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Self-Efficacy and Attitudes of Learning Disabilities Teachers Toward the Use of Artificial Intelligence in Education: Evidence from Saudi Arabia

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Abstract. In line with recent trends toward integrating artificial intelligence (AI) in special education, this study examined learning disability teachers' perceptions of self-efficacy and attitudes toward using AI and explored their relationships with gender, academic qualification, years of teaching experience, and participation in training courses related to AI applications in education. A descriptive qualitative approach was employed, and data were collected through an electronic questionnaire administered to 114 teachers of students with learning disabilities in the Eastern Province of Saudi Arabia. Descriptive statistics and correlational analyses were used to analyse the data. The findings indicated that teachers showed moderate self-efficacy and positive attitudes toward AI, with only a small gender difference in attitudes and a very small positive correlation between self-efficacy and attitudes. These results suggest the importance of targeted professional training programs and contextual institutional support to enhance the effective integration of AI in educational practice, while avoiding assumptions of broad or uniform impact. The study contributes to the objectives of Vision 2030 by informing professional development initiatives, supporting instructional practices, and identifying directions for future research in AI-supported special education.

Keywords: Learning disabilities teachers; artificial intelligence; self-efficacy; attitudes

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1. Introduction

Students with learning disabilities (SLDs) represent a heterogeneous group in terms of both the type and severity of disability. As a result, effective support for these students requires the use of evidence-based special education strategies and technology-supported interventions (Liu & Wachira, 2022). In recent years, the educational field has witnessed rapid technological advancement, leading to the development of innovative and personalized educational tools designed to address individual learning needs, particularly those associated with learning disabilities (United Nations Educational, Scientific and Cultural Organization, 2023). Within this context, artificial intelligence (AI) has emerged as a promising technological approach for teaching and supporting SLDs.

It is defined as a set of programming methods and computational approaches that enable computer systems to simulate selected aspects of human intelligence, including the ability to perform inference processes based on facts and rules stored in a computer's memory. (Mahmoud, 2020). In education, AI applications have demonstrated effectiveness in facilitating students', particularly SLDs', access to educational content. These applications support the integration of SLDs with their peers and enable individualized learning experiences aligned with their specific needs. Consequently, AI applications facilitate teachers' instructional work and help reduce professional burdens, whereas educational practice was previously largely teacher-centered (Mansour, 2021).

However, the benefits of employing AI are likely to be realized only when teachers have a clear understanding of how to use these applications, supported by ethical awareness (Celik, 2022) and an appreciation of the role of teachers' self-efficacy and attitudes toward the use of AI applications (Bobro, 2024; Mustafa, 2024). Additionally, acknowledging the opportunities offered by educational AI applications does not diminish the importance of understanding their potential challenges (Al-Malki & Al-Hawrani, 2023). Teachers' awareness of both the opportunities and challenges associated with AI applications may contribute to higher-quality implementation, which may be reflected in improved student achievement (Bobro, 2024).

Saudi Arabia, represented by the Education and Training Evaluation Commission (2020), has emphasized enhancing professional standards for teachers of SLDs by increasing awareness, improving performance quality, addressing obstacles that may hinder educational improvement, and enabling access to educational content. This emphasis reflects the growing need to keep pace with technological advancement in education and contemporary national approaches to preparing teachers of SLDs. However, despite increasing interest in AI in education, quantitative evidence regarding learning disability teachers' AI-related self-efficacy and attitudes within the national context remains limited.

Accordingly, there is a need to examine teachers' levels of self-efficacy and attitudes toward using AI applications while considering both the opportunities offered by educational AI and its potential challenges. In response to this gap, the present study examines teachers' self-efficacy in using AI applications when

teaching SLDs. It further explores teachers' attitudes toward AI integration in education and identifies statistically significant differences based on selected demographic and professional variables, including city, gender, academic qualification, teaching experience, AI-related training, and professional certification from the National Centre for E-Learning (2024). By addressing these aspects, the study aims to generate in-depth insights into the role of AI in supporting SLDs and to derive practical recommendations that respond to the needs of educational practice.

This study may contribute to advancing research on AI applications in teaching SLDs, given the limited number of local studies addressing this area. It also supports the use of modern technologies to enhance educational processes and teachers' professional efficiency in alignment with Saudi Vision 2030, which emphasizes expanding AI integration in education. At the applied level, the study may inform the design of training programs that raise teachers' awareness of AI applications in special education and support decision makers in identifying implementation challenges.

In addition, it may provide teachers with an opportunity to reflect on their self-efficacy and attitudes toward improving instructional practices for SLDs. Although the study was conducted within a specific educational context in Saudi Arabia, the integration of AI in special education represents a global concern across diverse educational systems. Educational mechanisms related to technology-supported learning for SLDs may therefore be adaptable to a range of educational contexts.

Accordingly, to build upon previous research, the present study sought to address the following research questions:

1. What is the level of self-efficacy in using AI applications among teachers of SLDs?
2. What are the attitudes of teachers of SLDs toward the use of AI applications?
3. Are there statistically significant differences ($\alpha = 0.05$) in teachers' self-efficacy and attitudes toward the use of AI applications based on gender, academic qualification, years of teaching experience, and participation in AI-related training courses?
4. Is there a statistically significant relationship ($\alpha = 0.05$) between teachers' self-efficacy in using AI applications and their attitudes toward these applications?

2. Literature Review

The theoretical framework guiding this study is presented in Figure 1, which illustrates the relationships among AI self-efficacy, attitudes, and AI use within the context of LDs. The study draws on research literature conducted across global and local contexts and contributes to the ongoing scholarly discussion by examining these variables within a new context, without assuming generalizability.

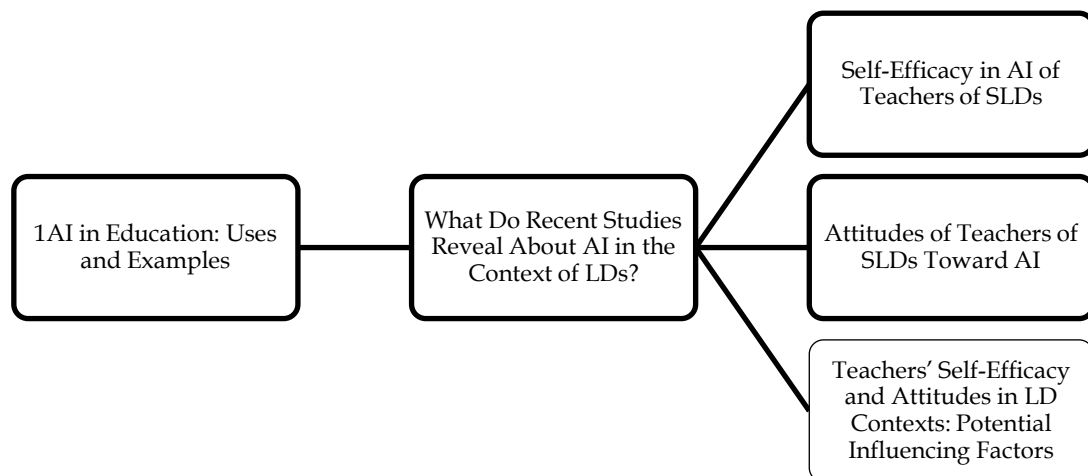


Figure 1: Theoretical framework illustrating research on AI self-Efficacy, attitudes, and AI use in LDs context

2.1 AI in Education: Uses and Examples

AI applications and tools have become an integral component of contemporary education, no longer viewed as futuristic or optional but as essential to educational development and progress. In May 2019, the Beijing Consensus, issued by the International Conference on AI and Education, emphasized the importance of deploying AI technologies to augment human intelligence and safeguard human rights (United Nations Educational, Scientific and Cultural Organization, 2019). In educational contexts, AI applications are defined as programs and systems capable of simulating aspects of human intelligence in learning, decision making, problem solving, data analysis, and instructional personalization. These applications also contribute to improving teaching methods by automating and simplifying routine tasks for both students and teachers, thereby supporting personalized and adaptive learning experiences that save time and effort (Al-Bashar, 2020).

One of the most prominent applications of AI in education is adaptive learning systems, which modify educational content by adjusting learning inputs or outcomes according to students' individual needs and abilities. Abdel-Raouf (2022) identified several examples of such applications, including voice-generation tools that convert written text into audible output and character recognition applications that allow users to edit text by correcting, adding, or modifying formatting. Additional examples include spell-checking tools and speech recognition applications that convert spoken language into written text.

Speech synthesis technologies are also used to generate spoken language from textual input. Abdel-Raouf further noted that some AI applications incorporate interactive features in addition to content adaptation, such as scanners that add virtual data and transform materials into interactive pages, as well as intelligent multimedia systems and smart educational games. These applications support SLDs by offering multiple modes of communication, including images, graphics,

and videos, and by employing learning approaches that promote competition and stimulate cognitive engagement. Mahmoud (2020) noted that educational robots and virtual assistants, such as chatbots, IBM's AI-powered Google Watson robot, and generative AI applications, can provide immediate support to students, respond to inquiries, and assist with writing and summarizing essays. Consequently, teachers and students can use these tools to complete school assignments more efficiently than through traditional methods.

AI also supports the development of interactive, simulated learning environments that enhance students' understanding of academic subjects, including virtual reality (VR) and augmented reality. Although both aim to create novel learning experiences, they differ in approach. VR creates a fully immersive digital environment commonly used in games and movies, whereas augmented reality overlays virtual elements onto the real world to create a mixed reality experience (Ministry of Communications and Information Technology, 2024).

Intelligent tutoring systems can further support learning by enabling self-assessment of student performance and providing immediate feedback with minimal or no teacher intervention. For example, smart content applications convert printed textbooks into digital formats and use AI to deliver content. Some companies have also developed integrated smart content platforms that incorporate exercises, media, and assessments (Abdel Salam, 2021). Additionally, several educational platforms employ AI-powered virtual assistants to support teachers through automated grading. These systems evaluate students by analyzing submitted responses, generating individualized training plans, and informing students of their grades. This approach is characterized by consistency and reduced human error (Abdel Salam, 2021).

At the local level, Saudi Arabia continues to implement AI applications in education in alignment with the goals of Saudi Vision 2030, with an emphasis on core principles such as inclusion, equity, and the promotion of lifelong learning opportunities for all learners, including SLDs (Al-Shami, 2024). Within the Saudi educational context, AI applications have been recognized for their ability to save time and costs, ease of use, and capacity to provide students with diverse needs access to educational content through multiple modalities (Al-Khaibari, 2020). More recently, global and local research has indicated that AI shows promise in teaching SLDs and enhancing their learning outcomes, as discussed in the following section.

2.1.1 What do recent studies reveal About AI in the context of LDs?

AI is increasingly being integrated into special education through the provision of personalized learning experiences that support SLDs (Barua et al., 2022; Garg & Sharma, 2020; Hopcan et al., 2022; Marino et al., 2023). AI applications are used to develop academic skills and promote inclusive pedagogical practices (Garg & Sharma, 2020; Hopcan et al., 2022). Several studies have demonstrated the effectiveness of AI applications for SLDs. For example, a meta-analysis reported a medium effect size for AI-based interventions on academic skills and learning outcomes among students with various disabilities (Zhang et al., 2024).

Additionally, AI applications have been effectively employed to enhance supportive education and improve social interactions among students with diverse disabilities, including autism spectrum disorders, attention deficit disorder, and LDs (Barua et al., 2022). AI effectiveness in education is further reflected in its capacity to adapt curricula to individual psychological profiles and learning paces, with ChatGPT identified as one of the most widely used AI tools in educational contexts (Mykhaylenko et al., 2024). Beyond generative AI, SLDs may also benefit from commonly used applications such as software-based tools, robots, and VR systems (Hopcan et al., 2022; Zhang et al., 2024).

Regardless of application type, recent studies have highlighted AI's potential to enhance educational quality in Saudi Arabia, particularly in relation to personalized learning, assistive technologies, and data-driven decision making in special education (Alsudairy & Eltantawy, 2024). Additional research has confirmed AI's important role in improving educational quality and supporting both teachers and students, including SLDs (Al-Ghamdi & Bakhit, 2023; Alsudairy & Eltantawy, 2024; Rice & Dunn, 2023).

Although the integration of AI applications into special education represents a promising opportunity to improve educational practices and support SLDs, researchers have cautioned against several challenges. These include limiting AI's role to workload reduction alone and underscoring the importance of empowering both students and their families (Rice & Dunn, 2023). Previous studies have also highlighted the need to address issues related to teacher training and curriculum adaptation (Walter, 2024). With the increased adoption of AI applications, the development of critical thinking skills, awareness of AI ethics, and instructional design competencies among both students and teachers has become increasingly important (Walter, 2024). The literature further emphasizes the need to consider the ethical and legislative dimensions associated with adopting AI in education (Marino et al., 2023).

Despite some expressed concerns, AI applications represent a qualitative shift with the potential to transform educational technologies, requiring continuous adaptation and the development of clear implementation strategies at a global level, including in Saudi Arabia (Al-Ghamdi & Bakhit, 2023). In addition, perceptions of special education teachers, including teachers of SLDs, toward the use of AI applications remain largely neutral, with professional experience influencing these perceptions (Alsudairy & Eltantawy, 2024). Accordingly, teachers' self-efficacy and attitudes warrant further investigation. The following section reviews relevant research on teachers' self-efficacy and attitudes toward AI applications.

a) Self-efficacy in AI of teachers of SLDs

Several definitions of self-efficacy exist; however, the definition adopted in this study is grounded in the concept formulated by psychologist Bandura (1977) within social cognitive theory. Self-efficacy refers to an individual's beliefs and self-perceptions regarding the knowledge, skills, and abilities required to successfully complete specific tasks. According to Bandura, self-efficacy is shaped

by four primary sources: mastery experiences, observation and modeling, social persuasion and encouragement, and individuals' psychological and emotional states. In educational contexts, self-efficacy is particularly critical for teachers, as it influences confidence, instructional effectiveness, and the ability to address professional challenges (Ahmed et al., 2021; Al-Amer, 2023; Al-Samadi & Al-Samadi, 2022). Previous research has also identified a statistically significant positive relationship between perceived quality of work life and self-efficacy among special education teachers, including teachers of SLDs (Ahmed et al., 2021).

A growing body of research suggests that teachers' self-efficacy plays a central role in shaping instructional practices and technology adoption. However, much of the existing literature has focused on general technological self-efficacy rather than AI-specific self-efficacy, particularly within special education contexts. Studies examining the self-efficacy of teachers of SLDs have indicated that self-efficacy is influenced by demographic and professional variables such as gender, academic qualification, teaching experience, and participation in training courses (e.g., Ahmed et al., 2021; Al-Amer, 2023; Al-Samadi & Al-Samadi, 2022). Despite these findings, empirical research explicitly examining AI-related self-efficacy among teachers of SLDs remains limited.

Within the Saudi educational context, Abu Rasin and Al-Rubaian (2023) reported that differences in self-efficacy and achievement motivation among female teachers of SLDs were associated with teaching experience and training opportunities. Other studies have emphasized the role of effective training programs in enhancing teachers' self-efficacy (Karim et al., 2021; Tzivnikou, 2015), highlighting the importance of integrating digital literacy and educational technology into both in-service and preservice teacher preparation programs. This perspective is further supported by Lim (2023), who found that digital literacy contributes to strengthening preservice teachers' self-efficacy in relation to teaching AI in early childhood education settings. Collectively, these findings underscore the role of teacher preparation and professional development in shaping educators' self-perceptions of their capacity to use advanced technologies, including AI, to support SLDs.

Although studies addressing teachers' self-efficacy in employing AI applications with their students remain limited, particularly Arabic-language studies focusing on LDs, several international studies have examined this issue from the perspective of teachers' confidence in their ability to integrate and use AI applications in educational practice. Wang and Chuang (2024) argued that, with the rapid development of AI applications, it is essential for researchers, educators, and practitioners to understand individuals' self-efficacy related to the use of AI technologies and how such beliefs influence subsequent behaviors toward AI advancements. Similarly, Bergdahl and Sjöberg (2025) emphasized the importance of measuring teachers' self-efficacy in using AI-driven chatbots in K-12 education and examining its influence on teachers' perceptions of AI as a resource for professional development.

At the local level, despite their limitations, existing studies indicate a growing interest in AI applications and the education of SLDs. For example, Al-Ajaji (2017) examined the use of virtual classrooms as an AI application and found that teachers' readiness to use AI was closely associated with the need for technical training. This finding is consistent with Al-Rubaian and Al-Khatib (2017), who reported that teachers must develop technical skills to effectively employ AI tools. In addition, Al-Shehri (2023) noted that, despite ongoing challenges, some special education teachers demonstrate positive awareness of AI's potential to support SLDs. Overall, findings from these local studies underscore the need for continued investigation into AI and teachers' self-efficacy, given its relevance to the field of LDs. Alongside self-efficacy, teachers' attitudes toward AI applications represent another critical factor influencing their use in educational settings; therefore, the following section focuses on these attitudes.

b) Attitudes of teachers of SLDs toward AI

In psychology, the term *attitude* refers to a state of readiness reflecting overall evaluations shaped by past experiences that guide individuals' cognitive, emotional, and behavioral responses toward people, objects, and situations (Wolf et al., 2020). A review of relevant studies indicates that much of the existing literature has focused on the extent of AI use in education rather than explicitly examining teachers' attitudes toward these applications, particularly the attitudes of teachers of SLDs. Despite their importance, quantitative evidence addressing teachers' attitudes in special education contexts, especially within national settings, remains limited. Accordingly, this section presents a brief overview of selected international and local studies, despite their limitations, to provide a clearer understanding of teachers' attitudes toward the use of AI applications.

Overall, prior research suggests that teachers tend to hold generally positive attitudes toward AI in educational settings, although findings related to demographic variables such as gender and teaching experience remain inconsistent, particularly in special education contexts. A sample of available studies further indicates variation in teachers' attitudes depending on contextual factors, with a general tendency toward acceptance of AI applications in teaching. However, these studies often do not clarify how AI use aligns with the objectives of individualized educational plans for SLDs, particularly in relation to developing academic skills in reading, writing, and arithmetic. For example, Haseski (2019) reported negative attitudes among preservice teachers in Turkey toward AI, accompanied by cautious enthusiasm linked to concerns about living in a technology-driven society.

In contrast, Bii et al. (2018) found widespread acceptance of chatbots among teachers in Kenya, who viewed them as enjoyable and effective educational tools. Similarly, Bani Melhem (2020) reported positive attitudes among special education teachers toward the use of tablets containing AI applications to support skill development in SLDs. At the local level, research indicates that AI technologies may enhance learning experiences when effectively integrated into educational settings (Abdul Latif, 2020). Al-Maliki and Al-Hourani (2023) noted that teachers of SLDs expressed positive attitudes toward interactive platforms

and their contribution to learning, despite existing infrastructure challenges. Likewise, Al-Harbi and Al-Mutairi (2023) reported positive attitudes toward tablet-based applications among teachers of SLDs, with no statistically significant differences attributed to gender or years of teaching experience and no reported technical barriers.

Despite these generally positive attitudes and recognition of AI's potential benefits, several studies have identified persistent obstacles to effective implementation, including limited training opportunities and resource constraints (Al-Shahri, 2023). Other research has emphasized that teachers' attitudes toward AI in the education of SLDs may also be shaped by factors related to awareness, ethical considerations, and regulatory frameworks (Al-Qahtani, 2023). Addressing these challenges requires targeted professional development initiatives, practical research to identify implementation barriers, and updates to teacher preparation programs to support the effective integration of AI technologies (Al-Shahri, 2023). The following section, therefore, examines factors influencing teachers' self-efficacy and attitudes toward AI applications in the field of LDs.

c) Teachers' self-Efficacy and attitudes in LD contexts: potential influencing factors

The relationship between teachers' attitudes toward AI and their self-efficacy in the context of LDs represents a complex and promising area of research. However, this relationship has not been explicitly examined within the existing literature reviewed here. Current research nevertheless suggests a generally positive trend indicating an indirect association between teachers' attitudes toward AI and their self-efficacy in AI use within K-12 education, offering preliminary insights into this underexplored area. For example, Bergdahl and Sjöberg (2025) reported a positive trend between teachers' attitudes toward AI and their perceived self-efficacy in classroom applications. This evidence suggests that more positive attitudes toward AI may be associated with greater teacher confidence in teaching and supporting SLDs. Teachers' attitudes toward AI are not uniform and vary across contexts.

These variations are influenced by factors such as geographic setting, digital competence, and years of teaching experience. Attitudes also differ depending on whether AI is discussed in general terms or in relation to specific instructional applications (Jenjić et al., 2025). In addition, factors contributing to the development of positive attitudes may indirectly influence self-efficacy. For instance, higher levels of digital literacy and perceived ease of use are associated with more positive attitudes toward AI applications (Galindo-Domínguez et al., 2024). Academic degree and professional role have also been positively associated with teachers' self-efficacy. Accordingly, researchers have emphasized the importance of enhancing teachers' attitudes and self-efficacy through user-friendly AI tools, improved digital competence, and targeted professional training initiatives (Bergdahl & Sjöberg, 2025; Yang, 2024).

In light of Saudi Arabia's efforts to strengthen professional development for teachers of SLDs, a focus on competence, professional orientation, and

technology-related performance standards has become central to supporting digital educational transformation (Education & Training Evaluation Commission, 2020). Based on the identified gaps, the present study examines AI-related self-efficacy and attitudes among teachers of SLDs. It also explores potential differences related to gender and teaching experience using a quantitative descriptive approach.

3. Methodology

A descriptive approach was adopted to examine the levels of self-efficacy in employing AI applications among teachers of SLDs, their attitudes toward these applications, and differences related to selected demographic and professional variables, including gender, academic qualification, experience, and participation in AI-related training courses. According to Sulaiman (2015), the descriptive method involves the systematic study of existing phenomena through scientific description and analysis, without manipulating variables or establishing causal relationships, to provide logical interpretations supported by evidence.

3.1 Research Population and Sample

The research population consisted of 256 teachers of SLDs. An electronic link to the study questionnaire was distributed to all eligible teachers, and 114 participants completed the survey. A non-random sampling technique was employed because the study targeted a specific group of elementary school teachers specializing in LDs who possessed relevant professional experience aligned with the purpose of research. After excluding the exploratory sample of 25 teachers who participated in procedures to test the validity and reliability of the study instrument, the final research community comprised teachers working in LD programs in government primary schools in the Eastern Province of Saudi Arabia during the second semester of the 2024–2025 academic year. The study sample represented 40.57% of the research population, as shown in Table 1.

Table 1: Distribution of study sample members according to variables

Variable and Levels		Frequency	Percent
<i>Gender</i>			
	Male	47	41.2
	Female	67	58.8
	Total	114	100
<i>Academic Qualification</i>			
	Bachelor	80	70.2
	Higher degrees	34	29.8
	Total	114	100
<i>Experience</i>			
	10 years and less	29	25.4
	More than 10 years	85	74.6
	Total	114	100
<i>Training Courses for Employing AI in Education</i>			
	No	78	68.4
	Yes	36	31.6
	Total	114	100

3.2 Instrument Development

The first author developed an instrument entitled Learning Disabilities Teachers' Self-Efficacy and Attitudes Toward AI Applications. The psychometric properties of the scale were established through procedures addressing content and construct validity.

3.2.1 Content Validity

Content validity was established using two complementary procedures based on Kempf-Leonard's (2005) framework.

a) Face validity

Scale items were developed through a review of relevant theoretical literature and prior empirical studies (e.g., Al-Bashar, 2020; Al-Oufi & Al-Ruhailli, 2021). In its initial version, the scale consisted of 30 items distributed across two domains. The first domain measured teachers' self-efficacy in employing AI applications and included 12 items derived from prior studies. The second domain assessed teachers' attitudes toward AI applications and comprised 17 items, including one negatively worded item (Item 12).

b) Logical validity

To establish logical validity, five experts reviewed the scale items. This panel included three assistant professors with expertise in special education, educational technology, and instructional design, as well as two teachers of SLDs. Experts evaluated each item for clarity, relevance to its domain, and appropriateness of linguistic formulation. When an item did not meet one or more of these criteria, experts provided recommendations for revision, addition, or deletion. All agreed-upon comments were incorporated. Following this review process, the final version of the scale comprised 29 items distributed across two domains: 12 items measuring self-efficacy and 17 items measuring attitudes, including one negatively worded item (Item 12).

3.2.2 Construct validity

Construct validity was examined by piloting the revised scale with a sample of 25 male and female teachers of SLDs who were not included in the main study sample. Corrected item-total correlation coefficients were calculated for items within each domain to assess the degree to which individual items were aligned with their respective constructs. These coefficients were computed using the specified equation (Lord et al., 1968), and the results are presented in Tables 2 and 3.

Table 2: Corrected correlations between self-efficacy and AI use areas among teachers of SLDs

Item of Self-Efficacy and its ID	Corrected Item-Total Correlation
I know the concepts and terminology related to AI applications.	
1	0.71*
I can use AI applications for early and rapid detection of academic and developmental LDs.	
2	0.80*
I can identify AI applications for SLDs for various purposes (e.g., teaching, assessment, and reinforcement).	
3	0.74*
I know how to use various AI applications to help my students learn or complete assignments.	
4	0.85*
I can adapt AI applications to suit the needs of my SLDs (such as asynchronous recording, using multimedia, and converting written texts to audio).	
5	0.76*
I can diversify my teaching methods and strategies for my students using AI applications.	
6	0.84*
I can employ AI applications to meet my students' individual educational goals.	
7	0.85*
I can empower my students through the use of AI applications.	
8	0.69*
I can solve technical problems encountered when using AI applications.	
9	0.71*
I have access to support channels to resolve technical issues.	
10	0.72*
I have sufficient information to use AI applications in education.	
11	0.82*
I have the knowledge to use AI applications to develop innovative capabilities.	
12	0.75*

Note. * The computed correlation values exceed the critical value (0.396071[$df=23$]) at ($\alpha = 0.05$).

Table 2 presents the corrected item-total correlation coefficients for items measuring teachers' self-efficacy in employing AI applications. The coefficients ranged from 0.69 to 0.85, indicating relationships of moderate to strong magnitude according to established interpretive guidelines (Hinkle et al., 2003). These results provide evidence supporting the internal consistency and construct validity of the self-efficacy domain.

Table 3: Corrected item–total correlations for the attitudes toward AI domain among teachers of SLDs

Item of Attitudes and its ID	Corrected Item-Total Correlation
I see AI applications helping support the teaching process for SLDs.	
1	0.77*
AI applications are an effective communication tool between me and my students.	
2	0.71*
I believe that using AI applications makes the teaching process more effective than traditional teaching.	
3	0.67*
AI applications help me track my students' performance and achievement.	
4	0.72*
I believe that using AI applications in education helps increase the students' motivation .	
5	0.71*
I would like to develop my skills and learn ways to optimize the use of AI applications in teaching SLDs.	
6	0.74*
The use of AI applications increases opportunities for professional development for teachers of SLDs.	
7	0.77*
AI applications encourage teachers to use educational tools that easily integrate visual, kinetic, and auditory input.	
8	0.84*
I support the expansion of AI applications to assist SLDs.	
9	0.76*
I see AI applications making it easier to complete tasks with minimal time and effort.	
10	0.82*
AI applications contribute to changing the role of the SLDs from recipients of knowledge to active seekers and practitioners of knowledge.	
11	0.73*
I believe that the use of AI applications may result in dependency when performing tasks (reversed).	
12	0.36*
I believe AI applications play a significant role in helping my students access the general curriculum.	
13	0.79*
I would like to know the impact of using AI applications on achieving the goals of my students' individual educational plan.	
14	0.73*
I realize that using AI applications in learning increases communication between students and teachers.	
15	0.75*
I understand that AI applications reduce psychological barriers to learning, such as shyness and low self-esteem.	
16	0.71*
I understand that AI applications help develop higher-level thinking skills in students with LDs and promote collaboration by fostering active learning.	
17	0.65*

Note. * The computed correlation values exceed the critical value (0.396071[$df=23$]) at ($\alpha=0.05$).

Table 3 presents the corrected item–total correlation coefficients for items measuring teachers’ attitudes toward AI applications. The coefficients ranged from 0.36 to 0.84, indicating relationships from weak to strong magnitude. All corrected correlation coefficients for attitude items exceeded the critical value of 0.39607 at $\alpha = 0.05$, as shown in Tables 2 and 3. Construct validity was examined by calculating corrected item–total correlation coefficients for items within their respective domains using the *t*-test for correlation coefficients, with 23 degrees of freedom based on the size of the exploratory sample. None of the coefficients fell below the critical value, indicating statistically significant relationships between items and their corresponding domains. These results provide evidence supporting the adequacy of the scale’s construct validity for both the self-efficacy and attitudes domains (Trochim & Donnelly, 2007).

The final version of the scale comprised two domains. The self-efficacy domain included 12 items, while the attitudes domain included 17 items, both measured using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Total scores ranged from 12 to 60 for self-efficacy and from 17 to 85 for attitudes, with higher scores indicating higher levels of the measured constructs. To interpret mean scores, a relative scaling model based on the category-length method was applied, classifying values as high (greater than 3.66), medium (between 2.34 and 3.66), and low (less than 2.34; Doran, 1980).

$$1.00 = \frac{3}{3} = \frac{4 - 1}{3} = \frac{\text{Minimum Scale} - \text{Maximum Scale}}{\text{Number of Judgment Discussion Results}} = \frac{\text{Range}}{\text{Number of Judgment Discussion Results}} = \text{Class Width}$$

3.2.3 Reliability

Internal consistency reliability for the two domains was estimated using Cronbach’s alpha based on data from the exploratory sample. Cronbach’s alpha was calculated using the standard equation (Cronbach, 1951), where *k* represents the number of items in each domain and r^{-} represents the mean inter-item correlation excluding the main diagonal. This coefficient assumes equality of item loadings within each domain under a confirmatory factor analysis framework and is derived from the variance–covariance matrix in which associated variances are constrained to be equal, as shown in Table 4. To examine test–retest reliability, the scale was administered twice to the exploratory sample with a two-week interval between administrations. Pearson correlation coefficients were then calculated to assess the stability of scores across the two measurement occasions.

Table 4: Internal Consistency and Test–Retest Reliability Coefficients for the Two Scale Domains

Scale	Cronbach’s Alpha		Stability Index		N of Items
	Value	Classification	Value	Magnitude	
Self-Efficacy	0.95	Excellent	0.88*	Large	12
Attitudes	0.95	Excellent	0.85*	Large	17

Note. * The computed correlation values exceed the critical value (0.396071[*df*=23]) at ($\alpha=0.05$).

Data presented in Table 4 indicate that the internal consistency coefficients for both domains reached 0.95, reflecting excellent reliability. Test-retest reliability coefficients reached 0.88 for the self-efficacy domain and 0.85 for the attitude's domain, both of which represent high stability over time. The correlation coefficients between the two administrations exceeded the critical value, providing evidence for the adequacy of the scale's reliability and the consistency of item construction across both domains.

3.3. Research Variables

The study included the following independent variables:

1. Gender, with two categories (male, female)
2. Academic qualification, with two levels (bachelor's, postgraduate)
3. Teaching experience, with two levels (10 years or less, more than 10 years)
4. Participation in training courses related to the use of AI applications in education, with two levels (yes, no)

The dependent variables included the following:

1. Self-efficacy in employing AI applications among teachers of SLDs
2. Attitudes toward AI applications among teachers of SLDs.

4. Data Collection and Analysis

After the questionnaire was peer-reviewed, it was converted into an electronic format using Google Forms to facilitate data collection. The questionnaire was administered to neither the exploratory sample nor the main study sample until peer review was completed and official approvals were obtained from the relevant authorities, specifically the Standing Committee for Research Ethics on Living Creatures affiliated with the Deanship of Scientific Research at Imam Abdurahman Bin Faisal University (Approval No: HAP-05-D-003, IRB No: IRB-PGS-2024-15-806; see Appendix 1). A letter facilitating the researchers' work was issued by the College of Education at the university, represented by the Agency for Scientific Research and Innovation, and submitted to the Director General of the General Administration of Education in the Eastern Province.

After departmental approval was granted, the researchers distributed the questionnaire link via email, accompanied by an informed consent form. The consent form ensured the privacy and confidentiality of the data and clarified that research-related data and results would be disclosed only to authorized individuals. The researchers also ensured that data collection respected participants' personal circumstances, cultural considerations, and voluntary participation, and that all procedures were conducted solely for scientific research purposes.

The questionnaire link was sent by the researchers to the Planning and Development Department of the Eastern Province Education Department for official distribution to the target group. The administration requested that the questionnaire first be administered to the exploratory sample to calculate the psychometric properties of the instrument. Based on the results of this analysis, decisions were made regarding any necessary refinements to the tool. The administration then requested that the finalized questionnaire be distributed to

the full study sample after excluding exploratory participants. The researchers monitored the response process regularly through the questionnaire link to ensure that the required sample size was achieved. They also coordinated with the Planning and Development Department to send a reminder email containing the questionnaire link to increase response rates, after which responses were compiled for analysis.

The research data were analyzed using the Statistical Package for Social Sciences version 30. The analytical strategy emphasized description and estimation rather than causal inference, with descriptive statistics and effect size interpretation serving as the primary basis for understanding the results.

1. To address the first and second research questions, means and standard deviations were calculated for the two domains, self-efficacy and attitudes toward AI applications. Item-level means were presented in descending order to describe participants' overall response patterns on each scale.
2. To address the third research question, means and standard deviations for self-efficacy and attitudes were calculated according to gender, academic qualification, teaching experience, and participation in AI-related training courses. Although multivariate analysis of variance (MANOVA) was initially considered, a review of the research questions indicated that a fully multivariate explanatory approach was not required. Therefore, a more parsimonious analytical framework was adopted. Artlett's test was conducted to examine the relationship between the two domains. Subsequently, four-way analyses of variance without interaction effects were conducted to examine group differences, first for the combined domains and then separately for each domain. Interpretation focused primarily on effect sizes and observed mean differences rather than statistical significance alone.
3. To address the fourth research question, a Pearson correlation coefficient was calculated to examine the relationship between teachers' self-efficacy in employing AI applications and their attitudes toward these applications.

5. Results and Findings

5.1 Level of Self-Efficacy in Employing AI Among Teachers of SLDs

Table 5 presents the means and standard deviations describing teachers' self-efficacy in employing AI applications. Overall, mean scores across items fell within a moderate range and clustered within a relatively narrow interval, indicating broadly comparable levels of self-efficacy rather than pronounced contrasts across dimensions. Items were arranged in descending order based on mean scores, beginning with "I can empower my students using AI applications" and ending with "I can solve the technical problems I encounter when using AI applications."

Items related to empowering students, diversifying teaching strategies, and adapting AI applications to students' needs received relatively higher mean scores. These items reflect areas in which teachers reported comparatively greater confidence. Items addressing the use of AI for teaching, assessment, reinforcement, and aligning instruction with individual educational goals followed closely, with mean values remaining within the same interpretive

category. Items related to understanding AI concepts and terminology were rated slightly lower, though still within the moderate range. The lowest mean scores were observed for items related to developing innovative capabilities using AI, access to technical support channels, and resolving technical problems. Although these items reflected comparatively lower self-efficacy, the differences were modest in magnitude and remained within the same overall level of self-efficacy, suggesting variation within a shared moderate profile rather than substantive disparities across dimensions.

Table 5: Levels of self-Efficacy in employing AI Among teachers of SLDs

	Mean				Std. Dev.
	#	Value	Rank	Level	
Self-Efficacy and its Items	I can empower my students with AI applications.				
	8	3.60	1	Moderate	1.04
	I can diversify my teaching methods and strategies for my students using AI applications.				
	6	3.49	2	Moderate	1.04
	I can adapt AI applications to meet the needs of my SLDs, such as asynchronous recording, using multimedia, and converting written texts to audio.				
	5	3.47	3	Moderate	1.00
	I can identify applications of AI with SLDs for various purposes, e.g., teaching, assessment, and reinforcement.				
	3	3.44	4	Moderate	1.11
	I can employ AI applications to meet my students' individual educational goals.				
	7	3.38	5	Moderate	1.08
	I know the concepts and terminology related to AI applications.				
	1	3.33	6	Moderate	1.09
	I know how to use various AI applications to help my students learn or solve assignments.				
	4	3.26	7	Moderate	1.11
	I have sufficient information to use AI applications in education.				
	11	3.14	8	Moderate	1.12
	I can use AI applications for early and rapid detection of academic and developmental LDs.				
2	2.92	9	Moderate	1.14	
I have the knowledge to use AI applications to develop innovative capabilities.					
12	2.90	10	Moderate	1.08	
I have access to support channels to resolve technical issues.					
10	2.86	11	Moderate	1.20	
I can solve technical problems encountered when using AI applications.					
9	2.73	12	Moderate	1.21	
Overall Self-Efficacy		3.21		Moderate	0.89

5.2 Attitudes Toward AI Among Teachers of SLDs

Table 6 indicates that teachers of SLDs reported generally positive attitudes toward AI applications, with all items reflecting positive attitudes. The ranking of

attitude items reflects differences in the perceived value of AI applications rather than contrasting evaluative positions. Items related to the desire to develop skills, support higher-order thinking, and enhance motivation were ranked highest, suggesting that teachers primarily associate AI with professional growth and instructional effectiveness. These were followed by items related to performance tracking, access to the curriculum, facilitating achievement, and enhancing communication, which are commonly linked to supporting educational goals. Items addressing the use of AI applications to enhance visual engagement, expand their use, and support learning were also rated positively, though ranked slightly lower.

Similarly, reducing psychological barriers and shifting students' roles from recipients to active participants were recognized as benefits but received comparatively lower rankings. The item related to concerns about passive dependence received the lowest mean score, indicating greater caution in this area. Overall, the pattern of responses reflects positive attitudes toward AI applications, accompanied by varying degrees of emphasis and emerging awareness of both their potential benefits and associated challenges.

Table 6: Means and standard deviations: Attitudes toward AI among teachers of SLDs

Attitudes and Their Items	Mean			Std. Dev.	
	Value	Rank	Direction		
I would like to develop my skills and learn ways to optimize the use of AI applications in teaching SLDs.	6	4.45	1	Positive	0.79
AI applications encourage teachers to use educational tools that easily integrate visual, kinetic, and auditory input.	8	4.35	2	Positive	0.79
The use of AI applications increases the opportunities for professional development for learning disabilities teachers.	7	4.33	3.5	Positive	0.76
I would like to know the impact of using AI applications on achieving the goals of my students' individual educational plan.	14	4.33	3.5	Positive	0.72
I see AI applications making it easier to complete tasks with minimal time and effort.	10	4.30	5	Positive	0.81
I support expanding the use of AI applications to assist SLDs.	9	4.19	6	Positive	0.83
I see AI applications supporting the teaching process for SLDs.	1	4.18	7	Positive	0.80
I believe that using AI applications makes the teaching process more effective than traditional teaching.	3	4.16	8	Positive	0.71
I believe that using AI applications education increases the motivation among SLDs.	5	4.14	9	Positive	0.85
AI applications contribute to changing the role of the SLDs from a recipient of knowledge to active seekers and practitioners of knowledge.	11	4.02	10	Positive	0.90

I believe AI applications play a significant role in helping my students access the general curriculum.	13	4.00	11.5	Positive	0.84
I understand that AI applications help develop higher-level thinking skills and promote collaboration through active learning among SLDs.	17	4.00	11.5	Positive	0.81
I understand that AI applications reduce psychological barriers to learning, such as shyness and low self-esteem.	16	3.98	13	Positive	0.82
I realize that using AI applications in learning increases communication between students and teachers.	15	3.96	14	Positive	0.81
AI applications help me track my students' performance and achievement.	4	3.92	15	Positive	0.81
AI applications are an effective communication tool between my students and me.	2	3.90	16	Positive	0.86
I believe that using AI applications may result in dependency when performing tasks (reversed).	12	3.75	17	Positive	0.94
Overall Attitudes		4.12		Positive	0.61

As shown in Table 7, descriptive differences were observed in the mean scores of teachers' self-efficacy and attitudes toward AI applications across levels of gender, academic qualification, teaching experience, and participation in AI-related training courses. These differences represent variations in central tendency rather than evidence of substantive group contrasts. To examine whether the observed mean differences warranted inferential testing, the intercorrelation between self-efficacy and attitudes was first calculated, followed by Bartlett's test of sphericity. This preliminary step was conducted to determine the appropriateness of analyzing the two dependent variables jointly or separately. Based on these results, four-way analyses of variance without interaction effects were conducted, examining self-efficacy and attitudes both jointly and independently, as presented in Table 7.

Table 7: Means and standard deviations of self-efficacy and attitudes according to variables

VARIABLE AND LEVELS	N	SCALE:				
		SELF-EFFICACY		ATTITUDES		
		Mean	Std. Dev.	Mean	Std. Dev.	
Gender						
Male	47	3.32	0.97	4.28	0.54	
Female	67	3.14	0.84	4.00	0.64	
Academic Qualification						
Bachelor	80	3.16	0.92	4.10	0.62	
Higher degrees	34	3.34	0.82	4.15	0.60	
Experience						
10 years and less	29	3.29	0.84	4.09	0.65	
More than 10 years	85	3.18	0.91	4.12	0.61	
Training Courses for Employing AI in Education						
No	78	3.12	0.93	4.08	0.59	
Yes	36	3.42	0.79	4.19	0.66	

Table 8 presents a weak but statistically significant correlation ($\alpha = 0.05$) between teachers' self-efficacy in employing AI applications and their attitudes toward AI. However, the correlation reflects an overall association between the two constructs rather than effects attributable to specific demographic or professional variables. Based on this relationship, and following verification of the assumptions for joint analysis, a multivariate ANOVA without interaction effects was conducted using the combined means of teachers' self-efficacy and attitudes across gender, academic qualification, teaching experience, and participation in AI-related training courses, as shown in Table 8.

Table 8: Means, standard deviations, and the relationship between teachers' self-efficacy and attitudes toward AI

Correlation	SELF-EFFICACY
ATTITUDES	0.17*
Bartlett's Test of Sphericity	
Likelihood Ratio	0.00
Approx. χ^2	18.78*
Df	2
Sig.	0.00

* $p \leq 0.05$

Table 8 indicates that no statistically significant multivariate effects ($\alpha = 0.05$) were observed for academic qualification, teaching experience, or participation in AI-related training courses on the combined means of teachers' self-efficacy and attitudes toward using AI. Gender was the only variable associated with a statistically significant effect on the combined outcomes. To further examine the source of the gender effect, four-way ANOVA without interaction effects were conducted for self-efficacy and attitudes separately according to each variable, as shown in Table 9.

Table 9: Four-way MANOVA* for self-efficacy and attitudes toward AI according to the variables combined among teachers of SLDs

Effect	4-Way MANOVA		Whole F	DF of:		Sig.	Partial η^2
	Type	Value		Hypothesis	Error		
Gender							
	Hotelling's Trace	0.06	3.29**	2	108	0.04	0.057
Academic Qualification							
	Hotelling's Trace	0.01	0.76	2	108	0.47	0.014
Experience							
	Hotelling's Trace	0.00	0.11	2	108	0.90	0.002
Training							
	Hotelling's Trace	0.04	1.95	2	108	0.15	0.035

* Multivariate Analysis of Variance

** $p \leq 0.05$

Table 10 indicates that there is no statistically significant difference ($\alpha = 0.05$) between male and female teachers in mean self-efficacy scores related to employing AI applications. Similarly, no statistically significant gender difference ($\alpha = 0.05$) was observed in teachers' attitudes toward AI applications. Although male teachers reported a slightly higher mean attitude score ($M = 4.28$) than

female teachers ($M = 4.00$), this difference did not reach statistical significance and reflects a small variation within an overall positive attitude profile.

Table 10: Four-way MANOVA for self-efficacy and attitudes toward AI according to each variable among teachers of SLDs

Dependent Variable	Source of Variance	Sum of Squares	Df	Mean Square	F	Sig.	Partial η^2
Self-Efficacy							
	Gender	0.91	1	0.91	1.16	0.28	0.011
	Qualification	1.02	1	1.02	1.30	0.26	0.012
	Experience	0.06	1	0.06	0.08	0.78	0.001
	Training	2.61	1	2.61	3.32	0.07	0.03
	Error	85.52	109	0.79			
	Total	90.11	113				
Attitudes							
	Gender	2.26	1	2.26	6.20*	0.01	0.054
	Qualification	0.17	1	0.17	0.46	0.50	0.004
	Experience	0.04	1	0.04	0.11	0.75	0.001
	Training	0.43	1	0.43	1.17	0.28	0.011
	Error	39.66	109	0.36			
	Total	42.55	113				

* $p \leq 0.05$

5.1 Relationship Between Teachers' Self-efficacy and Attitudes in Employing AI

As shown in Table 11, the Pearson correlation coefficient between teachers' self-efficacy in employing AI applications and their attitudes toward AI was positive and statistically significant ($\alpha = 0.05$). However, the magnitude of the correlation was very small, indicating a weak association between the two constructs (Hopkins, 2002).

Table 11: Pearson's correlation coefficient between the teachers' self-Efficacy and attitudes regarding AI

Correlation	SELF-EFFICACY	
	Pearson Correlation	Sig.
ATTITUDES	0.21*	0.03

* $p \leq 0.05$

6. Discussion

Overall, the results indicate that teachers reported a generally acceptable level of self-efficacy in employing AI applications, with mean scores falling within the moderate range. Although the ranking of self-efficacy items remained within this same interpretive category, the ordering suggests that teachers perceived relatively greater confidence in direct instructional uses of AI, such as empowering students, diversifying teaching strategies, adapting instruction to learners' levels, and employing AI for multiple instructional purposes, including teaching and assessment. These patterns suggest awareness of AI's potential to support instructional practices and to enhance the learning experience by addressing students' individual needs. However, this awareness should be

interpreted in light of the overall moderate level of self-efficacy, indicating emerging rather than fully developed confidence. The present findings are broadly consistent with previous research highlighting teachers' recognition of the benefits of AI in education (e.g., Al-Khaibari, 2020; Barua et al., 2022; Garg & Sharma, 2020; Hopcan et al., 2022; Mansour, 2021; Marino et al., 2023).

Additionally, the findings related to AI self-efficacy and effectiveness are consistent with previous studies showing that AI facilitates teachers' work (Al-Khaibari, 2020), enhances personalized learning (Barua et al. 2022), underscores the importance of AI self-efficacy (Bergdahl & Sjöberg, 2025), and AI significantly increases motivation (Bani Melhem, 2020). Items related to technical terminology, creative and innovative uses of AI, accelerating learning processes, and resolving technical problems received comparatively lower mean scores, although they remained within the same moderate range. This pattern suggests variation in emphasis rather than pronounced deficiencies and may reflect limited technical familiarity or a lack of specialized training rather than low self-efficacy overall.

Accordingly, these findings point to the value of professional development programs that extend beyond basic instructional applications to include technical, creative, and problem-solving aspects of AI use. Such programs may support the gradual strengthening of teachers' self-efficacy and promote more sustainable integration of AI into educational practice. However, the findings of the present study are not consistent with Ahmed et al. (2021), as no significant relationship was found between experience, training, and self-efficacy in their study. The interpretation aligns with the goals of the Education and Training Evaluation Commission (2020), which emphasize professional training tailored to teachers' knowledge, skills, and competencies.

From a theoretical perspective, self-efficacy, as defined by Bandura, refers to individuals' beliefs in their capacity to organize knowledge and execute actions required to achieve specific goals. Within this framework, training and experience contribute to self-efficacy by strengthening skills and providing mastery experiences. In the context of this study, the moderate self-efficacy levels observed may reflect early stages of confidence development as teachers gain exposure to AI applications in educational settings.

In terms of attitudes, teachers participating in this study reported generally positive views toward the use of AI applications. This result is consistent with the positive attitudes shown by special education teachers toward the use of AI applications on tablets in teaching students with disabilities (Bani Melhem, 2020). Unlike Haseski (2019), who reported generally negative attitudes among teachers toward AI, the views expressed by the participating teachers in the current study are largely consistent with more recent literature. These studies emphasize the perceived benefits of AI in education, particularly its role in supporting the development of both learners' and teachers' skills (Al-Ghamdi & Bakhit, 2023; Alsudairy & Eltantawy, 2024; Rice & Dunn, 2023).

Participants expressed favorable attitudes toward the use of AI applications to support diverse and innovative instructional approaches, which may be associated with opportunities for professional development. However, given the cross-sectional nature of the data, these associations should be interpreted as reflective of perceptions rather than evidence of behavioral change. In this context, the findings suggest that professional development initiatives may build upon existing positive orientations toward AI, while also addressing areas of caution or uncertainty. Participants also reported interest in understanding the impact of AI applications on achieving students' individual educational goals. This interest may reflect increasing awareness of the potential role of AI applications in special education, rather than a definitive shift in instructional practice (Abdel-Raouf, 2022).

In addition, teachers perceived AI applications as enhancing efficiency and saving time, a perception that aligns with prior research on the general benefits of AI integration in educational settings (Al-Khaibari, 2020). Finally, participants expressed a desire to expand the use of AI applications in their professional practice with SLDs. This inclination may be informed by their positive evaluations of AI as a supportive instructional tool, particularly in relation to perceived efficiency and student motivation. Nonetheless, these interpretations should be viewed as indicative of attitudinal readiness rather than direct evidence of implementation or impact.

One notable pattern, despite the generally positive attitudes toward AI, concerns perceptions of the learner's role. The item addressing the shift from learners as recipients of knowledge to active seekers and creators ranked relatively lower than other attitudinal items. This may reflect participants' stronger association of AI use with facilitating access to content and saving instructional time, rather than with transforming learner agency. Similarly, items related to reducing psychological barriers, enhancing communication, and supporting teachers' monitoring of student progress showed relatively lower mean ratings, while remaining within the positively overall. This may indicate that such benefits are perceived as fewer central aspects of AI use. Alongside these positive attitudes, teachers also expressed concerns about potential student dependency on AI applications. Participants indicated apprehension that excessive reliance on AI tools by students with LDs could reduce learner responsibility. These concerns highlight the importance of balanced integration rather than undermining positive orientations toward AI.

In this context, professional training assumes an ethical dimension, supporting teachers in distinguishing between effective instructional support, appropriate technical assistance, and the promotion of independent learning. This aligns with prior research emphasizing integrity and accountability in the ethical use of AI in education (Abdel Salam, 2021; Al-Qahtani, 2023; Marino et al., 2023). Research emphasizing learners' self-efficacy and self-regulated learning (Adiyono et al., 2025b), as well as the central role of teacher guidance in AI-supported educational environments (Adiyono et al., 2025a), highlights the broader influence of psychological and motivational factors in educational processes. Relatedly,

concerns regarding student reliance on AI tools (Adiyono et al., 2025c) suggest that instructional guidance should be accompanied by clear ethical frameworks and systematic training. Consistent with Bandura's social cognitive framework (1977), attitudes are shaped through interactions among cognitive, behavioural, and environmental factors. Systematic training may therefore support intentional and ethically responsible AI use rather than uncritical adoption.

In light of Bandura's view that self-efficacy and attitudes may be shaped by multiple individual and contextual factors, the absence of statistically significant differences ($\alpha = 0.05$) in teachers' self-efficacy and attitudes toward employing AI applications across gender, academic qualification, teaching experience, and access to training was unexpected. Previous research has often reported direct or indirect associations between such variables. However, this finding may be interpreted positively, as it highlights the potential value of comprehensive and noncategorical professional development programs that address shared foundational knowledge and skills related to AI use in education. Such programs may serve as an initial step, followed by more targeted training that responds to teachers' specific needs in planning, adaptation, differentiation, and evaluation using AI applications.

Finally, the relationship between self-efficacy and teachers' attitudes toward employing AI applications was positive and statistically significant but very weak. This indicates a limited association rather than a strong practical linkage. It suggests that factors beyond self-efficacy, such as the work environment, administrative support, or the quality and relevance of training, may play a more substantial role in shaping teachers' attitudes and warrant further investigation. Accordingly, the present findings should be interpreted as context-specific but conceptually informative, offering a basis for adapting theoretical frameworks and guiding research in other educational settings.

6.1 Implications

The findings indicate that teachers of SLDs reported moderate levels of self-efficacy in employing AI applications and generally positive attitudes toward their use. No statistically significant differences were found between self-efficacy or attitudes and demographic variables. This suggests that variation in AI use is less related to teachers' backgrounds and more closely associated with their perceived self-efficacy and attitudinal orientations. Accordingly, the results point to the importance of professional development opportunities that target self-efficacy as a means of supporting and sustaining positive attitudes toward AI applications.

Given the absence of statistically significant differences across experience, across qualification, and training, professional development initiatives may be most effective when designed for teachers across backgrounds rather than differentiated by these characteristics. Such an approach supports an empowerment-oriented model of the training that emphasizes shared competencies. The moderate level of self-efficacy further underscores the need for practical, task-focused training that strengthens teachers' confidence in planning,

adapting instruction, designing activities, implementing individual educational plans, supporting students, and applying differentiation and assessment strategies using AI applications. In addition, the generally positive attitudes observed suggest the value of fostering school cultures that support AI integration as a means of empowering teachers and students.

6.2 Future Research

Although the present findings are informative, research on AI in the field of LDs extends beyond the scope of this study and remains an important area for further investigation. Future studies may address the limitations of the current research by employing larger and more diverse samples of teachers across regions to improve the generalizability of findings. In addition, experimental or quasi-experimental designs could be used to examine the effectiveness of specific professional development programs aimed at enhancing teachers' self-efficacy and attitudes toward AI applications. As this study did not focus on specific AI tools, future research may also examine the impact of particular applications, such as machine learning, voice recognition, or VR, on the learning outcomes of students with LDs.

Given the dynamic nature of self-efficacy and attitudes, longitudinal or context-sensitive studies could explore the role of school environment and organizational culture in shaping teachers' adoption of AI applications. Finally, further research may consider additional variables, such as knowledge, intrinsic motivation, techno-anxiety, and managerial support, to provide a more comprehensive understanding of factors influencing teachers' self-efficacy and attitudes toward AI implementation.

7. Limitations

Despite the informative findings, this study has some limitations related to the selected methodology and the nature of the measured variables, which may affect the generalizability of the results. Methodologically, the study relied on a self-report survey, which may have introduced response bias or social desirability effects, such as overestimation of self-efficacy or responses shaped by perceived expectations. In addition, the voluntary nature of participation and the use of a non-random sampling technique may have limited the representativeness of the sample, thereby reducing the generalizability of the findings.

With respect to the variables, the correlational nature of survey research precludes causal inference between self-efficacy, attitudes, and background characteristics. Furthermore, self-efficacy was measured as a perceived belief rather than as observed instructional performance, which may not fully reflect actual practice. Finally, both self-efficacy and attitudes are dynamic constructs that may vary over time and across contexts, influenced by factors such as collegial support, availability of technical infrastructure, and educational setting. These contextual influences were beyond the scope of the present study and were not captured in the data.

8. Conclusion

Overall, the study findings suggest that teachers of SLDs, despite diverse demographic backgrounds, hold generally positive perceptions of their self-efficacy and attitudes toward the use of AI applications. These perceptions appear to reflect growing awareness of AI's potential to support instructional planning, teaching, student support, and assessment, rather than uniformly high levels of confidence or expertise.

The absence of statistically significant differences across demographic variables indicates that the need for professional development in AI use is not confined to specific groups of teachers. Instead, the findings point to the value of providing inclusive professional development opportunities that focus on strengthening self-efficacy and sustaining positive attitudes toward AI applications across the teaching workforce. Such opportunities may support teachers in applying AI-related knowledge and skills thoughtfully and professionally in practice, while remaining attentive to ethical considerations and contextual constraints.

Finally, the study highlights the importance of continued research on AI use in the education of students with learning disabilities, particularly from the perspective of teachers' self-efficacy and attitudes. Future studies may extend this work by examining specific AI applications, employing longitudinal or experimental designs, and exploring diverse educational contexts. Through such efforts, a more comprehensive understanding can be developed of how teachers' perceptions, institutional conditions, and professional support interact to shape the effective and responsible integration of AI in special education.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Compliance with Ethical Standards

This study did not involve experiments with animals. All procedures involving human participants were conducted in accordance with ethical standards. This study was approved by the Institutional Review Board of Imam Abdulrahman Bin Faisal University (Approval No: HAP-05-D-003, See Appendix 1). Informed consent was obtained from all participants in this study.

Data Availability Statement

The data are provided within the manuscript text.

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Author Contributions Statement

The initial draft of the research plan was written by AB and AA conducted the data analysis. Both authors contributed equally to all other aspects of the research, including interpretation of results, manuscript preparation, and final review and approval.

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The paper represents the authors' original work, and no AI tools were used in the development of its academic content.

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Appendix 1

Kingdom of Saudi Arabia
Ministry of Education
Imam Abdulrahman Bin Faisal
University
Office of the Vice President for
Scientific Research and Innovation



المملكة العربية السعودية
وزارة التعليم
جامعة الإمام عبد الرحمن بن فيصل
مكتب نائب الرئيس للبحث العلمي والابتكار

اللجنة الدائمة لأخلاقيات البحث على المخلوقات الحية

Institutional Review Board

NCBE Registration No. (HAP-05-D-003)

IRB Number	IRB-PGS-2024-15-806		
Project Title	Self-efficacy and Attitudes of Learning Disabilities Teachers Towards Using Artificial Intelligence Applications		
Principal Investigators	Ohud Ali Bindajam		
Supervisor	Dr. Aeshah Alsarawi		
College	Education	Department	Special education
Approval Date	06/11/2024		

The application was reviewed and approved at Imam Abdulrahman Bin Faisal University IRB through an Expedited Review on Wednesday, November 06, 2024.

Approval is given for four months from the date of approval. Projects, which have not commenced within two months of the original approval, must be re-submitted to the University Institutional Review Board (IRB) Committee. If you are unable to complete your research within the validation period, you will be required to request an extension from the IRB Committee.

On completion of the research, the Principal Investigator is required to advise the Institutional Review Board if any changes are made to the protocol, a revised protocol must be submitted to the Institutional Review Board for reconsideration.

Approval is given on the understanding that the "Guidelines for Ethical Research Practice" are adhered to. Where required, a signed written consent form must be obtained from each participant in the study group.

Chairman of the Institutional Review Board

Professor Badr Abdulrahman Aljandan



- CC. - Dean, Deanship of Scientific Research.
- Director General, King Fahd Hospital of the University (KFHU).
- Dean, IRMC.
- Supervisor General for Quality and Safety, KFHU.
- Director, Monitoring Office for Research and Research Ethics.
- Director, Pharmacy @ KFHU.