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Factors Affecting Secondary School Teachers' Intention to Use Education 4.0 in UAE: A UTAUT Analysis

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ABSTRACT

The development of education 4.0, driven by information technology, is a crucial aspect of secondary school education in today's fast-paced world. However, limited empirical research exists on how UAE institutions engage with education 4.0, and little attention has been paid to the factors influencing the actual use of technology in this context. Previous studies have tended to focus predominantly on e-learning, students, and universities, rather than on factors driving the intention to use education 4.0. While previous research has identified various important factors affecting users' intention to use technology in developed countries, the factors may differ in the context of developing countries like the UAE. The factors include performance expectancy, effort expectancy, social influence, and facilitating conditions, which were identified through the Unified Theory of Acceptance and Use of Technology (UTAUT) model. To address this literature gap, this study seeks to investigate the factors influencing UAE secondary school teachers' intention to use education 4.0 building on already established antecedents and factors.

Contribution/Originality: This paper contributes to the literature by investigating the utilization of education 4.0 in UAE secondary school education and the factors influencing teachers' intention to use it. The study addresses a research gap and provides valuable insights for educational policymakers and institutions in the UAE and other developing countries.

1. Introduction

In recent years, educational policymakers and institutions worldwide have emphasized the significance of incorporating technology in education (Zheng, Biswas, & Kinshuk, 2021). With the emergence of Industry 4.0, technology adoption has become increasingly vital to address the requirements of the digital age. The term "Education 4.0" describes the integration of technology in education, with a focus on its potential to revolutionize

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conventional teaching and learning practices (Abdullah & Ward, 2016). Education 4.0 is built on the concept of a "smart classroom," a learning environment that is designed to incorporate technology in a way that enhances the effectiveness of teaching and learning (Huang et al., 2021).

The adoption of Education 4.0 has become a significant focus for the United Arab Emirates (UAE) government. The UAE Vision 2021 initiative emphasizes the need to integrate technology into education to improve its quality and equip students for their future roles (Ministry of Education, 2017). To this end, the government has made significant investments in education technology (EdTech) and launched several initiatives, such as the Smart Learning Initiative and the Mohammed Bin Rashid Smart Learning Program, to promote its adoption in schools (Al-Shamsi, 2017).

Despite the United Arab Emirates (UAE) government's efforts to promote Education 4.0, there is a dearth of empirical research on its utilization in UAE institutions, particularly in the context of secondary school education (Alqurashi, 2019). Additionally, there is a lack of awareness regarding the factors that impact the effective use of technology concerning Education 4.0 (Zheng et al., 2021). This research gap is especially crucial because Education 4.0 holds the potential to revolutionize conventional teaching and learning methods in the UAE and enhance the quality of education.

Previous research has predominantly focused on examining the factors that impact the intention to use technology in education, particularly e-learning, in higher education institutions or colleges in the UAE (Al-Tamimi & Al-Sharafi, 2013; Alzahrani & Alshumaimeri, 2021; Fjortoft, 2019). However, most of these studies have centered on students and have only partially explored the intention to use Education 4.0. Furthermore, these studies have mainly concentrated on developed countries' contexts, which may not be generalizable to developing nations such as the UAE (Zheng et al., 2021). Therefore, there is a pressing need for research that delves into the factors that influence the adoption and utilization of Education 4.0 in the context of UAE secondary school education.

In order to fill the existing research gap, the present study endeavors to explore the factors that influence the inclination of secondary school teachers in the United Arab Emirates (UAE) to utilize Education 4.0. To achieve this goal, the study employs the Unified Theory of Acceptance and Use of Technology (UTAUT) model, which is widely recognized as a comprehensive framework for explaining the various factors that affect users' intentions to adopt technology in different contexts (Venkatesh et al., 2012). The UTAUT model comprises four primary constructs that contribute to determining users' propensity to adopt technology. These constructs are performance expectancy, effort expectancy, social influence, and facilitating conditions.

The term "performance expectancy" refers to users' perception that using technology will improve their performance, while "effort expectancy" relates to their belief that using technology will be effortless. "Social influence" refers to the impact of others on users' decision to adopt technology, and "facilitating conditions" refer to users' perception of the availability of resources and support to enable technology use (Venkatesh et al., 2012).

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2. Literature Review

2.1. Overview of Secondary Education Institutions in the UAE

While the UAE had already been moving towards digitalization and education 4.0 before the pandemic, the COVID-19 outbreak has accelerated the implementation of technology in education. Before the pandemic, around 60% of private schools in the UAE had already adopted online platforms (Ridge & Erfurth, 2020). However, with the widespread school closures that occurred in response to the pandemic, the government has fully embraced education 4.0 as a means to ensure that education continues uninterrupted, particularly for vulnerable children. In the UAE, the Ministry of Education is responsible for education and provides free state-funded education for all citizens (World Education Network, 2022). The pandemic has underscored the importance of technology in education and has prompted the UAE to further integrate education 4.0 in its educational system.

According to the World Education Network (2022), education is free for UAE citizens at government schools and institutes, as well as university level, and is mandatory for children aged between 6 and 18. Non-UAE citizens are required to pay for education fees to attend government institutes. The UAE Ministry of Education is responsible for setting educational policies, curriculum, and studies at all levels, as well as developing strategies aligned with the response to the COVID-19 pandemic. Secondary education in the UAE lasts for three years and covers grades 10, 11, and 12. Technical secondary education is also offered by technical, commercial, and agricultural secondary schools, divided into two levels: level 1 for preparatory education and level 2 for technical, commercial, and agricultural secondary education (World Education Network, 2022).

The Ministry of Education (MoE) governs primary, secondary, and higher education in the UAE on a federal level. However, each emirate has its own local governing body. For instance, in Dubai, secondary education is governed by the Knowledge and Human Development Authority (KHDA). Similarly, in Abu Dhabi, the Department of Education and Knowledge governs secondary education; while in Sharjah, the Sharjah Private Education Authority governs private schools (World Education Network, 2022).

2.2. The Evolution of Education 4.0

The evolution of the education sector can be traced back to Education 1.0, which began in the late 18th century and was influenced by essentialism (Ramírez-Montoya et al., 2022). As new technologies emerged and advanced, it became possible to identify four paradigms of educational evolution, which acted as catalysts for the appearance of new educational paradigms (Almeida & Simoes, 2019). Education 1.0 is characterized by a traditionally expository model, with evaluation based mainly on written and oral assessments. This educational paradigm aimed to meet the needs of an agricultural society, where knowledge was transferred from teacher to student, and students focused on the explanation provided by the teacher (Hussin, 2018). The emergence of new technologies has led to the development of new educational paradigms, such as Education 4.0, which integrates technology and digitalization into the learning process.

The Education 2.0 paradigm, which emerged in the early 20th century, was influenced by behaviorism and highlighted the importance of group projects using open technologies within institutional and classroom contexts (Almeida & Simoes, 2019; Huk, 2021). This type of education system was designed to meet the industrial needs of society, where the

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focus of knowledge acquisition was on technologies that would be useful in the workplace. Under Education 2.0, teachers not only taught but also acted as moderators to promote interaction in the classroom and discover the talents of their students through collaborative work (Almeida & Simoes, 2019). The evolution of Education 2.0 to Education 3.0 aimed to increase connectivity and interaction between people, particularly between teachers and students, and not just access to information (Hussin, 2018).

Indeed, Education 3.0 emerged in the late 20th century as an evolution from Education 2.0, characterized by a combination of educational experiences with the use of ICTs to encourage cooperation and collaboration in educational processes based on humanist and constructivist principles. The goal of Education 3.0 is to foster self-learning practices and meet the needs of society through the incorporation of technology. This stage of education allows for the integration of new tools that have improved the form of education over the last few decades, as noted by Hussin (2018). Education 4.0, the current paradigm, builds on this by integrating advanced technologies like artificial intelligence, virtual reality, and machine learning to further enhance the educational experience.

Furthermore, Education 4.0 is the latest paradigm in the evolution of education, which was developed in the early 21st century to meet the needs of the innovation age. This new paradigm reinterprets the concepts of student, teacher, and school learning to meet the demands of Industry 4.0. According to Himmetoglu (2020), Education 4.0 is an emerging paradigm that provides learning models adapted and customized according to real-time learner profiles. This new paradigm has been made possible by the dynamism of technology and the merging of the digital, biological, and physical aspects, which have changed the way of life in society (Almeida & Simoes, 2019).

Hussin (2018) emphasizes that Education 4.0 promotes closer connections with various sources of information and encourages self-directed learning, with a full digital approach to information search. Education 4.0 aims to stimulate students' competencies and encourages them to create new content through research, leading to greater interaction and dynamism in participative and creative learning (Hussin, 2018). Flipped classrooms are an example of innovative teaching and learning practices under Education 4.0, where students can acquire knowledge outside the traditional classroom through digital sources, such as videos and presentations, and then investigate related lessons on their own (Himmetoglu, 2020). Overall, Education 4.0 represents an advanced version of Education 3.0, where students can utilize classroom time for discussions, analysis, and problem-solving.

2.3. The Unified Theory of Acceptance and Use of Technology Model (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a theoretical framework designed to explain the intention of using information systems and the subsequent behavior (Faraliza et al., 2014; Batucan et al., 2022). Behavioral intention is defined as an individual's subjective probability of engaging in a particular behavior (Buraimoh et al., 2020). The UTAUT model is focused on identifying four key drivers of information system adoption, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. The theory has been subjected to rigorous empirical testing in longitudinal studies, with strong evidence of support found particularly in the area of social influence (Almulla, 2022; Masmali & Alghamdi, 2021). The fundamental components of the UTAUT model have been incorporated into the expectation

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confirmation theory, which serves as the foundational platform for this study, with modifications made to enhance the accuracy of actual behavior prediction.

As per the findings of Ali et al. (2018) and Wut et al. (2022), the UTAUT model is a comprehensive and valuable tool for researchers as it encompasses a range of theories related to technology adoption. It is widely regarded as having the highest explanatory power compared to other models focused on technology acceptance. In addition, the UTAUT model has been applied in studying technological advancements in higher education, such as cloud-based virtual learning technologies, virtual learning environments, desktop web conferencing, and interactive whiteboards. Furthermore, the UTAUT model has been utilized in educational research to determine the factors that influence the acceptance and use of different technologies across various countries (Almulla, 2022).

During the literature review, several UTAUT extensions and empirical studies were encountered that modified the UTAUT model in order to gain a better understanding of the intention to use online learning (Batucan et al., 2022; Almulla, 2022). Additionally, the UTAUT model has been demonstrated to be an effective tool for predicting teachers' intention to use blended learning (Yang et al., 2022; Yeboah & Nyagorme, 2022). In this study, the UTAUT model was employed as the theoretical framework. Originally formulated to assess the likelihood of successful acceptance and utilization of an IT or information system introduced within an organizational setting, the UTAUT model aids in comprehending the drivers that influence technology adoption and designing targeted interventions for users who may be less inclined to adopt the technology.

The UTAUT model was deemed the optimal theoretical framework for this study for several reasons. Firstly, the model has been shown to account for up to 70% of the variance in the behavioral intention to use an IT or information system, surpassing the effectiveness of other comparable models (Almulla, 2022). Secondly, the UTAUT model has demonstrated its effectiveness in predicting user acceptance of IT in various contexts and is a relatively recent model in the field (Almulla, 2022). Thirdly, the model's constructs are derived from eight theories in social psychology and sociology, offering a comprehensive theoretical foundation (Almulla, 2022). Lastly, the UTAUT model has exhibited significant influence in determining user perception of technology use (Yeboah & Nyagorme, 2022; Almulla, 2022), accounting for more variance in behavioral intention than other models related to the TAM. The UTAUT model was originally developed to elucidate user intentions to adopt new technologies (Yeboah & Nyagorme, 2022; Almulla, 2022).

2.4. Development of UTAUT Theory

The UTAUT model comprises four essential determinants of information system adoption, including performance expectancy, effort expectancy, social influence, and facilitating conditions. Among these, performance expectancy, which reflects a teacher's belief that technology use will enhance their classroom teaching and increase their productivity, is of utmost importance in determining their behavioral intention to use technology (Batucan et al., 2022). Meanwhile, effort expectancy, which represents teachers' perception of the ease of using an information system, is also a critical determinant of technology adoption, as teachers who perceive technology use as effortless are more likely to accept mobile technology (Buraimoh et al., 2020).

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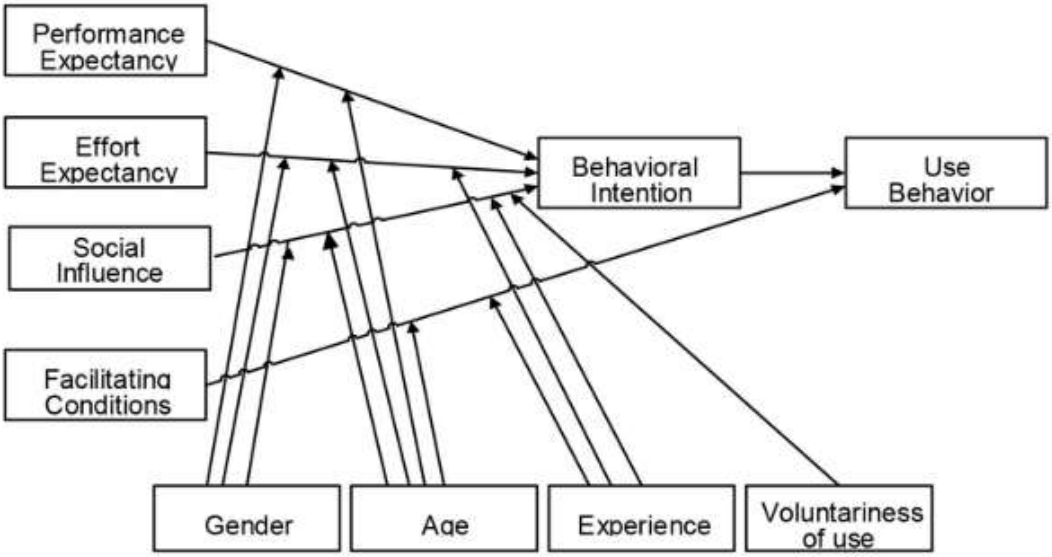
This study aimed to investigate the intention to use technology and address the limitations of previous research and concepts related to technology adoption (Batucan et al., 2022). Buraimoh et al. (2020) suggested that demographic factors, such as sex and age, and voluntary procedures and involvement can moderate the impact of the four key constructs on use intentions and performance. The UTAUT model identifies performance expectancy, effort expectancy, and social influence as determinants of behavioral intention, whereas behavioral intention and facilitating conditions directly influence use behavior. Facilitating conditions refer to individuals' perception of the technical support and resources provided by an organization to aid them in using a particular technology (Funmilola et al., 2020). Figure 1 illustrates the UTAUT model.

Figure 1: UTAUT Model



Source: Batucan et al. (2022)

In various countries and contexts, the UTAUT model has been extensively used to study technology acceptance. It consists of four primary constructs, which include performance expectancy, effort expectancy, social influence, and facilitating conditions, as well as four moderators, such as gender, age, experience, and voluntariness of use, that affect behavioral intention and use behavior (Almulla, 2022). Researchers have often extended or modified the model to better suit their research objectives, and as a result, UTAUT has been found to be a practical framework for studying IT use behavior and its influencing factors (Batucan et al., 2022). In this regard, Batucan et al. (2022) developed an integrated version of the UTAUT model that combines the core elements of IT use behavior and the moderators of the four key relationships to provide a more comprehensive framework for studying technology acceptance.

3. Conclusion

In conclusion, the implementation of Education 4.0 in the UAE has the potential to significantly improve the quality of education and enhance students' learning experiences. However, the successful adoption and integration of new technologies in education require careful consideration of various factors such as the UTAUT model's core constructs, moderators, and other relevant variables. The UTAUT model provides a comprehensive framework for understanding technology adoption and use behavior, making it a useful tool for guiding research on technology acceptance in the education

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sector. Studies in the UAE have shown that teachers' perceptions of performance expectancy, effort expectancy, social influence, and facilitating conditions significantly influence their behavioral intention to use educational technologies such as mobile applications and online learning platforms. Additionally, demographic factors such as age, gender, experience, and voluntariness of use also moderate the relationship between these core constructs and use behavior. Therefore, policymakers and educators should consider these factors when designing and implementing Education 4.0 initiatives in the UAE.

Furthermore, research has shown that the successful implementation of Education 4.0 requires a significant investment in infrastructure and resources to support the integration of new technologies into the education system. This investment should include the provision of technical support, training for educators, and the development of appropriate curricula and instructional materials. Additionally, the implementation of Education 4.0 requires a shift in the traditional teaching and learning approaches towards more student-centered and collaborative models. This requires a rethinking of the role of teachers as facilitators of learning rather than knowledge transmitters. Moreover, the implementation of Education 4.0 in the UAE should also consider the cultural and social context of the country. The UAE has a diverse population, including expatriates from different countries, and a strong emphasis on Islamic values and culture. Therefore, the implementation of new technologies should be culturally appropriate and sensitive to the needs and values of the UAE's population. This can be achieved through the development of localized content and the involvement of local stakeholders in the design and implementation of Education 4.0 initiatives.

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Conflict of Interest

The authors reported no conflicts of interest for this work and declare that there is no potential conflict of interest with respect to the research, authorship, or publication of this article.

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