Adoption of EdTech products among college students: a conceptual study

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Abstract

Purpose – This conceptual study investigates the adoption of education technology (EdTech) products among college students, focusing on identifying the key factors influencing the adoption process within educational institutions. Technology integration in education has rapidly gained prominence, with EdTech offering innovative solutions to enhance teaching and learning experiences. However, understanding the determinants that affect EdTech adoption remains critical for its successful implementation and impact. This paper aims (1) to identify the factors influencing the adoption of EdTech by college students (2) to create a conceptual model that shows the connections between the elements that lead to college students adopting EdTech.

Design/methodology/approach – The research employed a mixed-methods approach, combining qualitative data analysis and conceptual modeling to achieve the objectives. The underlying knowledge required to create a qualitative data gathering tool was obtained through a thorough literature analysis on innovation dissemination, educational psychology and technology adoption. College students, teachers and administrators participated in semi-structured interviews, focus groups and surveys to provide detailed perspectives on their attitudes about and experiences with EdTech. The Scopus and Web of Science databases are searched for relevant information in an organized manner in order to determine the factors influencing the adoption of EdTech. Second, an extended version of the technology adoption model is adopted to develop a qualitative data-based conceptual framework to analyze EdTech adoption in the Indian context.

Findings – Overall, by highlighting the critical components that emotionally influence college students' adoption of EdTech products in educational institutions, this course adds to the body of information already in existence. The conceptual framework model serves as a roadmap for educational stakeholders seeking to leverage EdTech effectively to enrich the learning environment and improve educational outcomes. By recognizing the significance of the identified factors, academic institutions can make informed decisions to foster a climate conducive to successful EdTech integration.

Research limitations/implications – A comprehensive conceptual framework model was developed based on qualitative data analysis to illustrate the interrelationships between the identified factors influencing EdTech adoption. This model presents a valuable tool for educational institutions, policymakers and EdTech developers to comprehend the complex dynamics of implementing these technological solutions.

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Originality/value – The findings of this study demonstrated a number of important variables that affect the uptake of EdTech products in educational settings. These factors encompassed technological infrastructure, ease of use, perceived usefulness, compatibility with existing academic practices, institutional support, financial constraints and individual attitudes towards technology. Additionally, the research explored the significance of institutional preparation for embracing technological advancements as well as the influence of socio-cultural elements.

Keywords EdTech, Educational institutions, Technology adoption model (TAM) model, Online learning
Paper type Research paper

1. Introduction

Education technology (EdTech) includes hardware, software, pedagogical theory, and practice to enhance learning. Today's educational setup requires a combination of digital learning applications, software, and hardware. EdTech is one solution that offers different forms of e-learning software, platforms, or even mobile learning devices designed for the modern teaching-learning environment. The world of business and consumers is experiencing a digital revolution, and EdTech is pushing the boundaries of traditional education. Companies that create educational technology are often referred to as EdTech companies. Educators today must integrate new EdTech tools and services into their classrooms for effective knowledge transfer. Learning in school has improved through transitions from rote learning methods to learner-centeredness. EdTech platforms are tools helpful in improving access, reducing costs, and improving academic quality, improving institutions' capability to cater to the needs of the current student community (Andreyanova *et al.*, 2021). In 2004, the beginning of satellite education and intelligent classrooms marked the start of India's EdTech journey. The first online course taken by prospective players was Extramarks in 2008. In 2022, Khan Academy began offering online instruction (EdTech Story, Nasscom, n.d). The creation and promotion of educational technology is changing in a contemporary manner thanks to the Internet, mobile technologies and devices, big data analytics, artificial intelligence, and digitally delivered services and apps (Daniel, 2015). Technology has advanced so quickly in recent years that it has transformed many aspects of education. Worldwide, educational institutions are seeing a major increase in the adoption of new educational technologies including m-learning and e-learning apps. These technologies offer diverse opportunities for enhancing teaching and learning experiences, providing flexible learning environments, and enabling access to various educational resources (Eppard *et al.*, 2021). In this context, understanding the factors influencing the successful implementation and usage of these technologies becomes crucial for educational institutions aiming to leverage their potential benefits.

There have been several studies on the usage of mobile learning (m-learning) apps and e-learning platforms in schools and universities. In order to determine the crucial factors influencing a university's choice to move toward adopting mobile learning apps, Peruzzo *et al.* (2022) performed a research in which they compared institutions that had embraced these applications with those that had not. The present study elucidated the distinctions between educational institutions that have implemented mobile learning and those that have not, therefore highlighting the significance of several elements in shaping their decisions. In addition, a conceptual framework identifying the elements required for an e-learning system's successful implementation was developed using the Delphi approach. Through the sharing of their experience and perspectives, subject-matter experts were able to identify critical components that impact the successful deployment of e-learning systems in educational settings (El-Bakry and Mastorakis, 2009). Studies on students' perceptions of mobile learning services have also provided valuable information on how students interact with and use m-learning applications. Customizing these technologies to successfully fulfill the requirements and preferences of students requires an understanding of their perspectives (Aginako and Guraya, 2021; Alzahrani *et al.*, 2012; Kagawa, 2007). Additionally, studies have

examined the effects of different factors at various stages of usage on the expansion of mobile learning applications. This research helped identify critical challenges and opportunities during different implementation phases, aiding in the refinement and optimization of M-learning applications (Huang and Chiu, 2015). To further comprehend the challenges and activities surrounding mobile learning systems, researchers conducted a preliminary study in a specific context, examining the significant difficulties and activities in a mobile learning system case study conducted in Jordan. This provides valuable insights into the localized challenges and potential solutions educational institutions may encounter when implementing mobile learning technologies. Furthermore, studies on the COVID-19 pandemic's exceptional consequences have driven the variables affecting the development of mobile learning apps at Jordanian institutions during this crisis. Understanding how external factors, such as the pandemic, influence technology adoption can inform strategies to enhance technology readiness and utilization (Díez-Gutiérrez, 2021).

In addition, during the COVID-19 epidemic, researchers developed a novel mobile learning success model specifically designed for higher education institutions. This methodology was designed to help administrators and educators navigate the pandemic's hurdles and use mobile learning tools as effectively as possible. Technology acceptance model (TAM), which employs the structural equation modeling (SEM) method, was used to assess the preparedness of m-learning system usage. As a result, a thorough grasp of the attitudes and preparedness of students to use mobile learning technology was made possible. Furthermore, the Madrasati Platform was used for virtual learning during the COVID-19 pandemic, and the elements influencing students' perceptions of its use were investigated. This research contributed to understanding online learning adoption during unprecedented circumstances and its impact on student attitudes and engagement. Thus, educational institutions have both possibilities and obstacles when implementing new educational technologies like m-learning and e-learning apps. The research mentioned above have given important new perspectives on the variables affecting the uptake of technology, the difficulties that arise in its use, and the success elements that support efficient use. This study aims to contribute to the existing literature by examining these concerns and providing guidance to educational institutions on how to optimize the use of EdTech to enhance learning outcomes and process quality. Previous studies have highlighted how important it is to include modern educational technology to increase learning assurance. According to the Jordanian perspective, resistance to change and worries about security and privacy are only a few of the issues that seriously hinder users' ability to embrace mobile learning.

In their 2019 study, Almaiah and Al Mulhem examined eleven variables that influence college students' propensity to use mobile learning tools. According to adopters in Jordan, factors including reluctance to adapt and worries about security and privacy are major obstacles to the uptake of mobile learning. Almaiah and Mulhem (2018) used a Delphi analysis to classify the critical success criteria for the successful deployment of e-learning in Saudi Arabia into four main categories: management, technology, quality, and awareness. The study involved 91 University Malaysia Terengganu undergraduate computer science students. It was evident from the results that students thought mobile learning was useful, engaging, and practical. The versatility of mobile learning, which let them learn whenever and anywhere they wanted, was something else they valued. The students also said they would like to use mobile devices for administrative tasks, including accessing library resources, registering for classes, and checking grades. The results of the study imply that mobile learning has the potential to enhance the educational experience for students and increase accessibility and flexibility. Still, further study is required to determine the most effective ways to create and execute mobile learning initiatives. Almaiah and Jalil (2014) developed a new model to examine how various aspects affect the creation of mobile learning apps in the three primary usage stages of transaction, interaction, and static. The study

results demonstrate that requirements for information quality, awareness, security, self-efficacy, system compatibility, perceived functional benefit, perceived image, availability of resources, and trust vary depending on the stage. The authors discovered significant differences in the perceptions and requirements of users about the adoption and usage of mobile learning applications in each of the three stages. In Jordanian institutions, this research examined mobile learning technologies' potential advantages and difficulties. The study determined that the primary obstacles are related to service quality, accessibility of educational materials, technological and design problems, and student needs. Accessing course materials, turning in assignments, and taking quizzes are the three main functions that students would like to be able to do on a mobile learning platform (Almaayah *et al.*, 2016). Mohammed Almaiah and Omar Almomani explore how students used mobile learning tools during the COVID-19 pandemic. The model pinpoints awareness, IT infrastructure, and top management support as the three main factors influencing the adoption of M-learning. To ensure successful M-learning adoption, the authors' findings advise institutions to concentrate on increasing awareness of the benefits of M-learning, making IT infrastructure investments to support M-learning, and securing top management support for M-learning initiatives.

Utilizing the TAM and SEM, this study examined the preparedness of M-learning system utilization. The findings demonstrate that M-learning readiness is favorably and significantly impacted by perceived utility, perceived simplicity of use, awareness, IT infrastructure, and top management support (Almaayah *et al.*, 2022). This study by Almaiah *et al.* (2023) looks into the factors influencing students' attitudes toward using the Madrasati Platform during COVID-19. The amount of time students spent utilizing the Madrasati Platform during the pandemic was shown to be considerably boosted by awareness, university management support, system quality, service quality, content quality, technical infrastructure, security concerns, and training. In their paper, Almaiah and Al Mulhem (2019) use thematic analysis with NVivo to determine the primary obstacles and variables impacting the effective deployment of e-learning platforms. They discovered 20 elements, including trust, self-efficacy, culture, e-learning system quality, financial assistance, and change management challenges. This study contributes significantly to our understanding of the factors that need to be considered in order to ensure that e-learning platforms are deployed effectively. A solid foundation for comprehending the significance of educational technology and the different elements influencing its acceptance and effectiveness in educational institutions is provided by our introduction, which incorporates this research.

Even if previous research shows that new educational technologies may be an effective tool for improving learning and teaching in educational backgrounds, it's crucial to understand the difficulties and success criteria involved in using these technologies. Educational institutions must navigate a complicated set of hurdles and success factors in order to successfully integrate new educational technology. When deciding which new technology to implement, educational leaders must carefully weigh these considerations. Instructional institutions may boost the likelihood that new instructional technologies will be successfully adopted by offering leadership support, teacher training, and student engagement in the classroom.

1.1 EdTech industry during Covid

An outbreak of COVID-19 has had a lasting impact on the world's education. Several facilities were closed by government authorities in order to ensure social distancing. Several countries have adopted a "Schools of Education" policy in response to the pandemic to ensure that the educational process is not interrupted due to extended school closures. A majority of

countries around the world have embraced distance learning, and India was no exception. Across the globe, universities in Asian countries and America and Africa provide vocation-focused tertiary education through EdTech platforms (Price and Ronnie, 2021). EdTech thus allows learners to acquire knowledge from sources that provide exciting and useful content. Education establishments such as colleges, universities, coaching centers, etc. must take action to stop the COVID-19 epidemic from spreading, were operating virtually as the government had implemented lockdown measures that prevented them from being physically open. During these difficult times, educational institutions at a global level have been closed. During the pandemic, statistics provided by UNESCO reveal that 157 crore students were enrolled in 191 countries (Higher Education | *UNESCO UIS*, 2020). Worldwide, there are 32mn students, considering all school, college, and university levels. Lockdown regulations imposed to curb the spread of COVID-19 infections affected colleges, universities, and recruiters' ability to train and hire students on time (Education: From Disruption to Recovery, n.d.). EdTech turned out to be the solution to overcome the difficulties during the lockdown scenario. Eventually, students and educational institutions benefited from the transfer of knowledge. More e-learning businesses are rising, and the companies need more educators and other employees. Due to this, India's skilled youth have several opportunities to earn a living by both learning and teaching from home. There will be seven EdTech unicorns in India by June 2022, according to market potential. Based on fast-digitalizing markets as well as uncertainty related to the pandemic, the Indian EdTech industry is expected to be valued at US$30bn in the future. Also, there were several disruptive technologies and applications developed that enabled and enhanced the easier functioning of EdTech. The EdTech platforms could offer ecosystem-based business models such as Netflix and Airbnb and lead to higher returns in terms of business.

1.2 EdTech product

It is possible to categorize EdTech products according to their primary purpose. The following are some of the major categories:

1.2.1 Management systems for learning (including remote learning). These companies provide course management tools. Staff and students can access and share learning resources through these cloud-based portals, also known as virtual learning environments. There are several significant players in the market, including Blackboard, Moodle, Google Classroom, and Microsoft Teams. A variety of educational content, such as videos, quizzes, and lessons, can be found in this category.

1.2.2 Management information system. Education institutions must have a database, which is one of the most important pieces of software. Students' information, timetables, assessment data, and other data are usually stored on these cloud-based, modular platforms. In some cases, parents can access their alumni data through parent portals. It is common for product vendors to align with their regions of operation. Popular providers include PowerSchool and Alma, the US market is flooded with companies. The UK, for example, also has a competitive market in this area.

1.2.3 STEM products. Recent years have seen an increase in schools' use of STEM and STEAM products. Often, these tools allow children to create code. Examples of robots include LEGO Mindstorms, Arduino, Raspberry Pi, littleBits, and Sphero.

1.2.4 Online tutoring. In recent years, this category has experienced significant growth, particularly in Asia. Tutors are available to help students with their homework and studies. There are several examples, such as Yuanfudao, Byju's, and Zuoyebang.

1.2.5 Language learning. Over the past few years, apps that support the learning of new languages have seen exponential growth. Duolingo and Babbel are popular examples. The rapid advancement of technology has revolutionized the education sector, enabling the

adoption of various EdTech products in classrooms and online learning environments. While the benefits of EdTech in enhancing student engagement, collaboration, and personalized learning are widely acknowledged, the effective utilization and adoption of these tools among college students remain a significant concern. To design successful interventions and foster supportive settings, educators, administrators, and EdTech developers must thoroughly understand the factors influencing college students' acceptance of EdTech products. In order to understand how these elements interact and affect the adoption process, this article offers conceptual research that attempts to identify and investigate the significant drivers of EdTech adoption among college students.

The purpose of this study is to determine the factors that affect EdTech product uptake. In the process, we provided answers to the following queries:

(1) What factors influence the adoption of EdTech products by college students in an Indian context?

(2) What is the link between the elements influencing college students' use of EdTech products?

This paper's remaining sections are organized as follows: Examining the research on educational technology, Section 2 highlights the elements that contribute to technology adoption success. Section 3 details the application of the TAM and the implications of this research. Section 4 presents the conclusion, while Section 5 highlights the limitations and elaborates on the potential for future growth of research.

1.3 Objectives of research

This study is focused on the following objectives:

(1) To identify the factors influencing the adoption of EdTech by college students.

(2) To create a conceptual model that shows the connections between the elements that lead to college students adopting EdTech

2. Review of literature

2.1 Literature review process for adoption of education technology

The literature review offers a summary of previous studies on the adoption of EdTech with an emphasis on college students' viewpoints. It looks at several theoretical frameworks and models. The suggested conceptual model is based on theories such as the Diffusion of Innovations theory, the unified theory of acceptance and use of technology (UTAUT), and the TAM. To appreciate the complexities of EdTech adoption among college students, the study highlights research gaps and emphasizes the need for a comprehensive framework that integrates human, institutional, and technological factors. The role of technology in education is growing, and there is constant discussion regarding its application in higher education. But how education technology is embraced will determine whether or not it succeeds in a chain reaction. Adoption of EdTech is defined by a number of qualitative characteristics. Research from ScienceDirect, SCOPUS, Web of Science, EBSCO, Emerald, and Springer was used in this review. Using terms like "education," "education technology," "technological capability," "social networking," "application," and "perceived benefits," these papers were found through database searches. A list of challenges in EdTech adoption was identified and compiled from reputable journal articles, books, and reports and the above search databases. We reviewed and studied EdTech papers and reports to discover themes and features of businesses. Out of all the publications that were gathered, 76 have been taken into consideration for this study.

The literature evaluation procedure for implementing educational technology is depicted in Figure 1. Seven main themes have emerged from the introduction of technology in education. The following sections provide descriptions of these concepts.

2.2 Research methodology

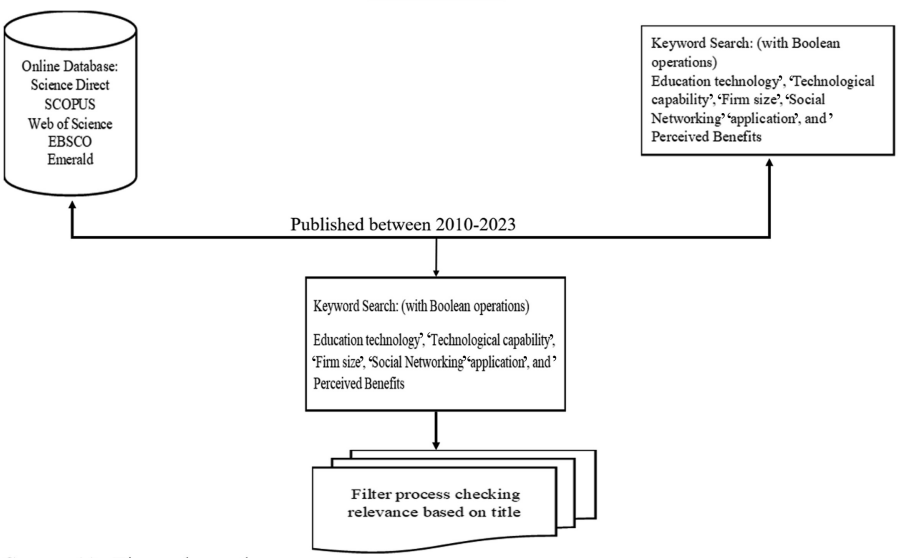
This study investigates college students' adoption of EdTech products using a qualitative research methodology. A qualitative study is deemed appropriate as it allows for an in-depth exploration of the factors influencing technology adoption within the educational context. The research methodology is designed to gain rich insights and understanding of the participants' perspectives and experiences related to EdTech adoption.

The qualitative research methodology will provide valuable insights into the adoption of EdTech products among college students, contributing to a conceptual understanding of the factors shaping technology integration in educational institutions. The secondary techniques employed to evaluate the data collected for this study from several sources were a content review and a thorough examination. The analytical sample's qualitative components have been considered. Only this report's secondary data has been used. This literature was thoroughly and methodically examined. The following are examples of secondary data sources: (1) academic publications and journals; (2) reports; (3) search engines; (4) corporate websites; (5) research papers; and (6) scholarly pieces. First, a structured literature review is conducted to identify the factors influencing EdTech adoptions in Scopus. Second, an extended version of the TAM is adopted to develop a qualitative data-based conceptual framework to analyze EdTech adoption in the Indian context and identify the critical success factors for EdTech students.

3. Factors of EdTech product and hypotheses development

3.1 Technological capability

Technical competency is the ability to create and innovate new products and procedures, advance one's understanding of the physical world via original research and application, and



Source(s): Figure by authors

Figure 1.
Literature review process

convert that knowledge into plans and guidelines that accomplish intended outcomes (Marchiori *et al.*, 2014). Technology capability is defined by Parasuraman (2000) as "people's willingness to use new technologies to accomplish goals in their personal and professional lives". To overcome the limitations of technical requirements, EdTech products need technologically solid capabilities. Additionally, solid technological capabilities strengthen the ability of organizations to adopt digital technologies, such as educational technology and application-based marketing models, to improve their performance in the market (Kirkwood and Price, 2016). Similarly, studies have shown that innovation in commerce and electronics in the EdTech line of business results from companies' technological capacity and adoption (Chao, 2003). Technology advancements require different personal characteristics for the creation and launch of innovations. In other words, the administrator's qualification level in business education significantly impacts whether an entrepreneur with only knowledge and technology-based abilities can get promoted to the managerial level (Camisón-Haba *et al.*, 2019). Likewise, payment processing technology and digital banking services are accelerating EdTech products to develop their activity (Grabar *et al.*, 2019).

Two factors that contribute to technology capability are optimism and innovativeness. In addition to technology readiness, the other two dimensions are "discomfort" and "security", which may suppress technology capability (Mick and Fournier, 1998). Technology optimism refers to a positive view of technology and the belief that technology will enhance efficiency and improve people's work and personal lives. Innovativeness refers to how confident a person feels that they are developing new technology-based products and services. The term discomfort describes a sense of being out of control over technology and hesitant to use it effectively. Technology-based transactions are perceived as insecure if users doubt their ability to work correctly.

H1. Technological Capability can be affected positively by EdTech Products.

Student mindset:- The term "student mindset" describes a person's self-perception of their abilities (Dweck, 2006). According to our observations, the majority of pupils possess both a fixed and a development mentality. Students who believe they can improve their skill level with hard work and persistence are said to have a growth mindset. Students who think they can't become better at anything no matter how hard they try, are considered to have a fixed or unchanging attitude. A person who has a development mentality is more adaptable to adversity and receptive to new experiences. On the other hand, a person with a fixed attitude shies away from difficulties and pays little attention to criticism (Mansouri and Mhunpiew, 2016). Observing instruction or participating in constructive discussion may enable students to learn new things. Learning is more effective when knowledge is constructed by contributing and participating rather than simply absorbing information (Benson Soong *et al.*, 2001).

H2. Student mindsets are adopted based on their EdTech product

3.2 Student collaboration

Students can interact and collaborate within an online educational environment through discussions and debates. Students can better comprehend topics if they collaborate than if they are taught traditionally. Spinuzzi (1997) highlighted in his critique of cooperative learning that students would only learn successfully and profitably if they gained relevant and intelligible knowledge. An essential characteristic of students in the e-learning setting is their ability to collaborate. It is essential, however, to design course content to encourage collaboration.

H3. Student Collaboration sets are adopted based on their EdTech product

3.3 Government policy and initiatives

The government plays a role through efforts to provide subsidized educational technology inputs, incentives, consulting, and technology services, as well as electronic distribution of market statistics, access to electronic markets, and the establishment of incubators. To encourage enterprises to use and adopt digital technologies. Establishing digital innovation centers with good broadband infrastructure across India would address the problems companies face in adopting new technologies. This would ensure the connection between technologies of information and communication (ICT) updates and student communities. A student-focused innovation hub can provide a one-stop-shop solution where students and products can access the latest technologies and skills. The construct variable is policy (Bahaddin Acat, 2008) and learning communities (Akbulut and Kesim, 2016) developing reliable and valid measurement tools.

H4. Government initiatives and policies play a positive role in the adoption of EdTech products.

3.4 Social networking

According to Hamid *et al.* (2010), Social media and websites that facilitate social networking are examples of digital platforms used for networking. Because of social networking sites, blogs, YouTube channels, instant messaging, Internet forums, and blogs, people may learn from the networks (Lippert and Ph, 2006). Individuals and businesses can adopt technologies to market themselves, thanks to learning and networking among students (Tosun, 2018). A particular research study examined the impact of social media on industry-level early adoption choices (Ahamat *et al.*, 2017). When companies lack information and adoption and use of technology are hindered, effective networking allows early adopters to communicate their potential with one another (Zolkepli and Kamarulzaman, 2011). According to Venkatesh *et al.* (2003), social networking is defined as a way to adjust or change people's behavior to conform to societal norms. It significantly impacts an individual's technology use and is corroborated by previous studies on technology adoption. According to a recent study, young people rely on family, friends, and peers for advice when it comes to online learning.

H5. Utilizing social networks promotes the adoption of educational technology Products.

3.5 Perceived benefits

Technology acceptance is a fascinating study topic because of the shift in how users perceive technology's role in identifying new business opportunities. The advantages of technology usage are what influence a firm's willingness to embrace it, but very few research have looked at the link between firm-level views of technology use and its acquired benefits (Domingo and Garganté, 2016). EdTech integrates social media apps with contemporary marketing communication technologies to extend the product and reach prospective customers (Piotrowski, 2015; Jayaram *et al.*, 2015). Many researchers have frequently used perceived benefits. For example, students' perceptions of the electronic medium's usefulness in delivering courses were believed to enhance their opinion of the course experience and encourage them to take the course online (Lu and Lin, 2012). We included both PU and PE in the study to examine perceived benefits. The level of user perception (PU) in the context of e-learning refers to how much users believe using an EdTech product would improve their knowledge and enable them to achieve their goals. Customers can contend that utilizing an ed-tech product is more advantageous than expensive. Depending on the source (Lu and Lin, 2012), PU has been considered a significant determinant of PE. The method for addressing perceived utility in the context of e-learning systems focuses on assessing the construct's applicability as a benchmark for EdTech products.

H6. Perceived benefits are adopted based on their EdTech product.

3.6 EdTech products

Several respondents commented that student and parent product endorsements were significant; however, they felt that teacher endorsements were the most critical. One respondent pointed out that they might be critical of anything new entering their environment: "And they are quite right to be critical of it". Thus, they will be viewed negatively if they endorse low quality. Schools typically embrace your product quite strongly once they trust it. Educators will consider teachers not only essential for their classrooms, but if the teachers widely adopt the products, it will also open the door for a wider adoption of EdTech products. The respondent from another EdTech technical person explains how things can go wrong when teachers do not fully embrace the product: "We must engage the teachers at the beginning of this journey. Otherwise, it will fail.' We may also have one teacher who is very knowledgeable about technology but is not going to sign off on the checks. Hence, you need to coordinate with every one of the teachers. Getting a start-up to work with the government is very difficult since they will just throw scale at you while trying to figure everything out. The value proposition should be understood, and you should be mature if you have built up your system. The moment you can take advantage of economies of scale because of their size, then it is a win-win situation for everybody. When creating a business model for students, the following factors are recommended by earlier research and are highly relevant to this e-learning issue.

4. Theoretical background of study

Since the TAM is so good at describing and forecasting consumers' acceptance and uptake of new technologies, it has been included extensively into the suggested model. Davis introduced TAM in 1989 and has since been extensively applied and extended to various domains, including mobile learning, e-government services, digital technologies, Internet banking, and mobile payment systems. Several studies have leveraged TAM to explore users' attitudes and intentions towards technology adoption and the factors that influence their acceptance of these technologies (Scherer *et al.*, 2019). To investigate the impact of quality characteristics on mobile learning acceptability, researchers have expanded the TAM in the context of mobile learning. Based on TAM, these studies investigated at how factors including usability, system performance, and content quality impact students' adoption of mobile learning applications. Similarly, the UTAUT has been used to study how college students use mobile learning platforms. UTAUT, a well-liked paradigm for understanding technology adoption, combines elements from several technology acceptance theories to provide a comprehensive framework (Nicholas Omoregbe *et al.*, 2016; Sitar-Taut and Mican, 2021). Researchers were able to examine how performance expectations, effort expectations, social influence, and enabling variables affect students' behavioral intents to use mobile learning systems by applying it to the setting of mobile learning. An expanded UTAUT model has also been used to investigate the viability of mobile learning applications as a teaching aid. The goal of this research was to look at how technical factors affected people's willingness to keep using mobile devices for learning. Using UTAUT in conjunction with other aspects of technology, researchers were able to get more insight on the long-term sustainability of mobile learning uptake.

Technology acceptance models such as TAM and UTAUT have found applications in a variety of sectors outside of education. For instance, in the context of e-government services, TAM has been used to identify the factors influencing the adoption of such services among citizens in Jordan (Yakubu and Dasuki, 2019). Additionally, the combination of TAM and the government adoption model (GAM) has been used to develop a mobile government adoption model, providing a comprehensive understanding of the factors influencing the adoption of mobile government services. Technology adoption models have been used to investigate

factors impacting students' ongoing desire to utilize digital technologies in higher education (Granić and Marangunić, 2019). These studies have sought to understand the determinants that drive sustained usage of digital technologies in the academic context. Moreover, in e-commerce adoption, TAM has been utilized to investigate the effect of privacy concerns on consumers' willingness to adopt e-commerce platforms, shedding light on the importance of addressing privacy-related issues to promote adoption. In the financial sector, adopting digital information technologies, Internet banking, and mobile payment systems has been explored using technology acceptance models, such as TAM and information system success model (ISSM), along with other relevant factors like perceived risk and perceived value. Researchers have also examined how information quality, perceived security, and perceived trust affect people's adoption of near-field communication (NFC) for mobile payments using TAM. This research has clarified these factors impacting customers' adoption of mobile payment technology.

According to Lacasa *et al.* (2021), technology acceptance models such as TAM and UTAUT are widely used in several fields because of their ability to explain users' acceptance and adoption of new technologies. We found that these models are resilient and versatile. In order to assist organizations and governments in making more informed decisions on how best to install and improve the usability of technology, these models provide a strong basis for researchers to investigate and comprehend the many aspects impacting technology adoption. Examining relevant studies that have used the TAM and related models in a variety of fields helps justify the model's use of TAM. A popular approach for analyzing and forecasting user adoption of technology is TAM. The incorporation of this technology into your model offers a strong basis for evaluating the uptake of mobile learning technologies in academic settings. Almaiah *et al.* (2016) use the expanded TAM to examine how quality attributes affect students' perceptions about adopting mobile learning. The results of the study suggested that responsiveness, interactivity, functionality, accessibility, customization, and high-quality learning materials had a positive impact on students' opinions of the usefulness and usability of mobile learning apps.

Almaiah *et al.* (2019) use the UTAUT paradigm to study how college students use mobile learning platforms. The study found that perceived security, self-efficacy, perceived compatibility, perceived trust, perceived awareness, and perceived material quality are the primary elements affecting students' adoption of mobile learning systems. Stated differently, students are more likely to use mobile learning systems if they perceive the information as reliable and valuable, if the system works with their current devices and learning styles, if they trust the system and its creators, if they are aware of the advantages of using the system, if they have access to the resources they need to use it successfully, if they think they can use it successfully, and if they perceive the system as secure. Similar to the previous study, this research extends UTAUT and demonstrates that the TAM's core constructs continue to play a crucial role in understanding technology acceptance, even within complex, extended models. In order to investigate the impact of technological aspects on the use of mobile devices as a learning tool, Alghazi *et al.* (2021) expand upon the UTAUT model. The researchers found that several characteristics, including device connectivity, compatibility, memory, performance, network coverage, and network speed, had a substantial and positive impact on students' intentions to utilize mobile learning. The findings show that website quality, confidence in the Internet, trust in the government, performance expectancy, effort expectancy, and facilitating conditions all positively affect behavioral intention to use e-government services. However, social influence was found to be insignificant. These findings suggest that the Jordanian government should focus on improving the quality of its e-government websites, building trust with citizens, and making it easy for citizens to use e-government services. The TAM and UTAUT models are used in Almaayah *et al.* (2020)'s mobile government adoption model to describe the variables

influencing consumers' acceptance of mobile government services. The study revealed a number of crucial variables, including performance expectations, effort expectations, social influence, enabling circumstances, habit, trust, and perceived utility. Scholars and decision-makers may use the model to create plans for encouraging the use of mobile government services. It has been noted that students' continual desire to utilize digital technologies is positively impacted by technological readiness, uncertainty avoidance, digital information flow, instructor quality, and learning pleasure (Fink *et al.*, 2023).

Althunibat *et al.* (2021) separate the adoption of smart-government services into three primary phases: static, interaction, and transaction. The model outlines several factors, such as resource accessibility, perceived image, security, system compatibility, information quality, awareness, perceived functional benefit, self-efficacy, and trust, that affect adoption at each stage. Over the course of the three phases, there is a discernible movement in user needs and attitudes toward the adoption and utilization of smart government services, according to the poll. Using a conceptual model, Akour *et al.* (2022) investigate how privacy concerns affect the adoption of e-commerce in the United Arab Emirates. The four components in the model are perceived Internet safety, transaction willingness, acceptability of e-commerce, and privacy concerns. The authors discovered that although perceived Internet safety and e-commerce acceptability moderate this effect, privacy concerns harm e-commerce uptake. Digital information technology (DIT) usage in higher education was examined by Almaiah *et al.* in 2022a, b, c, d. They used a TAM-based survey with 485 Chinese college students. The findings showed that students' opinions on the usefulness, convenience, and experience of the tools had a significant impact on their likelihood to utilize DITs. The way that material was presented and the caliber of the tutor had a significant influence on how well pupils understood DITs.

The authors conclude that higher education institutions should focus on improving the perceived convenience of use, perceived usefulness and perceived experience of DITs to promote student acceptance. This study provides a detailed discussion of the variables influencing the use of DITs in higher education. Organizations can utilize the results to create plans that encourage teachers and students to use DITs. In order to create a model of online banking adoption, Almaiah *et al.* (2022a, b, c, d) combined the UTAUT with perceived risk and price value. All criteria were shown to be significant predictors of the adoption of online banking by the model, with the perceived risk being the most significant. Almaiah *et al.*'s (2022a, b, c, d) study examines the variables affecting Saudi Arabia's use of Near-Field Communication (NFC) for mobile payments. The authors discovered that mobile payment usage is favorably impacted by perceived security, perceived trust and information quality. Accordingly, consumers with access to high-quality information regarding NFC mobile payments, trust the technology and the firms involved, and think their payments are safe are likelier to use NFC mobile payments. The rationale behind including the TAM in your suggested model is its adaptability and efficiency as a fundamental structure for comprehending technology adoption. The studies mentioned show that TAM ideas are still applicable and flexible in various contexts, such as e-government, e-commerce, mobile learning, and more. The application of TAMs in the planned study on college students' adoption of EdTech goods is further supported by their use in other fields. Application of TAM in several technical environments is possible due to its general-purpose nature. In general, the technology acceptance paradigm (TAP) is a widely recognized and validated paradigm that is very appropriate for the proposed investigation into college students' adoption of EdTech products. Strategies to encourage college students to embrace EdTech products may be developed using the information provided by TAM, It may help to clarify the factors influencing these students' behavioral intention to utilize these items.

4.1 Different model theories approaches in TAM to adoption of EdTech

Reasoned action theory, TAMs, extended TAM models, the theory of planned behavior, technological organization (TOE), social identification theory, social learning theory, and social network theories are just a few of the many theories that have been proposed to explain how people adopt new technologies. Rural extension services mostly employ the technology acceptance model and TOE models to help people adopt ICT. The combination of TOE and TAM, however, has not been widely used in research to gauge consumers' intentions to use mobile devices to get market data (Amiel and Reeves, 2008). Students production of marketable surpluses has been made easier by adopting EdTech products, which facilitates students' access to market information by enabling them to produce surpluses (Arrasyid *et al.*, 2020). Similar to how ICT use in marketing, production, and education technology benefits small businesses' ability to compete on the market against large businesses. Education technology helps knowledge gain access to new sales territories, opening up a new market for potential customers. Developing countries are increasingly in need of digital capabilities. Few studies have been conducted on how digital technologies are employed in education to produce and market goods.

On the other side, a TOE model clarifies a company's motivation for using new technology. Technologies, organizations, and environments all play a role in how new technologies are adopted. Business technology includes both internal and external technologies, such as infrastructure and processes (HOTI, 2015) are among the environmental factors. In addition to TOE factors, some researchers have suggested that social networks (Dwivedi *et al.*, 2012), Studies on the adoption of technology also take into account individual aspects and work characteristics (Kraemer, 2019). Networking has an impact on an invention's acceptance, user base, and other factors. When an organization adopts an innovation, it often creates interdependencies with other firms' goods in the utilization of related resources (Mattsson and Andersson, 2019). Perceived utility (Davis, 1989) is "the degree to which a person thinks that using a particular technology would improve business performance". Company level (Dincer and Dincer, 2016; Mailizar *et al.*, 2021). Therefore, this study focused on bridging the knowledge gap on the adoption of EdTech in education through the use of product marketing and promotion. Furthermore, generation-technology-organization-environment (T-O-E) is adopted in this study by Tornatzky and Fleischer (1990). This paper provides a comprehensive framework for measuring and evaluating technological adoption of EdTech products, integrating the existing theoretical review shown in Figure 2.

5. Research findings

Based on an investigation of EdTech adoption in the Indian setting, a number of literature evaluations served as the basis for this study's conclusions and identify the critical success factors for EdTech entrepreneurs. A framework is presented in this paper for performance practitioners to evaluate, plan, and develop impactful technological solutions for advertising and marketing EdTech products. As a result, there could be a more incredible opportunity for empirical research to evaluate and validate the suggested variant.

5.1 Implications of future research

The findings of this study will broaden the body of information previously accessible on the use of EdTech. Among college students and provide practical implications for educators, policymakers, and EdTech developers. Understanding the complex interplay between individual, institutional, and technological factors will enable stakeholders to design effective strategies to promote the successful adoption and integration of EdTech products in higher education. Ultimately, this research aims to enhance student learning outcomes, improve educational practices, and support the ongoing evolution of technology-enhanced education.

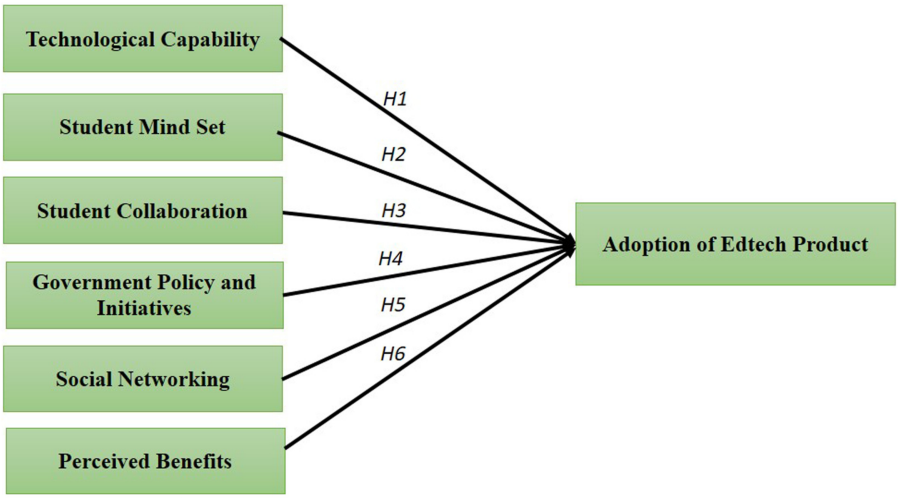


Figure 2.
Conceptual model for adoption of EdTech product

Source(s): Figure by authors

6. Conclusion

The educational technology sector is quickly evolving, and small technology products have an opportunity to capitalize on these changes. To reach their intended audience, one of these firms' top priorities is to find the best digital solution. There are many options available for education, but it's not always easy to know which one will provide the best return on investment. Additionally, I want to emphasize that technology is only a tool and not the answer in and of itself. Reaching your objectives won't come from just possessing it; you also need to make sure that it's being used to its full potential. The products with the best marketing abilities will benefit as more and more products use technology to build their networks, EdTech product is not just for students. More than ever, teachers and professors are using technology in the classroom to create engaging and interactive learning experiences. However, this trend has led to a growing concern that students who don't have access to technology at home are being left behind. In order to promote the commercialization of educational technology products, this paper offers development professionals an integrated framework for evaluating, organizing, and carrying out effective technological interventions in the classroom.

7. Limitations and future research avenues

Digital technology offers unique opportunities to empower EdTech products along the way. They should improve their skills at advertising their products. The fact is that there is no one perfect virtual solution for every situation, notwithstanding these options. In addition, the often-used term "digital answer" refers to a piece of technology that may be utilized as a backup to assist achieve the firm's goals rather than the only solution. As more and more education product applications extend their networks via generational adoption, people with the most delicate advertising competencies will in all likelihood gain greater advantages than those without. providing students with technical assistance on marketing and advertising skills, consequently extra study possibilities exist in the talent improvement region of Education Technology's A framework is presented in this paper for performance practitioners to evaluate, plan, and develop impactful technological solutions for advertising and marketing EdTech products. As a result, there may be greater scope for challenging and certifying the proposed version with empirical study.

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