RESEARCH ARTICLE

Evaluating the Intention for the Adoption of Artificial Intelligence-Based Robots in the University to Educate the Students

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ABSTRACT Technology adoption is accepting, integrating, and using the latest innovative technologies in society. Artificial intelligence (AI) and robotics are changing the face of the industrial and service sectors. There is a need to change the traditional way of teaching by introducing the latest innovative methods. This study aims to measure the intention of adopting AI-based robots in the educational system of Indian universities. This study uses three theories technology acceptance model, the theory of planned behaviour, and the technology readiness index. Thirteen hypotheses are proposed for this study. The teachers and students survey Indian universities. This study also measures the users' attitudes and the impact on their intention. Nine hypotheses got accepted, and four hypotheses got rejected. This study will benefit the university administration as they will understand the importance of AI-based robots and their applications. These will also be helpful in a way that the students and teachers both are in favours of the adoption process.

INDEX TERMS Artificial intelligence, robots, universities, intention, attitude.

I. INTRODUCTION

A technological revolution that started in the early 20th century affected modern society. This revolution has occurred in various areas where society is divided, including companies or organizations, social, health fields, and education [1]. In other words, the rapid growth of technology has fundamentally changed how we communicate, treat illness, and acquire knowledge [2]. Focusing on educational institutions, information technologies have impacted all current teaching and learning processes in a substantial, if occasionally slow, way [3]. The technological advancement in education has not resulted in an apparent enhancement of how it's done now regarding teaching and learning. In this sense, any educational approach incorporating various technological resources must be linked to improving the teaching approach [4].

Teachers must be aware of the changes more now than ever and be open to integrating new resources to support student teachers' active, collaborative learning [5]. India's higher education network has expanded dramatically over the last 20 years. Therefore, a fundamental change is urgently required at the time of the teaching-learning surroundings and administrative duties at the level of higher education delivery in India. A wide range of factors of higher education needs to be updated. Today's educational environments and theories aim to include real-world, complex problem-based learning [6]. The field of AI in education must adjust to these changes to remain relevant and have a more significant impact [7].

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With rising smartphone demand and increased use of messaging apps, the AI-based chatbot market is expanding extraordinarily in the age of AI [8], [9], [10], [11]. The financial, e-commerce, and food delivery sectors have all embraced chatbot technology in recent years. The educational sector is one of the industries that stands to gain the most from using this technology [12]. AI-based Chatbot development can be advantageous for education. It can enhance efficiency in teaching and learning, productivity, and communication while reducing interaction-related ambiguity [13]. With the aid of this technology as an engagement tool, a new educational platform can address pressing issues in education [14]. Sandu and Gide [15] studies the adoption of AI-based chatbots in education to improve the student learning experience.

Yang et al. [16] show the usage of AI in the education sector and the application of AI to assess novel design approaches and tools that can be used to advance AI research, instruction, practice, and policy to better the human condition. Hwang et al. [17] identified the challenges of AI in the education sector. Chatterjee and Bhattacharjee [18] studied the adoption of AI in India's higher education using the Unified Theory of Acceptance and Use of Technology (UTAUT) model. It was revealed that the model could assist authorities in facilitating the adoption of AI in higher education. Guan et al. [19] conducted a literature review on AI innovation in education. Zhong and Xia [20] conducted a literature review exploring educational robotics in mathematics education. The technical side of educational robotics research is crucial, as is its applicability.

Regarding the technical aspect, they have concentrated on how users perceive the robots' physical characteristics and potential interactions with humans [21]. Suryawanshi et al. [22] studied the application of robotics in education. Khosravi et al. [23] present a framework for using explainable AI in education. To analyse, build, and implement educational AI systems, researchers first provide a framework called eXplainable AI that considers six essential characteristics of explainability. These significant components concern stakeholders, benefits, methodologies for offering explanations, frequently used classes of AI models, human-centred designs of AI interfaces, and potential dangers of providing answers in education. Malik et al. [24] summarise and highlight AI's role in teaching and evaluating students. According to our findings, AI is the foundation of all-natural language processing-enabled intelligent tutor systems. These systems aid in developing skills such as self-reflection, responding to probing questions, resolving conflict statements, producing creative questions, and decision-making abilities.

Chen et al. [25] performed a systematic literature review on the application of AI in the education sector. The findings suggested that there was a growing interest in and influence of AI in Education research; little work had been done to introduce deep learning technologies into educational contexts; traditional AI technologies, such as natural language processing, were routinely used in educational contexts, but more advanced approaches were rarely used; and there was a shortage of studies that both employed AI technology and engaged closely with academic ideas. Goksel and Bozkurt [26] describe AI's future perspectives on learning experiences and education. The research highlighted three themes: AI as a potential educational process component, expert and intelligent tutoring systems, learning styles, personalisation, and adaptive learning. Wei et al. [27] designed and implemented AI-based sports learning systems for college sports. As a result, using human-computer interaction technology in AI to create an efficient sports training environment teaching system is critical for improving students' learning efficiency, expanding the application of AI technology in education and sports training, and improving students' learning efficiency.

Pan and Yang [28] presents a framework for investigating the subjective factors that improve educational enhancement in teachers' workplaces, aided by AI Administrative documents are examined using historical and cultural theory, which provides a way for both conventional data analysis and modelling estimation of individual output in feed-forward neural networks. Hu and Wang [29] investigates the potential for and attitudes toward using AI in dance teaching. Terblanche et al. [30] measured the performance and perceptions of the student for adopting an AI-based coach for the training program. Participants were then interviewed, and their AI coach experiences were deductively examined using the Unified Theory of Acceptance and Use of Technology paradigm. According to the findings, students' optimistic attitudes and performance expectations significantly affected their chatbot engagement. Students perceived the AI coach as approachable, simple to use, clever, and quick to answer. Participants saw the AI coach as posing little risk and would utilise it more if their buddies did. The technical platform and information on accessing the AI coach were also considered critical.

Razia et al. [31] try to develop a relationship between AI and higher education. This study revealed many aspects that contribute to improving high education through using Artificial Intelligence in higher education institutions. These factors include knowledge management, trust, learning, technical resources, and complexity. Alemi and Abdollahi [32] examined university students' attitudes towards adopting social robots. This study examines the impact of cultural background (Chinese vs Iranian), gender, and past robot acquaintance on robot acceptance using an adapted version of the negative Attitude towards Robots Scale. According to the findings, there was a substantial difference in robot acceptability between Chinese and Iranian respondents due to their cultural background, not their gender or past familiarity.

Kucuk and Sisman [33] studied Turkish secondary school students' attitudes toward robotics and STEM (Science, Technology, Engineering, and Mathematics) regarding gender and robotics experience. The findings suggest that pupils' attitudes toward robotics and STEM were favourable.

Cukurova et al. [34] studied the impact of an AI frame on the perceived trustworthiness of educational research evidence presented in this publication. In an experimental

study, 605 individuals, including educators, were randomly assigned to one of three circumstances in which the same educational research evidence was presented under one of three frameworks: AI, neuroscience, or educational psychology. The findings show that when educational research evidence is positioned inside AI research, it is regarded as less trustworthy than framed within neuroscience or educational psychology. Kashive et al. [35] investigated users' perceptions of the role of artificial intelligence (AI) in strengthening personal learning profiles, personal learning networks, and personal learning environments, as well as their impact on perceived ease of use, perceived efficacy, and perceived utility for improving overall attitude and satisfaction with e-learning. The unique learning environment was observed to influence perceived ease of use and usefulness. According to the findings, perceived ease of use mediated the relationship between personal learning environment, attitude, and satisfaction. In addition, satisfaction modulates the relationship between perceived ease of use and intention.

Dai et al. [36] created and verified a tool to assess students' readiness to learn about AI. Following the development and implementation of an AI course, the planned survey questionnaire was administered at a school district in Beijing. The obtained data and analytical results revealed information about elementary students' self-reported beliefs about AI preparedness and allowed for identifying elements that may influence this parameter. The findings showed that AI literacy did not predict AI readiness. The students' confidence and awareness of AI significance mediated the effects of AI literacy. Reducing AI anxiety and increasing AI knowledge did not impact the students' AI readiness. Chai et al. [37] included 131 primary students and looked at the elements influencing students' behavioural intention to engage in AI learning. Students regard the goal of learning AI for societal good as the most powerful predictor of their behavioural intention. Suh and Ahn [38] create an instrument that measures student opinions toward AI. The instrument was developed by eight computer education PhDs who tested its reliability and validity on 305 K-12 students. This scale made students' sentiments toward AI operational and quantifiable. As a result, educators can use it to diagnose pupils' current state or to test the efficacy of new AI instruction approaches.

Very few studies can be found in the literature that studies the attitude and intention for adopting AI-based robotics in the education sector. Therefore, the following research questions can be formulated:

RQ1: What factors impact the attitude of the teachers and students toward the adoption of AI-based robots in the education sector?

RQ2: Do teacher and student attitudes impact the intention to adopt AI-based robots in the education sector?

This study measures the attitude and intention of teachers and students toward adopting AI-based robots in the education sector. The study uses three theories for identifying the adoption factors. The three theories are the Technology

Acceptance Model (TAM), the theory of planned behaviour (TPB), and the Technology readiness index (TRI). Thirteen hypotheses are proposed for this study. This study will help universities with the adoption of AI-based robots. This study will benefit the service providers as they will know their attitudes and intention to adopt AI-based robots in the education sector.

II. LITERATURE REVIEW
A. ARTIFICIAL INTELLIGENCE-BASED ROBOTS IN THE UNIVERSITY EDUCATION

AI in higher education has advanced a little, but not nearly enough. The need for teachers and students will continue for a while, but as robots with AI enter the classroom, the position of human educators is likely to change significantly [39]. Students and educational institutions have suffered dramatically due to the post-COVID-19 era. Therefore, cooperation between academics and students using AI is essential to prepare the next generation for the jobs infused with this technology. With the help of digital education technologies, it is now possible to monitor how well a student has absorbed new information and skills and quickly correct the learning process, making education more flexible [40]. Technology has eliminated restrictions on space and time. In higher education, teaching and learning could be expanded and improved thanks to the rapidly evolving field of AI. As a result, academics and students who cannot physically enter the educational institution can now fully participate in any educational activity [41]. New possibilities come with new restrictions. Although many students admit they are comfortable with some video games and essential software, they still find many things uncomfortable.

The opportunity presented by these educational changes is also present: current theories support more excellent agency and personalization. Many existing classroom structures are ineffective in engaging students in ''big'' problems or giving them a choice [42]. Better, more specialised support is required for both teachers and students. Some fundamental factors have taken special attention to achieve high education standards [43]. Researchers think robotics and AI should be incorporated into higher education in India as soon as possible [44]. Robotic systems with AI integrate robotics and AI, where AI software is integrated into robot systems. In other words, AI plays a significant role in the intelligence of robots. Robotics aids in the development of problem-solving and critical-thinking skills [45]. Students will be better equipped for competitive education and professional society by obtaining the necessary skills. Robotics strengthens success-building strengths like critical thinking and problem-solving abilities. Using robotics, students with special needs learnt new levels [32].

Students can learn a variety of STEM disciplines using educational robots, which is beneficial in a world where technology is developing quickly. As students advance through the educational system, educational robots can offer a variety

of advantages. Young children can benefit from them by developing cognitive abilities and mathematical reasoning at a young age, as well as transferable skills they can use in other subject areas. They can frequently help teachers and even be avatars for students learning remotely. Schiff [46] studied the importance of AI in education and exceptional learning techniques. Cope et al. [44] studied the adoption of AI in the university and showed the future of technology adoption in education. Knox [47] studied the adoption of AI in the education sector of China. This article suggests the government implement AI strategies for the education sector. AI in education can create a new learning experience and develop students with creative and analytics skills [48].

B. THEORETICAL FRAMEWORK

Davis [49] proposed the model of TAM, which focuses on how end users perceive the utility and usability of new technology as it is adopted. TAM considered perceived usefulness (PU) and perceived ease of use (PEOU). Davis [50] added users' attitudes (ATT) for determining the adoption of a particular technology. Ajzen [51] proposed trust, an extension of the theory of reasoned action (TRA). Several different attitudes theories, such as the learning, consistency, expectancy-value, and attribution theories, were interconnected to form the foundation of the TRA activity. The TRA hypothesis states that when people have a positive attitude about a topic and their peers expect them to do so, aspirations (motivations) are much more likely to arise. The TPB examines circumstances in which individuals do not fully control what occurs. TPB contains several dimensions, including behavioural attitudes, intention to use, subjective norms, and actual usage [52].

TPB also includes a perceived construct known as perceived behaviour control (PEBC) [53]. The control part of the observation is being attempted to incorporate into the model under this firm, making the TPB more functional within its application. The predisposition of people to accept and employ new technology is known as TRI. According to TRI, Parasuraman [54], a person's inclination to adopt new technologies is mainly determined by their general mental state, which is the outcome of the balance between their enablers and inhibitors—using technology made people uncomfortable because they felt out of control and outmatched. Technology-related insecurity is characterised by worries about, mistrust, or scepticism toward its capabilities. A better ability to foresee the utilisation of new information resources will result from understanding technological acceptance. According to the study, improved personal control, flexibility, and knowledgeable information utilisation can result from confidence in one's ability to use technology. Therefore, having more information can boost productivity. Information quality, accessibility, and enjoyment influence perceived usefulness and usability. Perceived ease of use and perceived usefulness have improved students' interest in and intention to use technology in learning. TAM has been used in many previous studies, like

YouTube as a learning resource [55], quality assessment of the students [56], AI-based review [57], special education teachers' [58], vocational education [53], and digital technology in education [59]. We have used the TPB framework to measure the respondent's attitudes. Previous studies that have used the TPB framework are inclusive education [60], primary school teaching [61], Enterprise education [62], and Entrepreneurship Intention in Education [63], [64]. TRI framework is selected better to understand insecurity and discomfort regarding the technology adoption. Previous studies that have used the TRI framework are users' segmentation [65], e-learning [66], digital learning environments [67], and online classes [68]. **Figure 1** shows the proposed theoretical framework for adopting AI in universities.

C. DEVELOPMENT OF HYPOTHESIS

PU is a person's subjective belief that specific technology can improve career development. People are willing to consider a PEOU if they believe it is simple and requires little effort. TR is defined as a person's belief in a specific technology and the person's expectation that the technology will meet the firm's needs. ATT can be defined as the degree to which a person favours or dislikes any technology. The positive and negative feelings or beliefs about a specific technology are referred to as ATT [69]. ATT is viewed as a psychological propensity to rely on a particular technology. An individual's overall effective reaction (liking, enjoyment, joy, and pleasure) to using innovation is defined as their ATT toward user acceptance of technology. Pal and Patra [70] measured the university's attitude towards video learning. Lee and Ryu [71] have examined the factors influencing the students' behavioural intention to use a video-based system using a TAM-based approach. For technology adoption, TR is an essential factor as the users need to show trust in the technology usage, which will only come with proper awareness and knowledge. The student and teachers must have a positive attitude regarding the latest innovation.

H_1: PEOU positively influences the PU to adopt AI-based robots in education.

H_2: PU positively influences ATT to adopt AI-based robots in education.

H_3: PEOU positively influences the ATT to adopt AI-based robots in education.

H_4: TR positively influences the PEOU to adopt AI-based robots in education.

H_5: TR positively influences the PU to adopt AI-based robots in education.

H_6: TR positively influences the ATT to adopt AI-based robots in education.

H_7: ATT positively influences the intention of adopting AI-based robots in education.

Discomfort (DISC) is a feeling of unease when using a specific technology. These occur due to employees' changing resistance to adopting new technology. Individuals with a high degree of DISC have difficulty accepting new technology. Insecurity (INSE) is the creation of doubt in users' minds
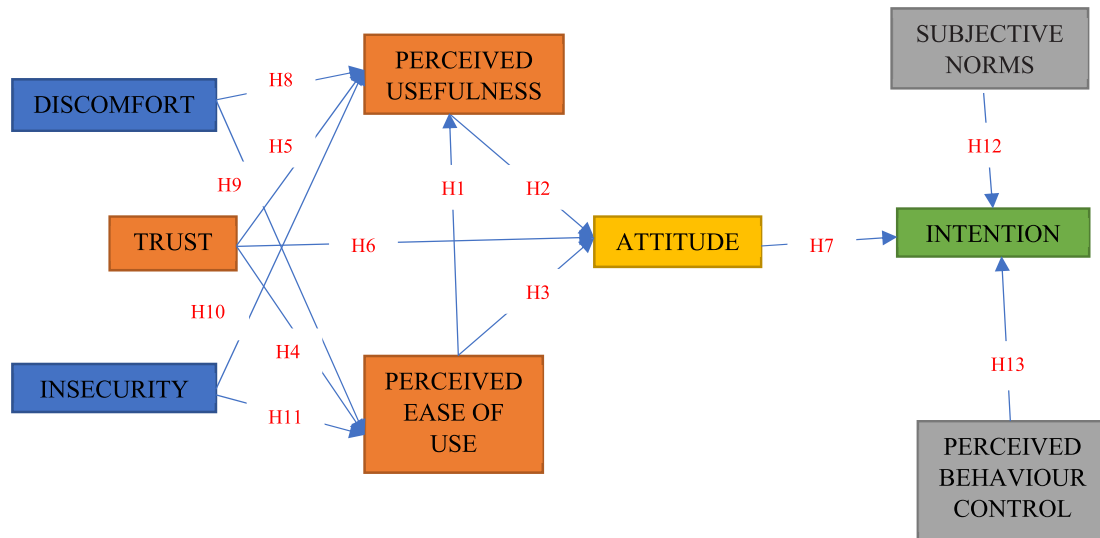
FIGURE 1. Proposed theoretical model for measuring the intention for the adoption of AI in the universities.

regarding any technology without expertise of its advantages. The term INSE is associated with ambiguity and low usage [72]. Employees fear their jobs will be lost due to the use of robots. According to studies, robotics is rapidly making its way into education and is benefiting students by performing repetitive tasks with high precision, flexibility, and human-robot hyperactivity. Since these devices are equipped with various features that give students engaging activities and authentic experiences, they also help create engaging and appealing learning environments. Employees who have a negative attitude toward innovation develop doubts and opposing views.

H_8: DISC negatively influences the PU for adopting AI-based robots in education.

H_9: DISC negatively impacts the PEOU for adopting AI-based robots in education.

H_{10}: INSE negatively affects the PU for adopting AI-based robots in education.

H_{11}: INSE negatively influences the PEOU to adopt AI-based robots in education.

Subjective norms (SUN) are a person's perception of what most people who are essential to him believe he should or should not do. SUN has the most significant influence on behavioural intention. SUN has been revealed to influence behavioural intention. SUN is observed to influence people's perceptions of the utility of technology [73]. PEBC refers to people's perceptions of their ability to perform a given behaviour to such an extent that it is an accurate reflection that PEBC, in conjunction with behavioural intention, can be used to predict behaviour [74]. Previous research has yielded incomplete results regarding the relationship between PEBC and behavioural intention [75], [76], [77]. Pal et al. [78] showed a positive relationship between SUN, PEBC and intention to adopt voice-based intelligent IoT products.

H_{12}: SUN positively influences the intention of adopting AI-based robots in education.

H_{13}: PEBC positively influences the intention of adopting AI-based robots in education.

III. RESEARCH METHODOLOGY
A. RESEARCH INSTRUMENT AND QUESTIONNAIRE DEVELOPMENT

This study uses three theories, TAM, TPB, and TRI, to measure the intention of the faculties and university students towards AI-based robots in education. The constructs are adopted from the previous literature, as shown in the table; for questionnaire development, constructs were identified from the literature. The questionnaire was developed in the English language. The questionnaire was divided into two parts mainly. The first parts discuss the respondents' demographic details, and the second part discusses the questions related to the study. After developing the questionnaire with the proposed model, it was sent to five persons working in academics and five persons working in the industry. Their responses and suggestions were incorporated into the questionnaire.

B. DATA COLLECTION AND SAMPLE

This study was conducted in an Indian university related to the education sector. The details of the universities were found online. The university's human resource department or registrar was contacted to participate in this survey. The selection of the respondents for this study was based on specific criteria. This study included the teachers and students because they are the ones who will be using AI-based technologies. Teachers will use AI-based technologies for teaching; on the other hand, students will use AI-based technologies to perform their tasks like assignments, exams, etc. For selecting the faculty as a respondent, the criteria were set based on educational degree and experience. The faculty member should be a PhD holder with a minimum of five years of experience in research and teaching—the criteria for selecting students as a respondent was set based on the degree they are pursuing.

The students pursuing M. tech/MS/MSC/MCA/MBA in management, engineering, and science were only considered. The study was conducted online by sending the questionnaire to the respondents. As AI-based robots in education is a new technology, few descriptions of the technology and its usage were provided in the questionnaire. The links were added to the questionnaire, showing a complete understanding of the AI-based robot teaching environments. The respondents' consent was taken, and the questionnaire was sent to them.

Before conducting the final survey, a pilot survey was carried out to know the reliability and validity of the respondents. For the pilot survey, fifty-two respondents were taken and asked to fill out the questionnaire. The collected data for the pilot survey was tested using Cronbach Alpha. The results for all the constructs came to be greater than 0.70, which is accepted as it is more significant than the threshold level of 0.70. After the pilot survey, we went for the final survey. The questionnaire was sent to eleven hundred sixty-five respondents, of which four seventy-six were students and six eighty-nine were faculty members. Two hundred fifty-seven student respondents filled out the questionnaire and gave us back. But only one hundred ninety-four questionnaires filled by the students were considered for the study as the rest were not adequately filled. Three hundred twelve respondents who were faculty members filled out the questionnaire and gave it back to us. But only two hundred fifty-one questionnaires filled by the faculties were considered for the study as the rest were not adequately filled. So, the total sample size taken for the study was four hundred forty-five.

IV. RESULTS

A. COMMON METHOD BIAS (CMB)

CMB helps check whether the responses filed by the respondents are biased or not [79]. For this, the Harman single-factor test is performed in SPSS 20.0. The result indicated that one factor captured only 15.653% of the variance (well below 50%) Podsakoff [80]; therefore, the data is free from CMB.

B. NON-RESPONSE BIAS

A test for non-response bias was performed on the early and late responses. It is necessary to test whether the early and late responses represent each other's opinions, when respondents differ from non-respondents, non-response bias is introduced. A t-test conducted on early-stage responses (217) and late-stage responses (228) resulted in no significant differences between these two groups. Therefore, it can be concluded that the data is free from non-responsive bias [81].

C. EXPLORATORY FACTOR ANALYSIS AND MEASUREMENT MODEL

To measure the reliability and validity of the data, Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE) are measured. **Table 1** highlights the values of CA (threshold > 0.7) and factor loadings (threshold > 0.5) [82]. **Table 2** shows the values CR (threshold > 0.7) and AVE (threshold > 0.5) [83]. Discriminant validity investigates how distinct the constructs in a proposed model are from one another. Confirmatory factor analysis (CFA) was performed. The goodness of fit indices was $\chi 2/df$ (CMIN/DF) = 1.981, RMSEA = 0.042, IFI = 0.911, CFI = 0.926, TLI = 0.938, PCFI = 0.879, PNFI = 0.781 and GFI = 0.922, which were within the threshold values as suggested by [84].

D. STRUCTURAL MODEL

Table 3 shows all parameters and the threshold levels of the model. AMOS 22.0 was used to test the formulated hypotheses. **Table 3** shows the path analysis result for the structural model. The result demonstrates that the nine hypotheses are accepted, and four are not supported. The goodness of fit indices was $\chi 2/df$ (CMIN/DF) = 2.091, RMSEA = 0.028, IFI = 0.912, CFI = 0.898, TLI = 0.876, PCFI = 0.862, PNFI = 0.761 and GFI = 0.820, which were within the threshold values [85]. **Figure 2** shows the structural model. The value of R^2 for PEOU is 0.52, PU is 0.57, TR is 0.41, ATT is 0.67, and INT is 0.61.

V. DISCUSSION

AI has contributed substantially to education [87]. AI has always benefited teachers and students, from robotic teaching to creating an automated system for grading answer sheets [88]. With the increasingly widespread use of AI technologies in education, instructors can eliminate time-consuming, repetitive tasks and quickly respond to student inquiries, advancing the adaptive and personalised teaching process [89]. Notably, improvements in hardware, like fast graphics processors and easy access to a variety of software libraries, have sparked an increase in the use of AI technologies, especially with the success of deep learning research and the adoption of data analysis techniques [90].

Two research questions were formulated. The first one is "What factors impact the attitude of the teachers and students toward adopting AI-based robots in the education sector?". This research was addressed with the help of a literature review by identifying the factor (perceived usefulness, perceived ease of use, discomfort, insecurity, trust, subjective norms, and perceived behaviour control). Thirteen hypotheses were proposed for this study. With the help of data analysis, the hypothesis was tested using a structural equation modelling approach. The nine hypotheses got supported, and four were not supported. The second research question is, "Do teacher and student attitudes impact the intention to adopt AI-based robots in the education sector?". These research questions were addressed from the data analysis as the value of R^2 for attitude is 0.67, and intention is 0.61, which means the proportion of variance in the attitude is 67%. For the intention, it is 61% which is greater than 50%. This study shows that the teacher and student both positively think about adopting AI in universities.

This study measures the teachers' and students' attitudes and intentions to adopt AI-based robots in the university's

TABLE 1. Factor analysis and reliability analysis.

Items	References	Cronbach Alpha	Factor loadings
PEOU1: The AI-based robot features in education will be more accessible and attractive.	[86]	0.794	.687
PEOU2: I can easily understand AI-based robot usage in education.			.867
PEOU3: I think AI-based robots in education will change the teaching environment.			.819
PEOU4: The teaching environment will be more attractive with AI-based education robots.			.579
PU1: The users will find it attractive.	[55]	0.874	.790
PU2: There will be a lot of problems when using AI-based robots in the education			.866
PU3: It will not be friendly towards the users.			.806
PU4: AI-based robots in education can help adequately understand the concepts.			.864
DISC1: It is challenging to understand AI-based robots in education.	[72]	0.835	.843
DISC2: Technology always seems to fail at the worst possible time			.875
DISC3: Users will find it discomfort as they are accustomed to traditional teaching.			.731
TR1: We have complete trust in this technology.	[73]	0.811	.788
TR2: This technology will improve the way of teaching.			.818
TR3: I believe this technology will be of no use.			.839
TR4: Users need to have trust in the technology adoption.			.439
INSEC1: I have insecurity about using AI-based robots in education.	[69]	0.863	.840
INSEC2: Traditional way of teaching system is best.			.897
INSEC3: Exam results will be wrong.			.889
INSEC4: There will be no problem and doubt-solving opportunities.			.716
ATT1: I strongly support the use of AI-based robots in education.	[72]	0.948	.859
ATT2: I guess using AI-based robots in education is a good idea.			.893
ATT3: My attitude towards AI-based robots in education is favourable.			.924
ATT4: I have a negative attitude towards using AI-based robots in education.			.864
ATT5: I firmly believe using AI-based robots in education will benefit everyone.			.893
SUN1: Using AI-based robots in education will create a competitive advantage in the market.	[72]	0.902	.951
SUN2: It will attract more and more admissions.			.940
SUN3: People whose opinions I value prefer that my university use AI-based robots in education.			.816
INT1: I predict AI-based education robots will help grow our university.	[18]	0.891	.823
INT2: Our university will use AI-based robots in education in the future.			.813
INT3: Our university has no intention of using AI-based robots in education shortly.			.836
INT4: There is a positive environment for using AI-based robots in our university's education.			.887
INT5: AI-based robots in education at our university will create an environment of innovation.			.480
INT6: Students and faculties favour changing the traditional form of education.			.904
PEBC1: University administration supports the usage of AI-based robots in education.	[72]	0.916	.893
PEBC2: Our university has resources available for using AI-based robots in education.			.856
PEBC3: Using AI-based robots in education. It is entirely within our firm's control			.823
PEBC4: Our university will use AI-based robots in education.			.838

education system. Thirteen hypotheses are proposed, but only nine hypotheses are accepted. H1 is supported, meaning that teachers and students will use AI-based robots in the university's education system to be helpful and accessible. Pal and Patra [70] shows a positive relationship between PU and PEOU in measuring the perception of video-based

TABLE 2. Discriminant validity output.

	CR	AVE	MSV	MaxR(H)	PU	PEOU	TR	ATT	DISC	INSEC	SUN	PEBC	INT
PU	0.949	0.787	0.211	0.957	**0.887**								
PEOU	0.898	0.605	0.046	0.928	0.198***	**0.778**							
TR	0.918	0.737	0.211	0.934	0.459***	0.213***	**0.858**						
ATT	0.871	0.634	0.025	0.913	-0.066	-0.041	0.160**	**0.796**					
DISC	0.854	0.607	0.084	0.949	-0.192***	-0.164**	0.176***	0.072	**0.779**				
INSEC	0.863	0.679	0.267	0.872	0.041	0.009	-0.005	-0.091†	0.289***	**0.824**			
SUN	0.914	0.784	0.037	0.992	0.012	0.096†	0.032	0.077	0.193***	-0.03	**0.885**		
PEBC	0.815	0.603	0.293	0.861	0.031	0.01	-0.005	-0.06	0.192***	0.517***	0.003	**0.776**	
INT	0.838	0.637	0.238	0.869	-0.004	-0.012	-0.064	0.117*	0.181***	0.488***	-0.014	0.329***	**0.798**

TABLE 3. Path analysis results.

	Estimate	SE	CR	P value	Hypothesis
PU <--- PEOU	0.276	0.133	2.0752	0.00	Supported
ATT <--- PU	0.112	0.033	3.3939	0.00	Supported
ATT <--- PEOU	0.191	0.087	2.1954	0.00	Supported
ATT <--- TR	0.178	0.079	2.2532	0.03	Supported
PU <--- TR	0.258	0.121	2.1322	0.00	Supported
PEOU <--- TR	0.458	0.077	5.9481	0.00	Supported
INT <--- ATT	0.133	0.054	2.4630	0.00	Supported
PU <--- DISC	0.12	0.068	1.7647	0.41	Rejected
PEOU <--- DISC	0.04	0.031	1.2903	0.09	Rejected
PEOU <--- INSEC	0.03	0.018	1.6667	0.12	Rejected
PU <--- INSEC	0.06	0.041	1.4634	0.29	Rejected
INT <--- SUN	0.091	0.043	2.1163	0.04	Supported
INT <--- PEBC	0.154	0.056	2.7500	0.00	Supported

learning. H2 is supported, which means there is a positive attitude among the teachers and students that technology can be helpful. H3 is supported, which means that the individuals have the right attitude and understand that using this technology will be easier.

Trust has a direct relationship with the attitude of the individuals, so the hypothesis (H4, H5, and H6) is supported. Teachers and students believe that AI-based robots will be helpful for them. Students trust that these technologies will bring them a new learning environment; on the other hand, teachers trust that this technology will benefit their teaching. Salloum and Al-Emran [86] supported the study results for adopting e-payment by university students. H7 is supported, which means there is the right attitude toward adopting AI-based robots in the university's education system. The right attitude towards technology adoption can influence the users' behavioural intention. Scherer et al. [59]

empirically tested teachers' intention to adopt digital technology in education.

Teachers and students will find no discomfort using AI-based robots in the university's education system, so the hypotheses (H8 and H9) are rejected. Wang et al. [69] empirically tested the relationship between DISC with PU and PEOU for studying the adoption of MOOC learning in China. Raza et al. [91] found university students use Facebook securely and comfortably. H10 and H11 are rejected, meaning users are not insecure about adopting the latest innovation. Opoku et al. [60] found that the teachers found zero insecurity towards practising inclusive education. H12 and H13 are supported, which means that the technology adoption influences the user's perception. Damerji and Salimi [92] studied the adoption of AI in accounting using TRI. Phung et al. [93] the readiness of the student to adopt technologies in the colleges of Vietnam.
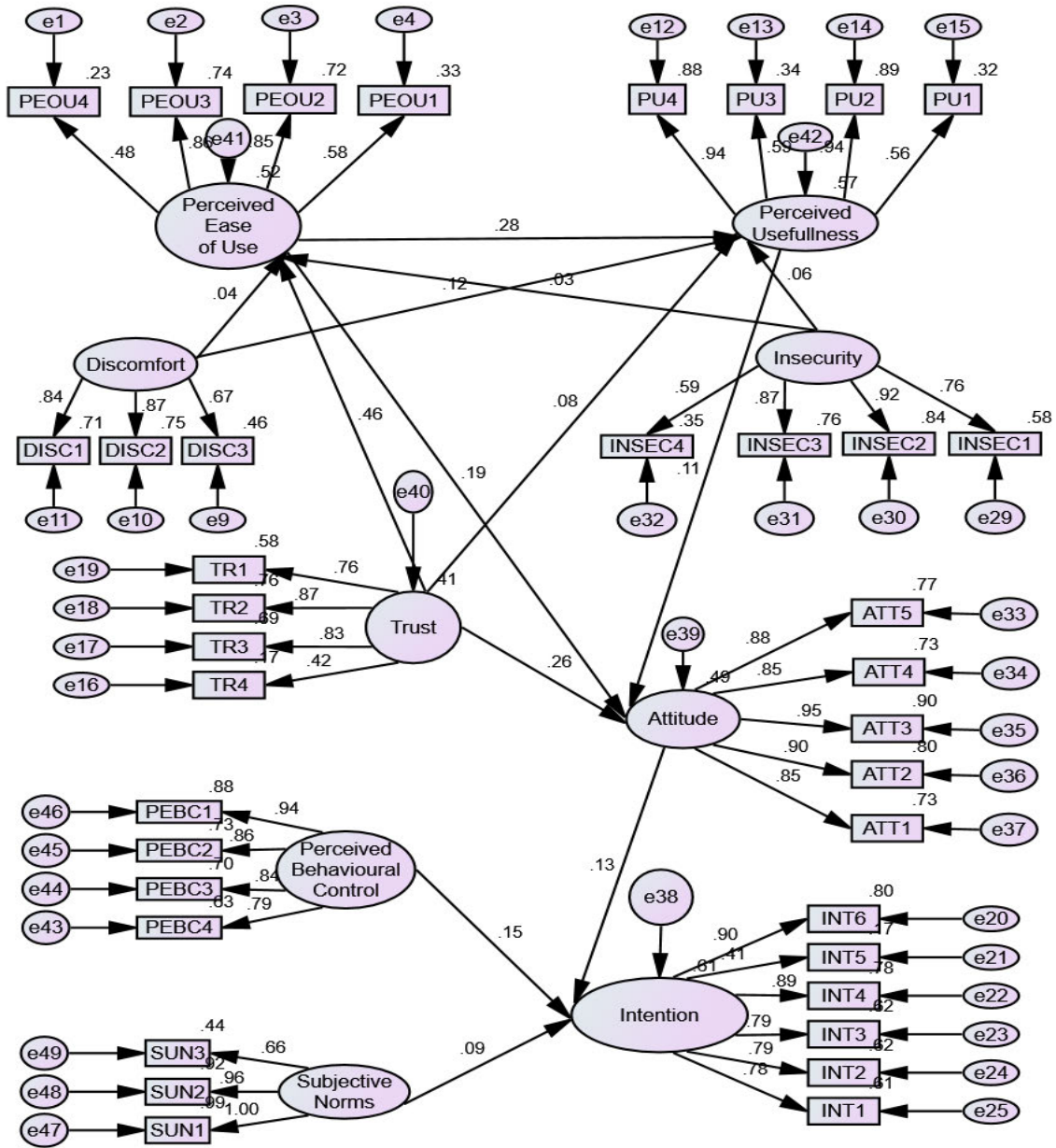
FIGURE 2. Structural model measuring the intention for AI adoption in the universities.

A. THEORETICAL IMPLICATIONS

This study measures the attitude and intention for adopting AI-based robots in the education sector of Indian universities. This study uses three theories, mainly TAM, TPB, and TRI. The proposed model had constructs like PEOU, PU, ATT, intention, TR, SUN, PEBC, DISC, and INSEC. Thirteen hypotheses were presented, of which only nine got accepted and four rejected. Few research articles have used three theories [72]. This study added theoretical contributions to AI adoption literature in the education sector. Prior very few research had been done on using AI to improve the quality of education [12], [15], [18], [21], [23], [28], [44], [47], [57], [89], [94].

The study addressed the first research question as the attitude of the teachers and students toward the adoption of AI-based robots in the education sector is positive. This contributed to the theory of AI-based robots. The second research question also showed positive attitudes toward adopting AI-based robots in the education sector. The TPB model's constructs DISC and INSEC showed a negative relationship for adopting AI-based robots. These research articles are the first kind that discusses AI-based robots in the educational

sector. Chatterjee and Bhattacharjee [18] examined the adoption of AI in Indian educational systems using UTAUT. First, no studies have empirically tested the intention and attitude toward adopting AI-based robots in the educational sector. This study empirically validates that TPB constructs need not be given importance while adopting AI-based robots in the educational sector. As TPB constructs had two variables, mainly i.e., discomfort and insecurity, this study empirically provided evidence that the university students and faculties are not insecure or having any discomfort.

B. PRACTICAL IMPLICATIONS

Higher education institutions must set learning objectives for all students and staff to develop their skills and stay current with new AI technologies. Institutions of higher learning should create a knowledge management repository to record all implicit and tacit knowledge. Included is information related to market demands, employee needs, and educational needs. The technical resources that all staff and students at these institutions are also required to achieve high levels of AI adaptation, enhancing their preparation for future challenges or changes. To improve their educational capacity and satisfy market demands, higher education institutions can take those actions. As a result, faculty members can benefit from collaboration, automated grading, and an intelligent system with the help of AI. AI integration will significantly impact our ability to increase digital literacy and skill set.

Robots can be a fantastic learning tool for students and teachers, providing an engaging way to delve deeply into a subject. This means that robots can give teachers a way to spend more one-on-one time with students who need extra assistance. Additionally, it enables them to test out novel teaching techniques, which is crucial when attempting to engage various learner types. For students, it's an opportunity to learn something new without feeling pressure from being the only student in the class or having their peers criticise them when they make mistakes. Robots can provide a place for people to feel comfortable if they don't immediately understand something. For students, robotics is essential because it can show them that engineering is more than just problem-solving on paper or drawing on a mat. They can see the results of their work and the outcome.

Additionally, teachers can use robotics as a teaching tool to impart lessons on current affairs or even math principles like fractions. Technology will undoubtedly play a crucial part in people's lives as it develops. Students can brighten their futures with the aid of AI and robots. The study's findings show that attitude plays a significant role in the intention to adopt AI-based robots in the educational sector. This study can play an essential role for the university that wants to adopt the latest innovation in its teaching systems. The teaching style will be changed from a traditional approach to a modern approach. Higher education institutions' system administrators should focus on the system's utility. They should be sincere about trying to make exploration as simple as possible. This would aid in managing the problem of

this novel technology's acceptance and use. To achieve these goals, the authorities should sincerely take responsibility for communicating to developers the essential needs of the users accurately. The technologies chosen should be more in line with the users' needs. The design shouldn't be overly complicated. The system's users might not experience any problems during use. The system's capabilities must be made known to the users. It is possible to increase the users' awareness of this by publishing product brochures, success stories, and real-world examples.

This study provides technology adoption that can change the face of the educational sector in the future. Nowadays, contactless delivery is adopted by companies so that the AI-based robot can give a facility of contactless teaching with the university experience. Students will be more attracted to studying with the help of the robot. Students will be able to develop analytical and logical skills. The work performance of the teachers will increase. The adoption of AI-based robots will highly attract university admission. The future is of AI and robots, so it is better to adopt these types of latest technologies and change the face of the traditional teaching environment. There will be good accuracy in teaching the students.

VI. CONCLUSION

This study aims to measure the intention of teachers and students to use AI-based robots in Indian universities for teaching. This study conducted a rigorous literature review to identify the factors that impact the intention to adopt AI-based robots. This study used constructs from three theories TAM, TPB, and TRI. Teachers and students of the Indian university were taken to do the survey. Thirteen hypotheses were proposed for the study, of which only nine got accepted and four got rejected. This study will be beneficial for the policymakers of the university. This technology needs to be adopted to change the traditional way of teaching. This technology adoption will create a competitive advantage in the market.

This study had some limitations that need to be fulfilled soon. The first limitation is that this study concentrated only on the university level of education, which needs to be expanded to schools for better outcomes. This study only collected data from postgraduate students, which can be extended to graduate and school students. This study was performed in a developing country and can be extended to developed countries.

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