-minded professionals, expand their knowledge base and networks. Further, developing professional learning networks can be another effective strategy for ongoing professional growth and collaboration (Baker-Doyle, 2011; Staudt Willet, 2024). Additionally, educators should explore ways to leverage social media platforms for classroom engagement, which can simultaneously improve their social networking skills and enhance student learning experiences (Marcelo-Martínez et al., 2024). By implementing these recommendations, teachers can bridge the gap between their current uncertainty and the growing demand for social networking proficiency in agricultural and entrepreneurship education.

Educators desire entrepreneurship-focused professional development. Researchers recommend training to improve social networking skills for building professional and community connections. This can be achieved by providing educators with trainings in effective communication strategies especially in professional settings, developing workshops aimed at building and maintaining relationships with students, parents, and community leaders. Educators should also be empowered to use social networking platforms to expand their professional networks, including equipping them with techniques for initiating and nurturing collaborations with other educators and institutions. We also suggest development in creative problem solving which can be achieved through introducing educators to design thinking methodologies, exercises in lateral thinking such as mind mapping and brainstorming techniques that they can use with their students to generate ideas and develop a growth mindset (Neck et al., 2024). Regarding the innovation competency, educators can receive training in emerging technologies, including artificial intelligence to enhance their teaching and engagement with students during ideation stage in design thinking to develop creative solutions.

The competencies of opportunity recognition and exploitation could be enhanced by equipping educators with skills to help students identify needs or market gaps through customer discovery techniques and market research, including transforming ideas into actionable business ventures through the lean start up approach (Ries, 2011). Further, educators need to be equipped with skills to evaluate and mitigate risks, crisis management, and developing contingency plans to deal with unexpected events. Helping educators to develop strategies for overcoming setbacks and learning from failure, including developing techniques to maintain motivation and focus on long-term goals through peer support systems can help them become resilient, persevere, reduce burnout, and attrition rates. Also, visionary thinking among educators can be enhanced through long term strategic planning and inspiring others towards a shared vision to help them stay focused and accountable as they guide their students. All these competencies can be developed through professional development programs which might include a structured curriculum with theoretical and practical entrepreneurial applications, including experiential leaning opportunities involving hands-on, minds-on projects and simulations to apply the skills learned. Enhancing these competencies would boost teachers' self-efficacy and effectiveness with students, while potentially leading to entrepreneurial opportunities that benefit the community.

Researchers found no differences between males and female educators regarding the importance of entrepreneurial competencies. Previous research has found males tend to be more entrepreneurial and likely to pursue entrepreneurial ventures than females (Abbasianchavari & Block, 2022; Cowling & Taylor, 2001; Kickul et al., 2008; Koellinger et al., 2011; Mukembo, 2017; Mukembo et al., 2020), and females reported lower perceived entrepreneurial competencies (Coleman & Robb, 2017; Somia et al., 2024). According to Shahriar (2018), differences in entrepreneurial tendencies between males and females can be attributed to distinct socialization and nurturing patterns across genders. In this study, researchers conclude both male and female teachers see entrepreneurial competence as important in their work as agriculture teachers. Educators, regardless of sex, reported entrepreneurship knowledge was relevant to effectively fulfill their teaching, mentoring, and supervision roles of student projects.

Despite high reported levels of competence, more than nine in 10 teachers reported entrepreneurship training would benefit teachers when supervising entrepreneurship projects with their students. Researchers recommend teacher preparation programs incorporate entrepreneurship training as part of their coursework and professional development, with a special focus on social networking skills which are essential for community integration, reducing teacher burnout and attrition, and building professional learning networks with other educators and students (Baker-Doyle, 2011; Staudt Willet, 2024). Further, a need exists to create peer mentorship networks, by connecting experienced entrepreneurship educators with those agricultural educators that are joining the field to help leverage their knowledge and build self-efficacy across all genders and experience levels. Acquiring such knowledge and related competencies will contribute to the development of their human and social capital (Becker, 1993; Schultz, 1961). Professional development for participants in entrepreneurship can

enhance entrepreneurs' self-efficacy and entrepreneurial competencies (Morris et al., 2013; Schenkel et al., 2022; Venesaar et al., 2022), thereby contributing to their human capital (Becker, 1993; Schultz, 1972) and effectiveness in assisting students with their entrepreneurship projects as well as building meaningful community relationships.

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