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Deanship of Scientific Research

Factors Affecting Teachers' Usage of Augmented Reality in Arabic Language to Non-Native Speakers Classroom

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Abstract

Objectives: Augmented reality is changing the service sectors, but there is paucity of research on its adoption in the education sector especially for Arabic language to non-native speakers institutes. Moreover, the adoption of augmented reality by teachers teaching Arabic to non-native speakers can help in improving the language learning. Therefore, this research aimed to examine the factors that affect the behavior intention of teachers towards augmented reality and actual use behavior of augmented reality. It could be the most appropriate model to predict technology adoption.

Methods: The questionnaire was designed for data collection, and measurements were adapted from previous valid studies. The data were gathered from 63 Arabic language teachers, and Smart pls was used for analysis.

Results: The results highlighted that among all elements of UTAUT including social influence (SI), effort expectancy, facilitating condition, performance expectancy, only social influence and FC influence the behavioral intention of teachers towards augmented reality and this behavioral intention leads to actual use behavior of augmented reality by teachers teaching Arabic to non-native speakers.

Conclusions: The study has focused on UTAUT framework to investigate the factors affecting adoption of augmented reality among teachers teaching Arabic to non-native speakers. Teachers' behavioral intention and usage of augmented reality in classrooms can be influenced by social influence and facilitating conditions. This research can help educational policymakers to emphasize social influence and FC to enhance behavioral intention and actual use behavior of augmented reality.

Keywords: Augmented Reality; Virtual Reality; Performance Expectancy; Facilitating Conditions; Social Influence; Behavioral Intention.

العوامل المؤثرة في استخدام المعلمين للواقع المعزز في اللغة العربية للناطقين بغيرها في الفصول الدراسية

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ملخّص

الأهداف: يعمل الواقع المعزز على تغيير القطاعات الخدمية، لكن هناك ندرة في الأبحاث حول اعتماده في قطاع التعليم، وخاصة معاهد اللغة العربية لغير الناطقين بها. علاوة على ذلك، فإن اعتماد الواقع المعزز من قبل معلمي تدريس اللغة العربية لغير الناطقين بها يمكن أن يساعد في تحسين تعلم اللغة. لذلك هدف هذا البحث إلى دراسة العوامل التي تؤثر على نية سلوك المعلمين نحو الواقع المعزز، وسلوك الاستخدام الفعلي للواقع المعزز. وبالتالي يمكن أن يكون النموذج الأكثر ملاءمة للتنبؤ باعتماد التكنولوجيا.

المنهجية: تم تصميم استبانة لجمع البيانات، وتم تكييف القياسات من الدراسات السابقة الصحيحة. جمعت البيانات من 63 معلم لغة عربية، وتم استخدام Smart pls للتحليل.

النتائج: أبرزت النتائج أنه من بين جميع عناصر UTAUT بما في ذلك التأثير الاجتماعي(SI) ، وتوقع الجهد، وحالة التسهيل، وتوقع الأداء، فإن التأثير الاجتماعي و FCفقط يؤثران على النية السلوكية للمعلمين تجاه الواقع المعزز، وهذه النية السلوكية تؤدي إلى سلوك الاستخدام الفعلي. الواقع المعزز من قبل معلمي تدريس اللغة العربية لغير الناطقين بها.

الخلاصة: ركزت الدراسة على إطار UTAUT لمعرفة العوامل المؤثرة في تبني الواقع المعزز لدى معلمي اللغة العربية لغير الناطقين بها. يمكن أن تتأثر النية السلوكية للمعلمين واستخدامهم للواقع المعزز في الفصول الدراسية بالتأثير الاجتماعي والظروف الميسرة. يمكن أن يساعد هذا البحث صناع السياسات التعليمية على التركيز على التأثير الاجتماعي والتواصل الاجتماعي لتعزيز النية السلوكية وسلوك الاستخدام الفعلي للواقع المعزز.

الكلمات الدالة: الواقع المعزز؛ الواقع الافتراضي؛ توقع الأداء؛ تسهيل الشروط؛ التأثير الاجتماعي؛ النية السلوكية

Introduction:

Digital technology advancements have significantly modernized almost every sector, including education. Technology-based learning approaches such as e-learning and online courses are helping educate students through the internet (Mohd Nizar et al., 2018). Technology adoption is also helping teachers (Kotrlik & Redmann, 2009; Aldunate & Nussabaum, 2013; Kearney et al., 2018; Huang et al., 2020) via different technologies such as ICT (Maharaj-Sharma et al., 2017), mobile teaching (Santi et al., 2020), Augmented Reality (AR) and Virtual Reality (VR) (Annamalai et al., 2023). According to Alotaibi (2023) AR and VR have the potential to revolutionize the overall effectiveness of learning processes. AR is defined as "the use of the virtual world so as to enhance the real world" while VR combines the visual aspects of the physical and computer world, both of which can inspire enthusiasm for learning in students (Alotaibi, 2023; Angra et al. 2022).

While VR is often associated with gaming experiences, it has significant applications in the education sector as well (Alalwan et al, 2020; Mohd Nizar et al., 2018). Both AR and VR can help students learn Arabic more effectively by increasing motivation, encouraging out-of-class language use, and enhancing active engagement with school subjects (Rahmawati & Tazali, 2022). To date, despite the multitude of available studies on the potential of this technology for learning new languages, studies on its integration in language courses are limited (Mikułowski and Brzostek-Pawłowska, 2020). VR and AR, due to their interactive nature, motivate students to learn providing a video game-like experience, aspiring a sense of play and helping them develop both soft and hard skills (Yildirim, 2020). AR is a highly interactive VR variation that combines the visual aspects of physical and computer worlds. For example, pointing mobile devices to an object can provide additional information (Turban et al., 2018; Van Krevelen & Poelman, 2010). This technology can enhance students' interest by creating immersive learning environments which reduce distractions and (Alalwan, 2020; Gadelha, 2018), combined with the use of VR-presented video content, can establish connections between concepts which support constructivist learning (Wan et al., 2021). The combination of real and digital worlds in AR and VR provides a visually appealing and rich environment, introducing new ways and improving students' overall learning experience (Rose, 2019). Thus, the use of relevant digital material by teachers has the potential to heighten students understanding of the world. However, literature highlighting the behavioral intention of teachers towards teaching using AR is scarce.

Various technology acceptance models and theories have been used to study the behavioral intention towards technology and underlying factors, including the Theory of Reasoned Actions (TRA) (Ajzen & Fishbein, 1975), Technology Acceptance Model (TAM) (Davis, 1989), and the Theory of Planned Behavior (TPB) (Ajzen, 1991). In an attempt to incorporate as many factors affecting behavioral intention towards technology adoption as possible, Venkastesh et al. (2003) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT). This theory has been extensively used in the educational sector by researchers focusing on e-learning (Lin et al., 2013; Gunasinghe et al., 2020), virtual classrooms (Aditya & Permadi, 2018), mobile learning systems (Almaiah et al., 2019), humanoid robots (Guggemos et al., 2020), electronic records management (Mukred et al., 2019), desktop video conferencing (Lakhal et al., 2013), and cloud classrooms (Yang et al., 2019). However, a limited number of studies focusing on augmented reality (AR) is available. Some studies emphasized the significance and effectiveness of AR and VR (Tegan, 2021) for teaching languages (Al-Asheeri, 2017) by empowering teachers to help their students learn (Roslan, 2020), while others questioned their effectiveness due to restrictions that limit their application (Al-Subaie and Issa, 2020; Karacan and Akoğlu, 2021). Alabdulla (2018) reported that the curriculum for teaching Arabic to non-native speakers lacks the latest modern technology innovations such as AR. Furthermore, research on the perspective and experience of non-native Arabic language teachers regarding the use of AR in Arabic language teaching in terms of the effectiveness of this technology at multiple levels, including comprehending and incorporating new ideas into the daily life of students and the factors influencing behavioral intention of teachers towards adoption of AR in teaching, is lacking. Fuertes et al. (2020) highlighted that to produce a working conceptual framework, results from prior studies should be combined with one or more existing theoretical frameworks. Therefore, this research has used the UTAUT framework which emphasizes performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC) (Pinto et al., 2022) as key factors to study teachers' behavioral intention to adopt AR in the classroom. Thus, the first objective of the study is to highlight the factors

affecting behavioral intention of teachers teaching Arabic to non-natives toward augmented reality. It will discuss which factors among UTAUT framework will enhance the behavioral intention. The second objective is to reveal the influence of teachers' behavioral intention of augmented reality on their actual use of augmented reality in classrooms.

This study will help the teachers to determine the factors that can influence their adoption of augmented reality in classrooms. The adoption of this latest technology by teachers will not only create ease for them, but it will help the non-native speakers to learn Arabic in short time. The usage of AR by teachers in classroom will build the interest of learners, they will be more motivated and learn Arabic confidently. Thus, the study can act as a guideline for Arabic language teaching institutions to create the environment for instructors so that they can adopt augmented reality and use it.

The research is limited to Arabic language instructors teaching non-native speakers. Moreover, it has only emphasized the factors suggested by UTAUT framework including performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC). The first section of the research has introduced the variables and highlighted the need for research. The literature review is given in the second section. The third section provided the detail on methodology, it has highlighted about data collection, sample, sample size, population, and analysis technique. The fourth and fifth sections focused on results and discussion respectively. The last sections have highlighted the implications, limitations, and recommendations.

Importance of the study

This research aims to investigate the perspectives of teachers on the use of Augmented Reality (AR) for teaching Arabic as a second language. The perceptions of teachers are crucial for this study as they provide valuable insights. Furthermore, this study holds significance as it can lay the groundwork for understanding the application of AR in teaching Arabic as a second language. AR combines visual, auditory, and interactive elements, providing a multimodal learning experience. This multimodality can enhance comprehension and retention of language, as learners receive information through multiple sensory channels. The findings can inform decision makers and provide a comprehensive understanding of the key areas in Arabic language instruction. Additionally, while there is existing research on AR in English second language acquisition, the area of AR in Arabic as a second language instruction remains relatively unexplored.

Literature Review

Significance of AR in Education

Research suggests that AR is more effective in vocabulary acquisition and improving language learning outcomes including vocabulary, reading, pronunciation, writing, speaking, comprehension, and phonics than traditional approaches (Ibrahim et al., 2018; Parmaxi & Demetriou, 2020). Furthermore, AR scaffolding helped Chinese students develop writing abilities by providing access to internal and operational elements for organizing generated texts at both word and sentence levels (Wang et al.,2017). AR can assist cultural awareness development by visualizing cultural content and fostering interaction between teachers and learners (Parmaxi et al., 2013; Yang & Liao, 2014). Furthermore, it can provide language practice opportunities by encouraging genuine conversations in natural settings as demonstrated in the Mazarin iPad app designed to help users learn through real-world routine activities, such as using the campus restaurant information system to improve Chinese pronunciation (Young, 2016; Palaigeorgiou et al., 2017). Furthermore, AR can improve listening, speaking, and writing skills, as well as control over content, article structure, and vocabulary (Liu, 2009; Wang, 2017).

AR-aided instructions enhance long-term memory, commitment, and consciousness of cognitive processes in writing (Lin et al.,2020). Programs like "Letters Alive" teach elementary school pupils to read by using vocabulary cards and 3D animations (Johnson et al., 2016), while multimedia-rich AR programs helped preschool pupils develop superior pre-literacy skills (Majid et al., 2018). AR is effective for enriching young learners' vocabulary driven by their positive attitudes towards this technology (Hwang et al., 2016; Vedadi et al., 2018; Juan et al., 2010; Barreira et al., 2012), while equally effective in vocabulary acquisition by adults as indicated by their observed academic performance and word retention improvement (Santos et al., 2016).

Huisinga (2017), developed an AR platform based on a scaffolding-theory mixed-methods approach by combining multimedia visual aids, text comprehension and vocabulary with questionnaires and focus group interviews to help children with weaker reading skills improve. Sahin and Ozcan (2019) used a quasi-experimental approach to test the effectiveness of the Aurasma 3D mobile app in teaching the ancient Turkish language to college students. Results demonstrated that AR increased student success, while establishing a pleasant and inspiring environment for students.

Moreover, higher education students are becoming more interested in language-learning AR-technology (Lin and Lan, 2015). Technology-aided educational practices enhanced the Arabic learning potential of Omani students particularly in terms of analysis, understanding, and discussion, improving learning quality, student enthusiasm, attentiveness, intent, and problem-solving skills (Al-Busaidi et al. 2016). Additionally, AR educational games facilitate effective learning of the Arabic language by improving student engagement and learning results (Busaidi et al., 2016). However, Arabic instructors lack of computer self-efficiency hinders the implementation of new technologies (Ismail et al., 2010). Teachers' awareness of the technological advances cultural non-neutrality of information can significantly impact their attitudes and teaching methods (Albirini, 2004). In 2016, a rich in teaching tools and user-friendly preliteracy AR smartphone app was well received both by teachers and students (Majid et al., 2018). A year later, two AR educational English vocabulary gaming apps for third-grade students were developed and tested in open and natural settings, improving students learning performance both in self-directed and task-based AR approaches.

Favored by the simplicity of use, mobility, social engagement, context sensitivity, connection, accessibility, and individuality, mobile-based AR is appealing (Reinders & Pegrum, 2017). An increased interest and engagement of learners driven by curiosity and tendency to use new technologies compared to traditional teaching techniques has been reported (Lindgren & Johnson-Grenber, 2013). Although the efficacy of AR in providing students with challenging, motivating, pleasant, and engaging assignments is well documented (Richardson, 2016; Taskiran, 2019), factors that affect AR adoption by teachers are unclear. Venkatesh et al., (2003) developed the user adoption of information systems UTAUT framework by intergrading eight different models. Mohd Nizar et al. (2018) highlighted behavioral intention as more relevant in predicting users' intention towards proposed technologies and focused on the main aspects of UTAUT to predict behavioral intention towards Mobile Augmented Reality Learning Cardiovascular (MARLCardio). Alotaibi (2023) emphasized on UTAUT and proposed that Pe, EE, SI, SI can influence behavioral intention towards AR adoption. Therefore, the present study focused on these elements of UTUT framework to determine AR adoption by teachers. Relevant to each element literature is given below.

Performance Expectancy and Behavioral Intention Towards AR

The significance of PE has not only been proven in UTAUT model, but it is also proved by many theories and model such as TAM and TPB. Venkatesh et al., (2012) revealed that when learning or teaching, PE is defined as the degree to which person believes that adopting the given system will allow him or her to achieve the objectives. In context of current study, PE is conceptualized as the degree to which teachers believe that performance of augment reality applications, instrument and technologies will help them in improving their performance in teaching. Many prior studies focusing on different technologies have highlighted the positive relationship between PE of technology and behavioral intention (e.g., Do Nam Hung et al., 2019; Chao, 2019; Fedorko et al., 2021), but there is paucity of literature in context of PE of AR. In addition, Alotaibi (2023) developed the conceptual framework based on UTAUT and AR in context of education and proposed that PE can enhance behavioral intention towards AR. Thus, following hypothesis is developed:

H1: PE of AR significantly influences the behavioral intention towards AR.

Effort Expectancy and Behavioral Intention Towards AR

In technology acceptance model theory developed by (Davis, 1989), and TAM 2 by (Venkatesh & Davis, 2000) EE was mentioned as perceived ease of utilize. According to Venkatesh et al. (2003) effort expectation is an extent to which a person believe that they will have ease in utilizing the system or they will be free from any effort while using the technology. In context of current study, it is defined as degree to which a teacher thinks the he or she will use the AR if it will be eased to use, or it will be hassle free. Many studies focusing on different technologies in education sector including early warning

systems (Raffaghelli et al., 2022), e-learning (Gunasinghe et al., 2020), mobile learning (Almaiah et al., 2019) and massive online open courses (Altalhi, 2021) found that EE is significantly related to behavioral intention. Whereas Madigan et al. (2017) and Paulo et al. (2018) highlighted insignificant connection between EE and behavioral intention. These studies focused on different technologies but ignored augmented reality, thus, to investigate the connection between EE and behavioral intention towards augment reality, following hypothesis is developed:

H2: EE of AR significantly influences the behavioral intention towards AR.

Social Influence and Behavioral Intention Towards AR

SI is "the person's perceptions that group of people who are important to him think he should or should not perform the behavior in question" (Venkatesh et al., 2003, p 452). The notion of SI is not directly highlighted in TAM, TAM2, TPB, and DTPB, but these models/theories used the similar concept (i.e., subjective norm). According to Taylor and Todd (1995), superiors and particularly peer groups are closer to SI. In context of current study, SI is conceptualized as the extent to which a teachers perceive pressure from peers, superiors, or close groups in his or her environment to use AR in teaching.

UTAUT model explains the beneficial connection between SI and behavioral intent toward a system or technology, but many studies found this relationship as negative. Abdullah and Ward (2016) evaluated different studies focusing on SI and found that 27 studies out of 32 highlighted positive association of SI with behavioral intention. In addition, Alotaibi (2023) found an important connection between SI and behavioral intention in context of university students' augmented reality, but this research has emphasized on augment reality adoption by teachers, and developed the following hypothesis:

H3: Social influence of AR significantly influences the behavioral intention towards AR.

Facilitating conditions, Behavioral Intention Towards AR and Use Intention

Theory of planned behavior and DTPB used the notion of perceived behavioral control, but UTAUT emphasized on FC instead of perceived behavioral control. Venkatesh et al. (2003) defined FC as a personal belief that the organizational and technical infrastructure is in place to support the use of the system, but in scenario of current research it is conceptualized as teachers perceived level towards the infrastructure to support the use behavior of augment reality (AR). Many studies have been conducted that have discovered a beneficial association between enabling circumstances and behavioral intention. towards system usage, such as Sung et al. (2015) revealed that FC are beneficial to use behavior of mobile learning. Whereas, studies have also found irrelevant connection between assisting conditions and behavioral intention (e.g., Madigan et al., 2017; Maillet et al., 2015). Thus, there is need of further investigation on influence of FC on behavioral intentions (Mohd Nizar et al., 2018) and use behavior. Therefore, the following hypotheses are developed:

H4: FC for AR significantly influences the behavioral intention towards AR.

H5: FC for AR significantly influence the use behavior of AR.

Behavioral Intention toward AR and Use Behavior of AR

Behavioral intention is the readiness of people to use specific system (Ajzen, 1992) and Venkatesh et al. (2003) explained that this intention significantly influence the usage intention of technology. The link between behavioral intention and used behavior has been highlighted by different studies but there is paucity of literature in context of teaching, particularly the adoption of augment reality (AR) by teachers. Therefore, to find the influence of behavioral intention towards augment reality (AR) on use behavior of augment reality (AR), the following hypothesis is developed:

H6: Behavioral intention toward AR influence the use behavior of AR.

Based on literature-based discussion given above, the following conceptual framework is developed for current research as presented in figure 1.

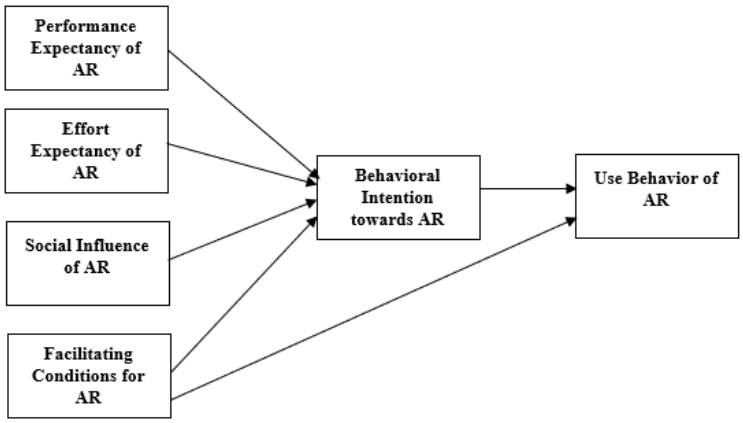

Figure 1: Research Model

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Terminology of the research:

Augmented Reality (AR): according to Milgram and Kishino (1994, p.282): "it is a reality environment where digital media products are used instead of real-world objects." This definition predicts that AR is a mixture consists of virtual factors supported by reality or real-life factors. This research sought to explore the behavioral intention towards AR and the expectancy of using this modern technology in teaching Arabic language for non-native speakers at Islamic university of Madinah (IU).

Method

The integration of Augmented Reality (AR) in the classroom has gained significant attention (Mundy et al., 2019; Marín-Díaz et al., 2022) as a potential instrument for enhancing teaching and learning experiences (Yip et al., 2019; Wen, 2021) and its important to understanding the considerations that impact teachers' usage behavior of AR in classrooms. Therefore, this study has highlighted the important components that can impact the behavioral intentions of teachers towards AR and its actual usage by adopting a quantitative method of data analysis. According to Yilmaz (2013) the use of a quantitative method enhances the rigor, objectivity, and validity of research studies, enabling researchers to draw reliable conclusions and make informed decisions based on empirical evidence.

Limits of the research:

This research was limited to explore of the performance, effort, and social influence expectancy of AR in addition to facilitating conditions for it according to points of view of Arabic language teachers who were teaching during the second semester of 2023 in the Institute of Arabic Language Education for Non-native Speakers at Islamic university in Madinah.

Participants

All teachers working at the Institute of Arabic Language Education for Non-native Speakers at the Islamic University of Madinah participated in the study. The total number of Arabic language teachers instructing non-native speakers was 81, and a sample of 63 teachers responded to the questionnaire. These 63 valid responses were then considered for analysis.

Age of Participant

The utilization of educational technology in the teaching process is frequently linked to age as a determining factor (Oyaid, 2009). For this study, the participants' age range fell between 22 and 59 years, encompassing Arabic language teachers across various stages of their careers. As a result, the selected age range represents two generations of teachers table 1.

Table 1. Age of participants

Age in Years	Frequency
22-30	9
31-40	19
41-50	17
51-59	18

Number of Years Teaching

The respondents were divided into four groups based on the number of years of teaching experience: (i) <10 years; (ii) 10-20 years; (iii) 21-30 years; and (iv) >30 years. It was clear that most teachers who responded to the questionnaire had been teaching for more than 20 years table 2.

Table 2. Number of years' teaching experience

Experience Level in Years	Frequency
1-10	5
11-20	15
21-30	29
31-39	14

Data Collection Instrument

To collect data on teachers' perceptions of augmented reality (AR), a questionnaire was employed as a data collection tool in this research study. The questionnaire was carefully developed by the researchers after thoroughly reviewing pertinent literature, ensuring that it was designed to effectively measure the responses of the teachers. In order to refine the questionnaire and gather feedback, it was initially presented to a panel of specialists. The questionnaire was revised and adjusted according to the feedback provided by the specialists. To distribute the questionnaire to the participants, a link was sent to all the teachers. The significance of the questionnaire and the importance of the teachers' cooperation were strongly emphasized. The questionnaire was divided into two sections, the first section aimed to investigate the demographic information. The second section inquired about the response of every participant to questions relevant to UTAUT constructs. The items of every construct including PE, EE, SI, FC, behavioral intention towards AR, and use behavior of AR were adapted from Venkatesh et al. (2003) and Venkatesh et al. (2012) in context of Augmented reality. PE, EE, SI, FC, behavioral intention towards AR, and use behavior of AR were measured with 3 items each. The final after face validity was converted online, and its link (i.e., URL) was shared with teachers. The contact information of teachers was taken from websites of different institutions. Moreover, some teachers in reference group were considered as participants and an online link of questionnaire was sent to them via email. The first 63 responses were considered for analysis. The data analysis was done by using Smart PLS, as its variance-based structural equation modelling is used to examine complex models (Do Nascimento et al., 2016). A pilot study was conducted prior to data collection to verify the validity and reliability of the data collection instrument.

Results and findings

The study is aimed to analyze factors affecting teachers' usage behavior of augment reality in classroom by using the comprehensive UTAUT theory framework which comprises PE, EE, SI, and FC. Therefore, Smart pls was used to analyze the data gathered from questionnaires and demographics were computed with SPSS. The results of demographics highlighted that 6(9.7%) of the respondents were within 26-33 years of age, 34(54.8%) were within 34-41 years, 13(21.0%) were within 42-49 years and 9(14.5%) were more than 49 years of age. In addition, first, to examine the convergent validity, a measurement model was tested which shows average variance extract (AVE), factor loadings and composite reliability (Hair et al., 2006). According to Wijaya (2023) the outer loading value more than 0.7 is considered as good indicator. The findings demonstrated that factors loadings of all the items of variables were greater than 0.7 except second item of FC and first item of use behavior of augment reality. Their loadings were 0.03 and 0.260 respectively. Figure 2 given below highlights the loadings of all the items.

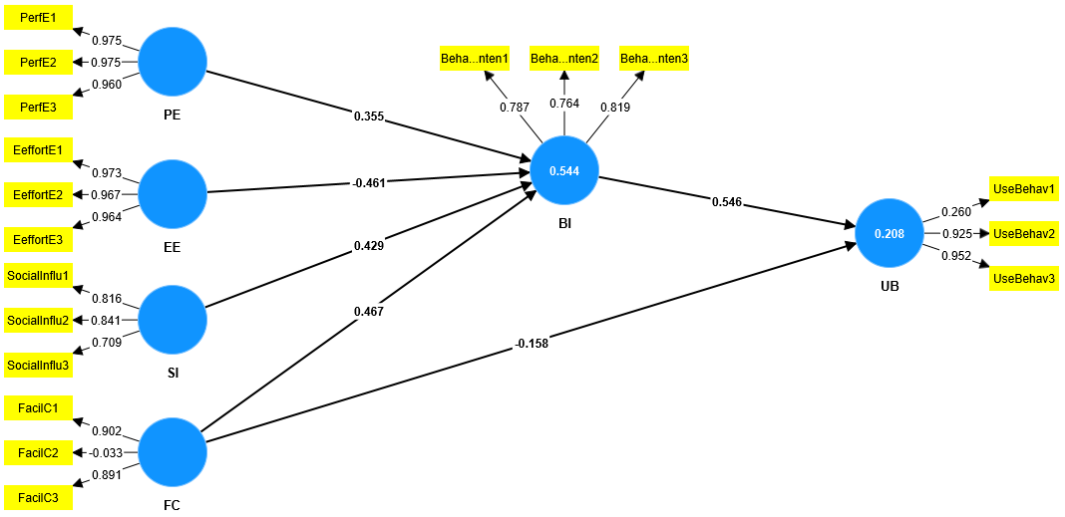

Figure 2. Validity (Including all loadings)

The second item of facilitating condition with loading 0.033 and first item of use behavior of AR was removed from final validity testing as their values are less than the standard of 0.7. The validity model of this research after removing these items is given in figure 3.

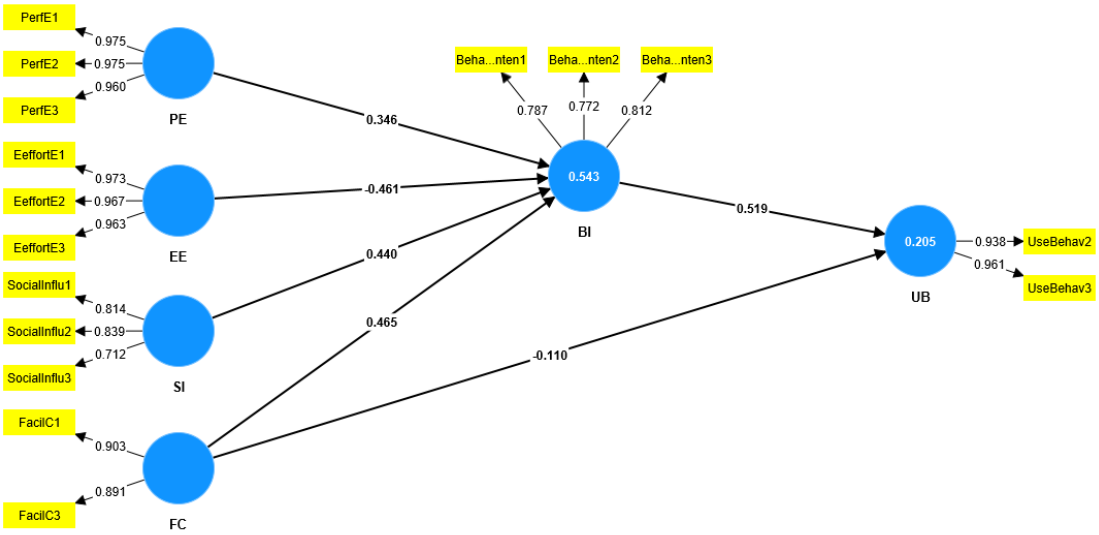

Figure 3. Validity (Removing all loadings)

Composite reliability demonstrates that to which extent the indictors of constructs show the latent construct, and according to Hair et al., (2006) the recommended value for composite reliability should be minimum 0.7. Average Extracted Variance (AVE) highlights the total variance among the indicators accounted for by the latent construct, and Hair et al., (2006) argued that its value should be at least 0.5. The results highlighted that all values of Composite Reliability (CR) and Average Extracted Variance (AVE) are more than the given standards. In addition, Cronbach's alpha is examined, and findings revealed that its value is more than 0.7 for all indictors. All factor loadings, and values of CR, AVE, and Cronbach's alpha are given in table 3.

Table 3: AVE, CR, Factor Loadings, Items

Constructs	Items	Loadings
Performance Expectancy AVE= 0.94 Cronbach's Alpha= 0.968 Composite Reliability= 0.979	I find augmented reality applications useful for teaching	0.975
	Augmented reality applications allow me to accomplish teaching activities more quickly	0.975
	Augmented reality applications increase my teaching productivity	0.96
Effort Expectancy AVE= 0.937 Cronbach's Alpha= 0.966 Composite Reliability= 0.978	Augmented reality applications are easy to use	0.973
	Learning how to use augmented reality applications for teaching is easy for me	0.967
	My interaction with augmented reality applications is clear and understandable	0.963
Social Influence AVE= 0.624 Cronbach's Alpha= 0.711 Composite Reliability= 0.832	My peers who influence my behavior think that I should use augmented reality applications for teaching	0.814
	My friends who are important to me think that I should use augmented reality applications for teaching	0.839
	My leaders whose opinions I value prefer that I should use augmented reality applications for teaching	0.712
Facilitating Conditions AVE= 0.805 Cronbach's Alpha= 0.758 Composite Reliability= 0.892	I have resources to use augmented reality applications	0.903
	A specific person (or group) is available to assist when difficulties arise with augmented reality applications	0.891
Behavioral Intentions towards AR AVE= 0.625 Cronbach's Alpha= 0.701 Composite Reliability= 0.833	I intend to continue using augmented reality applications	0.787
	For teaching, I would use augmented reality applications	0.772
	I will continue to use augmented reality applications on a regular basis.	0.812
Use Behavior of AR AVE= 0.901 Cronbach's Alpha= 0.892 Composite Reliability= 0.948	I use many functions of augmented reality applications for teaching	0.938
	I depend on augmented reality applications for teaching	0.961

After examining convergent validity, in second step the discriminant validity is examined. According to Ramayah, Yeap, & Igatius, (2013) discriminant validity is "the extent to which the measures are not a reflection of some other variables" (p.142). Fornell & Larcker, (1981) explained that for every construct, the square root of Average Extracted Variance (AVE) should be more than its corresponding coefficients pointing the discriminant validity. Table 3 given below shows the value of Fornell and Larcker Criterion which highlights the discriminant validity are given in table 4.

Table 4. Discriminant Validity

	Behavioural Intentions towards AR	Effort Expectancy	Facilitating Conditions	Performance Expectancy	Social Influence	Use Behaviour of AR
Behavioural Intentions towards AR	**0.791**					
Effort Expectancy	0.417	**0.968**				
Facilitating Conditions	0.664	0.439	**0.897**			
Performance Expectancy	0.422	0.933	0.348	**0.97**		
Social Influence	0.64	0.798	0.64	0.783	**0.79**	
Use Behaviour of AR	0.445	-0.099	0.234	-0.122	0.114	**0.949**

In the third step of analysis, R-square is investigated. The value of R square can be met by goodness fit model which is used for testing the structural model. Table 5 given below shows the values of R Square obtained by current research.

Table 5. R-Square Values

	R Square	R Square Adjusted
Behavioural Intentions towards AR	0.543	0.511
Use Behaviour of AR	0.205	0.178

Table 3 shows that R square of behavioral intentions towards augment reality is 0.543 which shows that 54.3 % of behavioral intentions towards augment reality can explain the use behavior of augment reality. The R square of use behavior of augment reality is 0.205 which contends that 20 %. At last, hypothesis testing is done, and results of hypothesis testing are given in table 6. Moreover, figure 4 shows the t-count of every latent variable's parameter.

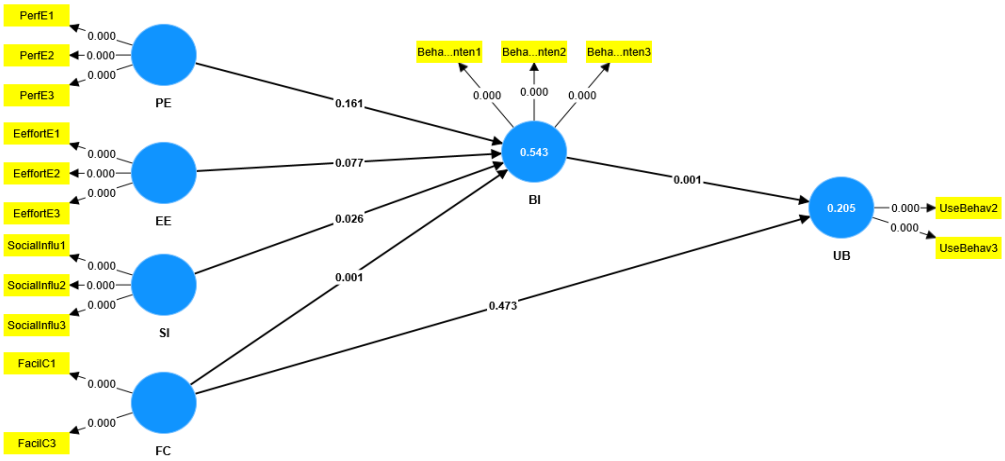

Figure 4. Hypotheses Testing

Table 6. Results of Hypotheses testing

Hypothesis	Indication	T-Statistics	P-Values	Results
Performance Expectancy → Behavioral Intention Towards AR	H1	1.402	0.161	Rejected
Effort Expectancy → Behavioral Intention Towards AR	H2	1.766	0.077	Rejected
Social Influence → Behavioral Intention Towards AR	H3	2.222	0.026	Accepted
Facilitating Conditions → Behavioral Intention Towards AR	H4	3.42	0.001	Accepted
Facilitating Conditions → Use behavior of AR	H5	0.837	0.403	Rejected
Behavioral Intention Towards AR→ Use behavior of AR	H6	3.477	0.001	Accepted

The results of hypotheses testing revealed that H1, H2, and H5 are rejected, and H3, H4 and H6 are accepted. These findings highlight that SI and FC influence behavioral intention of augmented reality, but EE and PE do not enhance behavioral intention of AR. Moreover, the results have supported that behavioral intention of augmented reality leads to use behavior of augmented reality. Thus, this research claimed that the teachers' intention to use augment reality is linked to only two factors of UTAUT including SI, and FC, and this behavioral intention of AR leads to actual use behavior of augmented reality in teaching, particularly in classrooms.

Discussion

One platform that might be employed to help learners in obtain the particular data and keeping up their vocabulary knowledge of a language is AR. AR-enhanced flashcards can help students learn Arabic by expanding their knowledge (Zainuddin & Idrus, 2016). Dalim et al., (2016) exhibited a tool dubbed Teach AR for teaching interactive augmented reality to children who do not understand English as a first language. The system was the first AR language learning tool designed to teach young children, ages 4 to 6, about spatial relationships and shapes. Learning strategies of students are significantly influenced both their mental effort and worry about acquiring another language and to educate and study the Arabic language, the "Arabic" mobile augmented reality app was developed in 2017. In the first stages, the application was divided into two main modules: a learning and exercise module with attention-grabbing 3D objects and a graphics, animation, video, and music module. Due to the printed textbook's combination with digital content and user testing, it was found that users were very interested in "Arabic" and rapidly picked up the courses (Hashim et al., 2017), but the adoption of AR by teachers remained a hot debate, thus, this research has emphasized on highlighting the behavioral intention of teachers towards AR and also highlighted the factors affecting the behavioral intention towards AR leading to actual usage.

First hypothesis of the research (i.e., H1) was developed to highlight the influence of PE on behavioral intention of teachers towards AR. The PE refers to teachers' perceptions of the extent to which using AR in the classroom will enhance their performance or effectiveness as educators. The results highlighted the insignificant influence of PE on behavioral intention of teachers towards AR. Thus, H1 is rejected. The results are in line with the study of Purwanto and Loisa (2020) who also found insignificant influence of PE on behavioral intention. The rejection of this hypothesis indicates that teacher's behavioral intention towards AR is not influence by PE of AR systems. The second hypothesis (i.e., H2) aimed to examine the connection between EE and behavioral intention of teachers towards AR. The findings also rejected this hypothesis by considering that teacher's behavioral intention towards AR is not affected by EE. These results are also supported by prior studies (Phan et al., 2020; Pan & Gao, 2021), but they have not focused on AR, particularly in context of education, even though AR in teaching Arabic can make the learning experience more attractive for students. By incorporating AR technology, teachers can leverage visually stimulating and interactive elements to capture students' attention and create a visually appealing learning environment. This attractiveness factor can contribute to a more enjoyable and engaging learning experience, ultimately enhancing student motivation and learning outcomes.

Third hypothesis of the research (i.e., H3) was developed to highlight the effect of SI on behavioral intention of teachers towards AR. The results highlighted relevance of studying behavioral intention of teachers towards AR linked with SI. The hypothesis was accepted by claiming that behavioral intention of teachers towards AR is significantly influenced by the SI. These results are supported by Yu et al., (2021) who also found significant relationship between SI and behavioral intention. The fourth hypothesis was aimed to investigate the connection between FC and behavioral intention of teachers towards AR. The findings revealed that alike SI, FC also enhance the behavioral intention of teachers towards AR. The social influence of teacher implies that the peers, friends, and colleagues that have can influence him or her. The social influencers can either advocate or discourage the teacher for using any technology. Therefore, it can strongly influence the behavioral intention of teachers. Similarly, the facilitating conditions means the environment or surroundings that can assist the teachers in completing the task by using any technology (Nandwani & Khan, 2016). Thus, the Arabic language teachers seek for SI and facilitating conditions, as these factors can change their behavioral intentions to adoption. Moreover, the results highlighted that the utilization of augmented reality in teaching Arabic has the potential to make the instructional process more interactive. Teachers recognized that AR offers opportunities for hands-on and immersive learning experiences, enabling students to actively participate in their learning journey. This interactive nature of AR in Arabic language teaching encourages students to explore, experiment, and collaborate, leading to a deeper understanding and retention of the language. The second last hypothesis was formulated to investigate the relationship between FC and use behavior of AR, and results found that there is insignificant relationship between facilitating conditions, thus, these conditions can only influence behavioral intention of Arabic teachers towards AR.

The last hypothesis (i.e., H6) was designed to determine the influence of behavioral intention of Arabic teachers towards

AR on use behavior of AR. The results highlighted relevance of studying use behavior of AR linked to behavioral intention of Arabic teachers towards AR. Thus, this hypothesis was accepted, by claiming that behavioral intention of Arabic teachers towards AR can influence actual use behavior of AR, but intentional behavior should only be based on SI and facilitating conditions. This suggests that educators recognize the potential benefits and value of AR in enhancing the teaching and learning experience for Arabic language instruction. Their preference for formal implementation indicates a desire for structured and systematic integration of AR technology into the curriculum. It also revealed that the teachers have future plans to utilize augmented reality in teaching Arabic. This implies that educators perceive AR as a promising tool for their instructional practices and have intentions to incorporate it into their teaching strategies in the coming times. The interest and intention to use AR in the future highlight the perceived relevance and potential advantages of this technology in Arabic language education. The teachers who have higher expectations of AR's performance-enhancing potential are more inclined to adopt AR and integrate it into their classroom practices. The acceptance and intention to use AR in the classroom have important implications for the effective implementation of AR in educational environment. When teachers have positive perceptions and expectations about the performance benefits of AR, they are more likely to invest time, effort, and resources into learning and incorporating this technology into their teaching practices. This, in turn, can lead to increased student engagement, motivation, and learning outcomes.

Implications

The study has focused on UTAUT framework in context of AR adoption and use intention among Arabic teachers, thus, it has provided several theoretical and practical implications. In terms of theoretical implications, first, it has extended the literature on PE, EE, SI, FC, behavioral intention, and actual use behavior in context of AR in educational context. Secondly, it highlighted the potential benefits and problems of AR technology in language learning and instruction. The incorporation of AR technology into the educational system has increased the accessibility of learning and teaching resources and boosted the language learning and teaching process. The use of AR can enhance instructors' digital competence, knowledge, and writing abilities, as well as facilitate their collaborative learning in the classroom. Thirdly, this research differs from prior studies as they ignored the application of AR in education and particularly in context of teachers as there is a lack of research that explores the perspectives and experiences of Arabic teachers to non-native speakers at higher educational institutions in Saudi Arabic teachers regarding the use of AR in Arabic language instruction in terms of the effectiveness of this technology on multiple levels.

In context of practical implications this research suggested that when teachers perceive AR as a valuable tool that can positively impact their teaching performance, they are more likely to express a stronger intention to use AR in their instructional practices. Moreover, it has assisted Arabic teachers in developing actionable strategies to assist learners in learning Arabic using technology. An examination of the possible advantages and disadvantages of implementing augmented reality (AR) technology into educational institutions to facilitate the teaching of foreign languages as well as the acquisition of such languages. The implementation of augmented reality (AR) technology into the educational system has resulted in an increase in the availability of learning and teaching materials and an increase in the efficiency with which students and teachers of foreign languages can teach and learn these languages. By using a kind of technology known as augmented reality, instructors can improve their digital competency level and their knowledge and writing skills (AR). In addition, the study has reported that social influence and facilitating conditions can influence the behavioral intention of teachers towards augmented reality. The Arabic language institutions should pay consideration to generate the knowledge about AR and its implications so that teachers can acquire it. When majority of the teachers in institutions will be using AR, it will ultimately develop the social influence that will influence the non-users to adopt it. Moreover, the institutions should facilitate the teachers and develop the classroom systems by keeping in the needs of AR systems.

The availability of this technology may also make it simpler for educators to engage their students in activities that foster collaborative learning with one another and their subject matter experts. The augmented reality (AR) technology and virtual three-dimensional (3D) activities offered ample opportunities for significantly enhancing and expanding writing

skills, grammatical knowledge, and vocabulary relevant to attaining a higher level of language proficiency. Therefore, the educational policymakers should emphasize on the developing social influence and providing facilitating conditions for adoption of technology by Arabic language teachers teaching to non-native speakers.

Limitations and Recommendations

Behavioral intention towards technology adoption always remained a hot debate among researchers, thus, this research has provided the comprehensive model to determine behavioral intentions and use behavior of augmented reality (AR), but still it has several limitations that can addressed by future studies. First, the study has focused merely on Arabic language teachers of KSA, and future studies can generally emphasize AR adoption among teachers irrespective of their language. Secondly, the research indicated that teachers encounter some challenges when using augmented reality in teaching Arabic. Although the specific problems were not outlined, these challenges could include technical difficulties, limited access to resources, or concerns related to pedagogical implementation. Identifying and addressing these challenges is crucial to ensure the effective utilization of AR in the Arabic language classroom and to support teachers in overcoming any barriers they may face. Thirdly, the research has followed the UTAUT framework without addition of any other factor, thus, its recommended for future studies to reveal other elements that can also influence the behavioral intention towards augmented reality.

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