
INTERACTIVE ARTIFICIAL INTELLIGENCE APPLICATIONS AND THE DEVELOPMENT OF ISLAMIC SOCIAL VALUES AMONG STUDENTS WITH LEARNING DISABILITIES: SPECIAL EDUCATION TEACHERS' PERSPECTIVES IN IRBID

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ABSTRACT

Purpose: This study examines the relationship between the reality of using interactive artificial intelligence (AI) applications and the development of Islamic social values among students with learning disabilities, from the perspective of special education teachers in Irbid, Jordan, and it identifies the challenges that limit the use of these applications.

Design/methodology/approach: A cross-sectional survey was applied through a 24-item questionnaire with three axes (reality of use, role in developing Islamic social values, and challenges), measured on a five-point agreement scale, and it was answered by 283 special education teachers working in government schools, private schools, and special education centres. The data were analysed through descriptive statistics, multiple linear regression with a bootstrap robustness test, and Welch tests for demographic differences. **Findings:** The teachers reported a high level of use ($M = 4.12$), a high perceived role of the applications in developing the values ($M = 4.03$), and a high level of challenges ($M = 3.79$), mainly the concern of the parents, the little Arabic Islamic content, and the cost. The reality of use was positively associated with the perceived development of values after controlling for the demographic variables ($\beta_1 = 0.46$, $p < .001$, $f^2 = 0.25$), and the bootstrap 95% confidence interval [0.35, 0.56] confirmed the result. The teachers who received training in AI reported a higher reality of use than the others ($d = 0.70$), while no significant differences appeared by gender, qualification, experience, or type of institution. **Originality:** To the best of our knowledge, this is the first quantitative study that links AI applications with Islamic social

values for students with learning disabilities in the Jordanian context. **Practical implications:** The findings support including the use of AI applications for teaching values in the training programmes of special education teachers, producing Arabic Islamic content suitable for students with learning disabilities, and addressing the cost, the infrastructure, and the concerns of the parents.

KEYWORDS: Artificial Intelligence; Learning Disabilities; Islamic Social Values; Special Education Teachers; Jordan.

1. INTRODUCTION

Artificial intelligence (AI) applications are entering classrooms in different forms, that is, educational chatbots, adaptive learning platforms, augmented and virtual reality applications, and interactive educational games. The research on these applications has grown fast, but most of the studies come from computer science and STEM disciplines, and it is still unclear for educators how to make a pedagogical advantage of AI (Zawacki-Richter et al., 2019). Moreover, the educators themselves need to be prepared before AI can be used in a meaningful way (Luckin et al., 2022), while the reviews of chatbots show that these tools are already used in many educational tasks (Okonkwo & Ade-Ibijola, 2021).

The learning disabilities (LD) have a long history of definitions, and Hammill (1990) reviewed the efforts made since 1962 to define them and recommended a consensus around the definition of the NJCLD. For students with LD, the attention of the research is mainly academic. Panjwani-Charania and Zhai (2024) reviewed 16 studies about AI that supports these students, and they found that ten studies focused on dyslexia and only one on dyscalculia, in which adaptive learning was the most used application. Rice and Dunn (2024) reviewed the use of AI with students with disabilities, and Krishna Kumari (2024) discussed the potential of AI to give personalized, data-driven support to these students, together with the ethical, privacy, and bias issues. However, the learning disability is not only an academic matter. Kavale and Forness (1996), in a meta-analysis of 152 studies, found that about 75% of students with LD show social skill deficits that distinguish them from comparison samples. This makes the development of social values an important need for this group.

In Muslim societies, the social values are taught inside Islamic education, in which the moral and spiritual formation of the learner has a central place (Halstead, 2004). The studies of Islamic religious education with students with special needs are qualitative or review-based and they do not include AI applications (Hasanah et al., 2026; Julaeha & Mubarak, 2026;

Rosita et al., 2024), and the studies that combine technology or AI with Islamic values treat general learners and rely on qualitative or conceptual designs (Hamada et al., 2026; Rahman & Nasution, 2025; Rois et al., 2026). In Jordan, the evidence about technology in special education concerns mainly the barriers. For example, Aldagamseh et al. (2026) surveyed 129 special education teachers in Irbid Governorate and found a high level of barriers to the use of assistive technology, mainly the high cost, the shortage of devices, and the insufficient training.

Special education teachers are the proper source of evidence in this situation, because they decide if and how a technology is used in the classroom, and their pedagogical beliefs are a main factor in technology integration (Ertmer, 2005; Ertmer et al., 2012). To the best of our knowledge, and based on the literature search conducted for this study, no quantitative study measures the relationship between the use of interactive AI applications and the development of Islamic social values among students with LD from the teachers' perspective. Accordingly, this study has three objectives: (a) to describe the reality of using interactive AI applications by special education teachers in Irbid, (b) to measure the perceived role of these applications in developing Islamic social values among students with LD, and (c) to identify the challenges that limit their use. The study contributes to the literature in three ways. First, it links two bodies of literature that are treated separately, that is, AI in special education and Islamic values education. Second, it gives quantitative evidence from a Jordanian governorate, in which the previous evidence is about barriers only. Third, it tests the role of AI training, which gives a direct implication to the teacher training programmes.

2. Literature Review and Hypotheses

2.1 Theoretical framework

The study is based on three theoretical lenses. The first is social learning theory. Bandura (1969) showed that moral judgments are learned through social learning processes, in which the models presented to the learner have an effect on his judgments. In this study, the interactive applications are seen as a way to present models of values (for example, interactive stories inspired by the Prophet's biography and simulated social situations) and to give the learner an active role with immediate feedback. The importance of the feedback is supported by Hattie and Timperley (2007), who conclude that feedback is among the major influences on learning, but its effect depends on its type and the way it is given. Character education supports the same view, since character is developed from teaching and learning

(Davidson et al., 2010), and Prabowo (2024) studied the values of respect and responsibility as part of online character education.

The second lens is the technology acceptance family, in which the use of technology depends on the perceived usefulness and the perceived ease of use (Davis, 1989) and on the wider factors of the unified theory (Venkatesh et al., 2003). For special education teachers specifically, Siyam (2019) examined the factors that affect the acceptance and the actual use of technology. The third lens is the TPACK framework, which sees the teacher knowledge as the integration of technology, pedagogy, and content (Mishra & Koehler, 2006). This lens is important here, since the applications must be used for teaching values (content) to students with LD (pedagogy), and that needs a specific teacher knowledge.

2.2 Interactive AI applications and students with learning disabilities

The applications covered by the first axis of the questionnaire have support in the literature. Panjwani-Charania and Zhai (2024) identified seven types of AI applications used with students with LD, including adaptive learning, chat robot, intelligent tutor, and interactive robot, and Nganji and Brayshaw (2017) showed how AI can recommend learning materials that match the needs of learners with multiple disabilities. The use of augmented and virtual reality for students with disabilities was also reviewed (Kim & Ok, 2019), and Azlina Mohamed Mokmin and Pasca Rassy (2022) reported that augmented reality was tested with students with learning difficulties and found positive results. Earlier technology supported these students as well; for instance, Hetzroni and Shrieber (2004) found that a word processor reduced the spelling and reading errors and improved the organization of the texts of three students with writing disabilities. At the same time, the review of AI and new technologies in inclusive education by Salas-Pilco et al. (2022) listed technological, pedagogical, dataset, satisfaction, and cultural challenges, which means that the benefit of AI is conditional and not automatic.

2.3 Islamic social values, special needs, and technology

The studies of Islamic religious education for students with special needs point to experiential methods. Rosita et al. (2024) analysed three primary studies and found that methods such as discussion, demonstration, and repetition had a positive impact on the understanding and the achievement, while the limited teacher knowledge was an obstacle. Julaeha and Mubarak (2026) found that cooperative learning improved participation, self-confidence, and social interaction, and strengthened the values of cooperation, responsibility, tolerance, and mutual respect among students with special needs. For children with intellectual disabilities, Hasanah et al. (2026) found that the formation of Islamic character starts with moral action, then the

emotional internalization, and then the understanding, which indicates the importance of concrete experiences and habituation. These findings suggest that the interactive applications, which give concrete and repeated experiences in simulated situations, may serve the same purpose.

On the technology side, Hamada et al. (2026) developed a conceptual framework that integrates Islamic values and technology ethics in digital learning, Rois et al. (2026) analysed how digital technology can enhance the learning outcomes while preserving the religious values, and Rahman and Nasution (2025) formulated AI-based strategies to instill honesty, responsibility, and social attention. The need is stronger for students with LD, because their social skills deficits are documented (Kavale & Forness, 1996), the nonverbal social interaction skills of these children were examined (Agalotis & Kalyva, 2008), and the interventions for social competence were widely reviewed (Vaughn et al., 2004).

2.4 Challenges and hypotheses

The third axis of the study concerns the challenges. In Jordan, Aldagamsch et al. (2026) found a high level of barriers and no statistically significant differences by gender, educational qualification, or years of experience. Alzubi (2024) reviewed the use of digital media and educational technology for students and teachers with disabilities in Jordan, and Alsagarat (2024) reported a high degree of guidance and social services provided to students with LD by primary stage teachers in Aqaba Governorate. At the international level, Lei et al. (2026) analysed the drivers, pedagogical uses, and barriers of teachers' AI adoption using TALIS 2024 data, and Guan et al. (2025) investigated the preparedness of pre-service teachers for AI-integrated education. Related evidence from another profession in Jordan shows that the anxiety about AI deserves attention: Al-Radaideh et al. (2026) surveyed 401 certified accountants and examined technology anxiety as a mediator between the perceived AI replacement threat and the job performance. Accordingly, the concerns of the parents about technological addiction are included in the third axis of the questionnaire.

Based on the theories and the literature above, the study tests two hypotheses. Following social learning theory and the technology acceptance logic, the teachers who use the applications more observe their usefulness and the reaction of the students directly, and therefore they are expected to perceive a stronger development of the values. Hence:

H1: The reality of using interactive AI applications is positively associated with the perceived development of Islamic social values among students with learning disabilities, after controlling for the demographic variables.

Following the TPACK framework, the insufficient training reported as a barrier by Aldagamseh et al. (2026), and the limited teacher knowledge reported by Rosita et al. (2024) as an obstacle, the teachers who received AI training are expected to use the applications more. Hence:

H2: Teachers who received training in AI report a higher reality of use of interactive AI applications than teachers who did not receive training.

In addition, the study explores if the reality of use and the perceived development of values differ by gender, qualification, years of experience, and type of institution, without a directional hypothesis, since the previous evidence from Irbid found no differences by the demographic variables (Aldagamseh et al., 2026).

3. METHOD

3.1 Design, population, and sample

The study follows a cross-sectional descriptive-analytical design based on a questionnaire. The population is the special education teachers who teach students with learning disabilities in Irbid, in government schools, private schools, and special education centres. The final sample is 283 teachers, selected by a convenience sampling procedure. The data were collected on paper.

3.2 Instrument

The questionnaire was developed by the researcher and it has two parts. The first part collects five demographic variables: gender (male, female), educational qualification (bachelor, master, doctorate), years of experience (less than 5, 5 to 10, more than 10), type of institution (government, private, special education centre), and previous training in AI (yes, no). The second part has 24 items distributed in three axes, as shown in Table 1: the reality of using interactive AI applications (8 items), the role of these applications in developing Islamic social values (10 items), and the challenges (6 items). The items are answered on a five-point agreement scale (1 = strongly disagree to 5 = strongly agree), and the score of each axis is the mean of its items. The axis mean is interpreted by equal-width classes: low (1.00 to 2.33), moderate (2.34 to 3.67), and high (3.68 to 5.00). The ten value items cover cooperation, honesty and trustworthiness, mutual respect, responsibility, tolerance and forgiveness, kindness to parents and family ties, altruism, cleanliness and orderliness, the practice of values in the real environment, and the observed change in behaviour.

Table 1. Questionnaire items by axis.

Code	Item
Axis A: Reality of using interactive AI applications (8 items)	
Q1	I use AI applications (such as interactive educational games) in teaching students with learning disabilities.
Q2	I have the skill to use adaptive AI tools that consider the individual differences among students.
Q3	My school or centre provides the infrastructure needed to use AI applications.
Q4	I use educational chatbots to explain value concepts in a simplified way.
Q5	I rely on AI-supported augmented and virtual reality applications to attract students' attention.
Q6	I employ adaptive learning platforms (e.g., Century, Lexia) with students with learning disabilities.
Q7	I use AI applications to assess and follow up students' progress immediately.
Q8	I find that AI applications make delivering information to students with learning disabilities easier than traditional methods.
Axis B: Role of the applications in developing Islamic social values (10 items)	
Q9	The interactive applications contribute to developing the value of cooperation and teamwork among students.
Q10	The applications help to instill honesty and trustworthiness through interactive stories inspired by the Prophet's biography.
Q11	The applications enhance mutual respect and acceptance of others among students with learning disabilities.
Q12	The applications develop responsibility and commitment through interactive daily tasks.
Q13	The applications contribute to enhancing tolerance and forgiveness in simulated social situations.
Q14	The applications help to develop kindness to parents and maintaining family ties through interactive scenarios.
Q15	The applications enhance the value of altruism and helping others.
Q16	The applications contribute to establishing cleanliness and orderliness as Islamic behavioural values.
Q17	The applications motivate students to practise the values in their real environment, not only virtually.
Q18	I notice a tangible improvement in my students' value-related behaviour after using AI applications.
Axis C: Challenges (6 items)	
Q19	Weak infrastructure and internet in special education schools in Irbid hinder the use.
Q20	Teachers lack specialised training on using AI in special education.
Q21	The high cost of applications and subscriptions is an obstacle for government schools.
Q22	There is little Arabic Islamic content designed with AI technologies for students with learning disabilities.
Q23	Parents are concerned about technological addiction or the effect on the child's identity.
Q24	It is difficult to assess values objectively through digital applications.

The reliability is evaluated by Cronbach's alpha (Cronbach, 1951) for each axis, where a value of 0.70 or above is acceptable (Tavakol & Dennick, 2011). Because all the variables

come from the same respondents, the common method bias is checked by Harman's single-factor test (Podsakoff et al., 2003). The questionnaire did not collect names or any other identifying information. Participation was voluntary and based on informed consent, the teachers were free to withdraw at any time, and the responses were treated as confidential.

3.3 Data analysis

The analysis is done in four steps. First, the means, standard deviations, ranks, and levels of the items and axes answer the first three objectives, and the Pearson correlations among the axes are reported. Second, H1 is tested by a multiple linear regression in which the perceived development of values (VAL) is the dependent variable and the reality of use (USE) is the independent variable:

$$VAL_i = \beta_0 + \beta_1 USE_i + \gamma' Controls_i + \varepsilon_i$$

where Controls are the dummy variables of gender, qualification, experience, type of institution, and AI training, and H1 is supported when β_1 is positive and significant at the 0.05 level. The size of the effect is read by the f^2 benchmarks of Cohen (1992). Third, the robustness test is the nonparametric bootstrap with 5,000 resamples, and it is supported when the 95% confidence interval of β_1 excludes zero. Fourth, H2 and the exploratory question are tested by Welch's t-test for two groups and Welch's one-way analysis of variance for three groups, with Cohen's d and eta squared as effect sizes. The use of parametric tests with the means of Likert-type items is accepted in the literature (Norman, 2010; Sullivan & Artino, 2013), and it is robust to the non-normality in large samples (Lumley et al., 2002).

4. RESULTS

The results are presented in the order of the objectives and the hypotheses of the study. The data of 283 questionnaires were complete, in which no missing values or duplicated responses were found, and all the 24 items were answered on the five-point scale.

4.1 Sample characteristics

Table 2 presents the demographic characteristics of the 283 special education teachers who answered the questionnaire.

Table 2. Demographic characteristics of the respondents. (N = 283)

Variable	Category	n	%
Gender	Male	107	37.8
	Female	176	62.2
Educational qualification	Bachelor	184	65.0
	Master	86	30.4

Variable	Category	n	%
	Doctorate	13	4.6
Years of experience	Less than 5 years	85	30.0
	5 to 10 years	114	40.3
	More than 10 years	84	29.7
Type of institution	Government school	177	62.5
	Private school	67	23.7
	Special education centre	39	13.8
Previous training in AI	Yes	115	40.6
	No	168	59.4

Note. n = number of teachers; % = percentage of the total sample (N = 283).

Table 2 shows that the sample is composed mainly of female teachers (62.2%), in which the male teachers represent 37.8%. As for the qualification, the bachelor holders are the largest group (65.0%), followed by the master holders (30.4%) and the doctorate holders (4.6%). The experience is distributed in a balanced way, since the group of 5 to 10 years has 40.3%, while the groups of less than 5 years and of more than 10 years have 30.0% and 29.7% respectively. Regarding the type of institution, the government schools represent 62.5% of the sample, the private schools 23.7%, and the special education centres 13.8%. Moreover, 40.6% of the teachers ($n = 115$) received training in AI, and 59.4% ($n = 168$) did not. It is worth mentioning that the doctorate group ($n = 13$) and the special education centres ($n = 39$) are small, and this should be considered when the group comparisons in Section 4.8 are read.

4.2 Reliability and common method bias

Table 3 reports the internal consistency of the three axes and of the whole instrument. The decision rule is that a Cronbach's alpha of 0.70 or above is acceptable (Tavakol & Dennick, 2011), and the coefficient is computed as proposed by Cronbach (1951).

Table 3. Descriptive statistics and Cronbach's alpha of the axes.

Axis	Items	Mean	SD	Level	Cronbach's α
Reality of using interactive AI applications (A)	8	4.12	0.44	High	0.865
Role in developing Islamic social values (B)	10	4.03	0.45	High	0.894
Challenges (C)	6	3.79	0.46	High	0.788
All items	24				0.891

Note. Levels follow the equal-width classes: low (1.00 to 2.33), moderate (2.34 to 3.67), and high (3.68 to 5.00). N = 283.

The results in Table 3 meet the decision rule, since the alpha coefficients are 0.865 for the reality of use, 0.894 for the role in developing values, and 0.788 for the challenges, and all of them are above the threshold of 0.70 (Tavakol & Dennick, 2011). The values axis has the highest consistency, while the challenges axis has the lowest one but it is still acceptable, which is expected since this axis combines different types of challenges (infrastructure, training, cost, content, parents, and assessment) in only six items. The alpha of the whole instrument is 0.891. Regarding the common method bias, Harman's single-factor test shows that the first unrotated factor explains 30.33% of the total variance of the 24 items, and three factors have eigenvalues above 1 (7.28, 2.72, and 2.31). In other words, a single factor does not account for the majority of the variance, and this means that the common method bias is not a dominant problem in the data (Podsakoff et al., 2003).

4.3 Objective (a): the reality of using interactive AI applications

Table 4 presents the means, standard deviations, ranks, and levels of the eight items of the first axis. The levels follow the classes defined in Section 3.2, that is, low (1.00 to 2.33), moderate (2.34 to 3.67), and high (3.68 to 5.00).

Table 4. Descriptive statistics of the items of Axis A: reality of using interactive AI applications.

Code	Item	Mean	SD	Rank	Level
Q1	I use AI applications (such as interactive educational games) in teaching students with learning disabilities.	4.18	0.62	3	High
Q2	I have the skill to use adaptive AI tools that consider the individual differences among students.	4.17	0.62	4	High
Q3	My school or centre provides the infrastructure needed to use AI applications.	4.03	0.61	6	High
Q4	I use educational chatbots to explain value concepts in a simplified way.	4.02	0.59	7	High
Q5	I rely on AI-supported augmented and virtual reality applications to attract students' attention.	4.21	0.60	2	High
Q6	I employ adaptive learning platforms (e.g., Century, Lexia) with students with learning disabilities.	4.14	0.62	5	High
Q7	I use AI applications to assess and follow up students' progress immediately.	4.23	0.59	1	High
Q8	I find that AI applications make delivering information to students with learning disabilities easier than traditional methods.	3.98	0.64	8	High
	Axis A mean	4.12	0.44		High

Note. N = 283. Rank is based on the item mean within the axis.

The reality of using interactive AI applications is at a high level, with an axis mean of 4.12 (SD = 0.44). All the eight items are also at the high level, and their means range narrowly from 3.98 to 4.23. The highest item is Q7 (using AI applications to assess and follow up the progress of the students immediately, $M = 4.23$), followed by Q5 (relying on AI-supported augmented and virtual reality applications to attract the attention, $M = 4.21$) and Q1 (using AI applications in teaching, $M = 4.18$). On the other side, the lowest items are Q8 (AI makes delivering information easier than traditional methods, $M = 3.98$), Q4 (using educational chatbots to explain value concepts, $M = 4.02$), and Q3 (the infrastructure provided by the school or centre, $M = 4.03$). The standard deviations of the items are between 0.59 and 0.64, which indicates a clear consensus among the teachers. Substantively, the teachers use the applications first for follow-up and for attracting attention, and less for explaining value concepts by chatbots, which is the content that is closest to the aim of this study. The high use of adaptive learning platforms (Q6, $M = 4.14$) is in line with the review of Panjwani-Charania and Zhai (2024), in which adaptive learning was the most used application, and the use of chatbots (Q4) agrees with the review of Okonkwo and Ade-Ibijola (2021) that these tools are used in many educational tasks.

4.4 Objective (b): the role of the applications in developing Islamic social values

Table 5 presents the descriptive statistics of the ten items of the second axis, using the same classes of interpretation.

Table 5. Descriptive statistics of the items of Axis B: role of the applications in developing Islamic social values.

Code	Item	Mean	SD	Rank	Level
Q9	The interactive applications contribute to developing the value of cooperation and teamwork among students.	4.02	0.62	4	High
Q10	The applications help to instill honesty and trustworthiness through interactive stories inspired by the Prophet's biography.	4.01	0.60	6	High
Q11	The applications enhance mutual respect and acceptance of others among students with learning disabilities.	4.15	0.62	1	High
Q12	The applications develop responsibility and commitment through interactive daily tasks.	4.10	0.62	3	High
Q13	The applications contribute to enhancing tolerance and forgiveness in simulated social situations.	3.90	0.63	10	High
Q14	The applications help to develop kindness to parents and maintaining family ties through interactive scenarios.	4.02	0.60	5	High
Q15	The applications enhance the value of altruism and helping others.	4.12	0.64	2	High

Code	Item	Mean	SD	Rank	Level
Q16	The applications contribute to establishing cleanliness and orderliness as Islamic behavioural values.	3.98	0.68	8	High
Q17	The applications motivate students to practise the values in their real environment, not only virtually.	4.00	0.65	7	High
Q18	I notice a tangible improvement in my students' value-related behaviour after using AI applications.	3.97	0.63	9	High
	Axis B mean	4.03	0.45		High

Note. N = 283. Rank is based on the item mean within the axis.

The perceived role of the applications in developing Islamic social values is at a high level ($M = 4.03$, $SD = 0.45$), and all the ten items are at the high level. The highest items are Q11 (mutual respect and acceptance of others, $M = 4.15$), Q15 (altruism and helping others, $M = 4.12$), and Q12 (responsibility and commitment through interactive daily tasks, $M = 4.10$). The lowest items are Q13 (tolerance and forgiveness in simulated social situations, $M = 3.90$), Q18 (a tangible improvement in the value-related behaviour of the students, $M = 3.97$), and Q16 (cleanliness and orderliness, $M = 3.98$). The range between the highest and the lowest item is only 0.24 points, and the standard deviations are between 0.60 and 0.68, so the teachers agree in general and the ranking should not be over-interpreted. Even so, the values that are practised in the interaction with others (respect, helping, and responsibility) are ranked above the values that need a simulated situation (tolerance) or a change that is observed in the behaviour (Q18, and Q17 on practising the values in the real environment, $M = 4.00$). This pattern is consistent with the studies of Islamic education for students with special needs, which point to concrete and repeated experiences and to cooperative activities as the way to strengthen values such as cooperation, responsibility, and mutual respect (Hasanah et al., 2026; Julaeha & Mubarak, 2026).

4.5 Objective (c): the challenges that limit the use

Table 6 presents the descriptive statistics of the six items of the third axis, using the same classes of interpretation.

Table 6. Descriptive statistics of the items of Axis C: challenges.

Code	Item	Mean	SD	Rank	Level
Q19	Weak infrastructure and internet in special education schools in Irbid hinder the use.	3.76	0.63	4	High
Q20	Teachers lack specialised training on using AI in special education.	3.64	0.65	6	Moderate
Q21	The high cost of applications and subscriptions is an obstacle for government schools.	3.89	0.67	3	High
Q22	There is little Arabic Islamic content designed with AI technologies for students with learning disabilities.	3.90	0.64	2	High
Q23	Parents are concerned about technological addiction or the effect on the child's identity.	3.92	0.68	1	High
Q24	It is difficult to assess values objectively through digital applications.	3.65	0.66	5	Moderate
	Axis C mean	3.79	0.46		High

Note. N = 283. Rank is based on the item mean within the axis.

The challenges are at a high level ($M = 3.79$, $SD = 0.46$), but this axis has the lowest mean of the three axes. The highest challenges are Q23 (the concern of the parents about technological addiction or the effect on the identity of the child, $M = 3.92$), Q22 (the little Arabic Islamic content designed with AI technologies for students with LD, $M = 3.90$), and Q21 (the high cost of the applications and subscriptions, $M = 3.89$). Weak infrastructure and internet (Q19, $M = 3.76$) is also at the high level. Only two items fall at the moderate level, that is, the lack of specialised training (Q20, $M = 3.64$) and the difficulty of assessing the values objectively through digital applications (Q24, $M = 3.65$). The standard deviations are between 0.63 and 0.68, which means that the dispersion is small. The high level of the cost challenge is in line with Aldagamseh et al. (2026), who reported the high cost, the shortage of devices, and the insufficient training as the main barriers in Irbid, although the training item is lower in the present data. Moreover, the content and the parents' items are specific to the aim of this study, and they show that the barrier is not only technical but also related to the cultural fit of the applications.

4.6 Hypothesis H1: reality of use and the development of Islamic social values

Before the regression, Table 7 reports the Pearson correlations among the mean scores of the three axes.

Table 7. Pearson correlations among the axes.

Pair of axes	r	p
Reality of use and development of values	.505	< .001
Reality of use and challenges	.215	< .001
Development of values and challenges	.202	< .001

Note. N = 283. Two-tailed tests.

Table 7 shows that the reality of use has a positive correlation of a large size with the development of values (Cohen, 1992) ($r = .505$, $p < .001$), while the challenges have weak positive correlations with both the reality of use ($r = .215$) and the development of values ($r = .202$), and both are significant at the 0.001 level. Accordingly, the relationship between use and values is the main relationship of the study, and it is tested in Table 8.

Table 8 presents the multiple linear regression in which the perceived development of values (VAL) is the dependent variable, the reality of use (USE) is the independent variable, and the demographic dummy variables are the controls. The decision rule is that H1 is supported when β_1 is positive and significant at the 0.05 level, and the size of the effect is read by the benchmarks of Cohen (1992) for f^2 , that is, 0.02 small, 0.15 medium, and 0.35 large.

Table 8. Multiple linear regression of the development of Islamic social values (VAL) on the reality of use (USE) and the controls.

Predictor	B	SE	Std. β	t	p	95% CI
Constant	2.110	0.227		9.29	< .001	[1.662, 2.557]
Reality of use (USE), β_1	0.456	0.055	0.444	8.22	< .001	[0.347, 0.565]
Gender: female (ref. male)	0.017	0.048	0.018	0.35	.725	[-0.077, 0.111]
Qualification: master (ref. bachelor)	0.008	0.050	0.008	0.15	.880	[-0.092, 0.107]
Qualification: doctorate (ref. bachelor)	0.057	0.110	0.027	0.52	.604	[-0.160, 0.275]
Experience: 5 to 10 years (ref. less than 5)	- 0.006	0.056	- 0.006	- 0.10	.917	[-0.116, 0.104]
Experience: more than 10 years (ref. less than 5)	- 0.094	0.060	- 0.095	- 1.56	.121	[-0.212, 0.025]
Institution: private school (ref. government)	- 0.021	0.056	- 0.020	- 0.37	.711	[-0.130, 0.089]
Institution: special education centre (ref. government)	- 0.094	0.069	- 0.072	- 1.37	.171	[-0.230, 0.041]

Predictor	B	SE	Std. β	t	p	95% CI
AI training: yes (ref. no)	0.179	0.049	0.196	3.63	< .001	[0.082, 0.277]

Note. Dependent variable: VAL. N = 283. B = unstandardised coefficient; Std. β = standardised coefficient. $R^2 = 0.301$, adjusted $R^2 = 0.278$, $F(9, 273) = 13.04$, $p < .001$. f^2 of USE = 0.25, computed from the change in R^2 when USE is added to the model with the controls only (R^2 of the controls = 0.128).

The model in Table 8 is significant and explains 30.1% of the variance of the perceived development of values (adjusted $R^2 = 0.278$; $F(9, 273) = 13.04$, $p < .001$). The coefficient of the reality of use is positive and significant ($\beta_1 = 0.456$, $SE = 0.055$, $t = 8.22$, $p < .001$, 95% CI [0.347, 0.565]), so one point of increase in the reality of use is associated with an increase of about 0.46 points in the perceived development of values, and the standardised coefficient is 0.444. The effect size is $f^2 = 0.25$, which is a medium effect because it lies between 0.15 and 0.35 (Cohen, 1992). The result meets the decision rule, and therefore H1 is supported. In addition, the reality of use adds 17.3 percentage points of explained variance beyond the controls, which explain only 12.8%. Among the controls, only the AI training is significant ($B = 0.179$, Std. $\beta = 0.196$, $p < .001$), in which the trained teachers perceive a higher development of values at the same level of use, while the other controls (gender, qualification, experience, and type of institution) are not significant (all $p > .10$). This result agrees with social learning theory and with the technology acceptance logic, since the teachers who use the applications more observe directly the reaction of the students and the usefulness of the applications.

The robustness test is the nonparametric bootstrap with 5,000 resamples of the respondents, and the rule is that the result is supported when the 95% confidence interval of β_1 excludes zero. Table 9 reports the bootstrap results.

Table 9. Bootstrap test of the coefficient of the reality of use. (5,000 resamples)

Estimate	β_1 (OLS)	Bootstrap mean	Bootstrap SE	95% percentile CI
Reality of use (USE) on VAL	0.456	0.456	0.055	[0.349, 0.564]

Note. N = 283. The confidence interval is based on the percentile method.

The bootstrap interval in Table 9 ([0.349, 0.564]) does not include zero, and the bootstrap mean (0.456) and standard error (0.055) are almost the same as the OLS estimates (0.456 and

0.055). The result meets the rule, so the support for H1 does not depend on the assumptions of the classical standard errors.

4.7 Hypothesis H2: AI training and the reality of use

Table 10 presents the comparison of the reality of use between the teachers who received training in AI and those who did not, using Welch's t-test. The decision rule is that H2 is supported when the trained group has a higher mean and the difference is significant at the 0.05 level, and the effect size is read by Cohen's d, where 0.50 is medium and 0.80 is large (Cohen, 1992).

Table 10. Welch's t-test of the reality of use by previous training in AI.

Group	n	Mean	SD	t	df	p	Cohen's d
Trained in AI	115	4.29	0.42				
Not trained in AI	168	4.00	0.41				
Difference		0.29		5.74	239.09	< .001	0.70

Note. Dependent variable: the mean of the reality of use (Axis A). df = Welch-Satterthwaite degrees of freedom.

The trained teachers report a higher reality of use ($M = 4.29$, $SD = 0.42$) than the teachers who did not receive training ($M = 4.00$, $SD = 0.41$), and the difference of 0.29 points is significant ($t(239.09) = 5.74$, $p < .001$). Cohen's d is 0.70, which is a medium-to-large effect. The result meets the decision rule, and therefore H2 is supported. The dispersion in the two groups is almost equal (SD of 0.42 and 0.41), so the difference is a shift in the level of use and not a difference in the spread. This is consistent with the TPACK framework, in which the technological knowledge of the teacher is a condition for integrating the technology into the teaching of the content (Mishra & Koehler, 2006), and with the limited teacher knowledge and insufficient training that were reported as obstacles in the previous studies (Aldagamseh et al., 2026; Rosita et al., 2024).

4.8 Exploratory differences by gender, qualification, experience, and type of institution

Table 11 presents the descriptive statistics of the reality of use and the development of values by the demographic groups, and Table 12 presents the tests of the differences. Welch's t-test is used for gender and Welch's one-way analysis of variance is used for the three-group variables, with Cohen's d and eta squared as effect sizes. The decision rule is that a difference is significant when p is below 0.05, and the benchmarks of Cohen (1992) are used for the

effect size, that is, d of 0.20, 0.50, and 0.80 and eta squared of 0.01, 0.06, and 0.14 for small, medium, and large effects respectively.

Table 11. Descriptive statistics of the reality of use (USE) and the development of values (VAL) by demographic group.

Variable	Group	n	USE Mean	USE SD	VAL Mean	VAL SD
Gender	Male	107	4.10	0.44	4.01	0.48
	Female	176	4.13	0.44	4.04	0.43
Qualification	Bachelor	184	4.12	0.45	4.02	0.44
	Master	86	4.12	0.44	4.03	0.47
	Doctorate	13	4.12	0.25	4.07	0.54
Experience	Less than 5 years	85	4.06	0.44	4.02	0.45
	5 to 10 years	114	4.14	0.45	4.06	0.46
	More than 10 years	84	4.15	0.43	3.99	0.43
Institution	Government school	177	4.14	0.42	4.05	0.44
	Private school	67	4.08	0.45	4.01	0.46
	Special education centre	39	4.10	0.50	3.94	0.50

Note. $N = 283$. USE = reality of use; VAL = development of Islamic social values.

Table 12. Welch's tests of the differences in the reality of use and the development of values by demographic variable.

Variable	Dependent variable	Test	Statistic (df)	p	Effect size
Gender	Reality of use	Welch t	-0.46 (221.64)	.649	$d = -0.06$
	Development of values	Welch t	-0.50 (207.19)	.614	$d = -0.06$
Qualification	Reality of use	Welch F	0.01 (2, 38.13)	.993	$\eta^2 < .001$
	Development of values	Welch F	0.05 (2, 31.47)	.954	$\eta^2 < .001$
Experience	Reality of use	Welch F	1.31 (2, 179.53)	.273	$\eta^2 = .009$
	Development of values	Welch F	0.63 (2, 180.27)	.533	$\eta^2 = .004$
Institution	Reality of use	Welch F	0.45 (2, 86.48)	.638	$\eta^2 = .003$
	Development of values	Welch F	0.91 (2, 87.54)	.407	$\eta^2 = .007$

Note. $N = 283$. Gender: male minus female. η^2 = eta squared.

The tests in Table 12 show that no difference is significant, since the smallest p value is .273 (experience, reality of use). The effect sizes are negligible, with Cohen's d of 0.06 and 0.06 for gender and eta squared values not higher than .009 for the other variables. Substantively, the male and the female teachers have almost the same means in the reality of use (4.10 and 4.13) and in the development of values (4.01 and 4.04). Some descriptive gaps appear in Table 11, for example the special education centres have the lowest mean of values (3.94)

against 4.05 in the government schools, but these gaps are small compared with the standard deviations and they are not significant. Because the doctorate group ($n = 13$) and the special education centres ($n = 39$) are small, the power of these comparisons is limited, and the results are better read as an absence of evidence for differences than as a proof of equality. The pattern agrees with Aldagamsch et al. (2026), who found no significant differences by gender, educational qualification, or years of experience in the barriers of assistive technology in Irbid.

5. DISCUSSION

This study examined the reality of using interactive AI applications, their perceived role in developing Islamic social values among students with learning disabilities, and the challenges that limit their use, from the perspective of 283 special education teachers in Irbid. The main finding is that the teachers report a high level of use ($M = 4.12$), a high perceived role of the applications in developing the values ($M = 4.03$), and also a high level of challenges ($M = 3.79$). Moreover, the reality of use is positively associated with the perceived development of values after controlling for the demographic variables ($\beta_1 = 0.456$, $f^2 = 0.25$), and the bootstrap interval confirms this result. The teachers who received AI training report a higher reality of use ($d = 0.70$), while the demographic variables do not show significant differences. The positive association between the use and the values supports H1, and it is in line with the theoretical lenses of the study. From the view of social learning theory, the applications present models of values and give the learner an active role with immediate feedback (Bandura, 1969; Hattie & Timperley, 2007), and the teachers who use the applications more are in a better position to observe this process. From the view of the technology acceptance family, the teachers who find the applications useful use them more and, therefore, see their results more clearly (Davis, 1989; Venkatesh et al., 2003). However, it should be noted that the use and the values are reported by the same teacher at the same time, and for this reason the association cannot be read as a causal effect of the applications on the students. In other words, a teacher who has a positive view of AI may rate both the use and the values higher. Harman's test does not show a dominant single factor, but it does not remove this possibility completely.

As for the values, the high level of the second axis is important for this group, whose social skill deficits are documented (Kavale & Forness, 1996). The values that are practised in the interaction, that is, mutual respect, helping others, and responsibility, are ranked higher than tolerance in simulated situations and the observed change in the behaviour, but the

differences between the items are small, so this ranking is only an indication. It is worth mentioning that the same direction appears in the studies of Islamic education for students with special needs, in which concrete experiences, habituation, and cooperative activities are the basis for the formation of the values (Hasanah et al., 2026; Julaeha & Mubarak, 2026). The present results suggest that the interactive applications may offer such experiences, but this suggestion needs evidence from the students themselves.

Regarding the training, the difference of 0.29 points in the reality of use and the effect size of 0.70 support H2, and the regression shows that the training remains significant for the development of values even when the reality of use is controlled. This result agrees with the TPACK framework (Mishra & Koehler, 2006) and with the importance of the beliefs and the preparation of the teachers in technology integration (Ertmer, 2005; Luckin et al., 2022). On the other side, the lack of specialised training (Q20) is only at the moderate level among the challenges ($M = 3.64$), which is lower than what was reported by Aldagamseh et al. (2026), and it is not fully consistent with the strong role of the training in the other results. This point cannot be solved with the present data, and it should be studied in the future by measuring the content and the quality of the training programmes.

For the challenges, the highest items are the concern of the parents about technological addiction and the effect on the identity of the child, the little Arabic Islamic content, and the cost of the applications. The cost is in line with Aldagamseh et al. (2026), while the parents and the content items show that the cultural fit of the applications is a barrier that is specific to the Islamic values education. A further point is that the teachers agree that the school or centre provides the infrastructure (Q3, $M = 4.03$) and, at the same time, that the weak infrastructure and internet hinders the use (Q19, $M = 3.76$), which means that the infrastructure is available but not enough or not stable. In addition, the challenges have a weak positive correlation with the use ($r = .215$), so the challenges do not prevent the use in this sample, and they may be felt more by the teachers who use the applications more in the practice. Finally, the absence of significant differences by gender, qualification, experience, and type of institution is similar to the finding of Aldagamseh et al. (2026), and it suggests that the use of the applications is related to the training more than to the background of the teacher.

6. CONCLUSION, IMPLICATIONS, AND LIMITATIONS

This study provides quantitative evidence from Irbid that special education teachers who use interactive AI applications more perceive a stronger development of Islamic social values

among students with learning disabilities ($\beta_1 = 0.456$, $p < .001$, $f^2 = 0.25$), that the teachers who received AI training use the applications more ($d = 0.70$), and that the use is limited by high challenges, mainly the concern of the parents, the little Arabic Islamic content, and the cost.

The findings have four practical implications. First, the training programmes for special education teachers should include the use of interactive AI applications, and they should include the use of these applications for teaching values and not only for academic content. Second, the developers and the educational authorities should produce Arabic content that is consistent with Islamic values and suitable for students with learning disabilities. Third, the schools and centres need to solve the problems of the infrastructure and the cost, especially in government schools, and the awareness of the parents about the safe use of the applications should be improved. Fourth, tools for assessing the values objectively through the digital applications are needed, since the difficulty of this assessment (Q24) was reported at the moderate level, which indicates a gap in evaluating the results. Theoretically, the study links two bodies of literature that are treated separately, that is, AI in special education and Islamic values education.

The study has limitations that should be considered. The data are based on the perception of the teachers and not on the observed behaviour of the students, and all the variables come from the same respondents at the same time, so the cross-sectional design does not permit causal conclusions. The sample was selected by convenience from one governorate, and therefore the results cannot be generalised to all special education teachers in Jordan, and the small size of some groups limits the power of the group comparisons. Future studies may use probability samples from more governorates, collect the views of the students and the parents, use observation or pre-post designs to measure the change in the values, and examine the type and the quality of the AI training and the types of applications separately.

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