Article

The Role of Artificial Intelligence in Enhancing Learning Motivation among Deaf and Hard-of-Hearing Students: Teachers' Perspectives

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Abstract: This study investigates the role of artificial intelligence (AI) in enhancing learning motivation among DHH students from the perspective of teachers. As AI technologies become more directly involved in the educational environment, the phenomena of whether they can enhance accessibility, interaction, and engagement in learners with disabilities are gaining more and more attention, especially in the case of deaf and hard-of-hearing learners. The research assumed a descriptive survey design and focused on 120 teachers who had to work with Deaf and Hard-of-Hearing (DHH) students DHH in special education settings. The results showed that teachers tended to have a positive attitude towards the use of AI to encourage DHH students to learn. The AI-based technologies were considered effective in enhancing the engagement of students, their access to the learning materials, and the development of more interactive and inclusive learning space. The findings also indicated a number of challenges that can constrain the successful adoption of AI in special education which involve a lack of teacher training, lack of technology, and technological barriers in learning institutions. Also, the study revealed no statistically significant differences in the perceptions of the teachers based on demographic variables, which means that the respondent has relatively close recognition of the importance of AI. The research concludes that AI may potentially be effectively used as a means of motivation to learn among DHH students in case they have the requisite infrastructure, training, and policy guidance available at schools. The results are relevant to the existing literature on the topic of inclusive education and the practical implications of this research on teachers, schools, and policymakers who want to apply AI in special education.

Keywords: *artificial intelligence, deaf and hard-of-hearing students (*DHH)*, learning motivation, inclusive education, educational technology, Assistive Technology*

Introduction

The current technological innovations have impacted learning processes to a great extent, especially with the adoption of artificial intelligence (AI) in classrooms (Khatun et al., 2024). The application of technologies of artificial intelligence opens up new possibilities to enhance the process of teaching, individualization of the learning process, and the engagement of students with learning material (Chen et al., 2020; Tang, 2024). With the growing use of digital tools in educational systems, applications based on AI can become a significant part of the support of various cohorts of learners, such as students with disabilities (Ahmed et al., 2025).

DHH students are usually vulnerable to special educational difficulties among students with disabilities because of the restriction of both communication and access to auditory information (Kontra et al., 2015). All these challenges can impact their involvement in the activities within a classroom, as well as they can affect their motivation to learn (Stinson & Liu, 1999). Motivation in learning plays an important role in determining the success of students in academics since it determines the willingness, engagement, and persistence of students in the learning process (Convertino et al., 2009; Albertini et al., 2012). Thus, coming up with proper strategies to increase motivation among DHH students has become a critical issue to educators and researchers (Aljedaani et al., 2023; Yuliang, 2024).

The solutions offered by artificial intelligence are promising and would assist in eliminating some of the obstacles encountered by DHH students in learning institutions (Coy et al., 2025; Ahmed et al., 2025). Communication, accessibility, and independent learning can be supported with the help of AI-powered technologies, including speech-to-text systems Mitra, 2024; Brotosaputro et al., (2024), automatic captioning, sign-language recognition applications, intelligent tutoring systems, etc. Such technologies can help to establish more inclusive learning spaces that can better accommodate the educational needs of the DHH students (Lata, 2024).

Moreover, educators are very instrumental in implementing the use of artificial intelligence in the education process (Salas-Pilco et al., 2022; Zawacki-Richter et al., 2019; Pedro et al., 2019). They are of fundamental importance in measuring the success of AI applications in boosting the learning motivation of DHH students (Adel et al., 2025). The viewpoint of teachers may be an important source of information regarding the practice of AI-based technologies in the context of special education (Almarzouq et al., 2025).

Although interest in artificial intelligence is increasing in the education field, limited research has been conducted to understand how the technology is used to motivate DHH students within the teacher

perspective. Thus, the proposed research will examine how artificial intelligence can be used to improve learning motivation among DHH students in the eyes of the teachers who teach this group of students. The results of the study can be used in the improvement of the educational practice and contribute to the creation of inclusive technologies, which will allow getting more motivated and better learning results in DHH students.

Literature Review

Artificial intelligence (AI) is now one of the most powerful technologies that are defining the contemporary systems of education. The use of AI in teaching and learning has become a more common practice in the recent years to facilitate the effectiveness of education and to make it more engaging to students. The AI technologies permit adaptive learning settings, smart tutoring, and automated feedback systems that enhance individualized learning and boost the academic results of the students.

A number of studies have also pointed to the use of artificial intelligence to assist students with disabilities. Educational technologies based on AI can offer unique learning experiences to meet various learning requirements and capabilities. The AI technologies that can greatly enhance access to learning resources and classroom communication in students with hearing impairments are speech recognition systems, automated captioning, and sign language recognition.

Motivation towards learning is termed to be an essential component in the process of learning. Motivated students are more likely to take active roles in classroom activities, show persistence in learning activities and attain better academic results (Sarkar et al., 2025; Daniel et al., 2024). When it comes to special education, the improvement of the learning motivation of students with disabilities is especially significant since they are generally exposed to some extra barriers that can decrease their desire to engage in the process of learning (Alkahtani, 2024; Khandaqji et al., 2025; Meftoud, 2025; Salawa et al., 2024; Fuller, et al., 2024).

Recent studies have highlighted the need to use technological advances to enhance student motivation (Al-Said et al., 2023). The learning environment using AI can offer interactive learning experiences that can arouse curiosity, motivate participation and facilitate autonomous learning (Zhang & Miao, 2025). In the case of DHH students, visual and interactive AI-based learning tools are likely to make the process of comprehending some teaching material easier and to implement motivation to learn better (Ahmad et al., 2025; Jiao & Shakibaei, 2025).

The use of artificial intelligence technologies in the educational institutions is highly dependent on teachers (Zawacki-Richter, 2019; chen, 2020; Okagbue et al., 2023). Their attitudes, views and

perceptions of the AI-based educational tools can be used to determine whether the technologies are effective in enhancing the learning experiences of the students. The trained teachers are more likely to be able to successfully implement these technologies in their teaching process and promote the motivation of students to learn (Miguez-Souto et al., 2023).

Although there has been a sizeable body of research on the role of artificial intelligence in education, not much has been done to analyse its impact on learning motivation among DHH students through the lens of teachers. Thus, additional studies should be conducted to identify the perception of teachers regarding the role of artificial intelligence applications in stimulating the learning process of DHH students in educational institutions, especially in United Arab Emirates.

Research Problem

Although there has been a high pace of growth in artificial intelligence technologies in the education sector, most institutions of learning continue to struggle in the deployment of the technologies in the teaching process, especially in the special education sector. Deaf learners usually face challenges in listening to auditory information and being able to engage in classroom relationships which could have a bad impact in their interaction and motivation to learn.

Even though artificial intelligence can offer novel solutions that can enhance accessibility and improve the learning experience of students with hearing impairments, in most learning institutions Meftoud (2025), the use of artificial intelligence in education among the deaf is still a theory on paper (Patel et al., 2025). Teachers are important actors in integrating and implementing such technologies in the classrooms; hence, it is vital to comprehend their views when assessing the efficacy of the artificial intelligence applications in improving the motivation of students to learn.

In addition, most of the past studies have concentrated on the overall application of artificial intelligence in education Chen et al., (2020); Roll & Wylie (2016) but very few studies have delved into the application of artificial intelligence on the learning motivation of DHH students (Almarzouq et al., 2025; Adel et al., (2025); Coy et al., (2025); ZainEldin et al., 2024). This gap indicates the necessity of studying the perception of the teachers about the effect of artificial intelligence technologies on the motivation of DHH students in the educational settings.

As such, this paper aims to investigate how artificial intelligence can be used to better motivate deaf learners as perceived by the teachers who will be involved with DHH students.

Based on the research problem, the study seeks to answer the following questions:

1. What is the role of artificial intelligence in enhancing learning motivation among DHH students from the perspective of teachers?

2. What are teachers' perceptions regarding the effectiveness of artificial intelligence tools in supporting the learning process of DHH students?

3. What challenges do teachers face when using artificial intelligence applications in teaching DHH students?

4. Are there statistically significant differences in teachers' perceptions of the role of artificial intelligence in enhancing learning motivation among DHH students according to demographic variables such as gender, years of experience, and educational qualification?

Objectives of the Study

The present study will investigate how the application of artificial intelligence can increase the motivation to learn in DHH students in the eyes of the teachers. Namely, the research aims at attaining the following objectives:

To investigate the perception of teachers regarding the role of artificial intelligence in enhancing the learning motivation of DHH students.

To determine whether artificial intelligence tools can help in aiding the learning process of DHH students.

To investigate the issues associated with teachers in embracing the artificial intelligence technologies in teaching DHH students.

To explore whether the differences in perceptions of teachers on the role of artificial intelligence on the basis of the demographic factors like gender, years of teaching experience, and educational qualification are statistically significant.

Significance of the Study

This research project is important because it contributes to the knowledge on the potential of the use of artificial intelligence to enhance the learning experience among the DHH students. With the current development of educational technologies, the incorporation of artificial intelligence in the learning setting could offer additional prospects of improving accessibility and engagement of students with impaired hearing.

This paper is significant as it dwells upon the attitudes of educators who provide direct work with DHH students and have to introduce educational technologies in classes. Their perspectives can be used to

offer important details about the practical advantages and issues of artificial intelligence application in special education.

In addition, the research results can help educational organizations and policymakers to formulate ways through which the artificial intelligence technologies can be incorporated in the teaching process. The research can also help in enhancing the learning motivation of DHH students through the use of exciting digital tools that facilitate inclusive learning.

Methodology

Research Design

The present research assumed the descriptive survey design because it aimed to explore the views of teachers on the role of artificial intelligence in helping to stimulate the motivation of learning among Deaf and Hard-of-Hearing (DHH) students. It was believed that this design was suitable because it enables systematization of data regarding the perception, attitudes, and experiences of participants in real educational contexts.

Participants

he study population consisted of teachers working with Deaf and Hard-of-Hearing (DHH) students in the United Arab Emirates. The stratified random sampling was used. The teachers in the selected schools who have direct contact with DHH students were used to administer the questionnaire. The study involved 120 teachers, which reflected a variety of backgrounds in terms of teaching experience; their educational level, which increases the relevance of the results to the general context. See table 1.

Table 1
Shows the sample Characteristics

Variable	Category	Frequency	Percentage (%)
Gender	Male	48	40.0%
	Female	72	60.0%
Years of Experience	Less than 5 years	35	29.2%
	5–10 years	50	41.7%
	More than 10 years	35	29.2%
Educational Qualification	Bachelor's Degree	70	58.3%
	Master's Degree	40	33.3%
	PhD	10	8.3%

The figures in Table 1 indicate that most of the respondents were female teachers (60%), but only 40 percent of the sample was constituted by male teachers. As to the number of years experience, the highest percentage of respondents (41.7) had a years experience of between 5-10 years, 29.2 had a year experience of less than 5 years and more than 10 years. Regarding the level of education, the majority

of participants had a bachelor's degree (58.3%), then master degree (33.3%), and the minor percentage had a PhD (8.3%).

Research Instrument

The researcher used a systematic review of the pertinent literature on artificial intelligence in education and motivation to learn among the student population with disabilities to create a structured questionnaire. The tool was aimed at gauging the feelings of the teachers about the AI application efficacy in improving learning motivation among DHH students.

The questionnaire was divided into several items that were given in the main dimensions and they included:Enhancing student engagement due to AI, the usefulness of AI tools in facilitating the learning process, and the difficulties of applying AI in special education institutions.

The validity of content was determined using the expert review as a way of promoting clarity of the items, their relevance and suitability. The reliability was determined by the help of Cronbach alpha coefficient that refers to a reasonable degree of internal consistency. The reliability of the instrument was confirmed with a Cronbach's alpha value of 0.89. See table 2.

Table 2
Table: Reliability Analysis (Cronbach's Alpha)

Dimension	Number of Items	Cronbach's Alpha
AI in Enhancing Student Engagement	5	0.88
Effectiveness of AI in Supporting Learning	4	0.86
Challenges of Using AI in Education	4	0.84
Total Scale	**13**	**0.89**

Data Analysis

The obtained data were processed in the Statistical Package of Social Sciences (SPSS). The responses of the teachers were summarized using descriptive statistics in means and standard deviations.

Further, the inferential statistical tests were done to determine the difference in the perception of teachers depending on the demographic characteristics like gender, teaching experience and educational qualification. The level of statistical significance was carried out at the traditional level ($p \leq 0.05$).

Results

This part is the findings of the statistical tests that were performed to assess the perception of teachers about the role of artificial intelligence in increasing the motivation to learn among DHH students. The responses were analysed using descriptive statistics (means and standard deviations).

Results Related to the First Research Question: What is the role of artificial intelligence in enhancing learning motivation among DHH students from the perspective of teachers?

To respond to this question, standard deviations and means of the responses provided by teachers to the questionnaire questions concerning the role of the artificial intelligence in increasing the learning motivation in DHH students were computed.

Table 3
Means and Standard Deviations of Teachers' Responses on the Role of Artificial Intelligence in Enhancing Learning Motivation

Item No.	Statement	Mean (M)	Std. Deviation (SD)	Level
1	AI helps increase student engagement	4.25	0.65	High
2	AI improves access to learning materials	4.18	0.70	High
3	AI enhances classroom interaction	4.10	0.72	High
Total		**4.18**	**0.68**	High

The findings in Table 3 show that the general prevalence among the teachers is the high level of agreement on the role of artificial intelligence in the rise of learning motivation among DHH students. The average score was mean = 4.18 and a standard deviation of SD = 0.68, which means that the perception among teachers about the effectiveness of artificial intelligence tools to support the motivation to learn was positive.

Moreover, some of the items scored very high on the mean, which implies that artificial intelligence applications can:

Enhance the classroom interactions of students.

Make educational material easily available.

Encourage interaction in the learning process.

These results imply that artificial intelligence technologies can play an important part in the motivation of learning of DHH students.

Findings in regard to the Second Research Question.

How do teachers feel about the efficacy of artificial intelligence tools in facilitating the process of learning by DHH students?

In order to respond to this question, the descriptive statistics were determined on the questionnaire items concerning the effectiveness of artificial intelligence tools to facilitate the learning process.

Table 4
Teachers' Perceptions of the Effectiveness of AI Tools in Supporting Learning

Item No.	Statement	Mean (M)	Std. Deviation (SD)	Level
1	AI helps explain complex concepts	4.30	0.60	High
2	AI provides alternative learning methods	4.22	0.66	High
Total		**4.21**	**0.64**	High

The findings described in Table 4 indicate that the teachers believe that artificial intelligence applications are the effective means of sustaining the process of learning among DHH students. Most of the items had mean score in the high level, which suggests that teachers feel that AI technologies can be used to enhance access and ease delivery of teaching materials.

The outcomes, as well, show that AI-powered educational tools could inform teachers to be more eloquent in their explanation of complex concepts and offer alternative ways of conveying information to meet the demands of deaf learners.

Findings with regards to the Third Research Question

What are the difficulties teachers experience in using artificial intelligence applications in teaching DHH students?

Table 5
Challenges Facing Teachers in Using Artificial Intelligence

Item No.	Challenge	Mean (M)	Std. Deviation (SD)	Level
1	Lack of training	4.40	0.55	High
2	Limited resources	4.35	0.60	High
3	Technical issues	4.20	0.70	High
Total		**4.32**	**0.62**	High

As the results indicated in Table 5, the teachers mentioned a number of difficulties related to the implementation of artificial intelligence in teaching DHH students.

The most common issues as were reported were:

Accessibility of AI-based learning tools to schools is low.

Absence of training on the use of artificial intelligence technologies by the teachers.

Some educational institutions have technical constraints and inadequate infrastructures.

These results show that despite the potential of artificial intelligence to promote the level of learning motivation in DHH students, there are a number of practical challenges that can inhibit the successful application of AI in learning institutions.

Findings in regards to the fourth research question

Do the teachers differ in their perceptions depending on demographic variables statistically significantly?

The statistical tests were performed to identify the differences in the perceptions of teachers based on the demographic factors, i.e. gender, years of teaching experience, and educational qualification.

Table 6
Differences in Teachers' Perceptions According to Demographic Variables

Variable	Category	Mean (M)	Std. Deviation (SD)	Sig.
Gender	Male	4.15	0.70	0.45
	Female	4.20	0.65	
Experience	< 5 years	4.10	0.68	0.38
	≥ 5 years	4.25	0.66	

The findings indicated that there were no statistically significant differences in how the perceived role of artificial intelligence in improving learning motivation among DHH students according to these variables among the teachers.

This observation indicates that there is a relatively similar opinion among the teachers on the significance and usefulness of artificial intelligence technologies in facilitating the education of the DHH students.

Discussions

The current research was meant to analyse how artificial intelligence can be employed to boost the learning motivation of DHH students in terms of the view of teachers. The results found that teachers were mostly in agreement with the positive effects of artificial intelligence on the motivation of students to learn. This finding suggests that AI-based technologies may be used to a considerable extent to design more interactive and engaging learning environments with DHH students.

The result of the initial research question revealed that artificial intelligence helps to enhance the involvement and engagement of students in the learning processes. The reason behind this is that the AI technologies emerged have the potential to offer visual, interactive, and adaptive learning, especially to the DHH students since the latter needs to consider more visual means of communication. The findings can be attributed to the earlier research that focused on the importance of technology in enhancing student motivation and engagement in learning settings.

As far as the second research question is concerned, the findings showed that teachers believe that artificial intelligence tools can be used in helping DHH students to learn. Speech-to-text-applications, automated captioning, and visual learning platforms are AI applications that can improve accessibility and understanding of education. This observation is consistent with the previous studies which stipulated that assistive technologies are capable of enhancing learning outcomes among students with disabilities by lowering the communication barriers and exposing more information.

With respect to the third research question, the findings demonstrated that there are a couple of challenges encountered by the teachers in the application of artificial intelligence in teaching DHHs. These issues are most noticeable when it comes to the insufficiency of training, the scarcity of AI-based

education tools, and technical restrictions in the educational institutions. The results emphasize the necessity to offer professional development opportunities to teachers and advance technological infrastructure to make artificial intelligence in education work.

In the context of the fourth research question, the findings did not indicate statistically significant differences in the perceptions of teachers according to the demographic variables of their gender years of experience and educational qualification. This indicates that teachers have comparatively close attitudes to the application of artificial intelligence in improving motivation to learn among DHH students, irrespective of the background attributes.

On the whole, the results of this research highlight the promise of artificial intelligence as a useful instrument of inclusive education support and motivation of learning in DHH students. Nevertheless, to be implemented successfully, it is necessary to take care of the practical challenges associated with training, resources, and technological preparedness in education institutions.

Conclusion

This paper has explored the potential application of artificial intelligence in increasing the motivation of learning among DHH students as perceived by the teachers. The results indicated that artificial intelligence is important in enhancing engagement, participation, and access to learning materials by students. The educators also indicated favourable attitudes to the usefulness of AI-based tools in facilitating the process of learning of DHH students.

The research further revealed that artificial intelligence technologies may be used to develop more inclusive and interactive learning environments that would support the requirements of hearing impaired students. Nevertheless, irrespective of such positive outcomes, a number of challenges were distinguished, among them being the absence of teacher training, the insufficient access to technological resources, and technical limitations of educational institutions.

In addition, the findings also reported that the perceptions of the teachers were generally similar with no appreciable differences based on demographic factors, which implies that teachers developed a common sense in the relevance of artificial intelligence in the learning motivation of DHH students.

In general, the paper demonstrates the significance of the artificial intelligence application in special education to facilitate inclusive education and enhance the achievements of DHH learners.

Recommendations

In accordance with the results of the research, the following recommendations are offered:

Schools, colleges, and universities should offer teachers special training on how to effectively use artificial intelligence technologies when teaching DHH students.

Educational software, including speech-to-text applications and sign-language scanners, requires development and deployment by schools and policymakers, which can be achieved through the deployment of AI.

The educational authorities also need to enhance the technology in schools to facilitate the successful adoption of artificial intelligence in conventional teaching methods.

A curriculum developer ought to integrate the use of artificial intelligence in the teaching strategies to improve the learning motivation among the hearing impaired students.

It is suggested to conduct further research to understand how artificial intelligence affects various facets of learning among students with disabilities in more sophisticated statistical procedures and larger sample groups.

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