

Emerging Trends for Middle School Agricultural Education in the United States: A Scoping Review

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Abstract

Recent trends in agricultural education have demonstrated that the number of middle school programs and students has been increasing. Despite this, middle school agricultural education students, teachers, and programs have been underserved. For example, middle school agricultural education teachers lack the training and resources to meet the needs of this diverse learning population. In response, this investigation's purpose was to synthesize the published research on middle school agricultural education. This scoping review revealed limited peer-reviewed publications on middle school agricultural education. However, the most commonly reported subject areas taught at the middle school level included career exploration, environmental and natural resources, international agriculture, and leadership/human relations, which included FFA-related topics. Additional research should be conducted to describe the characteristics of quality middle school SAE programs and determine the relevance of agricultural education's comprehensive, three-circle model to middle school programs. Moving forward, we recommend that middle school agricultural education teachers be provided with targeted professional development to serve students of this age level better and to create additional opportunities for students to be recognized through FFA award programs.

Introduction and Review of Literature

President Abraham Lincoln signed the Morrill Act (1862) into law one year after the start of the U.S. Civil War (Herren & Edwards, 2002). This act authorized states to create universities on granted land that focused on agriculture, mechanical arts, and military science (Gordon & Schultz, 2020). The adoption of this law allowed young men who desired a vocational and practical education the opportunity to gain skills rather than focus on careers such as (a) law, (b) medicine, (c) ministry, and (d) teaching (Gordon & Schultz, 2020). However, Phipps et al. (2008) explained that agricultural instruction for students in college did not start until their junior or senior year. To remedy this, providing agricultural coursework to students at the secondary level was necessary. As a result, the Smith-Hughes Act (1917) was adopted.

The Smith-Hughes Act changed the U.S. educational landscape, especially for school-based agricultural education (SBAE) (Herren & Edwards, 2002). With the adoption of this law, high schools were allotted finances from the government through federal and state boards to provide education and training in

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agriculture, home economics, and other industrial trades (Gordon & Schultz, 2020). One year after adopting the Smith-Hughes Act (1917), 15,453 high school students were enrolled in agricultural education courses (Gordon & Schultz, 2020). Then, SBAE was offered in all contiguous states by 1922 (Phipps et al., 2008). According to the most recent data gathered from 2020-2021, 946,538 students were enrolled in agricultural education courses in the U.S. (United States Department of Education, 2022). As such, there were 196,556 7th and 8th grade students enrolled in agricultural education courses in the 2021-2022 school year (National FFA Organization, 2023a).

At its creation, agricultural education was limited to males aged 14 and older to align with the requirements established through the Smith-Hughes Act (1917). However, some states began to expand opportunities in agricultural education for middle school students, with the first reported middle school agricultural education program established in 1926 for 8th Grade students in Virginia, where in the same year, 8th Graders were granted Virginia FFA membership. (Rossetti & McCaslin, 1994). It should be noted, however, that FFA membership nationally was not opened to middle school students until 1988 (National FFA Organization, 2022b). In 2022, there were 850,823 members (National FFA Organization, 2022c), with 108,853 being 7th and 8th grade students (National FFA Organization, 2023b).

Few national award programs have been available to middle school students. Within the agriscience fair, middle school students may compete in divisions one or two, depending on project requirements (National FFA Organization, 2018). Meanwhile, of the 26 nationally recognized career and leadership development events, only two have been offered to middle school members: (1) creed speaking and (2) conduct of chapter meetings (National FFA Organization, 2022a). The FFA Discovery Degree can be awarded to a middle school student at the local level. Meanwhile, middle school programs can be recognized at the state and national level through the *National Middle School Model of Excellence Award*. This award program recognizes middle school agricultural education programs that exhibit excellence in the three areas of the program of activities: (1) building leaders, (2) growing communities, and (3) strengthening agriculture.

Tucker and McHugh (2022) stated that middle school agricultural programs “serve as a recruitment pipeline, contributing to high school program growth. As students transition into secondary programs, they take their experience with them” (p. 25). These experiences included agricultural interest, career development, and agricultural literacy (Rossetti, 1992). Even so, the students in middle school programs have different experiences than high school students, especially regarding the length of instructional time, student maturity levels, and duplication of instructional topics (Jones et al., 2020; Rossetti, 1992). From the teacher’s perspective, instructional time, varying from six weeks to a full year can prove difficult for a middle school agricultural education teacher (McLean, 2022). Identifying effective teaching strategies and content to teach due to the lack of middle school educational standards (Jones et al., 2020), and the lack of attention to teacher preparation programs and professional development opportunities have posed challenges for middle school teachers (Croom et al., 2023; Golden et al., 2014; Roberts et al., 2020b). Since agricultural education was introduced into the U.S. educational system, middle school students, teachers, and programs have been underserved (Tucker & McHugh, 2022). This has been evident in the lack of opportunities available to middle school agricultural students and lack of curricular resources for middle school teachers (Traini et al., 2023). Further, middle school teachers have expressed a need toward targeted training and resources to meet the needs of this diverse learning population (Golden et al., 2014). Because of this, middle school agricultural education programs appear to have not met their full potential. Consequently, the following questions have persisted: (a) What gaps in the literature exist concerning middle school agricultural education programs? and (b) What changes need to be addressed to advance middle school agricultural education in the 21st Century and beyond?

Conceptual Frameworks

After the Smith-Hughes Act (1917) funded the teaching and learning of agriculture courses in public schools, agricultural-based clubs for youth eventually evolved into what has become known as the National FFA Organization (Croom, 2008). Meanwhile, Stimson's farm project concept eventually evolved into what has become known as SAE, by which students learn through individualized agricultural projects supervised by SBAE teachers (Croom, 2008). These three components – classroom/laboratory, FFA, and SAE – have historically provided a conceptual basis for delivering student learning in SBAE. Further, agricultural literacy, leadership, and career skill development have all been espoused to be embedded in the model (Croom, 2008). Despite agricultural education's three-circle model's widespread adoption, it has been criticized for not accurately demonstrating the outcomes and context by which students achieve learning in SBAE (Hughes & Barrick, 1993). More recently, Roberts and Ball (2009) offered an alternative model for SBAE that sought to explain how agriculture can be used as content and context for teaching and learning. Roberts' and Ball's (2009) model depicted that student knowledge could be achieved across learning domains by using industry-validated agricultural curriculum. Further, Roberts and Ball (2009) opined that student learning resulted from teacher-to-learner, as well as learner-to-learner interactions. The model also depicted the role of the agricultural education teacher as a facilitator of agricultural content and other interrelated educational domains (Roberts & Ball, 2009).

Roberts and Ball (2009) postulated that the merger of these concepts yielded two key outcomes: (1) a skilled agricultural workforce and (2) successful lifelong learners that are agriculturally literate citizens (Roberts & Ball, 2009). By viewing middle school agricultural education through this framework, we were positioned to examine the trends that emerged from this scoping review and explore how the knowledge of middle school agricultural education has been limited in the literature. We were also able to cast a speculative eye toward the future regarding the appropriateness of organizing and delivering middle school programs from conceptual lenses designed to understand high school students' experiences in SBAE.

Purpose, Significance, and Research Questions

The purpose of this study was to conduct a scoping review of peer-reviewed journal articles that have been published on middle school agricultural education in the U.S. In the future, this knowledge could inform research and provide additional opportunities for middle school agricultural education students. To meet the study's purpose, the following research questions guided the investigation:

1. What opportunities and challenges have been reported for middle school agricultural education students?
2. What opportunities and challenges have been reported for middle school agricultural education teachers?

Methods and Procedures

We conducted a scoping review to synthesize the peer-refereed journal articles that have been published on middle school agricultural education in the U.S. Munn et al. (2018) stated that "scoping reviews are an ideal tool to determine the scope or coverage of a body of literature on a given topic" (para. 5). Further, "scoping reviews are useful for examining emerging evidence when it is still unclear what other, more specific questions can be posed and valuably addressed by a more precise systematic review" (para 5). To accomplish this, we analyzed each journal article as outlined by the guiding research questions to identify emerging themes.

We utilized the EBSCO search engine provided through the Louisiana State University Library Portal. This search engine was limited to the ERIC and AGRIS databases. The search was also limited to scholarly (peer-refereed) journals with dates set from 1908-2021 to gather as many articles as possible. A Boolean search string was used to search for the occurrence of these terms (“agricultur* education” AND “middle school” OR “junior high” OR “intermediate school”). This search yielded 63 unique publications. Additionally, a search using the phrase “middle school” was conducted through the database for the *Journal of Agricultural Education* and the *Journal of Southern Agricultural Education Research*. This search yielded 33 additional articles. Five duplicates were removed. We reviewed the titles and abstracts of the 91 publications to determine if they met the following criteria for the study: (a) a description of the scope of SBAE middle school students or SBAE middle school teachers, (b) identified needs for SBAE middle school students or SBAE middle school teachers, and (c) mentioned middle school agricultural programs. As a result of this process, 79 publications were excluded from the analysis. In total, 12 peer-refereed journal articles met the criteria for inclusion in this study.

The 12 articles were then analyzed and coded by the researchers. To identify the emergent trends regarding middle school agricultural education, the following were identified: (a) type of article, (b) target participants, and (c) article context. The codes were developed following a classification system outlined by St. John and McNeal (2015). This framework was based on a five-level pyramid with each level increasing in the strength of evidence. The framework included the following unfiltered information: (a) practitioner wisdom/expert opinion, (b) qualitative and quantitative case studies, (c) qualitative and quantitative cohort studies, and (d) filtered information: meta-analyses and systematic reviews. Through the use of this framework, the following trends emerged regarding middle school agricultural education: (a) classroom/laboratory and program characteristics, (b) FFA, (c) SAE, and (d) teacher characteristics and needs.

Findings

Our analysis of the published articles in peer-refereed journals for middle school agricultural education revealed important emerging commonalities, gaps, and trends. In total, 12 articles were included in the scoping review (see Table 1). Based on the analysis of the articles, we found that middle school agricultural education has been researched in a variety of settings. For example, more than half of the articles analyzed in this review were conducted using survey methods ($f = 6$; 50%). Additional article characteristics were as follows: expert opinion ($f = 2$; 16.6%), practitioner wisdom ($f = 2$; 16.6%), and case-study ($f = 1$; 08.3%). Eight articles were state specific ($f = 8$; 66.6%) while four were completed nationally ($f = 4$; 33.3%) and one (0.3%) was local in scope.

Table 1

Summary of the Characteristics of Middle School Agricultural Education Reported in the Peer-Refereed Literature

Article	Article Type	Participants	Scope	Topic
Budke and Wooden (1971)	Expert Opinion	Range of experts	National	Occupational exploration
Brown and Stewart (1993)	Practitioner Wisdom/ Experimental Design	Students	State	Knowledge change based on length of instruction
Duncan et al. (2016)	Case Study	Students	Local	Impact of a school garden on middle school students
Frick (1993)	Expert Opinion	NVATA State Presidents	National	A framework for middle school programs
Fritz and Moody (1997)	Survey	Teachers	State	The state of middle school programs
Golden et al. (2014)	Survey	Teachers	State	Needs of teachers
Jones et al. (2020)	Survey	State FFA Leaders	National	Status of middle school programs
Rayfield and Croom (2010)	Expert Opinion	Teachers	State	Needs of students
Rohs and Anderson (2001)	Survey	Students	State	Motivational of students
Rossetti and McCaslin (1994)	Survey	FFA Executive Secretaries	National	The state of middle school programs
Rudd and Hillison (1995)	Survey	Teachers	State	Teacher characteristics and the adoption of agriscience curriculum
Skelton et al. (2018)	Practitioner Wisdom/ Pre- Post Test	Students	State	Science competence of students

The first question guiding this study focused on trends published in peer-refereed journals regarding middle school students. The emergent trends were divided into three sections: (a) classroom/laboratory and program characteristics, (b) FFA, and (c) SAE to align agricultural education's comprehensive three-circle model (Croom, 2008). In a study examining the status of middle school agricultural education, Jones et al. (2020) surveyed 32 state FFA leaders to determine the common subject areas taught in middle school agricultural education programs. Meanwhile, in a Delphi study, Frick (1993) gathered information regarding subject areas commonly taught in middle schools from the presidents of state associations of

agricultural education. After analyzing the 12 articles in this review, the most frequently reported subject areas for middle school programs were career exploration ($f = 4$; 33.3%), environmental/natural resources ($f = 3$; 25%), international agriculture ($f = 3$; 25%) and leadership/human relations ($f = 3$; 25%). For this study, all FFA-related topics were included in the leadership subject area (e.g., parliamentary procedure, public speaking, and employability skills).

Additional information regarding middle school agricultural education programs included the common grade level of students and the length of programs. On this point, Brown and Stewart (1993) reported that there were no statistically significant differences regarding middle schoolers' change in attitude or agricultural knowledge who received agricultural instruction between six and 18 weeks. Meanwhile, Jones et al. (2020) and Rossetti and McCaslin (1994) examined various program lengths of middle school agricultural education programs. The most commonly reported length of instruction included nine weeks ($f = 3$; 25%), six weeks ($f = 2$; 16.6%), and one semester (18 weeks) ($f = 2$; 16.6%). Finally, the grade levels described included 6th ($f = 8$; 66.6%), 7th ($f = 9$; 75%) and 8th grades ($f = 11$; 91.6%).

The impact of middle school programs has also been reported. One such impact was reported by Fritz and Moody (1997) who found that middle school programs promoted agricultural awareness and exposed students to agricultural careers. In this analysis, advantages and disadvantages ($f = 3$; 25%), knowledge retention and comprehension ($f = 2$; 16.6%), barriers ($f = 2$; 16.6%), student motivation ($f = 1$; 8.3%), school gardens ($f = 1$; 8.3%), and occupational education ($f = 1$; 8.3%) were found in the literature. Table 2 provides a summary of the emergent trends regarding classroom and laboratory for middle school agricultural education in peer-refereed journal articles.

Table 2

Summary of Emergent Trends Regarding Classroom and Laboratory in the Middle School Agricultural Education Literature

Emergent Trend	<i>f</i>	%
Classroom/Laboratory		
Subject Areas		
Career Exploration	4	33.3
Environmental/Natural Resources	3	25.0
International Agricultural	3	25.0
Leadership/Human Relations	3	25.0
Agricultural Literacy	2	16.6
Agricultural Mechanics	2	16.6
Animal Science	2	16.6
Business and Marketing	2	16.6
Plant Science and Horticulture	2	16.6
Soil and Crop Science	2	16.6
Agricultural Mathematics	1	08.3
Agricultural Science & Experimentation	1	08.3
Agricultural Vocabulary	1	08.3
Agricultural Writing	1	08.3
Food Safety/Consumer Relations	1	08.3
SAE	1	08.3
Soil and Crop Science	1	08.3
Using Microcomputers	1	08.3
Length of Instructional Time		
6 Weeks	2	16.6

Emergent Trend	<i>f</i>	%
9 Weeks	3	25.0
12 Weeks	1	08.3
16 Weeks	1	08.3
One Semester (18 Weeks)	3	25.0
20 Weeks	1	08.3
21 Weeks	1	08.3
Full School Year	1	08.3
Grade Level Taught		
6	8	66.6
7	9	75.0
8	11	91.6
Impact of Middle School Programs		
Advantages & Disadvantages	3	25.0
Knowledge Retention & Comprehension	2	16.6
Barriers	2	16.6
Student Motivation	1	08.3
School Gardens	1	08.3
Occupational Education	1	08.3

Trends also emerged regarding middle school students' FFA involvement. For example, FFA chapter organization was discussed. It was reported that some middle school chapters were separate from the high school chapters ($f = 2$; 16.6%) and that some middle school and high school chapters were combined ($f = 2$; 16.6%). Further, FFA dues were discussed in two articles ($f = 2$; 16.6%). Jones et al. (2020) reported that 25 state leaders collected dues from middle school FFA members, while seven states did not collect dues. In a study on the status of middle school programs, Rossetti and McCaslin (1994) reported that state-level competitions for middle school students were provided in 17 states, 14 states held their competitions with high school FFA events, and six states held their competitions separately from high school FFA events. In a more recent study, Jones et al. (2020) reported that five states held career development events (CDEs) separate from high school while 21 states held CDEs in conjunction with high school agricultural education programs. Trends also emerged from the literature regarding FFA opportunities for middle school students. The most frequent opportunities reported for middle school students included a combination of leadership development events (LDEs) and CDEs, including FFA creed speaking ($f = 2$; 16.6%), dairy foods ($f = 2$; 16.6%), livestock evaluation ($f = 2$; 16.6%), and public speaking ($f = 2$; 16.6%). A complete list of the reported FFA-related trends that emerged from the literature is provided in Table 3.

Table 3

Summary of Emergent Trends Regarding FFA in the Middle School Agricultural Education Literature

Emergent Trends	<i>f</i>	%
FFA		
Chapter Organization		
Separate chapter apart from high school	2	16.6
Joint chapter with high school	2	16.6
Dues	2	16.6
CDE Organization		
CDE in-conjunction with high school	2	16.6
CDE separate from high school	2	16.6
Opportunities		

Emergent Trends	<i>f</i>	%
FFA Creed Speaking	2	16.6
Dairy Foods	2	16.6
Livestock Evaluation	2	16.6
Public Speaking	2	16.6
Agricultural Mechanics	1	08.3
Agriscience Fair	1	08.3
All Contests	1	08.3
Broiler Contest	1	08.3
Conduct of Chapter Meetings	1	08.3
Conventions & Conferences	1	08.3
Crops (Agronomy)	1	08.3
Discovery Degree	1	08.3
Environmental Skills Contest	1	08.3
FFA Officer Team	1	08.3
FFA Quiz	1	08.3
Floriculture	1	08.3
Horse Judging	1	08.3
Livestock Showing	1	08.3
Meats	1	08.3
National FFA Awards	1	08.3
Poultry	1	08.3
Proficiency Awards	1	08.3
Record Books	1	08.3
Soils	1	08.3
State FFA Awards	1	08.3

Trends also emerged regarding supervised agricultural experience (SAE) programs in the literature on middle school agricultural education (see Table 4). Of the 12 articles included in this review, three articles (25.0%) addressed this topic. In particular, Jones et al. (2020) reported that “of the 32 participating states, 24 (75%) reported that middle school agricultural science students participate in SAEs, while eight states (25%) reported the students did not participate in SAE projects” (pp. 48-49). In a study conducted by Rayfield and Croom (2010), teachers in North Carolina stated that SAE programs should be *scaled-back* because many of the middle school programs had varying program lengths.

Table 4

Summary of Emergent Trends Regarding SAE in the Middle School Agricultural Education Literature

Emergent Trends	<i>f</i>	%
SAE Student Participation	1	08.3
SAE Teacher Preparation	2	16.6

The second research question for this study focused on the opportunities and challenges facing middle school agricultural education teachers. Golden et al. (2014) described the professional development needs of middle school agricultural education teachers. Meanwhile, Rayfield and Croom (2010) reported that improvements must be made in the middle school agricultural education curriculum to alleviate challenges for teachers. Curriculum development ($f = 2$; 16.6%) was the most frequently reported need for middle school teachers. Other needs were reported once ($f = 1$; 8.3%) and included: (a) community relations, (b) FFA, (c) SAE, (d) classroom activities, (e) instructional delivery methods, (f) curricular standards, and (g) personal management. It should be noted that Golden et al. (2014) reported on the professional development needs of middle school agricultural education teachers; however, not all specific topics

reported by Golden et al., (2014) emerged among multiple articles; therefore, some of the professional development needs were not included in this study. Additionally, the most frequently reported middle school teacher frustrations included facilities ($f = 2$; 16.6%) and scheduling issues ($f = 2$; 16.6%). A summary of emergent trends regarding the opportunities and challenges facing middle school agricultural education teachers can be found in Table 5.

Table 5

Summary of Emergent Trends Regarding Opportunities and Challenges Facing Middle School Agricultural Education Teachers related topics in the Literature

Emergent Trends	<i>f</i>	%
Teacher Related Topics		
Teacher demographics	2	16.6
Amount of agriscience taught	1	08.3
Willingness to teach agriscience	1	08.3
Professional Development Needs		
Curriculum	2	16.6
Community relations	1	08.3
FFA, SAE, and classroom Activities	1	08.3
In-service delivery methods	1	08.3
Standards	1	08.3
Personal management	1	08.3
Frustrations		
Facilities	2	16.6
Scheduling issues	2	16.6
Administrative support	1	08.3
Curriculum	1	08.3
Demands of teacher	1	08.3
Student motivation and accountability	1	08.3
Youth development and recognition	1	08.3

Conclusions

We conducted a scoping review of middle school agricultural education in the peer-refereed literature and identified existing trends and themes. Only peer-refereed articles that met the search criteria for this investigation were mobilized for analysis. The 12 articles meeting the search criteria were systematically analyzed following St. John's and McNeal's (2015) recommendations. This analysis provided an informative review of middle school agricultural education research in peer-refereed journal publications. Our analysis revealed that there has been limited research conducted on middle school agricultural education programs. However, of the articles analyzed, major trends emerged regarding (a) program characteristics, (b) classroom and laboratory, (c) FFA, (d) SAE, and (e) teacher characteristics and needs. As a result, we concluded that the most commonly reported subject areas taught at the middle school level were career exploration, environmental/natural resources, international agriculture, and leadership/human relations, which included FFA-related topics. This conclusion was similar to Rossetti (1994), who reported that the most common topics taught in middle school programs were plant science and career exploration. We also conclude that middle school SBAE program lengths have varied considerably, in which nine weeks emerged as the most frequently reported program length in middle school agricultural education (Brown & Stewart, 1993; Jones et al., 2020; Rossetti & McCaslin, 1994).

Regarding appropriate grade levels to be taught, recommendations from the literature ranged from

6th to 8th grade. For example, Jones et al. (2020) reported that eight states had students beginning in 6th grade, 23 reported enrollment beginning in 7th Grade, and 24 reported enrollment beginning in 8th grade. We also conclude that practitioners have used various instructional strategies to positively impact middle school students' learning about agriculture. As an illustration, our analysis revealed that innovative approaches included the use of middle school gardens (Duncan et al., 2016) and inquiry-based instruction (Skelton et al., 2018) to engage students in agricultural content, which yielded statistically significant and positive changes in their academic learning of agricultural topics. We further concluded that the literature on FFA chapters at the middle school level had reported diverse program characteristics. For instance, we found that some agricultural education programs had separate chapters, and others had combined the middle school FFA chapters at the high school and middle school levels, while other programs combined middle school and high school FFA chapters. Further, Jones et al. (2020) reported that some states did not allow middle school FFA chapters. We also concluded that some states have combined CDEs for high school FFA chapters and middle school FFA chapters, whereas other states have separate contests for middle school FFA members. Further, the most frequently reported middle school FFA opportunities were (a) creed speaking, (b) dairy foods, (c) livestock evaluation, and (d) public speaking.

Finally, research conducted on SAE programs at the middle school level has been limited. However, of the published literature on middle school SAEs, student participation and teacher preparedness were the primary issues explored. For example, Jones et al. (2020) reported on middle school students' participation level in SAEs. Meanwhile, both Rayfield and Croom (2010) and Golden et al. (2014) reported that middle school teachers desired professional development opportunities regarding how to facilitate quality SAE programs effectively. As such, we concluded that a need has emerged for the creation of targeted professional development opportunities for middle school agricultural education teachers. In particular, the most reported needs for professional development in the literature included curriculum, community relations, and facilitating learning opportunities with FFA, SAE, and the middle school agricultural education classroom (Golden et al., 2014; Rayfield & Croom, 2010).

Discussion, Implications, and Recommendations

Limited knowledge has been disseminated in peer-referred journal publications on middle school agricultural education. Nevertheless, enrollment trends for middle school agricultural education programs have demonstrated a significant increase and diversity in students and programs (Jones et al., 2020). On this point, Rayfield and Croom (2010) argued that middle school agricultural education programs were a critical starting point for many high school agricultural education students. To continue to grow high school agricultural education programs, while also leading middle school students toward a skilled agricultural workforce and agricultural literacy (Roberts & Ball, 2009), we recommend that more attention be dedicated to advancing knowledge on middle school agricultural education students, teachers, and programs. Regarding future research, we recommend that further investigations aim to describe middle school agricultural education program characteristics more intimately. This scoping review explored the characteristics regarding the length of instruction, subjects taught, and grade levels, but the findings were limited. Therefore, future studies should build upon Brown's and Stewart's (1993) work to analyze the role of the length of instructional time and the knowledge retention of middle school students in agricultural education programs, especially in the post-COVID era (Ramage et al., 2023). In addition, further research should be conducted to assess individual middle school programs concerning how teachers incorporate all students into the total agricultural education program (Croom, 2008).

There has been little research on the subjects and topic areas that should be taught at the middle school level. For example, only four ($n = 4$) articles reported on appropriate subject areas for middle school agricultural education programs. However, it should be noted that three of the articles were published more than 10 years ago. Therefore, future studies should seek to provide an update on the appropriate subjects

and topics to be taught. Further research should also be conducted to understand the variability of subject areas for middle school agricultural education programs from state to state. In particular, limited studies have reported middle school programs using industry-validated agricultural curricula (Croom et al., 2023; Roberts & Ball, 2009). Therefore, we recommend that future research examine the effectiveness of using curricular resources such as CASE's *AgXplore* and *Introduction to Agriculture, Food, and Natural Resources* for middle school students. Future research should also be conducted on expanding curricular materials and their efficacy in promoting agricultural literacy for middle school students (Roberts & Ball, 2009).

Key findings from this scoping review revealed that middle school students were involved in FFA at the local, state, and national levels. However, the experiences of middle school FFA students have varied considerably across contexts. The organization of local FFA chapters has also been reported to be diverse in delivery and scope. Further research should explore the benefits of independent middle school FFA chapters versus combining them with the local high school FFA chapters. Data should also be collected and synthesized from each state to evaluate how state FFA associations have included and recognized middle school FFA members in leadership and career development events, proficiency award areas, agriscience fair, and leadership camps and conferences. With this data, best practices can be advanced to serve middle school FFA members better (Roberts et al., 2020a; Traini et al., 2020).

We also recommend that future research examine the role of SAE programs at the middle school level. The farm project, as conceptualized by Rufus Stimson in 1908, now known as SAE, allowed students to learn more about agricultural concepts through project-based learning in an area of a student's interest (Croom, 2008). However, at its creation, agricultural education was limited to high school students (Solomonson & Roberts, 2022). As such, an important question emerged from this investigation that warranted future study: *Should the outcome of middle school agricultural education be to develop skilled workers and/or agriculturally literate citizens as espoused by Roberts and Ball (2009)?* On this point, many middle school students are just becoming aware of the variety of career options available. Therefore, students at this level may lack career goals (Roberts, 2003). Because of this, should SAEs for middle school students be rethought?

Moving forward, data should be collected to understand the current state of middle school SAE programs and describe best practices implemented by teachers. Further, quality indicators for exceptional middle school SAE programs should be identified (Roberts & Robinson; Traini et al, 2023). The *SAE For All* initiative aligns middle school students at the awareness level (National Council for Agricultural Education, 2017). Further, it describes Foundational SAE programs with five parts: (a) career exploration and planning, (b) employability skills for college and career readiness, (c) personal financial management and planning, (d) workplace safety, and (e) agricultural literacy, which eventually develops into an immersion SAE (National Council for Agricultural Education, 2017). However, limited empirical evidence has been reported that supports such outcomes for middle school agricultural students. Therefore, researchers should examine whether middle school students experience these reported outcomes. Research should also be conducted to evaluate if the *SAE For All* initiative is relevant for middle school agricultural education.

A key implication of this study was that middle school agricultural education teachers have unique needs. Therefore, we recommend that teacher preparation programs consider adapting their curricular resources to prepare teachers to lead middle school agricultural education programs. Perhaps by partnering with colleges of education, new pedagogical approaches and curricular resources could be created to address this need. Additional research should also be conducted to evaluate the existing curriculum resources available to middle school teachers. Future researchers should also assess whether the agriculture, food, and natural resources (AFNR) standards are relevant and if they reflect the learning outcomes that middle school students should attain (Traini et al, 2023). If they do not reflect the appropriate learning

standards, we recommend creating new curricular standards appropriate to middle school students.

Multiple studies in this scoping review reported that students developed an increased awareness of agricultural literacy due to their engagement in middle school agricultural education programs. However, when evaluated through the lens of Roberts' and Ball's (2009) model, we question whether the aims and purpose of middle school agricultural education have been adequately advanced. For instance, agricultural education's comprehensive, three-circle model demonstrated that student learning occurs at the intersection of (1) classroom/laboratory, (2) FFA, and (3) SAE (Croom, 2008), however, empirical evidence on middle school agricultural education has not necessarily supported such a notion. For example, due to the limited instructional time of some middle school programs, students often do not have in-depth experiences in each of the model's three components. Alternative models that seek to reflect a more accurate representation of middle school agricultural education's unique activities, context, and outcomes of student learning should be explored.

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