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Knowledge and use of AI in education by teachers of students with intellectual disabilities in intellectual education programmes

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Abstract

The research aimed to study the knowledge and use of applications in education by teachers of students with intellectual disabilities (ID). The study sample consisted of 179 male and female teachers in the primary grades in Al-Ahsa in the Kingdom of Saudi Arabia. The study used the descriptive analytical approach, which was represented in designing the study tool (questionnaire). The results of the study showed an average degree of knowledge of teachers about the uses of in education and an average degree of their use of applications in education with their students with ID. The results also showed statistically significant differences between male and female teachers in the total score of the questionnaire on the uses of applications in education and its sub-dimensions in favor of teachers. The results also showed no statistically significant differences between teachers in the total score of the questionnaire and the knowledge and use dimension according to the variable of the number of years of experience. The results highlight the need to focus pre- and in-service teacher programmes on the uses of AI in education and the need for education departments and schools to provide appropriate applications in the education of students with ID.

Keywords: Digital learning, Intellectual disability, Saudi Arabia teachers, Technology.

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1. Introduction

Advances in technology have led to radical change, as computer sciences have been transferred to many sectors, most notably the education sector to develop educational environments and increase access to education. Special education has benefited from technology and has adapted it to serve various learners and provided many services that rely on technology through Assistive Technology (AT) [1]. According to the Individuals [2] AT refers to two things: (1) AT devices, which includes any item, piece of equipment, machinery, or system of a product; and (2) AT services, which includes any service that helps individuals choose or use a technical assistance device [3]. Moreover, there are countless examples of technologies used with individuals with disabilities, for example, audio books, text-to-speech programmes, and many others [4].

AT contributes to improving the quality of life for students with disabilities, and it supports students with intellectual disabilities (ID) in several areas, including academic skills, daily living skills, and behavioural skills [5]. It can help students enhance and improve their independence, performance of scientific tasks, participation in the classroom, and overcoming some of the educational difficulties they face [6, 7]. In addition, AT con contribute to increasing the students' ability to produce, self-determine, live independently, participate in less restrictive environments, and access the general curriculum and non-classroom activities, whether at school, home, or professional settings [8].

Artificial Intelligence (AI) can be understood as the ability of a computer system to perform tasks that typically require human-level intelligence, such as speech recognition, visual perception, and object classification Smith, et al. [9]. Becker [10] and Luckin and Holmes [11] also defined AI as the ability of a machine to imitate intelligent human behaviour. Many forms of AI can be applied to AT, such as the development of a socially assistive robot [12] guidance systems for people with visual impairments [13] facial recognition to assist people with social difficulties [14] traditional speech recognition systems and their application in AT [9] and smart home systems, which have a positive impact on supporting independent living and quality of life [15, 16].

Moreover, AI's importance and its positive effects in education, specifically in the field of special education, have been praised [17-19]. In recent years, the use of AI technologies in educational settings has increased, as has its role in personalizing learning and increasing interactive experiences in the classroom has been promoted [20]. This confirms the importance of applying these technologies in educational environments, as teaching and learning activities become more effective, specifically in the field of special education [21]. AI's importance has also been acclaimed for implementing a variety of strategies in teaching and learning, such as the universal design for learning — an approach for both general and special education students that comprises three principles: participation, presentation, and expression, as with digital tools provides the necessary support [22]. In addition, individualized education is the nature of special education and technical applications, making education more personalized [18] improving the effectiveness in educational settings by supporting students' autonomy in learning, and supporting teachers when guiding students with disabilities in particular [19].

Research studies on the use of AI technology are promising and could ensure a better educational settings and quality of life for students with disabilities [21, 23]. In addition, the World Health Organization (WHO) [24] emphasized that recent developments in AI could contribute to the Protecting the autonomy of individuals, promoting their well-being, safety and the public interest, enhancing responsibility and accountability, and ensuring inclusiveness and fairness. The positive impact of AI in the education of students with disabilities has been recognized, as technological advances have enabled Microsoft to empower these students by providing educational tools that helped students with dyslexia to learn [25].

In the Kingdom of Saudi Arabia, the Ministry of Education is working to provide a unique educational model for students with disabilities, including those with intellectual disabilities, to improve their quality of life in various areas, such as educational, social, health, or professional [26]. The Disability Care System in the Kingdom of Saudi Arabia stipulates that the state guarantees the right of individuals with disabilities to prevention, care, and rehabilitation services and encourages institutions and individuals to contribute to charitable work in the field of disability. Disability services are provided by the competent authorities in eight areas, including complementary services, the provision of AT devices, and a special clause for adapting AT to serve people with disabilities [27]. Investing in the education sector in general is one of the most prominent goals of the Kingdom of Saudi Arabia's Vision (2030), as the Kingdom ranks first in the Arab world and twenty-second globally in AI. In addition, a goal of the United Nations [28] included raising the level of investment in data and technologies [29].

Despite an interest in technology in education, Hinojo-Lucena, et al. [30] highlighted the limited current research on the use of AI in the field of special education. A systematic review conducted by Hopcan, et al. [21] showed that previous studies focused on autism spectrum disorder followed by learning difficulties. Therefore, few studies are related to people with ID and their education in particular, demonstrating the need for more research in this field. In the Kingdom, AI applications are still in their infancy, which also confirms the need to conduct research and study teachers' points of view on the use of its applications in education, specifically in the field of special education. Given the importance of the primary grades for students with ID to provide them with the appropriate knowledge and skills and few studies have addressed the Arab world (to the best of the researchers' knowledge), this study sheds light on primary school teachers' knowledge of and their use of AI applications with their students with intellectual disabilities.

This research attempts to answer the following questions:

1. What is the degree of knowledge of teachers of students with ID about applications in education?
2. What is the degree of use of AI applications in education by teachers of students with intellectual disabilities?
3. Are there statistically significant differences between teachers of students with ID in the use of AI applications in education, according to the variable of gender?

4. Are there statistically significant differences between teachers of students with ID in the use of AI applications in education according to the variable years of experience?

2. Methods

2.1. Methodology

The current research followed the descriptive analytical approach. First, we first obtained approval from University, represented by the Scientific Research Ethics Committee, to conduct the research, and the approval of the Ministry of Education, represented by the approval of the Education Department in Al-Ahsa. Next, the survey was designed electronically and printed on paper. The survey was sent to the Education Department via the Internet and individually to teachers of students with ID via a link to their mobile phones or by visiting schools. Teachers were informed of the purpose of the study, confidentiality policies, potential risks, and the period during which data would be collected before entering the survey. In addition, informed consent was obtained from each respondent before starting the survey.

2.2. Participants

The participant group consisted of 179 teachers of students with ID enrolled in intellectual education programmes affiliated with public primary schools in Al-Ahsa Governorate in the Kingdom of Saudi Arabia. The researchers used Stephen Simpson's equation to determine the sample size from the original research community, which was 271, and the calculated sample size was 159. Therefore, the sample size in the current research is 179, meaning that 66% of the population participated, which is a representative sample of the community. The research sample was selected using the simple random method. Female teachers constituted the majority of the respondents. The participants' years of experience ranged from less than five years to more than 10 years, and the most prominent demographic group included teachers with less than five years of experience, followed by those with 5–10 years of experience, and finally those with more than 10 years of experience. Table 1 provides descriptive statistics for the demographic data.
(Insert table 1 about here)

Table 1.
Characteristics of the study sample individuals

Variable		Number	%
Gender	Males	94	47.48
	Females	85	52.51
Experiences	Less than 5 years	74	41.34
	Between 5–10 years	68	37.98
	More than 10 years	37	20.67

2.3. Procedures

To achieve the goal of research, the researchers designed a questionnaire.
The first section of the survey captured demographic data from the study sample (e.g., gender and years of experience). The second section included 20 items that explored teachers' use and knowledge of using AI with their students with intellectual disabilities.

2.4. Determining validity and reliability

The researchers confirmed the validity and reliability of the survey through the following:

2.4.1. Validity

The researchers extracted the questionnaire's internal consistency coefficients by calculating the binary correlation coefficient between the score of each statement of each dimension separately and the total score of the dimension and between the score of each dimension and the total score of the questionnaire (see Table 2).

Table 2
Internal consistency of questionnaire items and dimensions (n=48)

Knowledge	Consistency Coefficient	Usage	Consistency Coefficient
1	0.651**	11	0.862**
2	0.636**	12	0.745**
3	0.496**	13	0.917**
4	0.570**	14	0.916**
5	0.696**	15	0.777**
6	0.734**	16	0.907**
7	0.587**	17	0.740**
8	0.790**	18	0.887**
9	0.735**	19	0.855**
10	0.644**	20	0.825**
Correlation of dimension to questionnaire	0.561**	Correlation of dimension to questionnaire	0.560**

Note: ** Functional at level (0.01) * Functional at level (0.05).

Table 2 shows that all correlation coefficients of each statement with the dimension to which it belongs are statistically significant at the 0.01 level. It is also clear from Table 2 that all correlation coefficients of the questionnaire dimensions with the total score are statistically significant at the 0.01 level, which makes us trust the validity of the questionnaire statements and its main dimensions. Therefore, the number of questionnaire paragraphs in its final form comprised 20 statements distributed over two dimensions, such that each dimension contained 10 statements.

The researchers also calculated the concurrent validity (criterion validity) for the questionnaire. We calculated the correlation coefficient between the scores of the exploratory sample members, 48 male and female intellectual education teachers from the same research community, on the current questionnaire and their scores on the questionnaire on the reality of using AI applications in intellectual education programmes (Al-Ghamdi & Al-Farani) [30]. The value of the correlation coefficient between the scores of the exploratory sample members on the two questionnaires was 0.821. The correlation of the scores of the dimensions of the current questionnaire, with the total score of the questionnaire (Al-Ghamdi & Al-Farani) [30], were 0.815 and 0.659, respectively. All are significant at the 0.01 level, which makes us confident in the questionnaire's validity.

2.4.2. Reliability

The researchers relied on two methods to calculate the reliability coefficient of the questionnaire: Cronbach's alpha and the split-half (Spearman-Brown). Table 3 shows the reliability of the dimensions of the questionnaire and its total score using the split-half methods (Spearman-Brown) and Cronbach's alpha.

Table 3.
Reliability of the dimensions of the social factors scale and its total score using the split-half methods (Spearman-Brown) and Cronbach's alpha (n=48)

Dimensions	Number of paragraphs	Reliability coefficient (Cronbach's alpha)	Reliability coefficient (Spearman-Brown)
Knowledge	10	0.902	0.796
Usage	10	0.966	0.957
Total score of the questionnaire	20	0.949	0.720

It is clear from Table 3 that all the stability coefficients of the questionnaire dimensions and its total score by the Cronbach's alpha and the split-half (Spearman-Brown) methods are high. Notably, the stability coefficients ranged between 0.902–0.966 by the Cronbach's alpha method, while using the split-half method they ranged between 0.720–0.957, which makes us confident in the questionnaire's stability. Table 4 shows the relative weight of the three-point Likert scale.

(Insert table 4 about here)

Table 4. Relative weight of the three-point Likert scale.

Relative weight of sample responses on a three-point Likert scale	
Relative weight	Level
1: 66	Low
1.67: 2.33	Medium
2.34: 3	High

2.5. Data Analysis

The research used the questionnaire as a primary tool, via Microsoft Forms. The aim was to measure the degree of knowledge and use of AI applications by teachers of students with ID in the educational process for their students. The questionnaire in its final form contained 20 paragraphs distributed over two main dimensions: knowledge of AI applications in education and the use of these applications. Each dimension contained 10 statements. A set of studies and measures were reviewed on the use of AI in education by intellectual education teachers and teachers in general. The questionnaire's design benefited from previous studies, such as Al-Ghamdi and Al-Farani [31]; Fakhro and Ahmed [32]; Makari and Ajwa [33] and Standen, et al. [34].

The questionnaire was designed in the form of a three-point Likert scale (agree, somewhat agree, disagree) so that agree equals 3 points, somewhat agree equals 2 points, and disagree equals 1 point. The questionnaire was then distributed to the targeted participants manually and via a link sent to their mobile phones, ensuring wide accessibility and facilitating active participation by teachers of students with ID in Al-Ahsa. In addition, the analysis was carried out using several statistical methods, including the internal consistency method to calculate the validity of the questionnaire; the split-half method (Spearman-Brown equation) and the Cronbach's alpha equation to verify the stability of the questionnaire; frequencies, percentages and arithmetic means to determine the reality of the use of AI by intellectual education teachers; the t-test to calculate the significance of the differences between male and female teachers in the total score of the questionnaire and its sub-dimensions; and one-way analysis of variance (ANOVA) to calculate the significance of the differences between teachers in their use of AI in education according to years of experience in the total score of the questionnaire and its sub-dimensions.

3. Results

3.1. Degree of Knowledge of Teachers of Students with ID About AI Applications in Education:

The researchers used frequencies, percentages and averages to identify the degree of knowledge of teachers of students with ID about AI applications in education, which Table 5 illustrates.

(Insert table 5 about here)

Table 5.
Frequencies, percentages and averages to identify the degree of knowledge of teachers of students with ID about AI applications in education

Vocabulary	Disagree		Somewhat Agree		Agree		Relative Mean	Ranking
	Frequencies	%	Frequencies	%	Frequencies	%		
I have an idea about employing AI applications in education.	15	8.4	57	31.8	107	59.8	2.514	3
I believe that my abilities allow me to employ AI applications in teaching with students with intellectual disabilities.	10	5.6	65	36.3	104	58.1	2.525	2
I believe that my abilities allow me to train on employing AI applications in teaching with students with intellectual disabilities.	10	5.6	49	27.4	120	67.0	2.614	1
I trust myself to solve any problems I face when using AI applications in teaching with students with intellectual disabilities.	7	3.9	87	48.6	85	47.5	2.435	4
I have extensive knowledge about AI applications in general.	34	19.0	100	55.9	45	25.1	2.061	8
I have knowledge of some AI applications in education.	30	16.8	99	55.3	50	27.9	2.111	5
I have knowledge of the training I need to use AI applications in teaching with students with intellectual disabilities.	37	20.7	99	55.3	43	24.0	2.033	9
I have general knowledge of concepts and terminology related to artificial intelligence.	42	23.5	77	43.0	60	33.5	2.100	6
I have knowledge of some AI applications in evaluating students with intellectual disabilities.	66	36.9	62	34.6	51	28.5	1.916	10
I have knowledge of some AI applications that stimulate student participation and integration during the lesson.	45	25.1	75	41.9	59	33.0	2.078	7
							2.239	Medium

Table 5 shows the degree of knowledge of teachers of students with ID about AI applications in education. The paragraphs were arranged according to the importance of teachers' knowledge of them: The paragraph "I believe that my abilities allow me to train on employing AI applications in teaching with students with intellectual disabilities" ranked first, with an average of 2.614; the paragraph "I believe that my abilities allow me to employ AI applications in teaching with students with intellectual disabilities" ranked second, with an average of 2.525; the paragraph "I have an idea about employing AI applications in education" ranked third, with an average of 2.514; the paragraph "I trust myself to solve any problems I face when using AI applications in teaching with students with intellectual disabilities" ranked fourth, with an average of 2.435; the paragraph "I have knowledge of some AI applications in education" ranked fifth, with an average of 2.111; the paragraph "I have general knowledge of the concepts and terms related to artificial intelligence" ranked sixth,

with an average of 2.100; the paragraph "I have knowledge of some AI applications that stimulate students' participation and integration during the lesson" ranked seventh, with an average of 2.078; the paragraph "I have extensive knowledge of AI applications in general" ranked eighth, with an average of 2.061; the paragraph "I have knowledge of the training I need to use AI applications in teaching with students with ID" ranked ninth, with an average of 2.033; and the paragraph "I have knowledge of some AI applications in evaluating students with intellectual disabilities" ranked tenth and last, with an average of 1.916.

Table 5 also shows that the overall average of the knowledge scores of teachers of students with ID about AI applications in education is (2.239). This means that these teachers have an average knowledge of the uses of AI in education.

3.2. Degree of Use of AI Applications in Education by Teachers of Students With Intellectual Disabilities?:

The researchers used frequencies, percentages and averages to identify the degree of use of AI applications in education by teachers of students with intellectual disabilities, and the following table illustrates this.

Table 6.
Frequencies, percentages and averages to identify the reality of the use of AI applications in education by teachers of students with ID.

Vocabulary	Disagree		Somewhat Agree		Agree		Relative Mean	Ranking
	Frequencies	%	Frequencies	%	Frequencies	%		
I use applications to monitor students' performance and achievements.	42	23.5	52	29.1	85	47.4	2.240	6
I use applications to communicate between me and my students (their parents).	43	24.1	62	34.6	74	41.3	2.173	10
I use applications to teach my students with intellectual disabilities.	30	16.8	76	42.5	73	40.8	2.240	6
I follow a systematic plan to ensure the effectiveness of using applications in education with my students.	36	20.1	55	30.7	88	49.2	2.290	3
I use smart educational games to teach my students with intellectual disabilities.	22	12.3	60	33.5	97	54.2	2.419	1
I use augmented reality to teach my students with intellectual disabilities.	37	20.7	54	30.2	88	49.1	2.284	4
I use smart educational games to evaluate my students with intellectual disabilities.	27	15.1	52	29.1	100	55.8	2.407	2
I use the Distinguish and Read Letter application with my students with intellectual disabilities to convert printed images or handwritten texts into editable text files.	40	22.3	61	34.1	78	43.6	2.212	8
I use virtual reality applications with my students with intellectual disabilities to give them the opportunity to interact in the academic activity.	42	23.5	63	35.2	74	41.3	2.178	9
I take into account the individual educational differences between my students by using Intelligent Adaptive Learning with them to meet their different educational needs.	33	18.4	62	34.6	84	46.9	2.284	4
							2.273	Medium

Table 6 shows the degree of use of applications in education by teachers of students with intellectual disabilities, where the paragraphs were arranged according to the degree of teachers' use of applications in education as follows: The paragraph "I use smart educational games in teaching my students with intellectual disabilities" ranked first, with an average of 2.419; the paragraph "I use smart educational games in evaluating my students with intellectual disabilities" ranked second, with an average of 2.407; the paragraph "I follow a systematic plan to ensure the effectiveness of using applications in education with my students" ranked third, with an average of 2.290; the paragraphs "I use augmented reality in teaching my students with intellectual disabilities" and "I take into account the individual educational differences between my students by using intelligent adaptive learning with them to meet their different educational needs" ranked fourth, with an average of 2.284 for each; the paragraphs "I use applications in monitoring students' performance and achievements" and "I use applications in teaching "My students with intellectual disabilities" ranked sixth with an average of 2.240 each; the paragraph "I use the Distinguish and Read Letter application with my students with ID to convert printed images or handwritten texts into editable text files" ranked eighth, with an average of 2.212; the paragraph "I use virtual reality applications with my students with ID to give them the opportunity to interact in the academic activity" ranked ninth, with an average of 2.178; and the paragraph "I use applications in communication between me and the students (their parents)" ranked tenth and last, with an average of 2.173.

Table 6 also shows that the overall average of the scores of teachers of students with ID using AI applications in education is 2.273. This means that these teachers have multiple uses for AI applications in education to an average degree.

3.3. Differences in the Degree of Use of Applications in Education for Students with ID Depend on the Teacher's Gender

The researchers used the t-test to calculate the significance of the differences between the average scores of male and female teachers on the questionnaire scores, which Table 8 shows.

Table 7.
Significance of the differences between the average scores of male and female teachers on the questionnaire.

Variables	Gender	N	M	SD	DF	t	sig
Knowledge	Male	85	23.611	4.901	177	3.245	0.001
	Female	94	21.287	4.678			
Usage	Male	85	24.141	6.842	177	2.749	0.007
	Female	94	21.457	6.219			
Total score	Male	85	47.752	10.312	177	3.351	0.000
	Female	94	42.744	9.681			

Table 7 shows that there are statistically significant differences between the average scores of both male and female teachers on the total score of the questionnaire and its sub-dimensions in favour of the teachers.

3.4. Differences in the Degree of Use of Applications in Education for Students with ID Depend on the Teacher's Years of Experience

The researchers used one-way ANOVA to calculate the significance of the differences between the averages of teachers' scores on the questionnaire according to the variable (years of experience), which Tables 8 and 9 illustrate.

Table 8.
Arithmetic averages and standard deviations of the scores of teachers in the study sample on the questionnaire according to the variable years of experience

Variables	Under 5 years N=74		Between 5–10 years N=68		More than 10 years N=37	
	M	SD	M	SD	M	SD
Knowledge	22.810	4.806	22.014	4.742	22.527	5.153
Usage	24.243	5.155	22.000	6.992	22.648	6.921
Total score	47.054	9.219	44.014	10.179	45.175	10.820

Table 9.
One-way ANOVA for the scores of the teachers in the study sample on the questionnaire according to the variable of years of experience.

Variables	Source of Variance	Sum of Squares	DF	Mean Square	F	Sig
Knowledge	Between groups	17.519	2	8.759	0.360	0.698
	Within groups	4277.107	176	24.302		
	Total	4294.626	178			
Usage	Between groups	121.453	2	60.726	1.383	0.254
	Within groups	7729.676	176	43.919		
	Total	7851.128	178			
Total score	Between groups	221.703	2	110.851	1.052	0.352
	Within groups	18549.593	176	105.395		
	Total	18771.296	178			

It is clear from Table 9 that there are no statistically significant differences between the average scores of the teachers in the study sample on the total score of the questionnaire and each of the dimensions of knowledge of applications in education and the use of applications in education with their students with intellectual disabilities, as the values of (F) for each were not statistically significant.

4. Discussion

The study results show that teachers of students with ID use AI in education with their students with ID to an average degree. The results of the answers to the first question of the current study indicated that the study sample members of teachers of students with ID obtained the overall average of knowledge scores on using AI in education (2.239). This is an average value, indicating that they have average knowledge of using AI in education with their students with intellectual disabilities. Thus, teachers of students with ID still need more knowledge about the uses of AI in education, which will contribute to the effectiveness of their teaching and educational activities with their students with ID and the students' own effectiveness in the educational process. This is consistent with the findings of Makari and Ajwa [33] and Al-Ghamdi and Al-Farani [31] on the importance of refining the skills of teachers of students with disabilities in using AI in education with their students.

The results of answers to the second question also indicated that the study sample members obtained a total average for the use of AI in education (2.273), which is an average value. These results indicate that some teachers are effective in using AI in education with their students with intellectual disabilities. These teachers may see that AI is useful and effective in the educational process by activating the role of the student in purposeful educational activities, integrating and using some digital activities with kinetic effectiveness and sound and light effects in teaching. This contributes to attracting students' attention towards learning, controlling to some extent their attention deficit problem, and increasing their focus with these activities. This is consistent with the results of the studies by Garg and Sharma [35] which emphasized the importance of using AI in education for people with disabilities.

In addition, integrating AI in education with people with ID may provide an opportunity to make the educational process interesting, attractive, and enjoyable through the many audio and visual effects in digital educational applications. AI helps students increase focus and attention, and thus somewhat overcome the problem of distraction and lack of attention that accompanies intellectual disabilities, which negatively affects their academic achievement and the acquisition of independent skills and daily life skills. Therefore, integrating AI in education with people with ID may help achieve many goals for students with intellectual disabilities, such as helping to achieve academic goals in reading, writing, arithmetic, and science. On the skills side, the uses of AI in education for people with disabilities may help them to acquire many social skills, such as social communication, role exchange, and knowledge of the social roles of many members of society. Specifically, training students with ID through some applications that contain visual social situations they watch, and then they are asked to apply these roles and generalize them to their various life situations.

There are also aspects related to occupying free time and entertainment that positively affects the mental health of students with ID through the use of AI in their education. A student interacts with the dialogue of the visual story that is presented to them through digital applications, with sound and light effects and attractive colours. As well, the story has a dramatic plot that is appropriate for the students' mental age and social environment, with an academic, psychological and social goal. These stories may bring the students joy and happiness and positively affect their mental health. Some of the traditional methods of education with students with ID may cause boredom, which negatively affects their academic achievement and their acquisition of independent and life skills. When replaced with educational methods based on AI, this could help students to overcome many of these problems. This finding is consistent with Brown, et al. [17]; Karsenti [18] and Vincent-Lancrin and Van Der Vlies [19] in terms of the importance of the role played by AI in education with disabilities.

The results of answers to the third question indicate statistically significant differences between the average scores of male and female teachers in all dimensions of the questionnaire and its total score in favour of male teachers in the dimensions of knowledge of using in education, the use of in education, and the total score of the questionnaire.

The results of the first dimension indicate that male teachers have a higher level of knowledge about using AI in education than female teachers. The researchers attribute this result to the fact that males may be more inclined towards technology than females. The results of the questionnaire's second dimension indicate statistically significant differences between male and female teachers in the use of AI in education in favour of male teachers. The researchers believe that this result is natural in light of the result from the first dimension of this question, which indicated that male teachers obtained a higher level of knowledge about using AI in education compared to female teachers. This result shows that male teachers have a higher level of knowledge and use of AI in education for their students with intellectual disabilities. Although female teachers outperformed male teachers in terms of precise and manual work with students, their level of knowledge about using AI in education and the level of use were low. This illustrates the importance of working to train female teachers more about knowledge and use of AI in education with their students with intellectual disabilities.

The results of answers from the fourth question also indicated no differences between the study sample members of teachers of students with ID in the dimensions of knowledge and use of AI in education and the total score of the questionnaire according to the variable years of experience.

The results of this question indicate that years of experience did not play a prominent role in the dimension of knowledge of the uses of in education, and also in the dimension of using AI in education. This result is because it is possible that the number of years of experience played a greater role for those with more than 10 years of experience compared to those with 5–10 years of experience and those with less than 5 years of experience. On the other hand, those

with 5–10 years of experience and those with less than 5 years of experience may have acquired knowledge and experience faster than those with more than 10 years of experience in using digital technology and computer skills. This experience enabled them to employ these skills in using AI in education for their students with ID and to compensate for the lack of years of experience, which may be the reason why those with these different experiences are equal in knowledge and use of AI in education for their students with intellectual disabilities. This illustrates the importance of using AI in education, and it is not related to a teacher's number of years of experience. Teachers could continue training on the uses of AI in education by joining training programmes and workshops, attending relevant conferences, and refining their experiences through these training programmes and scientific conferences. This is consistent with what Vincent-Lancrin and Van Der Vlies [19] found through the effectiveness of using AI in education in terms of improving effectiveness in educational environments, supporting students' independence in learning, and helping teachers while guiding and teaching students with disabilities.

The use of AI in education for students with disabilities in general, and those with ID in particular, requires further research. This finding is consistent with Hinojo-Lucena, et al. [30] in terms of few current studies on the use of AI in the field of special education, and Hopcan, et al. [21] study that found few studies are related to people with ID and their education in particular. These studies clarify the importance of advancing the use of AI in education for students with disabilities in general, and those with ID in particular, because it will benefit teachers, students with ID and their parents, and society as a whole.

Therefore, training programmes and workshops are necessary for teachers of students with ID to integrate the uses of AI in education with their students and encourage them to integrate and employ AI in education with students. This is because AI has positive effects on the educational process for students with intellectual disabilities, while providing a more effective classroom and school environment that helps integrate and employ the uses of AI in education, and educating teachers and those in charge of the educational process with students with ID and their families about the importance of integrating the uses of AI in education.

5. Conclusion and Recommendations

Students with ID in Saudi Arabia face a unique set of issues. Unfortunately, little research has been conducted on the use of AI with these students, so a large number of students with ID remain unsupported. This finding underscores the need to pay urgent attention to exploring their teachers' knowledge and use of AI applications in their education to ensure that students are receiving appropriate support and services and better quality of life. The results of this study revealed an average degree of knowledge of teachers of students with ID about the uses of AI in education as well as an average degree of their use of AI applications in education with their students with intellectual disabilities. The results also showed statistically significant differences between male and female teachers in the questionnaire's total score on the uses of AI applications in education and its sub-dimensions in favour of male teachers. And the results showed no statistically significant differences between teachers in the questionnaire's total score and the knowledge and use dimension according to the variable of number of years of experience.

The results highlight the need for pre- and in-service teacher programmes to focus on the uses of AI in education and to coordinate with universities in their training. Integrating the use of AI in education within the evaluation of job performance may contribute to implementing educational practices and providing the necessary support, as it will increase interest in its use and make the necessary adjustments to individual educational plans for students with intellectual disabilities. This in turn will ensure that AI activities include appropriate applications, with greater reliance on digital technology in the education of people with intellectual disabilities, ensuring the development of the skills students need to increase their chances of success and quality of life. It is also necessary to intensify efforts to raise awareness among the families of students with ID by holding school guidance and training programmes to provide them with the necessary information on how to use and provide appropriate support for their children's social needs and prevent parents from depriving their children of opportunities to develop. Yet education departments and schools must provide appropriate applications in the education of students with intellectual disabilities. And teachers must be motivated. Therefore, the government could establish an award at the level of the ministry or education departments for the best male or female teacher in using these applications with their students.

6. Limitations and Future Research

The sample of this study was limited to one governorate (Al-Ahsa) within the Kingdom of Saudi Arabia and one educational level (primary). There is still a gap in research towards other governorates and other educational levels. Additionally, researchers working on future studies can explore the experiences and perspectives of stakeholders, such as general education teachers, specialists, and administrators, about the topic of this study. Future research can use qualitative, measurable methods to collect data on stakeholders' perceptions, which would allow researchers to uncover in-depth insights and clarify the specificity of the topic being studied. Stakeholder opinions would contribute to understanding what could improve knowledge and use of AI applications in education and provide valuable information for programme planning.

6.1. Practitioners Notes

What is already known about this topic

- AI supports the education of students with ID through studies that show that it can support skills and meet educational needs.

- Despite the interest in AI in particular, studies have indicated the limited current research studies on the use of artificial intelligence in the field of special education, specifically with individuals with ID and their education
- Exploring the knowledge and use of AI in education by teachers of students with ID is an important aspect that needs to be understood and interpreted in order to provide the necessary support and improve their quality of life.

What this paper adds

- This article explores the knowledge and use of AI applications in education by teachers of students with ID.
- The article adds to the existing literature by focusing on the primary school stage, students with individuals with ID taking the perspective of Saudi Arabia, and using a quantitative methodology, both of which are significant gaps in the research literature.
- The article highlights shortcomings in educational knowledge and practices, and provides insight into how teachers support students with ID.

Implications for practice and/or policy

- Provides practical implications of the findings for educators, policy makers, and program designers.
- Highlights gaps in academic knowledge as a limitation to the use of AI for teaching in the education of students with intellectual disabilities.

References

[1] M. Alsalem, "Considering and supporting the implementation of universal design for learning among teachers of students who are deaf and hard of hearing in Saudi Arabia," Unpublished Doctoral Dissertation, University of Kansas. https://core.ac.uk/download/pdf/213413592.pdf, 2015.

[2] Individuals, "Individuals with disabilities education improvement act, 20 U.S.C. Pub. L No.108–446," Retrieved: https://www.congress.gov/bill/108th-congress/house-bill/1350, 2004.

[3] R. M. Gargiulo and E. C. Bouck, *Instructional strategies for students with mild, moderate, and severe intellectual disability*. Thousand Oaks, CA: Sage Publications, 2017.

[4] S. Ovide, "Disability drives innovation. The New York Times," Retrieved: https://www.nytimes.com/2021/10/14/technology/audiobooks-innovation.html. [Accessed September 18, 2024], 2021.

[5] R. Schalock, S. Borthwick-Duffy, and V. Bradley, *Intellectual disability: Definition, classification, and systems of supports*, 11th ed. Washington, D.C: American Association on Intellectual and Developmental Disabilities, 2010.

[6] D. N. S. Almalki and B. M. Al-Harthi, "The importance of using assistive technology with students with intellectual disabilities in inclusive education schools," *International Journal for Research in Education*, vol. 44, no. 2, pp. 265-298, 2020.

[7] G. Alnahdi, "Assistive technology in special education and the universal design for learning," *Turkish Online Journal of Educational Technology*, vol. 13, no. 2, pp. 18-23, 2014.

[8] T. Alquraini, *Transitional programs and services for students with disabilities in light of global practices*. Riyadh, Saudi Arabia: Dar Al-Zahraa, 2018.

[9] E. M. Smith, D. Graham, C. Morgan, and M. MacLachlan, "Artificial intelligence and assistive technology: Risks, rewards, challenges, and opportunities," *Assistive Technology*, vol. 35, no. 5, pp. 375-377, 2023. https://doi.org/10.1080/10400435.2023.2259247

[10] B. Becker, "Artificial intelligence in education: what is it, where is it now, where is it going," *Ireland's Yearbook of Education*, vol. 2018, pp. 42-46, 2017.

[11] R. Luckin and W. Holmes, *Intelligence unleashed: An argument for AI in education*. London, UK: Pearson, 2016.

[12] S. K. Kim, J.-W. Jang, Y. S. Hwang, O. E. Lee, and H. S. Jo, "Investigating the effectiveness of socially assistive robot on depression and cognitive functions of community dwelling older adults with cognitive impairments," *Assistive Technology*, vol. 37, no. 1, pp. 22-30, 2025. https://doi.org/10.1080/10400435.2023.2237554

[13] M. Kahraman and C. Turhan, "An intelligent indoor guidance and navigation system for the visually impaired," *Assistive Technology*, vol. 34, no. 4, pp. 478-486, 2022. https://doi.org/10.1080/10400435.2021.1872738

[14] D. Adiani *et al.*, "Multimodal job interview simulator for training of autistic individuals," *Assistive Technology*, vol. 36, no. 1, pp. 22-39, 2024. https://doi.org/10.1080/10400435.2023.2188907

[15] A. Landuran, H. Sauzeon, C. Consel, and B. N'Kaoua, "Evaluation of a smart home platform for adults with Down syndrome," *Assistive Technology*, vol. 35, no. 4, pp. 347-357, 2023. https://doi.org/10.1080/10400435.2022.2075487

[16] K. Seidel *et al.*, "Implementation of a pan-European ecosystem and an interoperable platform for Smart and Healthy Ageing in Europe: An Innovation Action research protocol," *Open Research Europe*, vol. 85, no. 2, p. 14827, 2022. https://doi.org/10.12688/OPENRESEUROPE.14827.1

[17] M. Brown *et al.*, "EDUCAUSE Horizon report: Teaching and learning edition. EDUCAUSE," Retrieved: https://www.educause.edu/research-and-publications/reports/2020/educause-horizon-report-teaching-and-learning-edition. [Accessed August 31, 2023], 2020.

[18] T. Karsenti, "The urgent need to prepare teachers for tomorrow's schools," *Formation et Profession*, vol. 27, no. 1, pp. 1-12, 2019. https://doi.org/10.18162/fp.2019.a166

[19] S. Vincent-Lancrin and R. Van Der Vlies, "Trustworthy artificial intelligence (AI) in education: Promises and challenges," *OECD Education Working Papers*, no. 218, pp. 0_1-17, 2020. https://doi.org/10.1787/a6c90fa9-en

[20] A. S. Drigas and R.-E. Ioannidou, "Artificial intelligence in special education: A decade review," *International Journal of Engineering Education*, vol. 28, no. 6, p. 1366, 2012. https://doi.org/10.3991/ijet.v8i2.2514

[21] S. Hopcan, E. Polat, M. E. Ozturk, and L. Ozturk, "Artificial intelligence in special education: A systematic review," *Interactive Learning Environments*, vol. 31, no. 10, pp. 7335-7353, 2023. https://doi.org/10.1080/10494820.2022.2067186

[22] D. Banes and K. Behnke, *The potential evolution of universal design for learning (UDL) through the lens of technology innovation* (Universal Access through inclusive Instructional design). New York: Routledge, 2019.

[23] A. S. Drigas and R.-E. Ioannidou, "A review on artificial intelligence in special education," presented at the Information Systems, E-learning, and Knowledge Management Research: 4th World Summit on the Knowledge Society, WSKS 2011, Mykonos, Greece, September 21-23, 2011. Revised Selected Papers 4, 2013.

[24] World Health Organization (WHO), "WHO issues first global report on artificial intelligence (AI) in health and six guiding principles for its design and use," Retrieved: https://www.who.int/news/item/28-06-2021-who-issues-first-global-report-on-ai-in-health-and-six-guiding-principles-for-its-design-and-use, 2021.

[25] S. Athanasios and R. Ioannidou, "Artificial intelligence in special education: A decade review," *International Journal of Engineering Education*, vol. 28, no. 6, pp. 1366–1372, 2012.

[26] S. Al-Ajaji and N. Al-Maliki, "The degree of availability of assistive technologies for students with intellectual disabilities in intellectual education institutes in Buraidah City," *Journal of the Faculty of Education at Suef University*, vol. 34, no. 3, pp. 315–350, 2023.

[27] Authority for the Care of Persons with Disabilities, "Assistive technologies and their use in empowering individuals with disabilities in the Kingdom of Saudi Arabia," Retrieved: https://apd.gov.sa/web/content/4533?unique=424a43678db752c472f15a8dc6c11a7e180a0608, 2021.

[28] United Nations, *World summit on sustainable development: Key outcomes and investment in data and technology*. New York: United Nations, 2022.

[29] M. S. Al-Bukhat, "Artificial intelligence in Saudi Arabia. Al-Jazirah," Retrieved: https://www.al-jazirah.com/2022/20221019/ar3.htm, 2022.

[30] F.-J. Hinojo-Lucena, I. Aznar-Díaz, M.-P. Cáceres-Reche, and J.-M. Romero-Rodríguez, "Artificial intelligence in higher education: A bibliometric study on its impact in the scientific literature," *Education Sciences*, vol. 9, no. 1, p. 51, 2019. https://doi.org/10.3390/educsci9010051

[31] S. Al-Ghamdi and L. Al-Farani, "The reality of using artificial intelligence applications in special education schools in Jeddah from the perspective of teachers and the trend towards them," *International Journal of Educational and Psychological Studies*, vol. 8, no. 1, pp. 57–76, 2020.

[32] A. N. Fakhro and T. Ahmed, "The effectiveness of a training program based on artificial intelligence applications to improve the cognitive skills of students with mental disabilities in government integration centers," *Arab Journal of Measurement and Evaluation*, vol. 4, no. 8, pp. 1–19, 2023.

[33] N. Makari and M. Ajwa, "The reality of employing artificial intelligence applications and its challenges in rehabilitating children with special needs (autism spectrum disorder - mental disability) from the perspective of teachers and specialists," *Umm Al-Qura Journal of Educational and Psychological Sciences*, vol. 24, no. 1, pp. 70–146, 2023. https://doi.org/10.21608/JSRE.2023.199369.1545

[34] P. J. Standen *et al.*, "An evaluation of an adaptive learning system based on multimodal affect recognition for learners with intellectual disabilities," *British Journal of Educational Technology*, vol. 51, no. 5, pp. 1748-1765, 2020. https://doi.org/10.1111/bjet.13010

[35] S. Garg and S. Sharma, "Impact of artificial intelligence in special need education to promote inclusive pedagogy," *International Journal of Information and Education Technology*, vol. 10, no. 7, pp. 523-527, 2020. https://doi.org/10.18178/ijiet.2020.10.7.1418