Journal of Education & Social Sciences

Journal of Education & Social Sciences

ISSN: 2410-5767 (Online)
ISSN: 2414-8091 (Print)

Teacher and Administrator Perceptions of Using Artificial Intelligence in Education

Affiliation:

Muhammad Naeem
Ph.D. Scholar, Department of Commerce, The Islamia University of Bahawalpur, Pakistan.
E-mail: rainaeem63@yahoo.com

Muzzammil Siraj
Lecturer in Department of Business Administration, SBB Dewan University Karachi, Pakistan.
E-mail: sp24phms0005@maju.edu.pk

Sumair Farooq
Assistant Professor, Faculty of Management Sciences, Hamdard University Karachi, Pakistan.
E-mail: sumair.farooq@hamdard.edu.pk

Manuscript Information
Submission Date: July 29, 2023
Reviews Completed: October 19, 2023
Acceptance Date: October 26, 2023
Publication Date: October 30, 2023

Citation in APA Style:
Naeem, M., Siraj, M., & Farooq, S. (2023). Teacher and Administrator Perceptions of Using Artificial Intelligence in Education, *Journal of Education & Social Sciences, 11*(2), 71-88.

DOI: https://doi.org/10.20547/jess1122311205

.

Journal of Education & Social Sciences
Vol. 11(2): 71-88, 2023
DOI: 10.20547/jess1122311205

Teacher and Administrator Perceptions of Using Artificial Intelligence in Education

Muhammad Naeem [*] Muzzammil Siraj [†] Sumair Farooq [‡]

Abstract: *This study examines the teacher's and administrator's perceptions of using artificial intelligence (AI) in education. This study is based on the population of Pakistan. Mainly focus on the Teachers and Administrators working in the education sector. This study used the stratified sampling technique and subdivided the overall population into three strata. This study used the five-point Likert scale questionnaire and analyzed 385 responses. The powerful tool used for the analysis of Structural Equation Modeling (SEM) is the software Smart PLS version 4.0.9. Results indicate that influence from colleagues has significant mediation between academic load and outcome, perception towards using AI, and support from institutions for AI implementation to belief towards AI integration in education. This research has certain limitations. The study is only conducted on the people of Pakistan. Therefore, examining the other regions may validate the contributions of this study. The implication of this research is in the education sectors of primary, secondary, and higher education. Too many factors can affect the belief toward AI integration in the education sectors such as the usefulness of AI to enhance teacher performance, the efficiency of administrators, the level of AI training of teachers and administrations, and the impact of AI on the time commitments. To the authors' best knowledge, it is one of the pioneer studies conducted in Pakistan on teacher and administrator perceptions of using AI in Education.*

Keywords: Artificial intelligence, Education, Teacher perception for integrating technology, Attitudes towards artificial intelligence, Smart PLS, Pakistan.

Introduction

The world already entered the era of digitalization with the emergence of AI which can change everything even the aspect of the thinking of humans. Computer technology emerges day by day and it can play a catalytic role in every industry. According to Riopelle and Wang (2019), innovation is not that the world makes innovation in the general norms. However, the innovation is outside the box which is completely different from the world norms as they work. Let us discuss the example of the horse. The innovation

[*]Ph.D. Scholar, Department of Commerce, The Islamia University of Bahawalpur, Pakistan. E-mail: rainaeem63@yahoo.com
[†]Lecturer in Department of Business Administration, SBB Dewan University Karachi, Pakistan.
E-mail: sp24phms0005@maju.edu.pk
[‡]Assistant Professor, Faculty of Management Sciences, Hamdard University Karachi, Pakistan.
E-mail: sumair.farooq@hamdard.edu.pk

Received July 29, 2023; Received in revised form October 19, 2023; Accepted October 26, 2023; Available online October 30, 2023

is not that they make horses faster. The innovation is that you can make a thing that is beyond the imagination which can be faster than a horse such as an automobile.

Another example is Peters and Gadzama (2019) who distributed 40 papers in 1950 and conducted the papers manually. After accessing the paper, they realized that the content was copied from another source and it is plagiarized but they don't have any technology to identify the sources. However, Dr. Potter conducted the paper digitally in 2019 with full control of the plagiarized content. What is this? This is innovation which makes him more efficient, and more productive. With the emergence of AI, teachers, and administrators perform their work more efficiently and effectively as compared to the previous era.

The introduction of computers, technologies, and machine learning makes students and teachers more productive. Also, these technologies are beneficial in other sectors such as; economics, transactions, and society. Personal computers give independence to government and non-government entities to perform their task in a better way. Earlier in the mid-1900s computer and computer-aided technology saw the use of computer technology in education sectors. Later, other programming such as networking, internet, and programming languages were developed which showed the benefits in other sectors rather than education. However, these technologies evolve day by day, month by month, and year by year. Improvement continues improvement give us artificial intelligence. According to Coppin (2004), AI is the ability of a machine to deal with new situations, learn from previous data, solve critical problems make necessary decisions, and perform other important functions just like humans can perform. Concerning this definition, we can say without any doubt that AI has a human-like brain to perform the necessary tasks and learn from the previous task. The integration of AI in the education sector has a positive impact on the economy and society. These positive impacts; can improve efficiency, promote smarter learning, the more personalized learning content.

As mentioned previously AI is a supercomputer that thinks like a human and can perform the tasks as a human can perform. AI has the same behavior and cognitive ability. Nowadays, AI is widely used in music, data analysis, data science, web designing, web development, etc. In the education sector, the use of AI is increasing day by day among the students. However, the teacher and administrator staff also used AI but their usage is undocumented. Similarly, the integration of a robot system in education learning helps the students. Instead of working manually, the online portal is developed for the learning and administrator tasks as it can improve transparency. The AI algorithm is emerging day by day. There are many potential ways in artificial intelligence which can create the focus environment in the education system. These potential ways are: It is difficult for the teacher to solve the personal problems of every student related to education. However, AI promotes personalization (Hermann, 2022). AI tutors the students as they want to learn (Schofield, Evans-Rhodes, & Huber, 1990). There are too many aspects of answering the questions, AI is biased to the specific information related to the content. However, this improves the course quality with updated content (Bye, 2018). Some students are bright and confident but some students are shy too. They do not ask questions due to shyness. AI tutors these students too with immediate and meaningful feedback (Nazari, Shabbir, & Setiawan, 2021).

Several aspects can make this research unique; firstly, this research expresses the direct

and indirect variable effect on the belief towards AI integration in education. Secondly; there is limited research conducted on AI integration in education. So, this research also fills the literature gap in the research by understanding the perception of using AI in the education sector. The objective of this research is to identify the direct effect of perception towards using AI, support from institutions for AI implementation, and academic load and outcome on belief towards AI integration in education. Furthermore, this research identifies the direct effect of perception towards using AI, support from institutions for AI implementation and academic load and outcome on influence from colleagues and indirect effect on belief towards AI integration in education. This research also identifies the mediation effect of influence from colleagues between perception towards using AI, support from institutions for AI implementation, academic load and outcome, and belief towards AI integration in education. This research provides benefits to schools, colleges, and universities to decide on implementation of AI on their premises or not. However, this research also discloses the reason for the barrier arising from implementing AI in the education sector. Furthermore, this research reveals the importance and acceptance of AI usage among teachers and administrators.

Teachers and administrations in Pakistan are cautiously auspicious about the objectification of AI in education. Teachers see AI as a tool for bodying literacy and reducing executive costs, but numerous are also concerned about equity and the future of tutoring positions. Administrative appreciate AI's capability to address systemic issues but accentuate the significance of conservative planning and investment. Collaboration among stakeholders is critical to ensuring that AI in education helps all scholars and is harmonious with Pakistan's educational objectives.

Literature Review

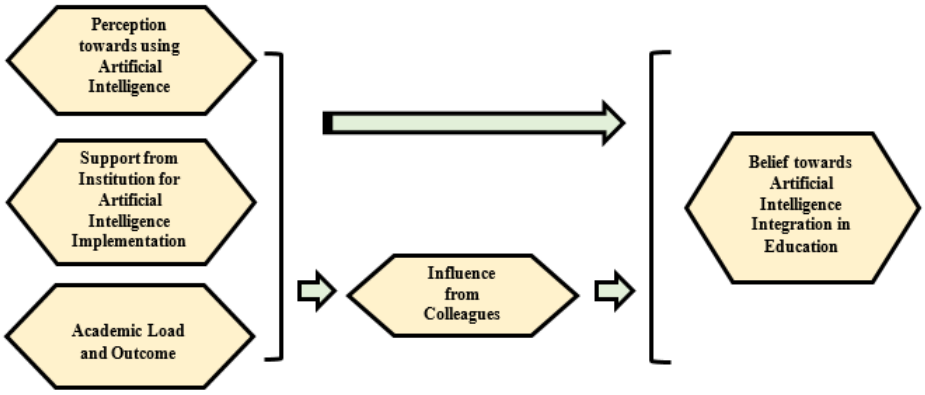
Theoretical Background

Integration of AI in the education sector provides a deep learning platform that includes graphical interpretation, incorporating the gaming pattern to solve critical problems and curriculum precision (Ting et al., 2019). A major impact was observed when these factors were incorporated into the era of education. Artificial algorithms and techniques for machine learning such as linear regression, gradient descent, logistic regression, super vector machines, decision trees, random forest, XGBoost, and K-means clustering already used in the field of data science (Malik, Tayal, & Vij, 2019). This research follows the theory of the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Diffusion Innovation Theory. The concept of the technology acceptance model (TAM) was developed by Davis (1989) and focuses on the user use of the technology based on the perceived ease of use and perceived usefulness. The use of this theory in the model that to know the perception of teachers and administrators for the ease of use of artificial intelligence in the education sector and the impact of AI in their processes (Marangunić & Granić, 2015). The concept of a unified theory of acceptance and use of technology was developed by Venkatesh (2003) who identified the technology

acceptance alternative view among the user. The implementation of this theory in this research is to know the behavior and influences of the user towards the acceptance of technology. However, to know the social influence of teachers and administrators regarding the use of technology (Attuquayefio & Addo, 2014; Nandwani & Khan, 2016). The concept of diffusion innovation theory was developed by Rogers (1962) and focuses on how technology or innovation adapted over time by time and how it spread over time. The implementation of this theory in research is to know the early adopters, and potential users towards the integration of AI in the education sector.

Theoretical Framework

Figure 1
Conceptual Framework



The theoretical framework is based on the dependent variables, independent variables, and mediator. The independent variable is perception towards using AI, support from institutions for AI implementation, and academic load and outcome. However, the mediator is used in is influenced by colleagues. Furthermore, the dependent variable is the belief in AI integration in education. The perception towards using AI is the independent variable in this research model. It is the perception of the teachers and administrators how easily they can incorporate AI tools and technologies in their tasks. The support from the institution for AI implementation is the second independent variable that is used in this research model. To know the policies, standard operating procedures, supports, or any hindrance from the institution for integration of AI tools and technologies. The academic load and outcome are the third independent variable that is used in this research model. To know the cognitive load associated with the integration of AI and learning outcomes from the students to integration of AI in the education sector. The influence of colleagues is used as a mediator in our research model. To know how the influence from colleagues mediates between the independent variable (perception towards using artificial intelligence, support from institutions for AI implementation, and academic load and outcome) and the dependent variable (belief in AI integration in education). The belief

towards AI integration in education is used as a dependent variable. To know what are the beliefs, attitudes, and perceptions of AI integration in the education sector.

An intelligent tutor system was developed for learning purposes with a feedback mechanism. The NLP and contextual interpreter algorithm is used in the model. The purpose of this model is to engage those students who become bored with the traditional teaching methods. The intelligent tutor system engages these students with reasoning-type questions to clear their concepts. The NLP or natural language processing algorithm is used to understand the students' problems as they can explain them and provide the desired outcome to solve their problems (Dzikovska, Steinhauser, Farrow, Moore, & Campbell, 2014). The system was developed to make teachers superior as teachers become in charge of the education system, not a computer. Teachers control the system rather system controls everyone. This multipurpose system also supports the problem of students related to science, statistics, and English. The researchers also used this system for data mining purposes. This system plays a connector role between the users as everyone supports each other and gets their desired outcome (Iqbal & Zikria, 2022). This system is more flexible as teachers use it in the classroom for routine work with the automatic feedback mechanism to build the teacher skills (Heffernan & Heffernan, 2014). Another tutor system was developed based on AI for the solution of mathematics problems. This method is based upon expert guidance as students post their problems for experts. Experts provide feedback related to the problem. This system is developed under the guidance of an expert. This system helps the student to break complex problems into simple ones for better understanding (Khachatryan et al., 2014).

The system was generated based on LBT or Learning by teaching algorithms along with up to millions of mathematical problems and rules. Initially, it was developed for the students of class six, and later, it became popular among the teachers. The main benefit of this system is that it can convert complex problems into simple game types. The students enjoy solving or playing the game. However, behind the scenes, it is learning for students (Lenat & Durlach, 2014). Auto tutor system was generated with three main algorithms; such as natural learning process, pedagogical agents, and human-inspired tutoring strategies. This system provides the solution to the complex problem in the three-dimensional graphical representation or context. The robust semantic machine algorithm for this system helps in the analysis, strategy formulation, and answering of deep learning reasoning questions (Nye, Graesser, & Hu, 2014). The system was developed for primary school children in the gaming concept. The motive for this system is to teach the children arithmetic and mental reasoning. The system contains 48 games with each level and two users play at the same time to test their knowledge by competing with each other. The mental reasoning mode for this game is whether your answer is supported or rejected. If your answer is supported you save the person in the game or if rejected you will lose the person (Pareto, 2014). The system is generated based on the puzzle game to solve basic and advanced mathematical questions. It used a competitive approach among the students; the timer was running during the problem-solving. Those who were more smart and intelligent finished their puzzle early and got the first ranking. The ranking system promotes the natural competition among the students and motivates the students to learn more and get a high ranking (Pelánek & Jarušek, 2015). A robotic AI laboratory system is

generated for the student of computer sciences to enhance their skills or get basic support in their inputs and outputs. However, this system provides the students with virtual supervision without any biases and encourages students to do more of their assigned tasks (Kumar & Meeden, 1998).

Hypothesis Development

Positive Effects

Overall attitude toward using AI and satisfaction after using the AI is enhanced by the perceived usefulness, perception towards using AI with ease of use, and perception regarding personal learning (Kashive, Powale, & Kashive, 2020). The desirable outcome after using AI with trust positively affects the behavior of the users. However, receiving the expected performance from AI encourages the users to trust more. The use of AI devices is influenced by social groups, perceived benefits, ease of use, and emotions regarding the outcome received as they expected from it (Pelau, Dabija, & Ene, 2021).

H1: Perception towards using artificial intelligence positively affects the belief towards artificial intelligence integration in education, mediated by influence from colleagues.

Differences in industries identify the trend of using AI as the use of AI tools is a game changer. It will improve the company's performance and save costs (Nguyen & Malik, 2022). The implementation of AI in the government sector provides a benefit to all users promotes a fair dealing policy and reduces the cost. However, the implementation requires planning, infrastructure, and adaptation behavior to support the change (Lin, Chi, & Gursoy, 2020). To enhance its business performance, the organization needs to implement AI tools in its marketing, finance, and supply chain processes. The organization achieves high performance only when it implements AI capabilities in its process (Vitezić & Perić, 2021).

H2: Support from institutions for artificial intelligence implementation positively affects the belief towards artificial intelligence integration in education, mediated by influence from colleagues.

Negative Effects

There are two sides to AI technologies, whether it has a negative or positive impact on the students. These variables are motivation, satisfaction, and self-efficacy (Wamba-Taguimdje, Fosso Wamba, Kala Kamdjoug, & Tchatchouang Wanko, 2020; Almaiah et al., 2022). The acceptance of the students has changed the survey conduct of the four courses with pre and post-questionnaire. The post-outcome of the survey is negatively related to the use of AI in the education sector. The integration of artificial intelligence is useful when integrated with the contingency plan. However, the system should be highly developed with a full range of support.

H3: Academic load and outcome negatively affect the belief towards artificial intelligence integration in education, mediated by influence from colleagues.

Methodology

Population and Sample

This study is based on the population of Pakistan. Mainly focus on the Teachers and Administrators who are working in the education sector. This study used the stratified sampling technique where the overall population is sub-divided into three strata;

Strata 01: School Teacher and Administrator Staff,
Strata 02: College Teacher and Administrator Staff,
Strata 03: University Teacher and Administrator Staff

The overall population is unknown. According to Serdar, Cihan, Yücel, and Serdar (2021), the sample size for the unknown population is 384 at 1,000,000 population size, having a 95% confidence interval with a 5% error margin. The formula used to calculate sample size is as follows:

$$n = Nx((Z^2xpx(1-p))/e^2)/([N-1+(Z^2xpx(1-p))/e^2])$$

Where, N = Size of Population Z = Normal Distribution Critical Value at a Required Confidence Level p = Proportion of Sample e = Margin of Error

Assumptions

Homogeneity within Strata

The named stratified slice fashion assumes unity of traits among academy, council, and university preceptors and directors. This means that people in each grouping have analogous perspectives and stations about AI integration in the education sector.

Representativeness of Sample

The slice approach presupposes that the chosen sample sufficiently represents the lesser population of preceptors and directors in Pakistan's education system. This supposition implies that the tried individualities' opinions and stations are representative of those held by the larger population.

Normal Distribution

The sample size computation approach presumes that the target population's responses to check questions is distributed typically. This supposition is necessary for using the sample size formula grounded on the normal distribution critical value.

Limitations

Potential Sampling Bias

Indeed when using a stratified slice fashion, there's a peril of slice bias if particular groups or individualities within each stratum are overrepresented in the sample. This constraint may lead to slanted conclusions that don't rightly reflect the diversity of shoes among the target group.

Unknown Population Size

The sample size computation approach is grounded on an estimate of the population size, which is taken to be unknown. Still, if the factual population size differs greatly from the anticipated estimate, the sample size computation's delicacy may suffer.

Margin of Error

The sample size calculation method assumes a specific margin of error (5%) and confidence level (95%) based on standard conventions. However, the chosen margin of error may impact the precision of the study findings and the ability to generalize results to the broader population.

Ethical Considerations

In agreement with ethical guidelines for mortal subject exploration, numerous preventives have been enforced to cover the rights and sequestration of study actors. Before data collection begins, all respondent are informed, assuring their voluntary involvement and appreciation of the study's objects and procedures. Respondent' responses is kept particular and anonymous, with all data securely archived and only accessible to approved experimenters. Likewise, preventives is taken to reduce any implicit troubles or discomfort for levies during the exploration procedure. This involves ensuring that participation in the study doesn't beget fleshly or cerebral detriment. By following these ethical rules and procedures, the study hopes to uphold the generalities of honesty, respect, and beneficence while guarding the rights and well-being of all participants.

Questionnaire Design

Our questionnaire is divided into two parts; the first part is demographics which includes the designation, level, gender, and district. The other parts belong to the variable survey questions which include the perception towards AI, support from the AI integration, load and learning outcome, influence from friends, and belief toward AI integration in the education sector. This study used the five-point Likert scale questionnaire, indicating 1 as strongly disagree and 5 as strongly agree. Therefore, this survey tool is used for the data collection in our research.

Data Collection

This study uses an online survey method for the data collection. The online Google form is generated and circulated to the teachers and administrators. A total of 400 responses were received but some were incomplete and not reliable. However, during the data processing, the unwanted response was removed, and use total of 385 responses were for analysis.

Statistical Analysis

A powerful tool used for analysis of the direct and indirect relationship between the variables is SEM. Therefore, as for analysis, this study used bootstrapping, PLS algorithm, and blindfolding test methodology for analysis by using software Smart PLS version 4.0.9.

Results and Findings

The structural equation modeling technique (PLS-SEM) is used to analyze the relationship between the variables.

Demographic Characteristics of Respondents

Table 1
Demographic Characteristics

Demographic Characteristics	Frequency	Percentage
Age		
18-24 years	129	33.50%
25-34 years	124	32.20%
35-44 years	68	17.70%
45-54 years	49	12.70%
55-64 years	15	3.90%
65 or older	0	0%
Gender		
Male	169	43.90%
Female	216	56.10%
District		
Urban	220	57.10%
Rural	165	42.90%
Institution		
Public	129	33.50%
Private	256	66.50%
Employment Institute		
School	151	39.20%
College	157	40.80%
University	77	20.00%
Employment Title		
Teacher	124	32.20%
Administrator	261	67.80%
Total	**385**	**100.00%**

According to Table 1, 43.9% are male and 56.1% are female, while age group wise are 33.5% are 18-24 years, 32.2% are 25-34 years, 17.7% are 35-44 years, 12.7% are 45-54 years, 3.9% are 55-64 years and 0% are 65 or older. 57.1% belong to the urban area while 42.9% belong to the rural area. However, 33.5% are from the public institute and 66.5% from the private institute. Furthermore, their employment institute 39.2% from school, 40.8% from college, and 20% from the university. Of their employment title, 32.2% are teachers and 67.8% are administrators.

Measurement Model Assessment

PLS algorithm tests are used to find the reliability and validity of the model. The discriminant validity, internal consistency, and cross-loadings were used to find the model's reliability and validity. However, outer loading is also used to find the reliability of the model, whose value is greater than 0.7 indicating the model item's reliability and validity.

A total of 20 items are used for the analysis in the while to reach the threshold level some questions are dropped. However, the outer loading of 0.7 or higher is considered more satisfactory (Henseler, Ringle, & Sinkovics, 2009; Chin et al., 1998) but the outer loading above 0.5 is regarded as acceptable, and less than 0.5 should be dropped. The composite reliability and validity are used to identify the reliability and validity of the questions. The composite reliability value is greater than 0.7 indicating the reliability and average variance extracted are used to find the validity of the questions and their acceptance range is 0.5 or above. The result is shown in Table 2 and Table 3.

Table 2
Outer Loadings

	OL	DAI	IF	PEI	SI
(DAI3)		0.547			
(DAI4)		0.548			
(IF1)			0.965		
(OL4)	0.602				
(OL5)	0.518				
(PE1)				0.721	
(PE4)				0.531	
(SI1)					0.813

Table 3
Composite Reliability and Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Academic Load and Outcome	0.957	1.053	0.978	0.958
Belief Towards Artificial Intelligence Integration in Education	0.800	0.800	0.909	0.834
Perception towards using Artificial Intelligence	0.845	0.762	0.841	0.728

Furthermore, the Fornell Larcker Criterion and HTMT ratio are used to find the discriminant validity of the questions and to know that the questions that are used in the questions are different from each other. The acceptance range of the HTMT ratio is that

the value of the HTMT ratio is less than 0.9 which can show the discriminant validity of the questions. The results are shown in Table 4 and Table 5.

Table 4
Heterotrait-monotrait ratio (HTMT)

	OL	DAI	IF	PEI	SI
Academic Load and Outcome					
Belief Towards Artificial Intelligence Integration in Education	0.096				
Influence from Colleagues	0.082	0.672			
Perception towards using Artificial Intelligence	0.592	0.346	0.585		
Support from Institution for Artificial Intelligence Implementation	0.111	0.077	0.095	0.031	

Table 5
Fornell-Larcker Criterion

	OL	DAI	IF	PEI	SI
Academic Load and Outcome	0.979				
Belief Towards Artificial Intelligence Integration in Education	0.082	0.913			
Influence from Colleagues	0.083	0.601	0.965		
Perception towards using Artificial Intelligence	0.439	0.280	0.494	0.853	
Support from Institution for Artificial Intelligence Implementation	0.105	0.069	0.095	0.022	0.813

Table 6 shows the cross-loading of the construct. The cross-loading value is near 1, showing the strong relation of the construct and having effective measurements.

Table 6
Cross Loadings

	OL	DAI	IF	PEI	SI
(DAI3)	0.664	0.913	0.548	0.261	0.437
(DAI4)	0.585	0.913	0.549	0.251	0.889
(IF1)	0.783	0.601	0.965	0.494	0.795
(OL4)	0.986	0.370	0.293	0.410	0.490
(OL5)	0.971	0.495	0.564	0.459	0.122
(PE1)	0.340	0.633	0.506	0.926	0.615
(PE4)	0.450	0.795	0.302	0.774	0.927
(SI1)	0.605	0.869	0.095	0.422	0.813

Structural Model Assessment

In the measurement model, the result shows the validity and reliability of the model. However, this test is used to identify the relationship between the variables. The test is used to identify the relationship between the variables which are bootstrapping. Results of direct effects are shown in Table 7 Direct Effects, indicate that academic load and outcome directly affect belief towards AI integration in education ($p = 0.006$), academic

load and outcome directly affect influence from colleagues (p = 0.003), influence from colleagues directly affect belief towards AI integration in education (p = 0.000), perception towards using AI directly affect belief towards AI integration in education (p = 0.000), perception towards using AI directly affect influence from colleagues (p = 0.000), support from institution for artificial intelligence implementation directly affect belief towards AI (p = 0.027), and support from institution for AI implementation directly affect influence from colleagues (p = 0.020).

Table 7
Direct Effects

	Original sample	Sample mean	Standard deviation	T statistics	P values
Academic Load and Outcome -> Belief Towards Artificial Intelligence Integration in Education	-0.107	-0.104	0.039	2.749	0.006
Academic Load and Outcome ->Influence from Colleagues	-0.178	-0.172	0.061	2.938	0.003
Influence from Colleagues -> Belief towards Artificial Intelligence Integration in Education	0.601	0.603	0.052	11.496	0.000
Perception towards using Artificial Intelligence ->Belief towards Artificial Intelligence Integration in Education	0.343	0.345	0.054	6.377	0.000
Perception towards using Artificial Intelligence ->Influence from Colleagues	0.570	0.570	0.062	9.262	0.000
Support from Institution for Artificial Intelligence Implementation -> Belief towards Artificial Intelligence Integration in Education	0.060	0.062	0.027	2.206	0.027
Support from Institution for Artificial Intelligence Implementation ->Influence from Colleagues	0.101	0.102	0.043	2.328	0.020

Table 8
Indirect Effects

	Original sample	Sample mean	Standard deviation	T statistics	P values
Academic Load and Outcome -> Influence from Colleagues ->Belief Towards Artificial Intelligence Integration in Education	-0.107	-0.104	0.039	2.749	0.006
Perception towards using Artificial Intelligence ->Influence from Colleagues -> Belief towards Artificial Intelligence Integration in Education	0.343	0.345	0.054	6.377	0.000
Support from Institutions for Artificial Intelligence Implementation ->Influence from Colleagues ->Belief towards Artificial Intelligence Integration in Education	0.060	0.062	0.027	2.206	0.027

Results of indirect effect are shown in Table 8 Indirect Effects, indicate influence from colleagues has a significant mediation between academic load and outcome and belief towards AI integration in education (p = 0.006), influence from colleagues has a significant mediation between perception towards using artificial intelligence and belief towards AI

integration in education (p = 0.000), and influence from colleagues have significant mediation between support from institutions for AI implementation and belief towards AI integration in education (p = 0.027).

Quality of Model

The r^2 value shows the influence of the variable to another variable. However, their acceptance range is different but it value greater than 0.10 is acceptable (Falk & Miller, 1992). This research shows the r^2 for Belief towards AI Integration in Education is 0.561. The f^2 value shows the effect size with the different ranges (Ahmad, Afthanorhan, et al., 2014; Iqbal et al., 2021; Sleimi, Okechukwu Lawrence, et al., 2017). The large effect range is a value greater than 0.35. The medium effect range is a value not less than 0.15 and not greater than 0.35. The small effect range is a value not less than 0.02 and not greater than 0.15. The results show the f^2 value of Academic Load and Outcome to Influence from Colleagues are 0.035. The f^2 value of influence from colleagues to belief towards AI integration in education is 0.565. The f^2 value of perception towards using AI to influence colleagues is 0.363. And, the f^2 value of support from the institution for AI implementation to influence colleagues is 0.365. The Q^2 value is used to predict the relevancy of the model. However, their acceptance range is a value greater than zero (Capriotti, Fariselli, & Casadio, 2004). The PLS prediction test was performed and the result shows that Q^2 is greater than zero (0.073) predicting that the model is relevant.

Discussion

The findings of this study shed light on the perceptions towards the integration of AI in education among teachers and administrators. Through the use of Smart PLS analysis, several key insights have emerged, offering valuable implications for educational practice and policy. Firstly, the results indicate a strong positive relationship between the perception of using AI and the belief towards AI integration in education. This suggests that individuals who hold favorable perceptions toward AI are more likely to support its integration into educational settings. Moreover, the mediation effect of influence from colleagues highlights the importance of peer support in shaping attitudes towards AI adoption. Educators are likely to be influenced by the opinions and experiences of their colleagues, emphasizing the significance of fostering a supportive professional environment for AI implementation in education.

Secondly, the study reveals that support from institutions for AI implementation positively influences the belief towards AI integration in education. Institutions that provide adequate policies and guidance for AI usage are more likely to foster a culture of acceptance and readiness for AI integration among teachers and administrators. However, the findings also indicate variations in institutional support across educational settings, with some institutes still exhibiting reservations or prohibitions towards AI adoption. This underscores the need for tailored strategies to address institutional barriers and promote a more inclusive approach to AI integration in education. Lastly, the study highlights

the negative impact of academic load and outcome on the belief towards AI integration in education. Despite the potential benefits of AI in enhancing learning experiences and improving educational outcomes, concerns about increased workload and potential negative effects on student performance persist among educators. However, the mediation effect of influence from colleagues suggests that peer support and positive experiences with AI implementation may help mitigate these concerns and foster a more favorable attitude towards AI adoption in education.

Overall, the findings underscore the importance of addressing perceptions, institutional support, and concerns related to academic load and outcome in promoting AI integration in education. By understanding and addressing these factors, policymakers, administrators, and educators can work towards creating a supportive environment conducive to the effective implementation of AI technologies in educational settings.

Conclusion

This study sheds light on how Pakistani teachers and administration perceive AI integration in education. The findings emphasize the significance of perception, institutional support, and enterprises about academic cargo and issues affecting stations toward AI relinquishment. Stakeholders may help to produce an enabling terrain for AI integration in education by feting the significance of peer influence, cultivating institutional support, and resolving enterprises about workload and pupil performance. Moving forward, it's critical to further probe the consequences of AI integration for educational practice and policy. The future study should concentrate on the efficacy of specific AI tools, the long-term effects of AI integration on pupil learning issues, and strategies for prostrating remaining walls and challenges. Structure on the findings of this study, preceptors, policymakers, and academics can help to progress AI integration in education, eventually perfecting learning gests and issues for all scholars. The implication of this research is in the education sectors of primary, secondary, and higher education. The in charge of the education institute must ensure and make the policies for their institute to support AI usage in their institute. The world moving towards technological gadgets, and AI implications provide a positive impact on the education sector. This implication can improve the student learning process, and educator professional development and provide the effectiveness to the student on the AI-driven tools. This research focuses on the perception towards using AI, support from institutions for AI implementation, and academic load and outcome. Many factors can affect the belief toward AI integration in the education sectors such as the usefulness of AI to enhance teacher performance, the efficiency of administrators, the level of AI training of teachers and administrations, and the impact of AI on the time commitments. These are also in the ambiguity period. However, this research study is only conducted on the people of Asian Pakistani while the perception of artificial integration in the education sector of other countries is also ambiguous.

Recommendations for Future Research

Future research should focus on a few important areas to help us better comprehend AI integration in education. To begin, there is an urgent need for cross-cultural comparative studies that go beyond the scope of Pakistani educators. Furthermore, longitudinal studies should be conducted to track the long-term influence of AI on student learning outcomes, educator professional development, and institutional dynamics. Furthermore, academics should perform thorough evaluations of specific AI tools and technologies in a variety of educational settings to gain a better understanding of their effectiveness. Finally, pushing for supportive policies at the institutional, regional, and national levels is critical to creating a conducive atmosphere for AI integration in education.

References

Ahmad, S., Afthanorhan, W., et al. (2014). The importance-performance matrix analysis in partial least square structural equation modeling (PLS-SEM) with smartpls 2.0 M3. *International Journal of Mathematics Research*, *3*(1), 1–14.

Almaiah, M. A., Alfaisal, R., Salloum, S. A., Hajjej, F., Thabit, S., El-Qirem, F. A., … others (2022). Examining the impact of artificial intelligence and social and computer anxiety in e-learning settings: Students' perceptions at the university level. *Electronics*, *11*(22), 3662.

Attuquayefio, S., & Addo, H. (2014). Using the UTAUT model to analyze students' ICT adoption. *International Journal of Education and Development using ICT*, *10*(3), 75-86.

Bye, R. T. (2018). A flipped classroom approach for teaching a master's course on artificial intelligence. In *Computers Supported Education: 9th International Conference, CSEDU 2017, Porto, Portugal, April 21-23, 2017, Revised Selected Papers 9* (pp. 246–276).

Capriotti, E., Fariselli, P., & Casadio, R. (2004). A neural-network-based method for predicting protein stability changes upon single point mutations. *Bioinformatics*, *20*(suppl_1), i63–i68.

Chin, W. W., et al. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*, *295*(2), 295–336.

Coppin, B. (2004). *Artificial intelligence illuminated*. Jones & Bartlett Learning.

Dzikovska, M., Steinhauser, N., Farrow, E., Moore, J., & Campbell, G. (2014). Beetle ii: Deep natural language understanding and automatic feedback generation for intelligent tutoring in basic electricity and electronics. *International Journal of Artificial Intelligence in Education*, *24*, 284–332.

Falk, M., & Miller, A. G. (1992). Infrared spectrum of carbon dioxide in aqueous solution. *Vibrational Spectroscopy*, *4*(1), 105–108.

Heffernan, N. T., & Heffernan, C. L. (2014). The assistments ecosystem: Building a platform that brings scientists and teachers together for minimally invasive research on human learning and teaching. *International Journal of Artificial Intelligence in Education*, *24*, 470–497.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In *New challenges to international marketing* (Vol. 20, pp. 277–319). Emerald Group Publishing Limited.

Hermann, E. (2022). Artificial intelligence and mass personalization of communication content-an ethical and literacy perspective. *New Media & Society*, *24*(5), 1258–1277.

Iqbal, S., Moleiro Martins, J., Nuno Mata, M., Naz, S., Akhtar, S., & Abreu, A. (2021). Linking entrepreneurial orientation with innovation performance in SMEs; the role of organizational commitment and transformational leadership using smart PLS-SEM. *Sustainability*, *13*(8), 4361.

Iqbal, S., & Zikria, A. (2022). Service quality and student engagement in higher education. *Journal of Education & Social Sciences*, *10*(1), 37-52.

Kashive, N., Powale, L., & Kashive, K. (2020). Understanding user perception toward artificial intelligence (AI) enabled e-learning. *The International Journal of Information and Learning Technology*, *38*(1), 1–19.

Khachatryan, G. A., Romashov, A. V., Khachatryan, A. R., Gaudino, S. J., Khachatryan, J. M., Guarian, K. R., & Yufa, N. V. (2014). Reasoning mind genie 2: An intelligent tutoring system as a vehicle for international transfer of instructional methods in mathematics. *International Journal of Artificial Intelligence in Education*, *24*(3), 333–382.

Kumar, D., & Meeden, L. (1998). A robot laboratory for teaching artificial intelligence. *ACM SIGCSE Bulletin*, *30*(1), 341–344.

Lenat, D. B., & Durlach, P. J. (2014). Reinforcing math knowledge by immersing students in a simulated learning-by-teaching experience. *International Journal of Artificial Intelligence in Education*, *24*(3), 216–250.

Lin, H., Chi, O. H., & Gursoy, D. (2020). Antecedents of customers' acceptance of artificially intelligent robotic device use in hospitality services. *Journal of Hospitality Marketing & Management*, *29*(5), 530–549.

Malik, G., Tayal, D. K., & Vij, S. (2019). An analysis of the role of artificial intelligence in education and teaching. In *Recent Findings in Intelligent Computing Techniques: Proceedings of the 5th ICACNI 2017, Volume 1* (pp. 407–417).

Marangunić, N., & Granić, A. (2015). Technology acceptance model: a literature review from 1986 to 2013. *Universal Access in the Information Society*, *14*, 81–95.

Nandwani, S., & Khan, S. (2016). Teachers' intention towards the usage of technology: an investigation using utaut model. *Journal of Education & Social Sciences*, *4*(2), 95–111.

Nazari, N., Shabbir, M. S., & Setiawan, R. (2021). Application of artificial intelligence powered digital writing assistant in higher education: randomized controlled trial. *Heliyon*, *7*(5).

Nguyen, T.-M., & Malik, A. (2022). Impact of knowledge sharing on employees' service quality: the moderating role of artificial intelligence. *International Marketing Review*, *39*(3), 482–508.

Nye, B. D., Graesser, A. C., & Hu, X. (2014). Autotutor and family: A review of 17 years of natural language tutoring. *International Journal of Artificial Intelligence in Education*, *24*, 427–469.

Pelánek, R., & Jarušek, P. (2015). Student modeling based on problem solving times. *International Journal of Artificial Intelligence in Education*, *25*, 493–519.

Pelau, C., Dabija, D.-C., & Ene, I. (2021). What makes an ai device human-like? the role of interaction quality, empathy and perceived psychological anthropomorphic characteristics in the acceptance of artificial intelligence in the service industry. *Computers in Human Behavior*, *122*, 106855.

Peters, E. E., & Gadzama, R. M. (2019). Influence of british pottery on pottery practice in Nigeria. *European Journal of Engineering and Technology Research*, *4*(6), 19–24.

Riopelle, K., & Wang, X. (2019). Building a shared present and future: Learnings from Henry Ford and Albert Kahn's co-Wuity collaborative innovation network on the moving assembly line and mass production. *Collaborative Innovation Networks: Latest Insights from Social Innovation, Education, and Emerging Technologies Research*, 3–41.

Schofield, J. W., Evans-Rhodes, D., & Huber, B. R. (1990). Artificial intelligence in the classroom: The impact of a computer-based tutor on teachers and students. *Social Science Computer Review*, *8*(1), 24–41.

Serdar, C. C., Cihan, M., Yücel, D., & Serdar, M. A. (2021). Sample size, power and effect size revisited: simplified and practical approaches in pre-clinical, clinical and laboratory studies. *Biochemia Medica*, *31*(1), 27–53.

Sleimi, M., Okechukwu Lawrence, E., et al. (2017). Do employee attitudes mediate the relationship between strategic human resource management practices and organizational effectiveness? a sem based investigation using SMART-PLS software. *Business and Economic Horizons*, *13*(1), 42-59.

Ting, D. S. W., Pasquale, L. R., Peng, L., Campbell, J. P., Lee, A. Y., Raman, R., ... Wong, T. Y. (2019). Artificial intelligence and deep learning in ophthalmology. *British Journal of Ophthalmology*, *103*(2), 167–175.

Vitezić, V., & Perić, M. (2021). Artificial intelligence acceptance in services: connecting with generation z. *The Service Industries Journal*, *41*(13-14), 926–946.

Wamba-Taguimdje, S.-L., Fosso Wamba, S., Kala Kamdjoug, J. R., & Tchatchouang Wanko, C. E. (2020). Influence of artificial intelligence (AI) on firm performance: the business value of AI-based transformation projects. *Business Process Management Journal*, *26*(7), 1893–1924.