

Examining AI Perceptions and Utilization Among Agricultural Educators in Utah

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Abstract

Artificial Intelligence (AI) has garnered attention as an innovative technology, revolutionizing various components of society, including education. The new technology can potentially improve efficiency and reduce burdens placed on teachers, but AI in educational settings may also have negative consequences. This quantitative survey research study aimed to identify how school based agricultural education (SBAE) teachers are currently using AI and what they already know about it, what beliefs and attitudes they have towards it, and what professional development needs exist. This research was guided by the Technology Acceptance Model (TAM) framework. The population for this study was all SBAE teachers in Utah during the 2023-2024 school year. A total of 70 SBAE teachers participated in the study. Findings suggest that SBAE teachers have mixed feelings about AI. Although some already integrate the technology into their teaching practices, others may have specific barriers keeping them from adopting it. Currently, teachers using AI in the classroom primarily leverage it to save time on administrative tasks and content development. It is worth noting that most of the concerns and specific professional development needs of SBAE teachers relate to students' use of AI and the use of AI around students. It is recommended that state staff provide training related to AI for in-service teachers and that university teacher education programs add curriculum or training related to AI for pre-service teachers. It is also recommended that more research related to AI in agricultural education be conducted.

Introduction

Teachers must have the ability to maintain good teaching practices and stay relevant within an ever-evolving education system and society. Artificial Intelligence (AI) has garnered attention as an innovative technology, which has the potential to revolutionize many aspects of society, including education. This new technology can potentially improve efficiency and reduce burdens placed on teachers, but may also have negative consequences in educational settings. Furthermore, teachers are responsible for preparing students to enter a workforce where AI utilization will become an essential skill. Without the skills to effectively

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integrate AI into the teaching and learning process, teachers may compromise the quality of education provided to students.

The need for this research arises from the realization that AI, in its early stages, is casting a veil of uncertainty over the education field, catching educators and stakeholders off guard (Dusseault & Lee, 2023b). More specifically, in School-Based Agricultural Education (SBAE), there is a lack of understanding of what teachers know about AI, their beliefs and attitudes toward it, and how they are currently integrating it into their teaching practices. This study addresses these unknowns associated with AI and its place in SBAE, and provides recommendations for professional development. Findings from the study can help state staff, administrators, and teachers' associations get ahead of the curve in creating professional development opportunities for teachers and developing policies for managing AI ethically and effectively.

Theoretical Framework

The Technology Acceptance Model (TAM) was the framework that guided this research. It suggests that when individuals are presented with new technology, several factors influence their decision about using it, including its perceived usefulness, perceived ease of use, and attitude toward it (Davis, 1986). If the TAM holds true, a teacher's belief that AI can help them be more productive or perform more effectively or efficiently in their job would increase perceived usefulness, and the likelihood of adopting the new technology would increase. Perceived ease of use is related to the difficulty level of using the new technology. The more difficult the technology is to adopt or integrate, or the more time or training required, the less likely it is to be adopted. Finally, attitude relates to an individual's willingness to learn to utilize the new technology. It also refers to the social perceptions surrounding the utilization of the new technology. For example, teachers who perceive AI primarily as a tool for students to utilize for cheating will have negative social views towards the new technology. Each of these factors plays a role in the teacher's intent to utilize AI as well as their willingness and perceived needs for self-learning and professional development.

The TAM model has been widely applied across diverse domains, providing a comprehensive understanding of users' behavioral intentions and actual adoption patterns. In the context of the current study, which focuses on AI utilization, perceptions, and professional development needs among SBAE teachers, the TAM serves as a useful framework for understanding the factors that influence SBAE teachers' acceptance of AI tools and gauging their attitudes and perceptions of AI integration within SBAE.

Literature Review

The purpose of this study was to investigate the use of AI by SBAE teachers in their agricultural education programs, including their knowledge about AI, their attitudes toward it, and their professional development needs related to AI.

Utilization of AI in Education

Trends and applications of AI within general education continue to evolve. A recent systematic review encompassing 66 individual studies found that teachers used AI tools for various tasks, including demonstration, academic performance prediction/intervention, academic behavior prediction/prevention, student engagement, automated grading/assessment, etc. (Martin, et al. 2023). Yousuf & Wahid (2021) showed that some teachers use AI to create personalized learning experiences in areas such as tutoring and student evaluation more than anything else, and claimed that various student needs can be met more easily by using AI tools. In Career and Technical Education (CTE), current research has examined how AI affects future job prospects for CTE students and how teachers can use AI to shape their teaching to foster a smoother transition through these changes (Hess, 2023).

Teachers' Attitudes and Intentions Regarding AI

Since AI is a new and evolving technology, many teachers have not had the opportunity to incorporate it into their teaching practices (Woodruff et al., 2023). Most literature regarding teachers' perceptions shows that teachers generally have a positive outlook on how AI can function in the classroom (Kim & Kim, 2022; Ayanwale et al., 2022). Despite the majority of teachers having positive perceptions about AI, many K-12 teachers are unsure about the capabilities of AI and the barriers and challenges that come with using it (Woodruff et al., 2023). Woodruff, et al. (2023) argued that teachers' negative perceptions about AI are generally misconceptions based on previous experiences with technology. Nazaretsky et al. (2022) found that the level of trust teachers have in AI and their knowledge about AI varies greatly, but that there is a prevailing fear among teachers that AI could one day take over their jobs. Teachers' distrust of AI technology also stems from the lack of knowledge about how information is generated through the technology (Dwork & Minow, 2022). Due to the rapid emergence of AI in education and the subsequent lack of training for teachers to learn about AI, many teachers are left with fears and uncertainty about AI (Song et al., 2023).

While broader studies have investigated the effects that anxiety and stress levels have on a person's intention to use AI, research focusing specifically on teachers' intentions suggests that these factors have little influence (Darayseh, 2023). Additionally, a study by Darayseh (2023) found no significant relationship between the intention to use AI and the demographic characteristics of teachers, such as gender, qualifications, and years of teaching experience. This study also found that self-efficacy, ease of use, expected benefits, attitudes, and behavioral intentions seemed to correlate with AI integration, confirming the strength of the TAM model (Davis, 1986) in predicting new technology integration.

Professional Development Needs Relating to AI

Due to the rapidity with which AI has begun to permeate the educational landscape, little is known about the professional development needs among teachers. Some research shows that teachers lack basic AI knowledge and competency, AI teaching skills, and AI teaching self-efficacy (Sun, 2023). Other research suggests that ethical issues associated with integrating AI in the classroom are a main professional development need among teachers (Lee & Perret, 2022). Teachers face a different set of concerns with using AI than the general population does, including ethical practices of AI, and the level of engagement with AI among teachers seems to be associated with a teacher's level of ethical concern over it (Cukurova et al., 2023). Assuring that ethical issues are minimized is essential for integrating AI in the classroom and at a school-wide level.

AI in School-based Agricultural Education

While many studies have been conducted investigating the utilization of AI in education generally, as well as the attitudes and intent of teachers in general regarding AI, no studies were found investigating issues relating to AI among SBAE teachers. Some studies have been conducted investigating the adoption of advanced technologies generally into SBAE, and have found that SBAE teachers are generally unprepared to adopt advanced technologies (e.g., robotics, unmanned aerial systems, AI, Internet of Things, etc.) into their curriculum (Akwah, 2024) and that they have a high need for professional development regarding these advanced technologies in agriculture (Clemons, et al., 2018; Smalley, et al., 2019). However, these studies did not focus exclusively on SBAE teachers' attitudes toward and adoption of AI or identify specific professional development needs regarding AI. Yet, as advanced technologies such as AI become ever more integral to the agricultural industry, it is essential to address this gap in the literature toward understanding SBAE teachers' attitudes towards and use of AI, and to identify and support their professional development needs in this area.

Purpose and Objectives

The purpose of this study was to determine current perceptions and usage of AI technology among SBAE teachers and the factors influencing those perceptions and utilization, and to identify professional development needs for SBAE teachers regarding the use of AI. This research aligns with the research values of the American Association for Agricultural Education (AAAE)—specifically, “Increasing prosperity through innovation in AFNR systems” and “Advancing public knowledge of AFNR systems.” The following research questions guided the development and execution of our research:

1. What is the current utilization of AI in SBAE programs in Utah?
2. What are the perceptions and beliefs of SBAE teachers in Utah regarding AI utilization?
3. What are Utah SBAE teachers' intentions in utilizing AI?
4. What are the AI-related professional development needs of SBAE teachers in Utah?
5. How do demographic variables predict the utilization of AI among SBAE teachers in Utah?

Methods

This quantitative descriptive study employed survey research methodology. The target population was all secondary SBAE teachers in Utah during the 2023-2024 school year. The state’s agricultural education listserv was utilized to identify the target population because it maintains an active database of SBAE teachers in Utah.

The survey instrument was primarily researcher-developed using the research instrument format from Seevers & Rosencrans (2001) and Sherman & Sorensen (2020) that measured utilization, perceptions, barriers, and needs related to volunteers within SBAE. Items specific to volunteers were replaced by AI-specific content, which were derived from other studies (e.g., Chounta et al., 2021; Oh et al., 2019). The survey instrument consisted of four sections, which included: 1) description of current AI utilization; 2) perceptions of SBAE teachers towards AI; 3) intentions for future participation in professional development programs in AI; and 4) demographic information. We conducted a post-hoc reliability analysis of the teacher perceptions towards AI, which yielded a sufficiently high reliability estimate (Cronbach’s alpha = .840). The current descriptive study mostly utilized individual items where responses were not intended to be uniform within concepts. Given this research was primarily descriptive in nature without constructs, making it challenging to and the problematic nature of determining test-retest reliability (Lamb, 1998; Noble et al., 2019; Polit, 2014), we focused our quality review on content and face validity (Middleton, 2024). The survey instrument was reviewed by one graduate student and three faculty in agricultural education with expertise in survey research, AI technology, and educational methods. The review panel examined instrument flow as well as face and content validity before distribution.

The first section of the instrument consisted of items designed to describe how AI is used in SBAE programs. This section was divided into three sub-sections to elicit information about (a) how often SBAE teachers utilized AI in their SBAE program, (b) what types of AI SBAE teachers were using, and (c) the specific tasks AI was used to perform within the program. To measure how often SBAE teachers utilized AI, we asked participants if they had used AI in the last 12 months, with a follow-up question asking the frequency with which they used AI. Participants were then asked what specific AI platforms they were familiar with or had used previously, as well as which of those AI platforms they utilized the most. Then, to determine how SBAE teachers were using AI and what kinds of tasks it was used to perform in the classroom, we asked participants to select all of the ways they used AI from a list of 14 options that were derived from other research (Seevers & Rosencrans, 2001; Sherman & Sorensen, 2020) and from other SBAE resources (Phipps et al., 2008). Sample items from this list included: grading and student feedback, developing instructional materials, writing grants, and communicating with stakeholders and parents. We

also provided the opportunity for participants to list any other ways in which they utilized AI that were not provided in the list.

The second section of the instrument consisted of items regarding the general beliefs and perceptions of SBAE teachers toward utilizing AI in their program. This was divided into two sub-sections: a) the perceived usefulness of AI for SBAE teachers, and b) general beliefs about both challenges and benefits of using AI. To determine the perceived usefulness of AI among SBAE teachers, we used the same 14 items from the previous list of ways teachers utilize AI and asked participants to provide their level of agreement about how useful they thought AI could be in those specific areas for all SBAE teachers. Participants indicated their level of agreement for the items using a five-point Likert-type scale ranging from (1) *Strongly Disagree* to (5) *Strongly Agree*. To determine SBAE teachers' general beliefs about using AI, participants were asked to provide their level of agreement on 21 different items regarding both potential challenges and benefits of using AI. Items were based on previous research and modified by the researchers (Chounta et al., 2021; Kim & Kim, 2022; Oh et al., 2019). Participants indicated their level of agreement for the items using a five-point Likert-type scale ranging from (1) *Strongly Disagree* to (5) *Strongly Agree*. Sample items included: "I do not trust AI to carry out tasks without error," "I think that AI can improve student learning," "I do not have time to learn how to integrate AI in my teaching practices," and "Teaching my students about AI is important for their future success."

The third section of the instrument consisted of items related to AI professional development of SBAE teachers. We first asked participants: "If given the opportunity, would you be interested in receiving professional development in using Artificial Intelligence (AI) in education?" Those who answered either "Yes" or "I don't know" received an additional set of questions with specific topics for training listed. Participants could select all that applied from a list of ten items and were given the option to list any other professional development needs that were not on the list. Items were based on previous research and modified by the researchers (Chounta et al., 2021; Cukurova et al., 2023; Lee & Perret, 2022; Oh et al., 2019). Sample items from this list included: "How to teach students how to use AI responsibly and effectively in academic settings," "Ways to use AI to save time on administrative tasks/paperwork," and "Specific types of AI platforms available to use in teaching."

The fourth section of the instrument was designed to collect demographic information from participants. Demographic information collected in the instrument included age, gender, and years of teaching experience.

The instrument was distributed via email to all SBAE teachers in Utah ($n = 169$), which contained a survey link for participants to complete the online survey through Qualtrics™. We made three different points of contact with potential participants via email (Dillman, 2007). We achieved a total response rate of 41.4% ($n = 70$). According to research, while the average on-line survey response rate is around 40%, response rates above 20% are generally acceptable (Wu et al., 2022). Furthermore, the demographic profile of the respondents (e.g., gender, age) are similar to the target population. Therefore, we assume the survey responses are representative of the target population. A comparison of early and late responders to selected survey items (i.e., AI utilization, technology adoption characterization, gender, age, and years of teaching) was conducted, and we found no significant differences; therefore, we assumed no systematic non-response bias (Lindner, et al., 2001). Data were downloaded into the Statistical Package for Social Sciences (SPSS) Version 26 for analysis. We used descriptive statistics (i.e., frequency and percentages) for RQ1 through RQ4 and correlational statistics (i.e., binary logistic regression) for RQ5. We collected demographic data and conducted a binary logistic regression to determine if selected demographics contribute to the utilization of AI among SBAE teachers. Utilization of AI was the dependent variable, with age, years of teaching, and gender as independent variables.

The adequacy of our sample size for regression analysis was evaluated using recommendations from Steyerberg et al. (2000), who suggest that for small datasets, a minimum of 20 participants per independent variable ensures sufficient power. With three independent variable in our model (age, gender, and years of teaching experience), a sample size of at least 60 participants would be required, which our sample exceeded. Additionally, Vittinghoff and McCulloch (2007) indicate that as few as five to nine events per predictor variable can suffice for logistic regression depending on the research question, further supporting our sample size as sufficient. These guidelines provide confidence in the statistical validity of our analysis.

Findings

Of the respondents, 48.6% self-identified as female and 25.7% identified as male with an additional 25.7% either not responding or identifying as another gender. Participants ranged from 22 to 65 years old, with 34 being the average age. Of note, 45.9% of the participants were younger than 35. Years of teaching experience ranged from one to 26 years, with a median of 5.5 years and a mean of 8.31 years.

For RQ1, we sought to determine current trends in utilizing AI and the factors that influence those trends. Most participants ($n = 50.8\%$) indicated they had used AI at least once in the last 12 months. Of the SBAE teachers that had used AI in the last 12 months, 22.6% used it just once, 16.1% used it between 2 and 4 times, 22.6% used it between 5 and 12 times, 22.6% used it 2 or 3 times a month, and 16.1% had used it one or more days per week.

In terms of the specific types of AI tools being utilized, ChatGPT emerged as the most commonly used platform (see Table 1). This preference highlights a trend toward conversational AI tools that offer versatility across multiple educational tasks. Following ChatGPT, many teachers reported using AI applications tailored for instructional design and planning, reflecting a strong interest in tools that can support curriculum development and reduce preparation time. When asked to identify which AI platforms they used most frequently, the highest percentage of respondents (11.3%) again named ChatGPT. Other frequently used platforms included SchoolAI (9.9%), which provides a range of classroom-focused AI tools, QuestionWell (4.2%), which assists in question generation, and Eduaide (2.8%), a tool designed to support lesson planning and instructional content creation. Additional platforms mentioned by participants included Midjourney, DeepL, Magic School, Classpoint AI, Gamma, OpenAI, Quizziz AI, Brisk, Slides AI, and Canva, suggesting a diverse array of AI tools are being explored by teachers to enhance their classroom practices.

Table 1

Types of AI used by SBAE Teachers in the SBAE Program

Types of AI used	<i>f</i>	%
ChatGPT	20	28.6
AI for content/lesson planning	19	27.1
Image generating AI	6	8.6
Assessment generating AI	6	8.6
Conversation generating AI	5	7.1
AI for writing/speech improvement	5	7.1

Participants were asked to select all of the ways in which they used AI in their agriculture program. The most frequently reported use of AI was for creating assignments or rubrics, with nearly one-third of respondents (32.9%) indicating this application (see Table 2). This suggests that many SBAE teachers are leveraging AI to streamline assessment design and ensure clarity and consistency in their expectations for student work. The second most common use was the development of instructional materials, reported by

22.9% of participants, indicating that AI is being used as a tool to enhance curriculum resources, likely assisting educators in generating content that aligns with educational standards and student needs. Additionally, 20.0% of respondents noted that they used AI to generate ideas for classroom activities or assignments, highlighting the role of AI in supporting teacher creativity and lesson planning.

Participants were also provided with the opportunity to specify additional, unlisted ways they had used AI in their agricultural education programs. Responses in this open-ended category included using AI for translating content, which may support language accessibility for English language learners, and writing Career Development Event (CDE) tests. These varied applications point to a flexible and expanding role for AI in SBAE contexts, supporting instructional and administrative functions as well as FFA.

Table 2

Roles of AI in School-Based Agriculture Education Programs

Utilization of AI in SBAE	<i>f</i>	%
Creating assignments or rubrics	23	32.9
Developing instructional materials	16	22.9
Generating ideas for activities or assignments	14	20.0
Expanding my content knowledge	9	12.9
Communicating with stakeholders and parents	8	11.4
Writing grants	4	5.7
Grading and student feedback	2	2.9
Marketing the local Ag Ed program	2	2.9
Completing student or chapter award applications	2	2.9
Training CDE teams	2	2.9
Organizing FFA events	2	2.9
Managing classroom behavior	1	1.4
Managing student SAE programs	1	1.4
Student leadership training	1	1.4
Creating CDE tests	1	1.4

For the second research question, we explored the perceptions and beliefs of SBAE teachers about AI technology in their professional practice. Participants identified several areas in which they believed AI could be especially beneficial. The most commonly cited application was in the creation of assignments or rubrics, suggesting that teachers see value in AI's ability to assist with assessment design and instructional efficiency (see Table 3). Closely following were the uses of AI for generating ideas for classroom activities and assignments, as well as for developing instructional materials. These findings indicate that many SBAE teachers perceive AI as a practical tool that can support their teaching practices.

In addition to identifying potential benefits, participants also shared their general beliefs and concerns about AI in education (see Table 4). One of the strongest concerns expressed was that AI may undermine student creativity and critical thinking skills. Another widely held belief was a lack of trust in AI's accuracy and reliability. These responses reflect a cautious optimism—while teachers recognize the potential of AI to support instructional duties, they also remain wary of its limitations and the implications it may have for student learning and educational integrity.

Table 3*SBAE Teachers' Perceived Benefits of Utilizing AI in their SBAE Programs*

I believe that AI is beneficial in agricultural education because it can help agriculture teachers with...	Strongly Disagree		Disagree		Neither Agree or Disagree		Agree		Strongly Agree	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Creating assignments or rubrics	-	-	2	2.9	4	5.7	34	48.6	15	21.4
Generating ideas for activities or assignments	-	-	1	1.4	9	12.9	32	45.7	12	17.1
Developing instructional materials	-	-	1	1.4	9	12.9	35	50.0	9	12.9
Writing grants	2	2.9	3	4.3	17	24.3	25	35.7	7	10.0
Expanding their content knowledge	-	-	8	11.4	15	21.4	25	35.7	6	8.6
Communicating with stakeholders & parents	6	8.6	6	8.6	9	12.9	25	35.7	8	11.4
Marketing the local Ag Ed program	3	4.3	7	10.0	20	28.6	21	30.0	3	4.3
Student leadership training	4	5.7	10	14.3	21	30.0	17	24.3	1	1.4
Grading and student feedback	2	2.9	17	24.3	15	21.4	20	28.6	2	2.9
Training CDE or LDE teams	5	7.1	10	14.3	25	35.7	11	15.7	2	2.9
Organizing FFA events	6	8.6	10	14.3	24	34.3	12	17.1	1	1.4
Completing student or chapter award applications	7	10.0	9	12.9	22	31.4	16	22.9	-	-
Managing student SAE programs	4	5.7	16	22.9	28	40.0	6	8.6	-	-
Managing student behavior	8	11.4	24	34.3	19	27.1	2	2.9	1	1.4

Note. StrD = Strongly Disagree, D = Disagree, NAD = Neither Agree or Disagree, A = Agree, StrA = Strongly Agree.

Table 4

SBAE Teacher's General Beliefs Regarding AI

	StrD		D		NAD		A		StrA	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
AI takes away student creativity and their ability to think critically	-	-	8	11.4	13	18.6	19	27.1	12	17.1
I do not trust AI to carry out tasks without error	-	-	7	10.0	11	15.7	27	38.6	8	11.4
I think that AI can improve the overall success of my program	1	1.4	2	2.9	25	35.7	20	28.6	4	5.7
I think that AI can improve student learning	1	1.4	5	7.1	19	27.1	23	32.9	3	4.3
Teaching my students about AI is important for their future success	1	1.4	7	10.0	18	25.7	22	31.4	4	5.7
I do not trust my students with AI	1	1.4	14	20.0	11	15.7	22	31.4	5	7.1
AI improves the quality of my work as a teacher and FFA advisor	-	-	7	10.0	30	42.9	11	15.7	5	7.1
The benefits of using AI outweigh the challenges and barriers	-	-	11	15.7	24	34.3	15	21.4	2	2.9
AI is not flexible enough to be beneficial for every student	2	2.9	13	18.6	23	32.9	13	18.6	2	2.9
I do not have time to learn how to integrate AI in my teaching practices	3	4.3	16	22.9	15	21.4	18	25.7	1	1.4
My school district discourages the use of AI among students	6	8.6	17	24.3	11	15.7	15	21.4	3	4.3
I struggle to learn how to use new technologies	3	4.3	22	31.4	13	18.6	12	17.1	3	4.3
I do not like using AI technology	5	7.1	17	24.3	19	27.1	10	14.3	2	2.9
AI takes a great deal of time to learn how to use	1	1.4	25	35.7	17	24.3	8	11.4	2	2.9
I am comfortable with how I do things and am not interested in using AI in my teaching practices	5	7.1	22	31.4	16	22.9	9	12.9	1	1.4
AI is too expensive	8	11.4	17	24.3	22	31.4	5	7.1	1	1.4
I am afraid of AI technology	10	14.3	19	27.1	12	17.1	9	12.9	1	1.4
My school district discourages the use of AI among teachers	9	12.9	20	28.6	17	24.3	4	5.7	1	1.4
I am afraid AI will lead to my job becoming obsolete	9	12.9	24	34.3	15	21.4	4	5.7	1	1.4
I am too old to learn new things like AI	14	20.0	25	35.7	8	11.4	5	7.1	1	1.4

Note. StrD = Strongly Disagree, D = Disagree, NAD = Neither Agree or Disagree, A = Agree, StrA = Strongly Agree.

For the third research question, we sought to determine teacher's intentions to utilize AI in the near future. The results revealed that a substantial portion of participants expressed a positive outlook toward integrating AI more frequently into their teaching practices. Specifically, 44.2% of respondents either agreed or strongly agreed with the statement that they plan to increase their use of AI over the next 12 months, reflecting a growing acceptance of AI as a potentially valuable resource in their teaching practices. In contrast, 18.6% of participants indicated a neutral stance, selecting "neither agree nor disagree." Meanwhile, 11.4% of respondents reported that they disagreed or strongly disagreed with the intention to use AI more in the coming year, suggesting a notable minority that remains skeptical or resistant. Overall, these findings illustrate a spectrum of intentions, with a significant lean toward increased usage and potential growth in AI integration within SBAE programs.

For the fourth research question, we sought to determine the AI-related professional development needs of SBAE teachers. Seventy-four percent of participants indicated that if given the opportunity, they would be interested in receiving AI-related professional development, indicating that agricultural educators recognize the growing opportunities with AI in education and the need for support and training to effectively integrate AI into their teaching practice. Meanwhile, 22.2% said they were unsure if they would be interested in receiving AI-related training. A small minority (3.7%) indicated they would not be interested, possibly suggesting skepticisms towards AI and its relevance in SBAE.

When asked to identify specific areas where they would benefit from professional development, respondents most commonly selected two key needs. The first was learning how to detect improper or unethical use of AI by students (see Table 5). This highlights SBAE teachers' concerns about academic integrity and the potential for misuse of AI among students. The second most frequently cited area was using AI to save time on administrative tasks and paperwork, pointing to optimism that AI potentially improve efficiency. Additionally, one participant selected the open-ended "other" option and noted a desire for professional development on using AI specifically for lesson planning. This further reinforces the need for AI training that supports teachers in their core instructional duties.

Table 5

Areas of Focus for Professional Development

Area of Focus	<i>f</i>	%
Ways to detect improper AI use by students	36	51.4
Ways to use AI to save time on administrative tasks/paperwork	34	48.6
How to teach students how to use AI responsibly and effectively in academic settings	31	44.3
A basic introduction to AI	29	41.4
Utilizing AI for FFA and SAE	28	40.0
Specific types of AI platforms available to use in teaching	23	32.9
Maximizing student learning with AI	23	32.9
Instruction on incorporating AI into learning across the curriculum	23	32.9
How to prepare students for AI use in the workforce	22	31.4
Instruction on incorporating AI into teaching specific subjects	22	31.4

To address research question five, we investigated whether demographic variables were associated with the use of AI among SBAE teachers. We conducted a binary logistic regression using AI utilization within the past 12 months as the dependent variable. This variable was coded dichotomously to reflect whether or not participants reported using AI in their teaching during the previous year. The independent variables included in the model were participants' age, total years of teaching experience, and gender. The results of the logistic regression analysis (see Table 6) resulted in a non-significant model ($p = .679$) and a lack of good fit (Hosmer and Lemeshow Test of Good Fit, $p = .579$). These results suggest that, within this

sample, demographic characteristics such as age, gender, and teaching experience did not significantly predict whether a teacher had utilized AI. In other words, AI adoption among SBAE teachers does not appear to be strongly influenced by these basic demographic factors.

Although our regression model did not yield statistically significant predictors of AI utilization among SBAE teachers, the sample size was sufficient based on established guidelines (Steyerberg et al., 2000; Vittinghoff & McCulloch, 2007). This suggests that the lack of significance is likely due to a true absence of strong associations rather than inadequate statistical power.

Table 6

Demographic Variables on AI Utilization

Variable	B	S.E.	Wald χ^2	Exp(B)	95% CI for Exp(B)		P
					LL	UL	
Age	-0.025	.038	0.458	0.975	-0.139	0.081	.498
Gender	-0.922	.670	.772	0.398	-2.898	0.380	.169
Years Teaching	0.088	.062	2.051	1.093	-0.044	0.275	.152

Note. Gender coded 0 = female, 1 = male.

* $p < .05$; $df = 1$

Conclusions and Recommendations

We acknowledge that the findings of this study are only relevant to this population, and generalizations should be made cautiously. Due to research constraints and the nature of the survey instrument, we did not perform a pilot study with a test-retest reliability analysis, but instead focused on face and content validity and a post-hoc reliability analysis as a guide for survey quality, which is a limitation of this study.

According to research from the Center for Reinventing Education, many states have lagged behind in adopting policies regarding AI use in school settings (Dusseault & Lee, 2023a). As of October 2023, only two states were listed as providing policy guidance of this nature, with several additional states in various stages of crafting policy frameworks. Twenty one other states had not yet addressed AI in education at all, instead leaving policy up to individual school districts. Seventeen states (including the District of Columbia) did not provide information about AI policy development. The state of Utah has only recently released policy guidance on the use of AI in education in the form of the Artificial Intelligence Framework for Utah P-12 Education (Utah State Board of Education, 2024). This framework takes a moderate stance on AI use in the classroom, focusing primarily on promoting ethical and productive use of AI in the classroom by students and teachers, while still ensuring that federal and state policies regarding student privacy are followed. Notably, Utah was listed as “Not Providing Guidance” by the Center for Reinventing Education as late as October 2023, and this policy framework was released in April of 2024, after data was collected for this study, illustrating the speed with which the educational policy landscape is evolving with respect to AI. The utilization of a sample of SBAE teachers from Utah, while limiting in terms of broad generalizability, provides a glimpse into a state that is representative of many other states in terms of adopting policy on AI in education. Thus, this study provides important insight into SBAE teachers’ adoption of AI in a rapidly developing context surrounding the use of AI in education that is typical across much of the United States.

As AI is quite new to the education world, these findings can serve as a baseline for understanding SBAE teachers’ engagement with and perceptions related to AI. Notably, half the participants reported having used AI in the last twelve months, and just over half of those who indicated using AI in the past year indicated multiple instances of use. These findings suggest that the use of AI is becoming prevalent in

SBAE among this population of teachers. While participants seem to be using AI in their SBAE teaching practices at some level, the other half may have specific barriers keeping them from adopting AI in their practice. It is possible that some SBAE teachers do not perceive AI as easy to use or valuable in their teaching practices, as suggested by the Technology Acceptance Model (Davis, 1986).

The findings of this study suggest that SBAE teachers have mixed feelings about AI, which is consistent with the literature in other disciplines (Kim & Kim, 2022; Nazaretsky et al., 2022; Woodruff et al., 2023). With the most common negative beliefs being related to AI taking away students' ability to think critically and an acknowledgment that teachers do not trust AI, there are undoubtedly negative perceptions and attitudes toward the use of AI in SBAE. The negative perceptions of AI may result from limited exposure or negative social views of AI. Previous experiences with technology, social media influence, news reports, conversations with colleagues, and more might influence the social views of SBAE teachers related to AI.

SBAE teachers also seem to realize the potential of using AI by agreeing that AI can improve a program's success and student learning. According to the TAM, these positive attitudes could lead to more widespread adoption of AI within SBAE (Davis, 1986). Participants in this study indicated that creating assignments and rubrics, generating ideas for activities or assignments, and developing instructional materials were the uses that SBAE teachers perceived to be the most beneficial. These are core activities of all teachers, regardless of their discipline. This is consistent with other research highlighting the utility of AI in assisting teachers with administrative tasks, such as paperwork, school reports, and other duties not directly associated with classroom teaching (Yousuf & Wahid, 2021). However, the majority of research focuses more on how AI is being used with students rather than how teachers are using it (Kengam, 2020). Interestingly, AI uses in FFA and SAE were among the items listed as least beneficial, with AI items related to FFA being the lowest. Perhaps this is due to the more rigid and organized structure of FFA and SAE programs and activities and a lack of perceived usefulness of AI within the structured systems.

The majority of participants expressed some level of interest in participating in professional development programs related to AI, which reflects some level of perceived usefulness, perceived ease of use, and positive attitude toward AI. An individual's perception of the usefulness of a technology can influence their willingness to adopt it and, in this case, their inclination to engage in further training or professional development. Yet, a subset remained unsure or indicated having little to no interest in receiving training related to AI. Do SBAE teachers simply lack the basic understanding of AI to realize the potential usefulness or ease of use? Or is the teacher's attitude the main factor of influence? Those with no interest in training may already use it and see no need for additional training. It is also possible that some teachers have already determined not to integrate AI and thus see no need for training. It is also possible that SBAE teachers are simply not interested in AI and would prefer to receive training in other areas of their teaching practices. Teachers with negative perceptions of AI may view an investment in related training as futile, diminishing their motivation to participate. Moreover, the perception may exist that incorporating AI into the classroom would demand more time than it would ultimately save.

The results of this study suggest that professional development training should be focused on addressing the ethical considerations of AI as well as the potentially negative aspects of AI in education. These topics are not specific to SBAE (Lee & Perret, 2022; Cukurova et al., 2023), and teacher professional development could be developed across all disciplines. One potential barrier to AI integration among SBAE teachers is the lack of understanding of how to address and manage the negative aspects of AI in education. Participants in this study also indicated a desire for training related to how AI can help them save time. This finding makes sense, given that SBAE teachers nationwide spend excessive hours engaged in SBAE-related activities (Sorensen et al., 2016).

The analysis concerning the relationship between demographic factors—specifically age, gender, and years of teaching experience—and the utilization of AI technologies among SBAE teachers revealed that these variables do not significantly predict AI adoption. Despite the broad age range of participants (19 to 65 years) and varying levels of teaching experience (one to 26 years), these factors did not demonstrate a statistically significant impact on the likelihood of using AI. Our study adhered to established recommendations for sample size adequacy in regression modeling (Steyerberg et al., 2000; Vittinghoff & McCulloch, 2007). While no significant predictors of AI utilization were identified, this finding reinforces the complexity of factors influencing AI adoption among SBAE teachers. This suggests that factors beyond the basic demographic characteristics traditionally considered in technology adoption studies may influence the decision to integrate AI. Although other literature indicates that younger individuals (e.g., Venkatesh et al., 2012) and more experienced teachers (Ertmer & Ottenbreit-Leftwich, 2010) tend to adopt new technologies like AI more readily, our results did not align with these trends. This discrepancy highlights the importance of considering other potential influences. Factors such as personal attitudes towards technology, institutional support, and targeted professional development related to AI may significantly explain the variability in AI adoption among teachers.

The alignment of our findings with the TAM model reveals nuanced insights into the integration of AI within SBAE. According to TAM, the acceptance and use of technology are significantly influenced by perceived usefulness and perceived ease of use. Despite the initial expectations based on demographic factors such as age, gender, and years of teaching experience, these were not significant predictors of AI adoption among the SBAE teachers in this study. This suggests that the barriers to and facilitators of AI integration in educational settings may extend beyond these basic demographic variables. This finding also implies that interest and engagement with AI tools may be distributed relatively evenly across different age groups, levels of teaching experience, and gender identities within the SBAE teaching population. It also highlights the possibility that other factors—such as access to technology, school culture, or personal attitudes toward innovation—may play a more influential role in shaping AI use in SBAE contexts.

Further examination shows that SBAE teachers in this study were able to identify potential benefits in AI applications, such as creating assignments and developing instructional materials, indicating recognition of AI's usefulness in repetitive and administrative tasks. However, there remained a significant variation in the perception of AI's ease of use and its overall impact on educational quality, which could influence adoption rates. Such findings underscore the importance of addressing the perceived ease of use and the usefulness of AI in professional development programs to enhance the acceptance and integration of AI. As proposed by TAM, enhancing teachers' positive perceptions and reducing the complexity associated with AI technologies could lead to a higher rate of adoption, suggesting that targeted interventions in professional development and support structures are crucial in maximizing the potential benefits of AI in education.

Recommendations for Research and Practice

As multiple professional development topics were identified as needs in this study, we recommend that state staff provide training for in-service teachers. Based on the findings of this study, training could be developed across multiple disciplines. It seems clear that there is still much to learn about AI as it proliferates through education. Therefore, we recommend that university teacher education programs add AI-related curriculum or training for pre-service teachers. Demonstrating how AI can be utilized in SBAE programs, including FFA and SAE, may also be important. Providing pre-service teachers more exposure to AI can also help dispel misconceptions and improve perceived usefulness, perceived ease of use, and their attitude towards using AI.

With a relatively small sample size in this study, we recommend research in other states or a national study to investigate these same research questions on a larger scale. After conducting this study, additional

questions still exist. More research should be conducted to determine why teachers are reluctant to engage in training related to AI. As the prevalence of AI expands in education, determining professional development needs and delivering training will be important. More quantitative research testing the TAM model to determine the degree to which specific factors influence AI integration would be important. Qualitative and mixed methods studies exploring SBAE teachers' past experiences with AI and how that influences their general beliefs about AI would add to the findings of this study.

Additionally, we recognize the importance of drawing comparisons between SBAE teachers who have and have not used AI. These comparisons can provide deeper insights into the barriers faced by non-users and the benefits experienced by users. In response, we recommend future analyses by examining differences in perceptions, professional development needs, and demographic factors between the two groups (users vs. non-users). While the current study focused primarily on descriptive findings, this added layer of analysis would enrich understanding and help tailor recommendations for professional development and AI adoption strategies.

Impact

We believe this research to be timely and relevant. The findings of this study have provided valuable insights for stakeholders and researchers related to AI utilization, perceptions, and professional development needs within SBAE in Utah. We view our study as a starting point for further AI-focused research within SBAE. It also provides a baseline for state staff and stakeholders for future activities and practices related to AI. While questions remain, this is an important first step into AI research in SBAE.

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