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Factors influence students' attitudes toward AI-based innovative solutions

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***Abstract*—As technology improves, it appears that academic machine instructors will be used in many jobs in future of education. Despite the fact that the existing research does not clearly define the idea of machine lecturers. Nonetheless, given the current era of education, it appears to be critical to begin thinking about this concept. Machine units are technologies with a specific level of agency, suggesting that they will play a specific function in communication. Lecturers are frequently thought of as those who encourage and help others to improve their emotional and learning behavior via data collecting, advancement, and moral shaping. The machine teacher model may be broadly characterized as a technological design that helps and interacts with a person in boosting affective and learning behavior through numerous techniques, as supported by these two notions. In this paper, different factors will be examined to determine whether these will have certain effects on college students attiudes toward AI teaching assistants.**

***Index Terms*—AI, Machine Teacher, Novelty value, Innovativeness, Interaction, Loyalty.**

I. Introduction

Artificial Intelligence (AI) has become popular in every "novel" of life, demonstrating its essential role in education, a top priority field in every country worldwide. In recent years, the demand for online education has been increasing. A new technology called machine teacher or artificial intelligence teaching assistant has been developed. AI teaching assistants have appeared in coursework and delivered efficient outcomes, especially at this moment when the Covid 19 pandemic has put students and teachers alike in difficult online teaching situations.

An AI teaching assistant is considered a practical assistant for learners and teachers, helping knowledge always to be learned and absorbed. Knowledge is always open, and actively supported in the learning and research process; we just need to sit at home, and turn on the phone to be able to study and work remotely. In particular, being able to maintain teaching and learning activities at all educational levels in general, even during the Covid pandemic from the beginning of 2020 up to now, by online form, is a clear demonstration as a breakthrough in the application of technology in education. The school system is implementing artificial intelligence into the teaching platform based on the virtual management platform, capturing the benefits of Deep Learning science research products. Some illusions that aid but are not realistic include Siri, Cortana, and Google's Alexa.

Our main aim was to understand how college students might react to the concept of a mechanical professor. The present study focuses on a teaching assistant who is a machining instructor. The study also examines the factors affecting the students' attitudes toward using AI teaching aids. Based on the original theoretical framework of the research, novelty value and innovativeness are proposed to have positive impacts on Interactions that influence Behavioral loyalty to AI teaching assistants, sequentially.

II. Literature Review and Hypothesis Development

Generally, the traditional interaction with the direct verbal method in the classroom between learning mentors and students is inefficient in the modern era [36]. Edwards C. [13] suggest that the allowance of technology blended into the curriculum generates more communication features for users via chat and online talk. Hence, incorporating AI products into educational interaction could be viewed as the appropriate solution to improve the efficiency of interaction between teachers, lecturers, and mentors with students, which is a global trend. AI software and product (e.g., social robots) are already widely used as a tool for teacher assistance, tutors, and peers in learning classrooms worldwide [48]. The novelty of this educational method is promised to increase users' interest compared with the traditional ones [44]. This literature review will examine the factors that impact the way teachers and students access AI, not only to experience the newfangled environment of education but also to improve the interaction between the users or users toward robots and AI products.

A. The novelty value of AI teaching assistants in building the network of interaction

The construction of interaction between human and AI products is a critical point in determining the feasibility of technological teaching assistants. Previously, instructional communication between humans and robots was primarily based on the synthesis of objective factors (e.g., immediacy, creditability, teaching clarity, humor) to optimize human-robot interaction (HRI) [13]. The construction of novelty value in using AI should have focused on this application's feasibility in different cases. For example, immediacy in communication in HRI was only ensured when AI and its application via software or metal form (robot) generated familiarity for users in the using process without any hesitance [21]. Hence, when the response of AI products to the needs of users is ensured, interaction efficiency will be enhanced. Looking at the novelty of using AI, Edwards, C [12] states that AI gradually generates a friendly educational setting via the format of social robots to be capable of appropriately relaying information to students better than traditional media. Overall, when creating novelty value to improve user inter-

action, it must be generated at the user's convenience and prioritize the application of AI. However," Is it enough to persuade the mindset modification about AI's value in the educational field ?" The uniqueness in teaching methods and education systems will clarify the role of social robots and AI products in orientating the right assistant. In an academic interview conducted in 2011 by Winter, P[50] that the uniqueness in educational teaching will enhance the interaction thanks to the rising interest from the perceiver toward the communicator. Simplifying this view, identity could be defined as irreplaceable by imposing on users' mindsets about the value of AI products(e.g., social robots) with their role only offered for this user segment. Thanks to its uniqueness, people will have well-sentiment and good interaction with this technological educational method.

B. Innovativeness And Interaction

The definitions and the measurements of innovativeness were introduced to generate the "newness" of innovation [34]. The basic definitions of innovativeness were also developed on the scale and in-depth understanding of the innovation linked with the technology [16]. Already, innovation in education has been investigated to promote online satisfaction during the learning process with interaction measurement via AI products (e.g., robots and learning software [2]. In general, innovativeness directly facilitates the penetration of AI and its applications and improves user interaction and the AI product. It is examined by Rampersad G. [41] with academic research to establish the connection and multilateral effect of the potentiality of innovativeness with using AI in the educational field. This research clarifies the hypothesis that innovativeness positively affects interaction in using AI. Additionally, innovativeness in utilizing and optimizing AI products is also mentioned in the statement. As a result, the question "What type of innovation could positively affect the interaction and use of AI process?" Before deciding on an answer, it is necessary first to perceive the question. The value of innovation in using AI and its application in teaching assistants is described as "essential abilities" that require students to be able to solve new challenges and generate new ideas (WEC 2016). Applying skill in the generation of innovation is critical for developing innovation in the use and interaction with AI. Rampersad G. [41] emphasized that innovation is also an opportunity for adaptation. Rampersad G. [41] noted that innovation is also an opportunity for transformation for the users, especially students accessing AI. Nonetheless, it requires multiple skills that students have to satisfy the development of AI products, problem- solving, and critical thinking. To clarify this conclusion, within the growth of Artificial Intelligence (AI), users must strive to adapt and transform AI values to optimize personal benefits [47]. As a result, the innovativeness of using AI in educational assistance must begin with users' awareness of the value of bettering themselves. Problem-solving is essential for difficulties related to challenges in developing solutions using technology in education [42]. While critical thinking facilitates evaluating the using-AI efficiency, they adapt to the requirements [26]. Subsequently, the general assessment of the innovativeness of using AI for educational assistance reflects not only the role of generating new products to solve and simplify the process of using AI but also the motive to promote the improvement of users, particularly students when receiving the development of learning technology.

C. Loyalty to Artificial Intelligence

The application of artificial intelligence (AI) may alter consumer behavior. Innovation threatens trust and loyalty in AI products in the digital technology era. This is explained, for this analysis, by the consistent speed in technological growth with the incessant introduction and updating of AI products that generate a diversity of choices. Nonetheless, it could not obscure whether people believe AI and AI generate reliability for people's experiences . Initially, the connection between trust and loyalty in customer psychology is determined by the adequacy of faith generated. Hence, trust building is essential before examining and evaluating the extent of loyalty of customers toward products [18]. Particularly related to using AI solutions, establishing the loyalty measurement scale is crucial to developing the construction of innovation [33]. The measurement scale based on research by McMullan, R. also emphasized consistency between the systems, including phase stages responsible for representing the truthfulness aspect of judging and measuring loyalty.

Furthermore, users' loyalty was determined based on AI's experiences. Clients who have used a product or new technology without incident may continue to use the product or technology [45]. In clear expression, achieving users' loyalty to products, especially in the educational field via AI products (e.g., social robots, teaching software), requires the establishment of the quality and applicability of the product for clients. For example, student trust in an AI- powered curriculum results from meeting students' needs through the feature that supports their work. Hence, building trust is interwoven to enhance the efficiency of educational solutions [5]. Take an overview of the relevant aspects to achieve loyalty to AI-designed products. The generated attraction and privacy are the ultimate missions that AI's solution must ensure. The generated interest motivates students to follow and have a sentiment about the online learning technological application [24].

At the same time, privacy is the crucial point that determines whether to make the decision process stay in experience with AI products and optimize the benefit that AI generates. Privacy via the access and publication of personal data causes the fear of being used [15]; [30]. The AI proposed solution is successful because it relies on the guarantee of a private network set up to ensure the personal information of users and students does not leak. However, to accomplish this mission, the implementation of users' privacy on AI products (e.g., chatbots, online learning apps) should have been imposed [25]. As a result, the development of AI threatens the workforce's job, as the original purpose of AI was to provide convenience and reduce the workload for humans. However, robot and automatic processes directly threaten human work due to the working principle of robots without any weariness and interruption up to 24 hours per day. McClure, P.K. [31] stated that AI and its products should play a role as assistants rather than the leading role.

In the educational system, AI solutions to facilitate the work of lecturers and teaching support with current products such as chatbots, online learning platforms, and learning apps are focused on their benefits for teaching work. This client segment will commit to using AI products for their work. However, AI products like robots play a role as teachers and lecturers that contribute to the unemployment process of the labor force. There is no loyalty and commitment established.

D. Machine Teacher

With the development of technology, the long-term nature of educational background is likely to expand with the introduction and adoption of academic lecturers in machine shape in diverse functions (e.g., teaching assistant, tutorial advisor). To firmly emphasize, the conceptualization of this notion is crucial in the initial period, especially in the educationally innovative era, despite the fact that there is a lack of research to outline the concept of machine teachers. Machine units are somehow defined as technologies that include a precise level of agency and serve a specific function in the communication process [14]. Regarding lecturers, lecturers are often cited as people who generate and assist others in improving their emotional and learning behaviors via acquiring knowledge, progress, or even moral development [3]. Meanwhile, the machine teacher model can be clarified by the support of the two above ideas, concluding the following definition as a technology design that aids humans in improving their emotional and cognitive behavior through a variety of means through the learning acquirement of students.

The term "machine teacher" can be expressed in many types, particularly embodied or incorporeal representatives. Embodied or incorporeal representative are two of the types that the term "machine teacher" expresses when expressing its function. Generally, "embodiment" can be generated in the progressive transformation of physical manifestation or presence to become the system requirement [40]. Hence, the proper implementation of the machine teacher requires the presence of a possible and attainable machine instructor that is physical, virtual, or hybrid. The proposal of a physically manifested machine can be utilized and constructed based on biological components (e.g., steel, acrylic). Already, the record of existing examples of a physically manifested machine, namely NAO, is a machine that interacts in specific educational environments by using an embodiment. A computer system that generates a visually distinct being solely presented on a screen might also be considered the confluence of technology and virtual embodiment [29]. In a similar case, the role of an academic machine lecturer can be responsible for a form generated from a combination of physical embodiment and disembodiment. While non-embodied instructional machine teachers interact using a variety of separate possibilities, robots with physical manifestations are combined with specialized digital devices to represent simulated entities on display.

For instance, VNU Chatbot and Duolingo are both viewed as machine disembodiment in the eyes of VNU students. It is clear to predict an increase in the use of machine lecturers sooner rather than later because of the increasing availability and ubiquity of online courses at numerous educational levels. Typified instructional machines, whether immaterial or realized, will be crucial in the current web-based world. However, it is unknown how pupils could respond to machine teachers.

E. The impact of anthropomorphism on consumer desire to utilize AI teaching assistant

According to Guthrie [19], anthropomorphism is imputing imagined behavior or real attributes, such as inspirations, expectations, or sympathies, to non-human professionals. Recent research has revealed a complex relationship between leverage and consumers' willingness to personalize things. This word is not very uncommon considering how many robots have been created and trained to converse with people on their own. The robots were limited by the preset timetable of their master.

Moreover, the proposal that constructing artificial social networks or giving technology human-like characteristics may improve users' subsequent interactions. Goetz and Kiesler [17] discovered that people preferred amiable, gregarious, and sociable robots over serious or introverted robots. Moreale and Watt [35] noted that "I believed that a humanized internal helper program would enhance users' capacity to learn the software and provide beneficial guidance in any situation". In a wilderness survival experiment, participants responded more positively and attentively to interfaces that featured more human expressions [4].

The client's capacity to utilize humanoid attribution in particular addresses a sizable stream in advertising writing. Numerous marketing academics have looked on the implications of humanoid attribution for customers' desire to utilize it. According to Waytz et al., [49] clients have higher faith in human-AI administration professionals than non- human ones

According to De Visser et al. [11], humanizing administration experts boosts the intelligent efficacy between AI administration professionals and clients. Essentially, Yuan and Dennis [52] examined the effects of overtly human factors on consumers' willingness to purchase and reached a sound result. The favourable effect of humanoid attribution on consumers' recognition of or ability to use them is supported by a number of experimental findings from other advertising studies.

Overall, the current research proposes four hypotheses based on constructed conceptual framework of the study

H1: The novelty value of AI has a positive impact on the students ' interactions

H2: The innovative of AI solutions has a positive impact the students ' interactions

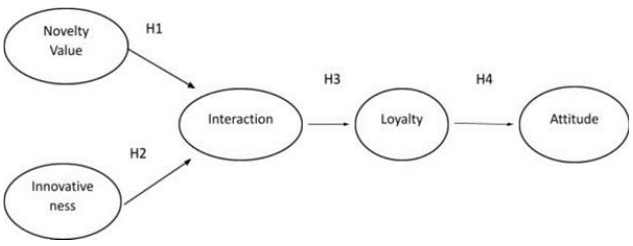

Fig. 1 Conceptual Framework.

H3: Students ' high level of interactions will results in the loyalty of AI solution

H4: The loyalty of students will lead to a positive attitude toward using AI solutions

III. Methodology

The first 200 undergraduate students from an international university made up the original sample size. The total sample size was 165 after the removal of 12 responses, which failed the participant's check, and 23 incomplete responses. Given that it exceeds the required sample size of 100, additional analysis is appropriate [21]. Table 2 displays the respondents' descriptive data. A suitable non-probability sampling process was chosen since it seemed like the most practical choice and is the one used by researchers the most .Screening questions were used to identify whether the respondents used Grammarly for their reports on their computers.

The novelty value, innovation, engagement, and loyalty questions that followed On average, each respondent needed eight to ten minutes to complete the survey. The MS Team platform was used to operate undergraduate students and collect statistics. The first through fourth years of study are covered by them. The students have been advised to use the AI tool by the lecturers during their 10-week course of study. Advised AI teaching assistant at the moment can be related as Grammarly, Google Translator, Cortona, and Google Voice. These are trustworthy educational environments and credible sources of psychological information.

TABLE I
Demographics

Variable	Definition	Frequency	Percentage
Gender	Female	97	58.79
	Male	68	41.21
Attend AI-related training or courses	Attend before	126	76.36
	Do not Attend AI-related training or courses	39	23.64

The majority of the assessments in this study were on a 7-point Likert scale. Compared to the 5-point Likert scale, the 7-point Likert scale captures more variety Most of the items were derived from well-known sources, ensuring the measures' reliability and validity. Table 3 lists the components in each construct and their respective sources. The list of measures is expressed via a questionnaire to evaluate and generate an in-depth view related to AI- teaching assistants. Notably, the measurement scale for the entire measurement would strictly adhere to the 7-Likert scale, which is an effective tool for comprehending the perception of the research [22]. As for the first aspect, attitudes toward new technologies (ATT) were measured through two items. For instance, "How comfortable would you be with new technologies (e.g., robots, AI) taking routine roles?" and " How comfortable would you be with new technologies (e.g., robots, AI) taking interpretive roles?" Responses for this aspect would be obtained from the 7 Likert Scale (e.g., 1 = strongly disagree; 7 = strongly agree). The 7-Likert-type scale was applied to generate the results (e.g., 1 = strongly disagree; 7 = strongly agree). In the further step, Intention to adopt AI teaching assistant- based education (INT), the items were listed to establish the initial idea about adopting efficiently into AI products. Kim, J. et al. [23] listed it as "If an AI teaching assistant-based online class is available, I would consider taking the class" and "If an AI teaching assistant-based online class is available, I would be interested in taking the class." The 7- Likert-type scale also evaluates it. To evaluate the aspect of consumer innovativeness (INV), it is required to use the in-depth scale to review the perception of innovativeness that people need [43]. It lists six items to clarify users' sentiment toward innovativeness provided in the questionnaire. Furthermore, the novelty value provided beneath the five items begins with "Using AI-based technology (e.g., virtual agent, voice-based agent, robot) is ". It served as a tool to evaluate the newness of the teaching assistant. Also, the innovativeness was supported by the proposal of Interaction (ITR). It included statements like " I can easily.." It also assessed how users accessed the features and facilitated how users generate their own experiences. Generally, the measurement scale also examines the loyalty of users in the four items, including "I will use AI-based technology the next time I seek solutions,"; "I intend to keep using AI-based technology,"; "I am committed to AI-based technology"; and "I would be willing to pay a higher price for AI-based technology over other solutions." Subsequently, the function of the loyalty examination is to generate a survey about the trust and loyalty of users for following usage [7]. It will be concluded by the service quality with three supported items to probe the review of the user toward the AI-teaching assistant solution.

TABLE II
Corellation and Ave value

	Innovativeness	Novelty	Attitude	Interaction	Loyalty
Innovativeness	0.828				
Novelty	0.613	0.883			
Attitude	0.573	0.686	0.933		
Interaction	0.653	0.756	0.674	0.913	

TABLE III
Smart PLS Results

Relationship	Coefficient	Standard Deviation	T Statistics	P Values	CI 2.5%	CI 97.5%	VIF
Innovativeness -> interaction	0.305	0.085	3.582	0	0.135	0.462	1.601
Novelty -> interaction	0.569	0.07	8.18	0	0.444	0.702	1.601
interaction -> loyalty	0.747	0.046	16.271	0	0.647	0.824	1
loyalty -> attitude	0.733	0.047	15.569	0	0.63	0.812	1

IV. Discussion and Conclusion

In conclusion, the current study investigated the variables that affect students' acceptance of novel AI-based educational solutions. It is thought that a key element in determining good views toward the AI teaching assistant model is the novelty value or innovativeness that an AI teaching assistant offers for students, which ultimately leads in behavioural loyalty. Future scientists are recommended to expand this area of focus by repeating it with various understudy populations and educators in light of the basic findings of the rise and growth analysis. Depending on their level of education, understudies may have different perspectives regarding an AI displaying partner (for instance, school versus secondary school). Additionally, AI guidance may provide an effective technique for providing essential instruction if the COVID-19 epidemic prevents face-to-face human interaction.

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