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A Conceptual Framework of ICT Impact on Students' Academic Performance: Higher Education Institutes (HEIs) in Sindh

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ABSTRACT

Currently, Information and Communication Technologies (ICT) is considered one of the key elements as services and features in higher education. Learning through traditional way is no longer the norm in higher education. Instead, advanced ICT is becoming a viable paradigm for fundamentally altering Higher Education Institutions (HIEs). In this regard, the Higher Education Commission (HEC) of Pakistan has launched several initiatives and made significant investments in the usage of technology in the education segment. However, it is unclear what influence ICT usage will have upon the environment, student academic performance, and learning. Therefore, it needs to recognize the significance of ICT availability and the academic performance of students. The determination of this study is to explore, examine, and evaluate ICT acceptance impact on student performance at universities in Sindh, Pakistan. The goal of this research is to identify the precise variables that affect students' decisions to adopt and use new technology for learning. By extending previous research on the Technology Acceptance Model (TAM), this project will create an integrated model. It is anticipated that this research study will also contribute to the development of techniques for educators in the creation and execution of technology-integrated course designs. To obtain the intended research outcomes, this study triangulates data using a quantitative research method and a cross-sectional survey method to gather data. Based on those outcomes a critical framework would be recommended for students to integrate ICT. The significance of this framework will recommended (HEIs) to enrich the quality of the education system and to improve students capacity to be effective and quality oriented professionals using ICT.

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INTRODUCTION

ICT use and impact are thought to be interesting topics in a variety of real-world contexts, primarily in education. These days, teachers can utilize ICT as a tool to change the way they teach in the classroom in order to improve student performance. Academic institutions are providing ICT-focused academic programs and implementing ICT-based instructional approaches (Ullah et al., 2019).

As of early, the Pakistani government has envisioned the Digital Pakistan Policy as a means of strategically facilitating an expedited digitization ecosystem in order to enhance the knowledge-based economy and promote socioeconomic development.

As a result, students use a variety of smart gadgets and the internet to access ICT resources for both academic and non-academic purposes. It is necessary to assess pupils' academic achievement and honesty when they use ICT for both academic and non-academic purposes.

Hence, the objectives of this research are as under:

1) To uncover the effect of ICT on the academic performance of students at various universities in Sindh.

2) To find the relationship between the use of ICT for academic and by students.

The most recent advancement and innovations in ICT has transformed the traditional educational learning way. Students nowadays benefit from learning being entertaining and easily access to a wealth of information (Gupta et al., 2021).

The number of universities have completely embraced ICT has seen massive advancements in the use of ICT to enhance learning approaches, training, research, and development. However, it is unclear what influence the ICT applications have on students' performance and achievement (Gupta et al., 2021).

The latest and emerging information and communication technology (ICT) are developing as a sustainable prototype for transforming education through digitization (Bhattarai & Maharjan, 2020). By symbolizing the change from conventional desktop based to the network-based paradigm, it enables active learning through improved delivery and how students understand it (Islam et al., 2018). The research's uniqueness is employing real-time monitoring tools to track students' actions and development, including how often they use and whether they intend to adopt a technologically driven system.

The university authorities should place a high focus on fully using the potential use of ICT to aid students' effective adjustment to academic life. Universities should focus on improving students' academic study abilities, which will lead to improved academic success. In addition, universities should incorporate self-regulated skills, motivation, and frameworks to leverage the benefits of investment in ICT adoption in HEIs (Basri et al., 2018).

The Growth in ICT technology itself does not ensure that ICT-based education would stand generally believed by learners. Consequently, it is important to comprehend and research aim as disowning and acceptance of technology (Granić, 2022).

In the Information Systems frequently studied the extent of technological acceptance among students. The ICT-based learning impact on academic performance in universities is reliant on the student's technology acceptance. The earlier research showcased that ICT-based learning were broadly used and accepted in atmospheres of HEIs. The research approaches extended TAM to develop a theoretical framework and explore important factors of acceptance ICT based on the student's perception to usage of ICT-based learning in educational system at HEIs Sindh, Pakistan. There are numerous researches concerning the use and acceptance of technology in educational circumstances, and the significance of this research will be on HEIs to increase the quality of the education system by efficiently employing ICT to enhance the students' capability to be more active and quality-oriented professionals.

PROBLEM STATEMENT

Almost all government higher educational institutions in Sindh, Pakistan have access to digital (ICT) infrastructure, utilizing substantial investment through a grant by HEC. Although, there is limited literature available on the adoption of ICT in HEIs, and a scarcity of research on what impact ICT has on students' academic performances. As a result, there is a greater need for in-depth research, data analysis, and discovering the core factors enhancing academic performance among HEIs in Sindh.

Therefore, a complete empirical study is needed to evaluate ICT acceptance at universities and identify success factors and barriers that may impede ICTs on academic performance. The key factors will be explored in this study which influences ICT acceptance and usage of ICT skills in education in the HEIs atmosphere. The efforts try to answer the question that ICT-based learning is cost-efficient, easy to access, and an effective, procedure of education in Sindh. Similarly, it responds with what facts students have to acquire to properly Implement ICT-based education. Moreover, it explores the features and needs

a sustainable strategy that would appropriately allow sustenance in an ICT-based learning atmosphere and also improvement in a student's academic performance.

TECHNOLOGY ACCEPTANCE MODEL

TAM is a popular influential extensions of Theory of reasoned action (TRA) on psychology approach by Ajzen and Fishbein (2003) acceptance of innovative technology proposed by Davis (1985).

The TAM consists of three-part adoption, validation, and extension, in the adoption part amounts of applications are adopted and tested in an information system. Validation parts evaluate users' acceptance performance of numerous technologies. The last phase introduces association among TAM's variables. The Extended TAM (TAM 2) was developed by Venkatesh and Davis (Venkatesh and Davis (2000) later Venkatesh and Bala developed an extended TAM namely (TAM3), which was employed and tested in technology adoption. Moreover, many scholars have authenticated and prolonged the model in various diverse situations (Venkatesh, 2000).

In Information Technology related field, The TAM calculates Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Davis describes PU such as a person believes that using a particular system would improve performance and PEOU was explained as shown a person believes that using a particular system would be effortless (Ching-Ter et al., 2017). This significant relations defined by this model are as follows:

1. The PEOU has a direct effect on PU.

2. Both PEOU and PU have an impact on Attitude towards usage the technology.

3. An Attitude has a straight impact on Behavioral Intention (BI) which consequently determines actual system use [11].

Figure 1 exhibit's basic TAM introduced by Davis (1985) . Consequently figure 2 represents the historic view various acceptance model (Turner et al., 2010).

ACADEMIC PERFORMANCE IN HEIS:

Higher Education Institutes (HEIs) open doors to a variety of professions, higher learning, financial independence, and fulfillment of our dream (Jeganathan et al., 2022) Academic achievement has been the focus of studies on higher education
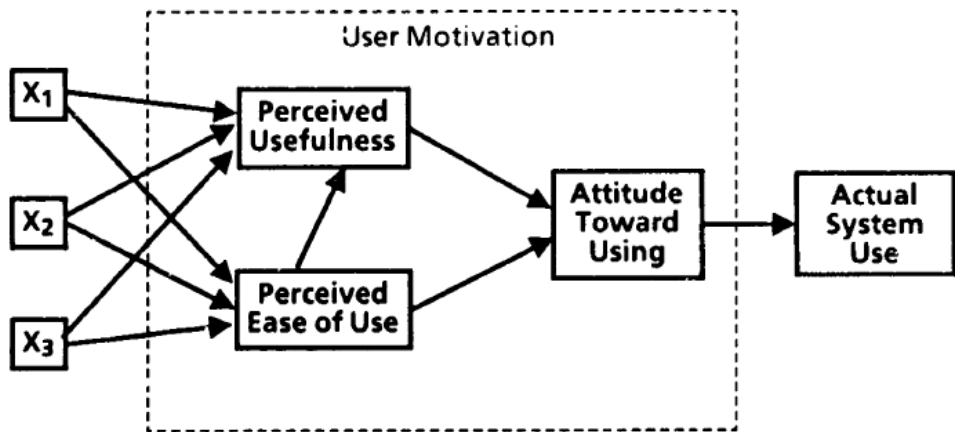
Figure 1: *Original Technology Acceptance Model (Fred Davis)*

for many years. Academic performance has been operationalized as course exam scores, although there isn't a clear definition of it in the literature (Sokkhey & Okazaki, 2020).

Academic performance has been operationalized in the literature in many different ways, but more theoretically-based techniques of operationalizing academic performance for HEI students are still needed to make the findings of future studies more convenient (Youssef et al., 2022)observing in performance as a result. He achieved this by making a difference between the behaviors that promote and support performance, such as motivation for achievement, and the performance indicators themselves, such as achievement or outcome measures. As a result, Bandura considers letter grades to be reliable performance indicators. The best way to assess academic performance would be to look at how well students perform on a variety of tasks over a long period, as one test score might not be a reliable indicator of students' achievement (Timarán-Pereira et al., 2020).

Proposed Model and Hypotheses

Plentiful concepts and models evaluate the acceptance of innovative technology i.e. TPB, TRA, DOI, TAM, and UTAUT for interpretation of inner beliefs, perception of user concentration while using innovative technology acceptance, TAM is a suitable model. Based on its simplicity and self-centered features are the basic motives for its well-known use (Venkatesh & Davis, 2000a). PEOU and PU are the chief elements defined in TAM that impact user acceptance of a specific
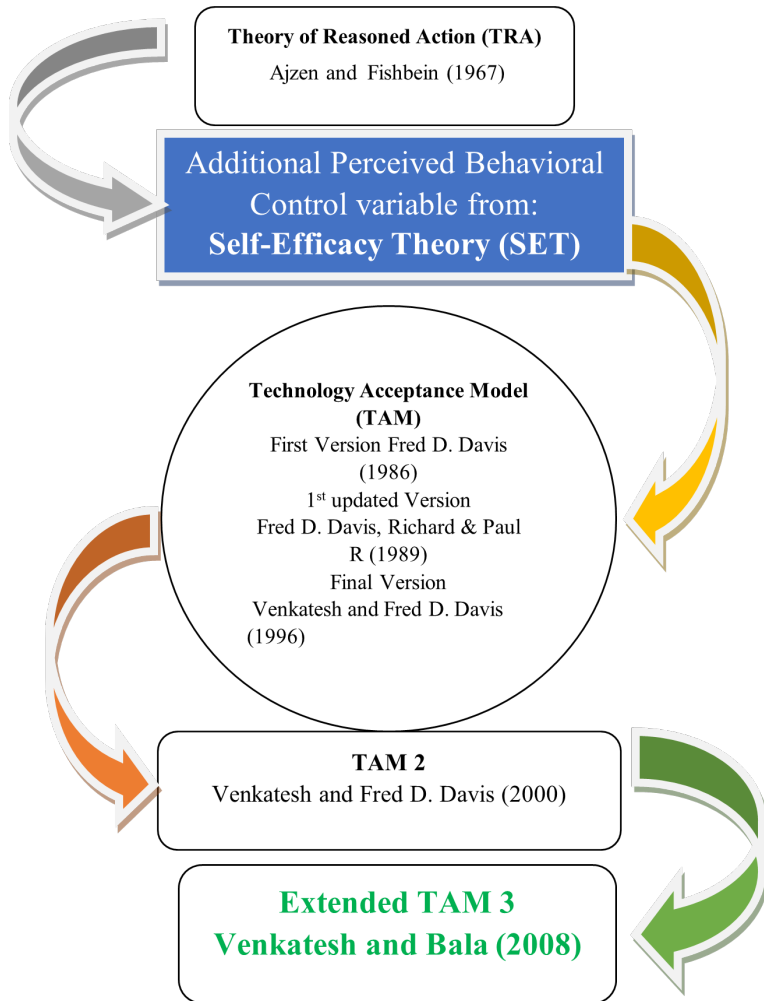
Figure 2: *Evolution of TAM*

technology. In this study uses TAM as elementary model.

This hypothetical model will be tested and analyzed as shown in Fig.3 below. In this model eight students' factors used to communicate to behavioral intention towards ICT. This research seeks to magnify TAM and usage perspective of ICT-based learning impact on students' academic performance and prospect of acceptance ICT within emerging country (i.e. Pakistan).
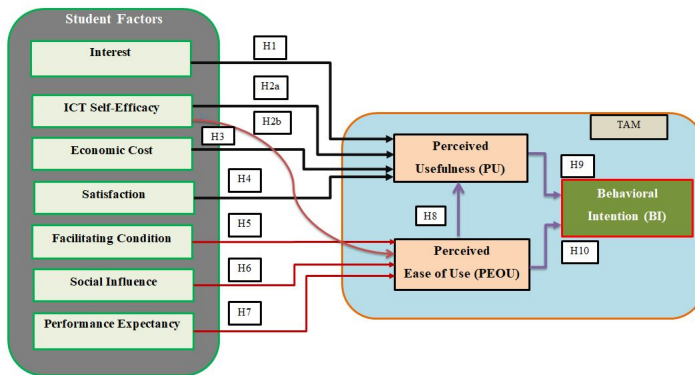
HYPOTHESIS DEVELOPMENT

Figure 3: *The Proposed model of research*

External Variables

When conceptual constructs are utilized to measure the impact, they are referred to as variables. The usage of the external variables is to examine direct and indirect attitude behavior of users.

Students' factor interest

Defines as the level of interest and understand user cognitive relationship between subject content and students (Gupta et al., 2021). This terminology is used in the current study to state to the learner's level of interest as it relates to usage of ICT in learning. The earlier study showed interest has positive impact on learning.

ICT self-efficacy

Self-efficacy denotes a person's belief in his or her capacity to execute behaviors necessary to produce specific performance (Rohatgi et al., 2016). This study will assess ICT self-efficacy states to learner's confidence in his or her capacity to utilize ICT skills and carry out the series of actions required to complete a task or learning.

H2a: Student ICT self-efficacy (ISE) will have a positive effect on perceived usefulness (PU) in HEIs.

H2b: Student ICT self-efficacy (ISE) will have a positive effect on Perceived ease of use (PEOU) in HEIs.

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Economic cost

The cost value that reflects the user's skills to support between the perceived costs and benefits of using ICT services. Economic costs is the amount of money invested in an ICT product. When a user considers accepting a service or using a product, the cost has usually an influence on the users acceptance. In this study the cost related to the behavior of the students will be perceived. Economics cost will have negatively influence on HEIs students' behavioral intention to use ICT tools.

Satisfaction

Expresses the idea of success and the happiness that results from completing a task (Gupta et al., 2021). The student satisfaction is a significant metric for assessing the quality of educational skills. As new technologies have changed how students interact with teachers and peers, it is important to look into how satisfied students are with the usage of ICT in the learning process. This study will explore the extent of that satisfaction.

H4: Student Satisfaction will have a positive and significant impact on Perceived Usefulness (PU) in HEIs.

Facilitating conditions

Facilitating conditions are described as the extent to which a person considers that an organization and technological infrastructure exist to make the use of the system easier (Arfi et al., 2021). Describe how students perceive the tools and assistance they have to perform a particular behavior this study focuses to assess extent of availability of technical support and facilities.

H5: Facilitating conditions will have a positive and significant impact on the behavior of students with Perceived Ease of Use (PEOU).

Social Influence

The extent to which an individual believes that other people who are influential, consider those who should use the new systems known as social influence (Mohebi, 2021). In this study, social influence is defined as students' feelings of other significant individuals in their lives who support the value of using ICT in learning.

H6: Student Social Influence environments will have positive influence on behavioral intentions of students of HEIs in sindh to usage an ICT for learning.

Performance Expectancy

Performance expectancy is the extent of single users believes that implementing the system would enable to meet higher academic standards (Alawadhi & Morris, 2008). In this study will assess the level to which students expect their ICT skills to help them in enhancement in their academic performance is known as performance expectancy.

H7: Performance Expectancy will have a high positive influence on the behavioral intention of HEIs students' performance to use ICT with Perceived Ease of Use (PEOU).

Internal variables

The effect of the internal variable is the value changes in response to changes in the external variables.

TAM FACTORS

Behavioral Intention

The degree to which an intended is to stimulate to perform a specific behavior is referred to as behavioral intention (Gupta et al., 2021). Means the student's select to keep using the technology or not, and this concept is considered to be a factor affecting how much a technology is used. Consequently, it is supposed in this study that behavioral intention to use in relation to ICT has the potential to enhance students' learning outcomes. The inclusion of ICT in this work is significant because it is essential to the development of technology utilization models.

H8: PEOU will have a positive and significant impact on PU.

Perceived Usefulness (PU)

The perceived usefulness is used to describe how well learners believe a specific system will escalate their ability to learn (Gupta et al., 2021). The factor known as perceived usefulness was found to have a significant impact on behavioral intention for usage in ICT and in learning.

The degree to which a person thinks implementing a particular system will enhance his or her ability to perform their job. In this study "PU" stands for the extent to which students believe that ICT support them learn more effectively and have positive effects.

H9: PU will have a positive and significant impact on BI.

Perceived Ease of Use (PEOU)

Describes a person's extent of confidence that using a specific system will be flexible to use (Gupta et al., 2021). Based on this study, PEOU refers to students' perceptions of how easy and helpful ICT-based learning is for their education. The term used in this study is to describe the students' perspectives on using an ICT in learning that could improve their academic performance.

H10: PEOU will have a positive and significant impact on BI.

CONCLUSION

The extended TAM will be confirmed in the perspective of education in this current study, and present more information about the students' potential perceptions of the usage of an ICT. This research will enhance the theoretical and empirical literature in the domains of information systems and information technology. This study will also assist the Pakistani government and higher education institutions in formulating the optimal strategy for student academic development and ICT implementation. The findings of this study will be in a standard framework for universities students to use and enhance their ICT skills. The overall goal of this research is to improve the quality of education in HEIs in sindh, under the latest demands and to educate students to be effective with ICT. Additionally, it explores the function of TAM in forecasting ICT acceptance impact on learnings as it affects in developing, culture (Sindh). The suggested model will be examined and validated in upcoming work.

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