

## PAPER

# Augmented Reality Technology in Learning Arabic Vocabulary from the Perception of University Students

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## ABSTRACT

Augmented reality technology has been widely adopted in various fields, particularly in the realm of education. In the west, this technology has been applied to various foreign languages such as Malay, English, Chinese, Spanish, French, and Ukrainian. However, in the context of learning Arabic in Malaysia, the use of this technology has been less explored, particularly from the perspective of students at the public university level. Hence, this study aims to examine the level of perception among students at University Sains Islam Malaysia (USIM) regarding the use of augmented reality as a new technology in Arabic language learning today. A questionnaire was used in this study to collect data from a sample of 30 respondents. Analytical findings on frequency distribution, percentage, mean, and standard deviation were obtained through descriptive statistical analysis. Cronbach's alpha analysis showed that all eight items of the questionnaire had good internal consistency. The overall mean score of the items was 4.48, indicating a high level of data interpretation. Based on the analysis of the findings, the study revealed that the majority of students responded positively and expressed satisfaction with their readiness to use augmented reality in language learning. In conclusion, augmented reality is a valuable learning aid that can greatly benefit students in understanding Arabic vocabulary more easily.

## KEYWORDS

arabic vocabulary, augmented reality, learning, perceptions

## 1 INTRODUCTION

Society recognizes that the current Industrial Revolution has introduced augmented reality tools as a new technology in the field of education. Augmented reality is defined as a computer-generated visual effect in which virtual objects are superimposed onto the real-world scene displayed on screen. As a result, the user who views the real world through a computer screen will perceive various additional objects alongside the existing reality. In general, there are two types of augmented reality applications: marker-based augmented reality and markerless

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augmented reality [20]. This augmented reality technology can convey information more effectively to the virtual world than to the real world, thanks to specialized tools that engage students' understanding and motivate them to learn. Usually, the augmented reality tools that will be used include cameras, computer webcams, and special glasses. The display technique used incorporates the characteristics of three-dimensional objects, including animation, audio, and video. This feature allows the smartphone to scan the camera towards the focal point of the intended image, even when directed at a flat surface. As a result, the user can perceive the three-dimensional object as if it were real [5].

The potential presence of augmented reality technology in education needs to be identified in order to enable it to truly benefit education. In addition, it is important to identify elements of form and content in order to make learning Arabic more appropriate and meaningful in education. Nowadays, augmented reality technology is frequently emphasized in foreign language learning. Among the other languages involved are Malay [32], English [1], Chinese [49], French [39], Spanish [8], and the study of Ukrainian language and literature [40].

This study proposes reforms to the education system of the country, particularly in the area of Arabic language vocabulary learning. Augmented reality technology has the potential to have a positive effect on learning Arabic vocabulary. This study may also demonstrate that the utilization of augmented reality technology can enhance students' interest and motivation in acquiring Arabic vocabulary. Furthermore, augmented reality technology can assist students in comprehending and utilizing Arabic vocabulary more efficiently. This study may demonstrate that the utilization of augmented reality technology can offer substantial advantages in enhancing students' perception and improving their performance in mastering Arabic vocabulary.

## 2 PROBLEM STATEMENT

University students often encounter various challenges when it comes to learning vocabulary [51]. This is because students' mastery of Arabic vocabulary is reported to be at an unsatisfactory level. Learning Arabic requires more attention from all parties. It is based on specific reasons. First, previous research reported the weakness of students in vocabulary mastery among 260 school students. The findings of a previous study on the level of Arabic vocabulary proficiency among students were moderately high, with an overall mean value of 3.35 items and a standard deviation of 0.28. However, there are a few students who still achieve low results. Among the reasons for students' weakness is their lack of emphasis on Arabic as a second language. This leads to obstruction in the smooth speech process in Arabic and fails to convey the message clearly. This causes students to feel less confident, embarrassed, and afraid if errors occur while they speak Arabic [26].

Moreover, the problem lies in the unnecessary use of vocabulary in speech, neglecting the vocabulary that should be included in the sentence structure [34]. This weakness in word mastery causes students to be unable to comprehend the text or article that they read, which results in their inability to construct coherent sentences and essays. Lack of mastery of vocabulary will hinder language proficiency skills and impede efforts to master the language. This indicates that mastering vocabulary is an important factor in determining language proficiency. Without a strong vocabulary, it is impossible for a student to master language skills such as reading, listening, writing, and speaking. It is like the heart of a language and is a challenging aspect for most second-language learners to master in large numbers.

A strong command of vocabulary is one of the fundamental aspects of learning a second language. In other words, students with an extensive vocabulary will be able to learn a second language more quickly.

Second, there are problems with teacher's teaching techniques. Teachers' teaching techniques that are one-way and focus solely on memorization are less relevant nowadays. The tendency of teachers to present facts without considering the abilities and interests of students makes the learning atmosphere dull and uninteresting. This situation only makes teaching and learning less interesting and effective. The results found that teachers' teaching techniques, which involve choosing less accurate methods, directly contribute to students' failure to effectively master vocabulary. Many factors hinder the effectiveness of the teaching and learning process of language, especially in vocabulary mastery [34].

Therefore, the selection of less effective teaching methods is one of the main factors contributing to weak vocabulary mastery. This is due to the selection of teaching methods that are less engaging and varied, while other studies argue that vocabulary is the most crucial element to master in the realm of teaching and learning. Therefore, students need to be provided with and exposed to various methods for mastering vocabulary so that they can acquire as much vocabulary as possible in order to construct simple sentences [51].

Some scholars from the West have suggested integrating language learning with augmented reality technology. It is said to be effective and impactful in learning English [1], Malay [32], and other foreign languages such as Chinese [49], French [39], and Spanish [8], as well as the study of Ukrainian language and literature [40]. This indicates that studies on the use of augmented reality have been widely conducted in the field of foreign language learning. Yet, in the context of this study, there is a lack of surveys on the use of augmented reality technology, particularly among students at the public university level. Therefore, this study aims to understand the perception level of university students towards augmented reality technology in Arabic language learning.

### 3 RESEARCH OBJECTIVE

To assess the perception of university students regarding the use of augmented reality technology in learning Arabic vocabulary.

### 4 RESEARCH QUESTION

What is the level of university students' perception towards augmented reality technology in Arabic vocabulary learning?

### 5 LITERATURE REVIEW

#### 5.1 21st century technology

21st-century technology is a transformative element in the Malaysia Education Development Plan 2013–2025. It suggests a paradigm shift in the implementation of learning practices and student facilitation, aiming to elevate the prestige of the Malaysian education system to a global level. These new technologies have the

potential to enhance education across the curriculum and provide opportunities for teachers to communicate with students in ways that were not possible before [53].

The learning technology of this century is a transformative force in the national education system, requiring changes, particularly in the realm of teaching and learning. Moreover, the views of western scholars [43] have clarified the definition of 21st-century learning as a form of education that necessitates students to not only master content but also evaluate information from a wide range of subjects.

In addition, critical thinking, creativity, communication, and collaboration are four skill concepts introduced by the National Education Association [30]. Critical thinking is the ability of students to engage in critical reasoning, express themselves effectively, analyze information, and solve problems. In addition, 21st-century educational technology also highlights how technology has become a more effective medium for conveying information. It enables learning to take place without boundaries, allowing students to interact and receive information [4].

This shows that the use of technology in the teaching and learning process is essential for enhancing the skills of both teachers and students. Through this technology, students will be exposed to various tools and materials, such as computers, LCD screens, CDs, pen drivers, and the internet. Among the technologies used are multimedia technology and mobile learning [30].

## 5.2 Augmented reality technology in the fourth industrial revolution

The Fourth Industrial Revolution (Industry 4.0) is a continuation of the progress made in internet networking and the emergence of cyber-physical systems. Industry 4.0 is also about the adoption of various new technologies within the manufacturing sector, which serve as catalysts for advancements. These technologies include autonomous robots, big data, augmented reality, cloud computing, the Internet of Things, 3D printing, simulation, and digital system integration [20]. The concept of augmented reality technology plays an important role in the Fourth Industrial Revolution by providing the correct visual information to the appropriate individuals at the appropriate time and in the appropriate location [36]. This technology provides suitability, increased competitiveness, and continuous improvement. Therefore, in this study, the researchers took an approach to investigate the use of augmented reality technology in education [6].

Augmented reality is a technology that combines real-world objects with computer-generated objects. It is a form of computer-human interaction that involves adding virtual objects to the real world as displayed by a video camera. Augmented reality also has the potential to stimulate, motivate [38], and increase students' engagement [46] by allowing them to view and manipulate learning materials from various angles [6]. In addition, this technology also encourages collaboration between students, teachers, and fellow students, creating a real learning environment [31] that caters to the diverse learning styles of students, as seen in the study of foreign language learning.

Among them, I studied game technology and augmented reality in education in China. The study's results found that the utilization of such technology is highly effective for learning foreign languages. Students also agreed that this type of learning can enhance their vocabulary knowledge [28]. Moreover, I studied French using mobile learning tools that are based on augmented reality technology. The results showed that the students in the experimental group were more motivated to learn mission solutions and collaborate with teammates when using the Explorez game

method. This is related to the three elements found in the theory of self-determination, namely efficiency, autonomy, and relationships. In this way, students also put in an effort to communicate in French by using a form of sign language when they don't know the vocabulary words in French [39].

Furthermore, a study on Spanish pedagogical models that applied augmented reality to the teaching of Spanish as a foreign language found that students were able to effectively use augmented reality in educational projects. This technology provided them with access to information and utilized three key features of mobile learning: location freedom, time freedom, and meaningful content. Furthermore, students can utilize and enhance their Spanish-speaking skills at every stage of their learning journey. Additionally, students have the opportunity to exchange knowledge with their peers [8]. Next, the study on augmented reality education in children's books in Bangladesh also mentioned that students need to learn two or more languages, namely Bengali and English. The study's findings revealed that students have a preference for using augmented reality technology as a learning method for these two languages [21].

Meanwhile, I studied the use of augmented reality to enhance Chinese vocabulary learning. The results of their study found that the use of augmented reality technology can enhance the learning of Chinese vocabulary. In the design process, students can visually perceive vocabulary through a three-dimensional model and audibly encounter the vocabulary in authentic situations. Therefore, students can memorize vocabulary more easily through repetitive practice, which takes a longer time [49]. Finally, a study on the use of augmented reality technology in training prospective professional teachers of the Ukrainian language and literature found that the effectiveness of their professional training directly depends on the use of computer technology in the learning process. Specifically, the use of augmented reality technology makes teaching methods more modern and encourages students to be more active in their learning [40].

Thus, based on discussions from previous studies on the effectiveness of augmented reality technology in foreign language learning, researchers would like to explore new perspectives on students' readiness and perception at the university level, particularly regarding the adoption of augmented reality technology in Arabic language learning. This is because studies that focus on augmented reality in learning methods are still poorly identified, especially at the public university level.

### 5.3 Augmented reality technology is embedded in learning Arabic

The use of augmented reality technology in learning Arabic can provide several benefits and improve student learning experiences. Firstly, augmented reality can be used to visualize Arabic vocabulary in a more interesting and interactive way [9]. Students can view virtual objects associated with Arabic words, such as images of common objects with their corresponding Arabic labels. This helps students associate words with real objects and reinforces their understanding of Arabic vocabulary.

Besides, augmented reality can be used to provide opportunities for students to practice conversational Arabic. For example, augmented reality applications can provide simulated conversational situations where students can interact with virtual characters or classmates in Arabic. It helps improve students' oral communication skills in Arabic [42][14].

Moreover, the use of augmented reality in learning Arabic can promote self-directed learning. Students can use augmented reality applications to independently



explore and learn vocabulary, sentence structure, or read Arabic texts [49][47][11]. This gives students the opportunity to study at their own pace and increases their independence in learning Arabic. Through augmented reality, students can hear and imitate the correct pronunciation of Arabic words. They can hear the correct sound and improve their intonation and pronunciation. This helps improve students' ability to pronounce words correctly.

In addition, augmented reality can also help students learn Arabic in a more authentic context. For example, with augmented reality, students can observe and engage with Arabic texts in a realistic setting, such as encountering Arabic texts in a supermarket or on the street. This helps students relate Arabic to real-world situations [48][21], which increases their understanding of using Arabic in everyday contexts.

#### 5.4 Arabic vocabulary

Vocabulary in Arabic refers to it as '*mufradat*.' Based on linguistics, vocabulary can be viewed from the perspective of morphology [29]. This term is also considered a minimal independent form. A minimum unit, or morpheme, is a combination of the smallest units in a language that carries a grammatical meaning or function. This Arabic morphology is important for identifying the root words of Arabic words, including nouns, verbs, and adjectives. This helps students acquire Arabic vocabulary [33][54]. In addition, knowledge of morphology is significant for students when reading Arabic words without diacritical marks, as it complements their understanding of syntax, sentence structure, and discourse context. Words in Arabic are divided into three groups, namely nouns (الإسم), verbs (الفعل), and particles (الحرف).

The noun (الإسم) is a word that refers to a specific meaning and is not dependent on the element of time. An example of a word is "كتاب", which means "book" in Arabic. In other words, a noun is a word that indicates the name of a person, place, or thing [54]. Apart from common and proper nouns, adjectives, adverbs, and pronouns also belong to the category of nouns. The verb (الفعل) is a word that indicates a meaning on its own and has a relationship with the element of time. *يدرس* means he (the man) is studying. This indicates that a verb is a word that signifies an event that is accompanied by a specific time. The particle الحرف is a word that does not convey meaning on its own, but rather relies on something else to convey meaning. In Arabic, there are various types of particles such as conjunction particle (حرف الجر), connecting particle (حرف العطف), exclamation particle (حرف النداء), and so on.

The size and depth of the vocabulary typically vary. Vocabulary size is one of the objectives of vocabulary acquisition. The quantity aspect refers to the number of vocabulary words a person knows. This vocabulary size also refers to the number of words known by students at a specific level of language proficiency. Yet, empirically, the size and depth of this vocabulary are two inseparable dimensions and are always closely related to each other. Both the size and depth of this vocabulary need to be integrated into in teaching and learning process [50]. Vocabulary mastery is a measure of excellence achieved by mastering a larger amount of vocabulary. It is also closely related to language proficiency: the more a student knows words, the easier it is for them to master something new [54].

Furthermore, the vocabulary terms 'receptive' and 'productive,' or better known as 'passive' and 'active' vocabulary, are often spoken according to different aspects [33]. Both terms are related to the primary language skills of reading, listening, speaking, and writing. Productive vocabulary knowledge refers to words that

students understand and can pronounce accurately. Even students can use it clearly in speech and writing. Furthermore, according to a previous study, this productive vocabulary [11] can be considered an active process of word acquisition, as students are able to produce words to express their thoughts. Productive vocabulary knowledge is characterized by the ability to retrieve the structure and meaning of words, as well as to convey them accurately in the student's native language.

On the other hand, passive or receptive vocabulary refers to words that are used when listening and reading. Both skills require more passive acceptance. These two types of vocabulary have differences in terms of usage and require different teaching and learning methods. This means that receptive vocabulary knowledge refers to the words that students understand and comprehend when they read or listen to a text. Vocabulary learning is typically presented in a receptive format, where the teacher provides the meaning of the word and uses it in a sentence, but only requires the students to pronounce and spell it [33].

## 5.5 Learning methods using augmented reality technology

When comparing learning methods using augmented reality technology to traditional methods, several differences and advantages can be observed. Augmented reality technology allows students to visualize and interact with virtual objects in real-world contexts. This immersive experience enhances understanding and retention of information compared to traditional methods, which often rely on static images or descriptions.

Augmented reality provides students with contextual learning experiences by overlaying digital information onto the real world [3]. This helps students understand how concepts and theories apply in practical situations, making learning more relevant and meaningful. This technology also promotes active learning through hands-on experiences [2]. Students can manipulate virtual objects, engage in simulations, and solve problems in real time. This interactive approach enhances engagement and critical thinking skills [8].

In addition, augmented reality technology can adapt to students' individual needs and preferences. It can provide real-time feedback, offer personalized learning materials, and adapt the level of difficulty according to students' progress. This personalized approach supports individualized learning and improves learning outcomes [14].

Augmented reality technology facilitates collaboration and social learning. Students can collaborate on augmented reality projects, share information, and communicate effectively using augmented reality tools [22][18]. This collaborative approach promotes teamwork, communication skills, and the exchange of ideas among learners.

Besides, augmented reality engages multiple senses, such as sight and sound, which enhances the learning experience [19]. Students can see, hear, and interact with virtual content, making learning more interactive and memorable. Augmented reality technology enables real-time feedback and assessment. They can receive immediate feedback on their performance, allowing them to correct mistakes and enhance their understanding [16]. Traditional methods often require delayed or manual feedback.

Augmented reality technology can be accessed through various devices, such as smartphones or tablets, making it more flexible and accessible for learners. Students can learn at their own pace and in their preferred environments, allowing for

greater flexibility in the learning process [24]. While traditional methods still have their merits, integrating augmented reality technology into learning methods offers numerous advantages. It enhances engagement, promotes active and personalized learning, fosters collaboration and critical thinking, and provides a more immersive and contextual learning experience. Teachers should consider incorporating augmented reality technology based on the specific learning goals, resources, and student needs to maximize the benefits of this innovative approach, especially in Arabic language educational contexts [50][35][9].

## 6 METHODOLOGY

### 6.1 Research design

This study employed a quantitative approach, utilizing a survey method with the use of a questionnaire. Data analysis is conducted descriptively using measures such as frequency, percentage, mean, and standard deviation to assess the level of student perception of augmented reality.

### 6.2 Study sample

The study sample consists of students from the Arabic Language and Communication program and the Postgraduate Diploma in Islamic Education at USIM. The researcher used the random sampling method in this research. Random sampling methods help to minimize bias, ensure that the sample is a fair representation, and provide a solid foundation for statistical analysis in research [15]. Since this study is a preliminary survey, the sample involved a total of 30 students from Years 1, 2, 3, and 4 who had prior exposure to augmented reality technology. The study was conducted over a period of one month. However, even though the respondents are only a minimum sample, according to past studies, it still falls within the 95% confidence levels required to obtain meaningful statistical analysis in this research [27].

### 6.3 Research instrument

To obtain the data, a questionnaire was used. The research instrument consists of two parts: Part A, which includes student demographics, and Part B, which contains eight items that will measure the level of student perception of augmented reality. Overall, the questionnaires contained 17 items adapted from previous studies [17][7]. These items were selected to align with the objective of the previous study [15], which aimed to gather students' perspectives on augmented reality technology.

There are five levels of the Likert scale used to indicate the perception level of using augmented reality as a learning method in the classroom. Among the answer choices are strongly disagree (SD), disagree (D), neither agree nor disagree (N), agree (A), and strongly agree (SA). Data were analyzed using the statistical package for the social sciences (SPSS) software. The researchers referred to the interpretation outlined in [37] to determine the levels of mean scores obtained, as shown below:



**Table 1.** Level determination based on mean score

Mean Score	Level
1.00–2.33	Low
2.34–3.67	Moderate
3.68–5.00	High

Source: Language learning strategies: What every teacher should know? [37].

To ensure that the obtained instrument’s reliability is at a satisfactory level, the researchers referred to the table of reliability values [13] below:

**Table 2.** Determination of the value level of reliability coefficient

Reliability Coefficient	Level
0.90 or more	Very good
0.80–0.89	Good
0.60–0.79	Moderate
0.40–0.59	Doubted
0.00–0.39	Rejected

Source: Psychological testing and assessment: An introduction to tests and measurement [13].

Based on Table 2, the overall reliability value in the questionnaire instrument of this study is at a good level of .801.

## 7 DATA ANALYSIS

### 7.1 Part A: Student demographics

In this section, nine items were used to gather information about the background of the respondents. Table 3 presents the demographic analysis of students based on gender, age, semester of study, program of study, prior Arabic language study before attending USIM, level of Arabic language proficiency, type of mobile phone, internet usage, and knowledge of augmented reality.

**Table 3.** Demographic characteristics of respondents, frequency and percentage

Demographic Characteristics		Frequency	Percent
Gender	Male	5	16.7
	Female	25	83.3
Age	17–20 years old	0	0
	21–30 years old	30	100
Semester of study	1st semester	5	16.7
	2nd semester	3	10.0
	3rd semester	1	3.3
	4th semester	21	70.0

(Continued)

**Table 3.** Demographic characteristics of respondents, frequency and percentage (*Continued*)

Demographic Characteristics		Frequency	Percent
Education programme	Degree in Arabic Language and Communication	26	86.7
	Diploma in Islamic Education	4	13.3
Ever studied Arabic before going to USIM?	Ever	30	100.0
	Never	0	0
Level of proficiency in Arabic	Very good	1	3.3
	Good	9	30.0
	Moderate	19	63.3
	Very weak	1	3.3
Type of mobile phone	IoS	10	33.3
	Android	20	66.7
Does your phone have Internet?	Yes	30	100.0
	No	0	0
Do you know about augmented reality?	Yes	18	60.0
	No	12	40.0

Based on the analysis of Table 3, the study found that the number of female students is higher than that of male students. Specifically, there were 25 female students (83.3%) compared to only five male students (16.7%). In addition, all respondents who completed the questionnaire fall within the age range of 21–30 years, totaling 30 individuals (100%). Furthermore, the distribution based on the semester of study shows that the majority of students involved are in semester 4, totaling 21 people (70.0%). While one person (3.3%) is from semester 3, three people (10.0%) are from the 2nd semester, and five people (16.7%) are from the 1st semester. Most of the respondents who completed the questionnaire were students from the Arabic Language and Communication program, accounting for 26 individuals (86.7%). The remaining participants were from the Diploma in Islamic Education program, comprising only 4 individuals (13.3%). Furthermore, all respondents, namely 30 students (100.0%), have a background in learning Arabic before entering USIM. In addition, out of the total number of students, 19 people (63.3%) have a normal level of knowledge of Arabic, while one (3.3%) has a very good level. Nine people (30.0%) have a good level, and only one student (3.3%) has a very weak level of Arabic proficiency. In addition, out of the total number of students, 20 (66.7%) use Android mobile phones, while the remaining 10 (33.3%) use iOS. The entire student body has access to an internet network on their cell phones. Finally, out of the total number of students surveyed, 18 people (60.0%) were aware of augmented reality, while 12 people (40.0%) had on knowledge of augmented reality.

## 7.2 Part B: The level of students' perceptions of augmented reality

In this section, eight items were used to survey students' perceptions of using augmented reality for learning Arabic vocabulary. Table 4 below shows that the level of students' perception of augmented reality is quite high, with an overall mean value of 3.97.

**Table 4.** Level of students' perceptions of augmented reality

No.	Items	SD	D	LA	A	SA	Mean	Sd.
B1	Augmented reality technology was able to grab my attention.	3.3% (1)	3.3% (1)	20.0% (6)	33.3% (10)	40.0% (12)	4.03	1.033
B2	Augmented reality technology has an impact on my language learning.	3.3% (1)	16.7% (5)	30.0% (9)	20.0% (6)	30.0% (9)	3.56	1.194
B3	Augmented reality technology is flexible (in or out of the classroom).	6.7% (2)	10.0% (3)	23.3% (7)	23.3% (7)	36.7% (11)	3.73	1.257
B4	The use of augmented reality can improve my skills.	–	10.0% (3)	6.7% (2)	33.3% (10)	50.0% (15)	4.23	.971
B5	I believe augmented reality technology can improve my learning motivation.	3.3% (1)	10.0% (3)	16.7% (5)	30.0% (9)	40.0% (12)	3.93	1.142
B6	Augmented reality applications create a sense of reality in learning.	3.3% (1)	6.7% (2)	10.0% (3)	46.7% (14)	33.3% (10)	4.00	1.017
B7	I want the learning materials to be supported with augmented reality.	3.3% (1)	13.3% (4)	13.3% (4)	30.0% (9)	40.0% (12)	3.90	1.184
B8	I want to use an augmented reality app in learning Arabic.	–	–	16.7% (5)	26.7% (8)	56.7% (17)	4.40	.770
	Overall student's perception						3.97	.698

Based on the analysis of Table 4, the study found that all eight items surveyed had recorded mean value readings at a high level. As observed in the table above, it is evident that learning Arabic vocabulary using augmented reality is the most recent learning method that students are interested in. This data demonstrates that this technology is able to capture the interest of students. The majority of 12 students (40.0%) strongly agreed, while 10 students (33.3%) agreed. Additionally, six students (20.0%) were somewhat agreeable, and only one student (3.3%) disagreed or strongly disagreed with this statement. In addition, a total of six students (20.0%) agreed with the statement that augmented reality technology has an impact on students' language learning, while the remaining nine students (30.0%) strongly agreed or somewhat agreed with this statement. The remaining five students (16.7%) and one student (3.3%) answered "disagree" and "strongly disagree" to this statement. Furthermore, 11 students (36.7%) strongly agreed that augmented reality technology is flexible to use in or out of the classroom, while seven students (23.3%) agreed and a few disagreed. The rest of the students answered "disagree," and two students (6.7%) strongly disagreed with this statement. In addition, 10 students (33.3%) agreed that the use of augmented reality can enhance their language skills, while 15 students (50.0%) strongly agreed, two students (6.7%) somewhat agreed, and three students (10.0%) disagreed with this statement. Furthermore, out of the total number of students surveyed, 12 students (40.0%) strongly agreed and nine students (30.0%) agreed that they believe augmented reality technology can enhance their motivation to learn in the classroom. Furthermore, 10 students (33.3%) strongly agreed that augmented reality applications create a sense of reality in learning. In addition, 14 students (46.7%) agreed, three students (10.0%) were less agreeable, two students (6.7%) disagreed, and one student (3.3%) strongly disagreed with this statement. In addition, nine students (30.0%) agreed that they would like the learning material to be supported with augmented reality, while 12 individuals (40.0%) strongly agreed with this statement. Finally, out of the total number of students,

17 (56.7%) strongly agreed that they would like to use augmented reality applications for Arabic language learning. Additionally, eight students (26.7%) agreed, while five students (16.7%) were less agreeable to this statement.

## 8 DISCUSSION

The findings of the study show that students have a high level of perception regarding the use of augmented reality. As a result, they agreed that augmented reality technology can attract the attention and interest of students. This finding is supported by a previous study, which argued that augmented reality has engaging content that attracts students to learn using this technology [20]. However, interest in these technologies may vary according to students' learning styles, which play an important role in shaping the way they process and receive information. This, in turn, impacts students' cognitive development for language learning [45]. The same opinion is also expressed by previous studies, which found that augmented reality technology increases students' interest in the course and motivates them to learn Arabic [23]. This is because augmented reality enables students to actively engage in their learning. They can manipulate virtual objects, explore virtual environments, and interact with digital content in real time. This hands-on experience keeps students engaged and motivated to learn [38].

In addition, most respondents also agreed that augmented reality technology can improve skills and have an impact on students' language learning. The proof is that with the use of this technology, it can foster a culture of innovation and make learning more interactive [40]. It is also supported by past studies that innovative learning is technology-based learning [45]. For example, it is a learning process that facilitates students learning while teachers play a role as facilitators. This clearly shows that the use of augmented reality technology in education can enhance the quality of student learning activities [10]. This is said because the ability of augmented reality, which can combine the virtual [41] and real world [46], has successfully produced a new approach that is able to further improve the quality of teaching and learning. For example, augmented reality can provide interactive language exercises, including quizzes, games, and simulations. These activities actively engage students in their learning, allowing them to practice grammar, vocabulary, and language skills in a fun and interactive way.

Moreover, augmented reality technology is flexible both inside and outside of the classroom. Based on the analysis of statement B3, the mean value is 3.73, while the standard deviation is 1.257. This indicates that the reading interpretation is at a high level. Statement analysis shows that 11 students (36.7%) strongly agreed with this item. This indicates that the technology is easy to use because augmented reality allows students to actively participate, whether in or out of the classroom. In this way, augmented reality technology allows teachers to facilitate both formal and informal learning. Past studies have also shown that students can adapt their communication styles based on their individual learning environments, allowing for greater flexibility and comfort [23]. At the same time, flexible time allows individuals to interact, solve problems, and enhance their thinking skills with one another. Thus, applications that provide a realistic simulation and testing environment for students make learning more interactive [52].

Next, the analysis of item B5 revealed that the majority of students, 9 people (30.0%), agreed that augmented reality can enhance their learning motivation. A mean value of 3.93 and a standard deviation of 1.142 are considered to be high

levels. This analysis is supported by previous studies that have found augmented reality to be enjoyable, motivating, and user-friendly [25]. Findings from previous studies have also indicated that there are still a small number of university students who lack motivation to learn Arabic. However, with the advent of augmented reality technology in learning, intrinsic motivation among students increases. This is because the learning style and methods used by teachers can attract students to learn Arabic [26]. Thus, this intrinsic motivation is born within the students themselves, causing them to feel motivated to learn the language using technology. Augmented reality can be customized to meet the individual needs and preferences of students. It can offer personalized learning materials, adapt to different learning styles, and provide choices in how students interact with the augmented reality content. This individualized approach increases students' ownership and motivation in their learning [38].

Based on item B6, the majority of 10 students (33.3%) strongly agreed that augmented reality can enhance the sense of reality in learning. The mean and standard deviation findings were 4.00 and 1.017, respectively. This means that the interpretation of the data is at a higher level. The emergence of three-dimensional objects virtually causes students to feel as if the object exists in the real world [20]. Augmented reality can attract students by allowing them to visualize information on real objects using only their mobile phones. As a result, students gradually develop an interest in learning Arabic. Thus, in general, the use of augmented reality in learning Arabic vocabulary can provide a positive stimulus for students during the process of acquiring Arabic vocabulary. By creating a sense of reality in learning, augmented reality technology enhances student engagement [46], motivation, and understanding. It bridges the gap between theoretical knowledge and practical application, making learning more meaningful and immersive [4]. However, it is important to note that the effectiveness of augmented reality in creating a sense of reality depends on the quality and relevance of the augmented reality content, the instructional design, and the integration of augmented reality into the overall learning experience [31].

Based on item B8, students expressed their desire for learning materials to be augmented reality-supported, specifically for learning Arabic. Based on the analysis of the items, the mean value is 4.40, while the standard deviation is 0.770, indicating that the reading interpretation is at a high level. Statement analysis shows that the majority of 17 students (56.7%) strongly agreed with this statement. These findings are supported by previous studies that show augmented reality has an impact on students' use of technology in language learning [23]. This is because of the attractive three-dimensional graphic presentation as a learning material, which influences the students to be more motivated during each learning session using technology [12]. Although students may initially be unaware of the emergence of new augmented reality technology, they can eventually grasp the concept of using augmented reality in learning through introductory videos and examples of related pictures [44]. Therefore, with the presence of lecturers as mentors, student engagement is enhanced, allowing students to effectively grasp the learning content through the use of this augmented reality application.

It is important for students to have a positive perception of augmented reality technology because it increases their engagement and active participation in the learning process. Augmented reality can create an immersive and interactive learning environment, capturing students' attention and making the vocabulary learning experience more enjoyable and stimulating. The innovative and novel nature of augmented reality can spark students' curiosity and interest [36], making them more

eager to explore and acquire new vocabulary. This motivation can lead to increased effort and dedication in their endeavors to learn vocabulary. With the interactive and supportive nature of augmented reality, it can provide immediate feedback [53] and guidance, helping students feel more confident in their language learning abilities.

## 9 CONCLUSION

In conclusion, incorporating augmented reality into Arabic vocabulary learning is highly advantageous for students, particularly in the context of 21st-century education. Therefore, it should be embraced as a teaching and learning method in universities to enhance the effectiveness of classroom instruction and diversify learning approaches. Furthermore, this technology can change students' negative perceptions of Arabic language subjects, thereby increasing their interest and achievement in this subject. The presence of augmented reality not only introduces new technology in university education but also complements and enhances existing educational practices. In turn, this technology will be the most interesting and effective learning medium for Arabic language learning.

## 10 LIMITATION AND RECOMMENDATION

However, this research only limits the perception to university students and a small sample group. As a suggestion, the researcher hopes that future studies will focus more on conducting experimental studies using augmented reality and developing model designs for Arabic language learning. In addition, it is also necessary to conduct a study on the acceptance of primary school Arabic teachers in terms of their ability to utilize current technology for the development of augmented reality.

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