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CHALLENGING FACTORS TOWARDS THE EFFECTIVE USE OF CHATGPT IN EDUCATION IN PROVINCE SINDH, PAKISTAN: APPLICATION OF TAM MODEL

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Abstract

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The study aims to identify the significant challenging factors of using ChatGPT in the educational context. Several researchers contributed theories and models for investigating the factors that lack the integrity of teachers and students in routine academic activities. On the other hand, ChatGPT-generated text responses might not hold always true explanations for a particular course content which can lead the learners to misconceptions about information understanding. The UTAUT model was applied to determine the influential challenging factors. For the quantitative approach, a survey questionnaire was devised to validate the research model and achieve research objectives. Fifty-one participants recorded initial responses for reliability analysis. All constructs had Cronbach's alpha significance coefficient greater than 0.7, ranging from 0.866 to 0.928. This study will contribute to teachers' perceptions towards ChatGPT as learners may become overly dependent on ChatGPT for academic tasks, leading to a decrease in critical thinking skills, creativity, and independent problem-solving abilities.

Keywords: Challenging, ChatGPT, Education, TAM, Sindh.

Introduction

(Ramati, 2024), Nowadays, technology education become an integral part of standardized and modernized education that offers numerous opportunities for learners to improve their skills by integrating innovative technology applications in their studies. Learners should understand how technology plays a vital role in their studies and class activities to achieve learning outcomes (Castillo, et al., 2022). There is a rapid change in advanced technology and computer applications, the developer designed interactive software that thinks and acts like a human known as AI (Bianchini et al., 2022). Moreover, Artificial intelligence (AI) is computer software that focuses on human intelligence simulation and understands the natural language that works on learning, reasoning, and problem-solving (Nalbant et al., 2021; Neumann, et al., 2023). In addition, a recently invented AI-based application is ChatGPT abbreviated by Chat Generative Pre-Trained Transformer developed by OpenAI that launched on November 30, 2022. ChatGPT is a language model based on GPT-3.5 architecture developed by OpenAI. ChatGPT is designed to generate responses like human text and engage in natural language conversation on a wide range of questions with humans having a good accuracy percentage (Deng & Lin, 2022). ChatGPT model has generated auto text which is closely similar to human language and engages in meaningful text conversation according to Grassini, (2023). For decades technology emerged in education, learners use ChatGPT for several benefits and take advantage to support their learning needs in education (Lo, 2023). Additionally, ChatGPT enables learners to quickly access a broad range of information on a variety of learning topics and use it to find the answers to questions that can be collected information for their assignments and research (Neumann, et al., 2023). ChatGPT assists and helps learners in preparing and completing home assignments,

term explanations, and solving mathematically complex problems (Trương, 2023). Moreover, learners consider a ChatGPT as a reliable source of assistance that provides information available around the clock and makes topic explanations convenient for learners who study a variety of subjects (Fauzi, 2023). However, learners can use ChatGPT to obtain study techniques and improve their grammar for seeking relevant information by exploring innovative learning methods to apply technology in their academic class activities. Despite the possible advantages of ChatGPT in academic settings from learners' perspective, however, ChatGPT cannot be a replacement for instructors. (Alam, Khalid, et. al, 2023), ChatGPT decreases the essential need for the instructor and facilitator to support the routine aspect of learning the contents of the subject in academic class settings which ultimately leads to dependence on the ChatGPT tool rather than seeking guidance from the instructor in their academic relevancies (Biswas, 2023; Lo, 2023; Saif et al., 2024). Another study by researchers (Baidoo-Anu & Ansah, 2023; Bozkurt et al., 2023; Qadir, 2022), urged that ChatGPT produces inadequate explanations that may not reflect the most current knowledge and up-to-date information in academic learning. AI-generated patterns might not hold always true explanations for a particular course content which can lead the learners to misconceptions about information understanding. In addition to the researcher (van Dis et al., 2023), due to the limitation of natural language processing, the text response sometimes may not be clear or misinterpreted by learners. (Stephens, Harris, et. al. 2023), Considering the facts, this research intends to identify the challenging factors influencing the effective use of ChatGPT in the educational context and understand the instructors' perceptions specifically when learners integrate the ChatGPT tool into their academic routine tasks, which need to be investigated. (Kayali, Yavuz, et. al. 2023), This research will contribute to the strong status of

Challenging factors faced by instructors and facilitators from learners specifically when they are using the ChatGPT tool in their academic activities.

Purpose Of Research

The purpose of the research can be defined as integrating the ChatGPT in education can pose several challenges for instructors, especially when learners are involved in using it effectively in their academic routine tasks. The instructors need to ensure that the content is accurate, relevant, and appropriate to the course objectives. A past study revealed that ChatGPT-generated text responses might not hold always true explanations for a particular course content which can lead the learners to misconceptions about information understanding. On the other hand, relying heavily on the ChatGPT tool may disconnect the interaction between instructor and learners, which ultimately leads to dependence on the ChatGPT tool rather than seeking guidance from the instructor in their academic relevancies. By considering these facts, this research aims to examine the challenging factors influencing ChatGPT usage and understand the instructors' concerns and views regarding the use of ChatGPT in learners' educational settings, which need to be investigated.

Research Question

1. What challenges do instructors encounter when the learners utilize ChatGPT for educational purposes?
2. How Instructors may evaluate the learners to effectively integrate ChatGPT into their academic routine tasks?

Research Objectives

- To explore the instructor challenges encountered by learners when utilizing ChatGPT for educational purposes and propose potential solutions.
- To assess the impact of ChatGPT on learners' engagement and interaction with educational content.

- To examine the influence of ChatGPT on learners' confidence and self-efficacy in their academic pursuits.

Literature Review

The literature review provides the context of background information and existing knowledge for the research that is contributed by researchers. The literature covers three main areas of this research which are "ChatGPT adoption", "Technology Acceptance Model", and "the terms that are challenging factors towards ChatGPT usage".

ChatGPT Adoption

ChatGPT can assist on an individualized basis and offer explanations, questions, and help learners prepare assignments and home tasks that meet each learner's needs in an educational context ([Trương, 2023](#)). Moreover, ChatGPT allows learners to seek help on topics and gain a deeper understanding of their studies' relevant course content ([Neumann, et al., 2023](#)). According to [Qadir 2022](#), ChatGPT is used ethically in education ensuring the complement for learners to guide their unique needs rather than the replacement of the instructor.

Technology Acceptance Model (TAM)

Technology acceptance refers to the willingness of individuals or organizations to adopt and use new innovative technology. Individuals can observe that the technology is useful and has certain benefits, they are more likely to use it. Ultimately, the level of technology acceptance is a significant factor that impacts the integration of newly adopted technologies for successful implementation in various contexts, including education, healthcare, businesses, and government organizations according to [Shaengchart, \(2023\)](#). The researchers proposed various sufficient models for technology acceptance by composing several constructs that measure the level of a significant impact of individuals' technology acceptance and attitude towards using it. However, this research uses the TAM model proposed by Fred Devis in 1989, which is

still a widely used and efficient model that determines the individuals' attitude toward using new innovative technology (Davis, 1989; Sallam, et al., 2023). The technology acceptance model (TAM) has integrated with the original five constructs that impact users' intention to adopt and use the actual system, the original constructs are "Perceived Ease of Use", "Perceived Usefulness", and "Attitude (Tiwari et al., 2023). The model examines the behavior intention of the individual's perceived usefulness and perceived ease of use on the attitude towards technology acceptance. In the recommendation by researchers (Andersson et al., 2023), many researchers have proven that these two constructs are the strongest variables for measuring individuals' attitudes toward technology acceptance. The attitude construct identifies the positive or negative intention of the users' behavior to adopt the new technology as measured by perceived usefulness and perceived ease of use. (Walter, 2024), For this research past literature revealed that many researchers explained the similar definitions of PEOU, PU, and ATT towards the adoption of new technology. A logical diagram of the original TAM is shown in the figure. 1.

- **PU** is typically an integral construct associated with the Technology Acceptance Model (Allassafi, 2022). The original construct becomes relevant in understanding individuals' attitudes and intentions towards adopting and using ChatGPT technology acceptance (Liu & Ma, 2023; Sallam et al., 2023). The role of this construct is a key determinant in the context of ChatGPT acceptance. Below is the hypothesis:

H₁: Perceived Usefulness will have a significant impact on attitude towards ChatGPT.

- **PEOU** significantly impacts individual initial adoption of new innovative technology acceptance (Choudhury & Shamszare, 2023). Perceived ease of use is the critical construct in the context of ChatGPT that influences individuals' intention from initial adoption to continuous usage (Shahsavari & Choudhury,

2023; Sallam et al., 2023). The role of this construct is a key determinant in the context of ChatGPT acceptance. Below is the hypothesis:

H₂: Perceived Ease of Use will have a significant impact on attitude towards ChatGPT.

- **ATT** is the mediating variable between the experiences towards the acceptance of new technology (Liu & Ma, 2023). Also determines the positive or negative feelings toward the information system (Allassafi, 2022). ATT is considered the individuals' attitude towards the adoption and continuous usage of ChatGPT. Below is the hypothesis:

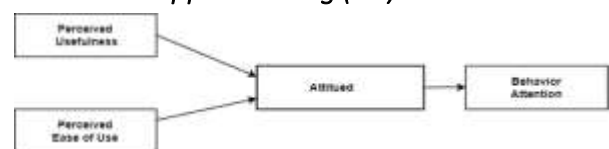
H₃: Attitude will have a significant impact on ChatGPT usage.

- **Intention to ChatGPT usage:** The learners intend to employ the ChatGPT tool effectively in their academic activities. This construct is an important predictor of technology adoption and acceptance in the context of using the ChatGPT tool in their educational context (Choudhury & Shamszare, 2023).

Figure 1. TAM (Technology Acceptance Model)

The terms that are challenging factors towards ChatGPT usage

Instructor support lacking (ISL)



The instructor is the main player in education who instructs professionally in communicating clear information that's strongly influenced by learners' achievements (Biswas, 2023). Instructors can provide guidance on how a learning process is navigated and help learners understand what to focus on, which gives the appropriate direction for approaching the challenging topic (Kleebayoon & Wiwanitkit, 2023). The research by Perkin (2023), asserted that the instructor's instructions are crucial for understanding and developing skills in problem-solving which is essential in enhancing learning potential toward critical thinking in academic topics.

According to (Zhai 2022; & Bin-Nashwan et al., 2023), stated that ChatGPT can be a useful tool for seeking relevant information but not a substitute for instructors who can lead in maximizing the learning skills and outcomes necessary for academic and personal growth. On the other hand, (Qadir, 2022), the instructor instructional approach brings a unique perspective and expertise to the learning process that cannot be replicated by the ChatGPT application. Therefore, below is the hypothesis:

H4: Instructor support lacking will have a significant impact on ChatGPT usage.

Inadequate Explanations of Academic Topics

The quality of information generated by ChatGPT heavily depends on prompt input which means if the prompt input is imprecise the ChatGPT may provide inadequate explanations or misleading information according to Baidoo-Anu & Ansah, 2023. In addition, ChatGPT responses influencing the request of users or prompt input intentionally or unintentionally provide incorrect information on a prompt that might not meet the desired explanation of academic standards. ChatGPT does not possess expertise in the specific domain of academics however generated responses in a limited capacity that is considered incomplete information (Bozkurt et al., 2023). In the past literature Qadir, 2022, it is important to note that ChatGPT is not a replacement for human creativity, domain expertise, and critical thinking. Below is the hypothesis:

H4: Inadequate explanations for academics will have a significant impact on ChatGPT usage.

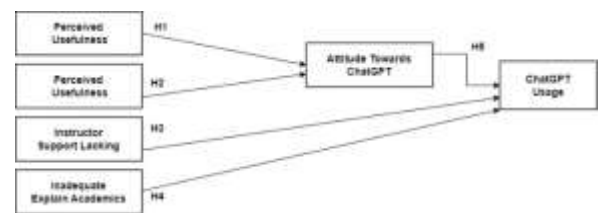
Proposed Research Model

This researcher uses the research proposed model by integrating the amended TAM model to examine the influences of ChatGPT adoption by adding the other external variable by identifying the significant impact on the attitude of the use of ChatGPT in education which is challenging by recognizing the key factors shown in Figure 2. (Stein, Banks, et. al.

2023), The proposed research model comprises the Intention to adopt ChatGPT which is the dependent variable and other added independent variables such as Instructor support (ISL) and inadequate explanation for academic topics (IEA) are considered the challenging factors from teachers' perspective. (Thanomsing, Sharma, 2024), The proposed model contributes a strong piece of literature and explores the important challenging factors that influence ChatGPT usage in education that need to be investigated.

Figure 2. Proposed research model

Material and Methods



Procedure and Data Instrument

The data collection team comprises teachers from prestigious public universities in Sindh, Pakistan. For the quantitative data collection approach, a survey questionnaire was designed to validate the proposed model and achieve study objectives. A questionnaire adapted from past studies. A survey questionnaire comprises 34 items, including demographic information related to the personal profiles of the targeted respondents. (Hepp, Loosen, Dreyer, et. al. 2023), The second section is associated with addressing the construct items such as instructor support lacking (ISL, having five items), inadequate explanation for academics (IEA, having four items), Perceived Usefulness (PU, having five items), Perceived Ease of Use (PEOU, having five items) considering independent constructs. A mediating variable attitude towards ChatGPT (ATC, having four items) influencing the behavior intention, and all constructs influencing behavior intention to ChatGPT usage (CU, having four items) is a dependent variable. (Delcker, Heil, et. al. 2024), All significant factors influencing the intention to use ChatGPT. A cross-sectional study with a

frequency seven-point Likert scale involved that begins with strongly disagree (1) to strongly agree (7). The data collection tool was designed in Google form format and shared a link to the targeted participants through emails and faculty WhatsApp groups. By collecting initial responses, the study evaluates the reliability test analysis using the SPSS statistical tool to determine the data collection instrument's consistency and validity. Researchers (Pallant, 2020; Hajjar, 2018), stated that SPSS is a comprehensive tool for many statistical studies, including descriptive and inferential statistics, and it also supports the use of the reliability and validity test to strengthen the validity and consistency of the survey instrument.

Results and Discussions

Participants and Descriptive Statistics

This study collected fifty-one initial responses from the teachers who are delivering academic courses at top public universities of Sindh province such as (Karachi University, Sindh University, and Sukkur IBA University). The collected responses were used to determine the validity and consistency of the measurement instrument before including it in the final study for achieving research purposes. For our demographic analysis, the bulk of responses were collected from males a total of 31 percent (58.6%), and females a total of 20 percent (37.4%). The majority of the participants a total of 30 were aged ranging from 31-40 percent (56.5%). The majority of Masters qualified a total of 39 percent (73.6%). The bulk of participants' experiences were less than a year in total 20 percent (37.7%). Table 1, illustrates the demographic profile information of all participants.

Table 1

Descriptive Statistics

Participants Profile	Frequency	Percentage (%)
Gender		
Male	31	58.6
Female	20	37.4
Age		
22-30	09	17.0

31-40	30	56.5
41-50	09	17.0
More than 50	03	5.7
Qualification		
Bachelor	--	--
Master	39	73.6
Ph.D.	12	22.6
Department		
Computer Science	21	20.8
Business Administration	11	39.6
Education	11	20.8
Mathematics	--	--
Engineering	--	--
Others	8	15.1
Teaching Experience		
Less than 1Year	20	37.7
1-2	17	30.2
2-3	7	9.4
3+	7	9.4

Preliminary data analysis

This part is considered the essential and initial phase of data analysis throughout the research. The process is to address the quality issues in collected data such as outliers and missing values. Moreover, the preliminary data analysis ensures that data accuracy is crucial for the reliability of the research findings.

Pretesting

Pretesting is important to ensure the overall effectiveness of the contents and accuracy of a survey questionnaire. Moreover, the researcher focuses on the clarity of written language in the questionnaire by identifying the confusion and ambiguity before it is administered to the actually targeted audiences. Therefore, Two Professors in the domain experts from a top university in Malaysia critically evaluated the design questionnaire by ensuring that it aligned with the research objectives.

Reliability Analysis (Pilot testing)

Before including the measurement items in the final survey, exploratory research was carried out to validate and assess their dependability. In this preliminary stage, fifty-

one participants were chosen at random from the target population. Cronbach's alpha was used to assess the internal consistency of the construct items, with a sufficient significance coefficient of 0.70 or higher, as recommended by [Hair et al. \(2013\)](#); [Morgan et al., \(2019\)](#). The reliability coefficients obtained for each construct were as follows: CU ($\alpha = 0.902$), ATC ($\alpha = 0.923$), PEOU ($\alpha = 0.928$), PU ($\alpha = 0.914$), ISL ($\alpha = 0.877$), and IEA ($\alpha = 0.866$). All constructs had Cronbach's alpha coefficients greater than 0.7, ranging from **0.866 to 0.928**, ([Pallant, 2020](#); [Hajjar, 2018](#)), as shown in Table 2.

Based on these data, the researchers concluded that the constructs had enough dependability and survey questionnaire was acceptable. Therefore, researchers are allowed to proceed with the final research investigation emphasized by [Ursachi et al. \(2015\)](#).

Table 2

Reliability test results

<i>Constructs</i>	<i>No. of Items</i>	<i>Alpha (α)</i>
ChatGPT usage (CU)	04	0.902
Attitude towards ChatGPT (ATC)	04	0.923
Perceived Ease of Use (PEOU)	05	0.928
Perceived Usefulness (PU)	05	0.914
Instructor Support Lacking (ISL)	05	0.877
Inadequate Explanations of Academic (IEA)	04	0.866

Conclusion

ChatGPT is a new entrant AI-based application to effectively integrate technology education that enables learners to quickly access a broad range of information on a variety of academic learning topics and existing research. Moreover, learners consider a ChatGPT as a reliable source of assistance and information available around the clock and make resources convenient who study a variety of subjects and do research. Several

researchers highlighted in their research contributions that ChatGPT decreases the essential need for instructor and facilitator support in the routine aspect of learning the contents of the subject. On the other hand, several researchers believed that ChatGPT produces inadequate explanations that may not reflect the most current knowledge and up-to-date context in academic learning. By considering these crucial challenges that occur in academic institutions, it is important to measure the challenging factors towards ChatGPT usage in education from the instructor's perspective that needs to be investigated. This research adopted the TAM model for determining the impact of teachers' attitudes on the effective use of ChatGPT in academics. For the quantitative methods, this study gathered fifty-one respondent data for reliability test analysis. The Cronbach's Alpha test assesses the consistency of items within each construct. A Cronbach's Alpha coefficient value equal to or greater than 0.7 is generally considered reliable. The reliability coefficients obtained for each construct were as follows: CU ($\alpha = 0.902$), ATC ($\alpha = 0.923$), PEOU ($\alpha = 0.928$), PU ($\alpha = 0.914$), ISL ($\alpha = 0.877$), and IEA ($\alpha = 0.866$). All constructs demonstrated significant values exceeding 0.7, ranging from 0.866 to 0.928, respectively. Hence, the researchers can proceed with the final investigation as the reliability values obtained for all constructs were satisfactory and consistent. The significant challenging factors such as instructor support (ISL), inadequate explanation for academics (IEA), Perceived Usefulness (PU), and Perceived Ease of Use (PEOU). attitude towards ChatGPT (ATC) by considering mediate construct. All constructs influence the dependent construct behavior intention toward ChatGPT usage (CU). This study contributed to teachers' concerns about ChatGPT as learners may become overly dependent and complete academic routine tasks using the ChatGPT tool which can lead to decreased critical thinking skills, creativity, and

independent problem-solving abilities.

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