TPM Vol. 32, No. 4, 2025
ISSN: 1972-6325
https://www.tpmap.org/

THE ROLE OF ARTIFICIAL INTELLIGENCE APPLICATIONS FOR INDIVIDUALS WITH SPECIAL NEEDS: PERCEPTIONS OF SPECIAL EDUCATION TEACHERS IN AMMAN CITY, JORDAN

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Abstract

Background: Artificial Intelligence (AI) is increasingly being integrated into educational settings to support students with diverse learning needs. In the context of special education, AI tools offer promising solutions to enhance engagement, personalization, and accessibility. However, the perceptions of educators play a crucial role in determining the successful adoption and implementation of these technologies.

Objectives: This study aimed to explore the perceptions of special education teachers in Amman City, Jordan, regarding the role of AI applications in supporting individuals with special needs. Specifically, the study examined their views on the benefits, accessibility, and challenges of AI in the classroom.

Methods: A cross-sectional quantitative design was employed. The study sample included 351 special education teachers selected through convenience sampling. Data were collected using a self-administered online questionnaire consisting of two sections: socio-demographic information and 21 Likert-scale items measuring perceptions across three domains—perceived benefits, ease of use/accessibility, and concerns/challenges. Data were analyzed using IBM SPSS version 26, applying descriptive statistics, t-tests, and one-way ANOVA to examine differences based on socio-demographic characteristics.

Results: Findings indicated generally positive perceptions of AI among participants. The highest scores were observed in the domain of perceived benefits (M = 4.08, SD = 0.28), followed by concerns and challenges (M = 3.96, SD = 0.26), and ease of use and accessibility (M = 3.70, SD = 0.29). Teachers appreciated AI's ability to enhance student engagement, personalize instruction, and support communication. Significant differences were found based on gender, age, teaching experience, and educational qualification. Female teachers and those with higher degrees or longer experience reported more favorable perceptions.

Conclusion: The study highlights a generally positive outlook on AI applications in special education among teachers in Amman. However, barriers such as limited training, language availability, and ethical concerns must be addressed. Educational policymakers should focus on professional development and infrastructure enhancement to support the effective integration of AI in inclusive education settings.

Keywords: Artificial intelligence, special education, teacher perceptions, inclusive education, Jordan, educational technology.

INTRODUCTION

The rapid advancement of artificial intelligence (AI) technologies has brought transformative changes to numerous fields, including education. Within this context, special education has begun to explore the potential of AI to provide tailored support for individuals with special needs. AI tools can offer personalized learning experiences, support communication, and improve accessibility in ways that traditional methods cannot. As noted by Hopcan et al. (2023), the integration of AI in special education is evolving, with growing interest in how these technologies can help overcome barriers to inclusive learning. The present study seeks to explore the perceptions of special education teachers in Amman, Jordan, regarding the role and impact of AI applications on teaching students with special needs.

Artificial intelligence can play a significant role in developing adaptive learning systems that respond to the unique needs of each learner. Technologies such as speech recognition, predictive text, emotion detection, and virtual assistants are increasingly used to support students with disabilities. According to Şen and Akbay (2023), innovative AI-driven applications have shown promise in addressing cognitive, emotional, and behavioral challenges among students with special needs. These tools not only promote autonomy and engagement but also empower teachers with data-driven insights to tailor instruction accordingly.

Furthermore, AI contributes to inclusive pedagogy by promoting personalized learning environments that foster equal opportunities. Garg and Sharma (2020) emphasize the transformative impact of AI in enabling students with disabilities to participate more fully in mainstream educational settings. Similarly, Alkan (2024) highlights that AI technologies can be leveraged to assess learning progress, suggest intervention strategies, and enhance the overall learning experience for students with special needs. Such advancements underline the importance of teacher readiness and awareness in effectively utilizing these tools within the classroom.

Despite the benefits, the adoption of AI in special education also presents several challenges. These include a lack of infrastructure, insufficient training for educators, and ethical concerns surrounding data privacy and algorithmic bias. Kharbat et al. (2021) argue that the integration of AI requires a multidisciplinary approach that combines insights from education and health sectors to bridge existing gaps. Moreover, Elmohamady (2024) warns that while AI offers powerful capabilities, its misuse or misapplication could hinder rather than help students if not implemented thoughtfully and ethically.

Given the global momentum toward AI integration in education (Chen et al., 2022; Budhwar et al., 2022), it is essential to understand how these developments are perceived at the local level. In Jordan, where educational reforms and digital transformation are ongoing, teachers' perspectives play a pivotal role in shaping the successful implementation of AI in special education. This study aims to investigate the views of special education teachers in Amman to identify opportunities, challenges, and practical recommendations for leveraging AI to support students with special needs effectively.

METHOD

Research Design

This study adopted a **cross-sectional quantitative research design** to explore the perceptions of special education teachers in Amman City, Jordan, regarding the role of artificial intelligence (AI) applications in supporting students with special needs. A cross-sectional design was chosen because it allows the researcher to capture a snapshot of participants' opinions and attitudes at a single point in time. This type of design is particularly effective for understanding prevailing views, measuring the current level of awareness and acceptance of AI technologies, and identifying demographic factors that may influence these perceptions.

Research Population and Sample

The research population consisted of special education teachers currently working in both public and private educational institutions in Amman, the capital city of Jordan. These educators play a crucial role in delivering personalized learning experiences and support services to students with various disabilities. A total of 351 teachers participated in the study. The sample included both male and female teachers with varying levels of experience and educational backgrounds. Participants were selected using a **convenient sampling strategy**, which involved including teachers who were readily accessible and willing to participate in the study. This approach was suitable given the time and logistical constraints of the research, and it enabled the researcher to obtain a diverse yet manageable sample size for statistical analysis.

Data Collection Tool

Data were collected using a **self-administered questionnaire** developed by the researcher to assess the perceptions of AI applications in the field of special education. The questionnaire was designed in Arabic, the native language of the participants, to ensure clarity and comprehension. It consisted of two main sections. The first section gathered data on the **socio-demographic characteristics** of the participants, including age, gender, years of teaching experience in special education, and highest educational qualification. These variables were included to allow for subgroup analysis and to explore whether demographic factors influenced teachers' perceptions.

The second section of the questionnaire was composed of **21 statements** that measured teachers' perceptions of the role and usefulness of AI applications for students with special needs. These statements were rated using a **five-point Likert scale**, where responses ranged from 1 (strongly disagree) to 5 (strongly agree). The statements were designed to reflect key dimensions such as perceived effectiveness, practicality, ethical concerns, and the potential of AI to enhance individualized instruction and communication.

To interpret the overall perception levels of the participants, a scoring system based on the **total mean score** of the 21 items was developed. A mean score ranging from 1.00 to 2.33 was classified as indicating **negative perceptions**, a score between 2.34 and 3.66 indicated **neutral perceptions**, and a score from 3.67 to 5.00 was interpreted as

reflecting **positive perceptions** toward the use of AI in special education. This scoring approach allowed for a consistent and meaningful interpretation of the overall trends in teacher responses.

Data Collection Procedure

The data collection process was carried out **online using the Google Forms platform**, which allowed for convenient and wide-reaching distribution of the questionnaire. The online format also ensured anonymity and confidentiality for the participants, thereby encouraging honest and open responses. The questionnaire link was shared through various channels, including educational forums, email lists, and social media groups frequented by special education professionals in Amman. Before beginning the questionnaire, participants were presented with an **informed consent statement** explaining the purpose of the study, assuring them of the voluntary nature of participation, and clarifying that their responses would be used solely for research purposes. Only those who agreed to the terms were able to proceed with completing the survey.

Data Analysis

After the completion of data collection, responses were downloaded and organized for analysis using **IBM SPSS Statistics version 26**. A series of statistical techniques were employed to analyze the data. **Descriptive statistics** such as frequencies, percentages, means, and standard deviations were used to summarize the demographic characteristics of the participants and their overall perception scores. To examine potential differences in perceptions based on demographic variables, **independent samples t-tests** were used for comparing the means between two groups (such as male and female teachers), while **one-way analysis of variance (ANOVA)** was applied to compare mean scores across more than two groups (such as teachers with different levels of education or years of experience). These inferential tests were selected due to their suitability for assessing mean differences in perception scores based on categorical independent variables. All statistical analyses were conducted at a significance level of $p < 0.05$.

RESULTS

A total of 351 special education teachers participated in the study. Of these, 143 (40.7%) were male and 208 (59.3%) were female. The participants represented a range of age groups, with 85 teachers (24.2%) under the age of 30 years, 132 (37.6%) aged between 30 and 39 years, 90 (25.6%) aged between 40 and 49 years, and 44 (12.5%) aged 50 years or older. Regarding teaching experience, 97 participants (27.6%) had less than 5 years of experience, 123 (35.0%) had between 5 and 10 years, 76 (21.7%) had between 11 and 15 years, and 55 (15.7%) had more than 15 years of experience. In terms of educational qualifications, the majority held a bachelor's degree (n = 215, 61.2%), followed by those with a master's degree (n = 86, 24.5%), a diploma (n = 38, 10.8%), and a doctorate degree (n = 12, 3.4%).

Table 1. Socio-Demographic Characteristics of the Enrolled Teachers (N = 351)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	143	40.7%
Female	208	59.3%
Age Group		
Less than 30 years	85	24.2%
30–39 years	132	37.6%
40–49 years	90	25.6%
50 years and above	44	12.5%
Years of Experience		
Less than 5 years	97	27.6%
5–10 years	123	35.0%
11–15 years	76	21.7%
More than 15 years	55	15.7%
Educational Qualification		
Diploma	38	10.8%
Bachelor's degree	215	61.2%
Master's degree	86	24.5%
Doctorate	12	3.4%

Participants' perceptions of artificial intelligence (AI) in special education were measured across three main domains: perceived benefits, ease of use and accessibility, and concerns and challenges.

In **Domain 1: Perceived Benefits of AI in Special Education**, the highest-rated item was "AI improves students' engagement in learning" (M = 4.32, SD = 0.71), followed by "AI helps in customizing learning based on individual needs" (M = 4.25, SD = 0.75) and "AI enhances communication for students with speech difficulties" (M = 4.10, SD

= 0.81). The overall mean score for this domain was relatively high (M = 4.08, SD = 0.28), indicating a generally positive perception of AI's potential to support students with special needs.

In **Domain 2: Ease of Use and Accessibility of AI Tools**, responses were slightly lower overall. The highest-rated statement was "AI applications are easy to use in the classroom" (M = 3.92, SD = 0.82), while the lowest-rated was "AI does not require advanced technical skills" (M = 3.48, SD = 1.01). The total mean score for this domain was moderate (M = 3.70, SD = 0.29), suggesting that while participants found AI tools somewhat accessible, they also perceived limitations in training, language availability, and institutional support.

In **Domain 3: Concerns and Challenges Regarding AI Use**, the top-rated concern was "AI may raise ethical concerns regarding student data" (M = 4.28, SD = 0.74), followed by "There is a risk of over-reliance on AI tools" (M = 4.20, SD = 0.77). The item with the lowest score in this domain was "AI may not be suitable for all types of disabilities" (M = 3.58, SD = 0.95). The total mean score for this domain was moderately high (M = 3.96, SD = 0.26), indicating that while participants acknowledged the usefulness of AI, they were also aware of its limitations and potential risks.

The **overall total mean score** across all 21 items was (M = 3.91, SD = 0.23), reflecting generally positive perceptions of AI in special education among the participating teachers.

Table 2. Participants' Responses to the AI Perception Questionnaire (N = 351)

Domain & Item	Mean ± SD	Rank
Domain 1: Perceived Benefits of AI in Special Education		
AI improves students' engagement in learning	4.32 ± 0.71	1
AI helps in customizing learning based on individual needs	4.25 ± 0.75	3
AI enhances communication for students with speech difficulties	4.10 ± 0.81	5
AI supports early identification of learning disabilities	4.08 ± 0.76	6
AI saves time in preparing individualized learning plans	4.00 ± 0.79	8
AI helps track student progress effectively	3.96 ± 0.83	10
AI increases students' independence in learning	3.89 ± 0.88	13
Total Mean Score for Domain 1	**4.08 ± 0.28**	–
Domain 2: Ease of Use and Accessibility of AI Tools		
AI applications are easy to use in the classroom	3.92 ± 0.82	11
AI tools are accessible for both teachers and students	3.85 ± 0.89	14
Most AI programs are compatible with our teaching platforms	3.81 ± 0.91	15
Training is sufficient for using AI in special education	3.66 ± 0.95	17
AI tools are available in Arabic language	3.60 ± 0.93	18
Schools provide adequate support for using AI	3.55 ± 1.02	19
AI does not require advanced technical skills	3.48 ± 1.01	21
Total Mean Score for Domain 2	**3.70 ± 0.29**	–
Domain 3: Concerns and Challenges Regarding AI Use		
AI may raise ethical concerns regarding student data	4.28 ± 0.74	2
There is a risk of over-reliance on AI tools	4.20 ± 0.77	4
AI may reduce human interaction in teaching	4.05 ± 0.80	7
Some AI tools are not culturally appropriate	3.98 ± 0.83	9
There is a lack of clear policies on AI use in education	3.94 ± 0.86	12
Financial costs of AI tools are a major barrier	3.70 ± 0.92	16
AI may not be suitable for all types of disabilities	3.58 ± 0.95	20
Total Mean Score for Domain 3	**3.96 ± 0.26**	–
Overall Total Mean Score (All Items)	**3.91 ± 0.23**	–

Differences in participants' perceptions across the three AI-related domains were examined based on their socio-demographic characteristics, using independent samples t-tests and one-way ANOVA, as appropriate.

In terms of **gender**, female teachers reported significantly higher mean scores than male teachers in all three domains. The difference was statistically significant in **Domain 2: Ease of Use and Accessibility** ($t = 2.10$, $p = .036$), indicating that female participants perceived AI tools as more accessible and easier to use compared to their male counterparts.

For **age group**, one-way ANOVA revealed statistically significant differences in all three domains. Participants aged 50 years and above reported the highest mean scores across the domains, while those under 30 reported the lowest. The differences in **Domain 1: Perceived Benefits** ($F = 4.28$, $p = .006$) suggest that older teachers tend to have more favorable views about the effectiveness and potential of AI in special education compared to younger teachers.

Similarly, significant differences were found based on **years of teaching experience**. Teachers with more than 15 years of experience showed the highest mean scores across all domains. The differences in **Domain 1** ($F = 3.65$, $p = .013$) were statistically significant, indicating that experience plays a role in shaping more positive perceptions of AI's usefulness and implementation in the classroom.

Lastly, teachers' **educational qualifications** were also significantly associated with their domain scores. Respondents holding a doctorate reported the highest mean scores, followed by those with a master's degree. The ANOVA test revealed significant differences in **Domain 1** ($F = 5.02$, $p = .002$), **Domain 2**, and **Domain 3**, showing that higher academic qualifications are associated with more favorable perceptions of AI in special education settings.

Overall, these findings indicate that gender, age, years of experience, and level of education significantly influence teachers' perceptions of AI's role and applicability in the field of special education.

Table 3. Differences in Domain Scores Based on Socio-Demographic Characteristics (N = 351)

Socio-Demographic Variable	Domain 1 (Mean ± SD)	Domain 2 (Mean ± SD)	Domain 3 (Mean ± SD)	t / F value	p-value
Gender					
Male (n = 143)	4.05 ± 0.31	3.65 ± 0.30	3.90 ± 0.27	t = 2.10	0.036*
Female (n = 208)	4.10 ± 0.25	3.73 ± 0.28	4.00 ± 0.24		
Age Group					
< 30 years (n = 85)	4.00 ± 0.30	3.60 ± 0.29	3.85 ± 0.22	F = 4.28	0.006**
30–39 years (n = 132)	4.07 ± 0.28	3.71 ± 0.31	3.95 ± 0.25		
40–49 years (n = 90)	4.15 ± 0.24	3.78 ± 0.27	4.01 ± 0.23		
≥ 50 years (n = 44)	4.20 ± 0.20	3.82 ± 0.24	4.05 ± 0.21		
Years of Experience					
< 5 years (n = 97)	4.02 ± 0.27	3.64 ± 0.30	3.88 ± 0.26	F = 3.65	0.013*
5–10 years (n = 123)	4.08 ± 0.26	3.71 ± 0.29	3.95 ± 0.23		
11–15 years (n = 76)	4.12 ± 0.29	3.76 ± 0.27	4.02 ± 0.22		
> 15 years (n = 55)	4.18 ± 0.23	3.81 ± 0.25	4.08 ± 0.20		
Educational Qualification					
Diploma (n = 38)	3.95 ± 0.32	3.55 ± 0.33	3.80 ± 0.30	F = 5.02	0.002**
Bachelor's degree (n = 215)	4.06 ± 0.27	3.68 ± 0.28	3.92 ± 0.25		
Master's degree (n = 86)	4.15 ± 0.25	3.80 ± 0.26	4.05 ± 0.22		
Doctorate (n = 12)	4.20 ± 0.22	3.85 ± 0.23	4.10 ± 0.20		

* Statistically significant at $p < 0.05$
** Statistically significant at $p < 0.01$

DISCUSSION

The present study explored special education teachers' perceptions in Amman, Jordan, regarding the role of artificial intelligence (AI) applications in supporting students with special needs. The overall findings revealed generally **positive perceptions**, particularly in the domain of AI's perceived benefits, where teachers expressed strong agreement on AI's potential to enhance engagement, personalize learning, and improve communication for students with disabilities. This aligns with the findings of Hopcan et al. (2023), who reported that AI technologies—such as adaptive learning platforms, speech-to-text tools, and emotion recognition systems—can be transformative in special education by offering individualized and responsive support to learners.

In line with global trends, the results showed that teachers particularly appreciated AI's capacity to **customize learning** to individual needs, a feature that has been emphasized in the literature as a core strength of AI in inclusive education (Elmessiry et al., 2023). These adaptive systems allow teachers to deliver differentiated instruction and better monitor student progress. Furthermore, Gallup et al. (2025) noted that AI can supplement teachers' efforts by automating routine tasks and helping them focus on high-impact, student-centered activities—an observation consistent with the high mean scores seen in this study's first domain.

However, while the **perceived benefits were strong**, teachers expressed **moderate perceptions regarding the ease of use and accessibility** of AI tools. This suggests that, despite recognizing AI's potential, they may experience difficulties in implementation. This finding echoes the work of Yao and Wang (2024), who found that perceived ease of use and digital literacy significantly influence educators' intentions to use AI in their teaching. In the Jordanian context, limited access to training, language barriers (such as tools not being fully available in Arabic), and lack of institutional support may pose practical challenges. Alsudairy and Eltantawy (2024) similarly found that special

education teachers in the Gulf region demonstrated interest in AI integration but lacked the necessary infrastructure and technical support to apply these tools effectively.

The domain related to **concerns and challenges** revealed that teachers were particularly cautious about ethical issues such as data privacy, over-reliance on technology, and the potential for AI to reduce human interaction. These concerns are widely documented in recent literature. Yunus et al. (2025) emphasized that while AI offers valuable tools for inclusive education, there are ethical considerations that must not be overlooked, particularly around student data security and the need to preserve the human connection central to teaching and learning. The relatively high concern scores observed in this study suggest a need for clear guidelines and ethical frameworks within Jordan's educational policies to ensure safe and effective AI usage.

Significant differences in perceptions were observed based on gender, age, experience, and educational qualifications. Female teachers and those with higher degrees or longer teaching experience exhibited more favorable attitudes across all domains. This supports Gallup et al. (2025), who found that higher levels of training and exposure to AI in academic or professional settings were associated with more confidence in using such tools. Similarly, Bah and Artaria (2020) argue that educators who have engaged in professional development or research related to AI are more likely to appreciate its transformative potential in addressing learning challenges, especially in post-pandemic educational reform contexts.

CONCLUSION

In conclusion, while the study demonstrates **optimism among special education teachers** in Amman regarding the potential of AI, it also highlights critical areas needing attention—particularly training, accessibility, and ethical clarity. As emphasized by Hu and Wang (2021), successful AI integration in special education requires a balanced approach that combines technological innovation with pedagogical sensitivity and institutional readiness. Policymakers and education leaders in Jordan should prioritize building educators' AI competencies and provide robust support systems to ensure these tools are applied effectively, ethically, and equitably in special education settings.

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