



## Exploring the Utilization of Augmented Reality in Higher Education Perceptions of Media and Communication Students

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### Abstract

The present study aims to explore the perceptions and usage of Augmented Reality (AR) technology among media students in Palestinian universities. A quantitative approach was adopted, and data was gathered from a web-based survey of 237 media students. The Technology Acceptance Model (TAM) was utilized to gauge participants' perceptions of AR, and descriptive statistics were used for analysis. The findings reveal a generally positive perception of AR as a beneficial tool for skill enhancement, with mean scores ranging from 3.70 to 4.04 indicating strong agreement. The study also found moderate to high AR usage among participants, particularly for translating texts using Google Translate, but noted that usage patterns were more individual-oriented. Additionally, 91.1% of respondents attributed the COVID-19 pandemic to increased technology usage in higher education. The novelty of this study lies in providing insights into the perception and application of AR in higher education within the Palestinian context, an under-researched area. The study sheds light on the potential for integrating AR more formally into curricula, which could foster a more engaging and immersive educational experience. However, it also highlights the need to address barriers such as lack of technical support and possible discomfort with technology.

### Keywords:

Augmented Reality;  
Media and Communication;  
Higher Education;  
Palestine Student Perception.

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## 1- Introduction

Augmented Reality (AR) is a rapidly emerging technology that blends the physical world with digital elements, offering new avenues for learning and interaction. Over the past decade, numerous studies have investigated the use of AR in education across different contexts and disciplines. For example, Alkhabra et al. (2023) [1] and Ragheb et al. (2022) [2] highlighted the positive impact of AR on student motivation and learning outcomes. Similarly, Akçayır and Akçayır (2017) [3] and Bacca et al. (2014) [4] reviewed various AR applications and emphasized their potential for improving academic achievement. However, despite the growing body of literature on AR in education, there remains a dearth of research focusing on its application and perception in developing countries, particularly in conflict-affected regions such as Palestine.

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The higher education system in Palestine has undergone significant transformations, particularly in terms of methodologies, objectives, student demographics, and mirroring global technological advancements [5]. These shifts, as Ghani et al. (2022) [6] noted, are evident in the burgeoning use of information technology for delivering instructional material, improving competencies for utilizing informational resources in knowledge creation, and enhancing the flexibility of education for diverse age groups. However, despite the general uptake of technology, the integration of innovative technologies such as Augmented Reality (AR) remains limited and underexplored, especially in media and communication fields [7].

The COVID-19 pandemic has significantly impacted the global education landscape, and Palestine was no exception. The closure of universities paved the way for a more aggressive adoption of digital learning tools. Scholars such as Abu Mukh & Salhab (2021) [8] and Aburub & Assaf (2022) [9] pointed out that the crisis presented an unprecedented opportunity for long-awaited reforms in the Palestinian education system, with a notable shift towards online learning. Moreover, Aqel and Azam (2018) [10] stated that the incorporation of cutting-edge technology into Palestinian education is being achieved through digital learning platforms, enhancing remote access to instructional materials, and facilitating distance learning.

However, despite these advancements, several challenges hinder the full realization of digital education's potential, especially in the context of media education. Horoub (2023) [11] highlighted the lack of comprehensive technological infrastructure within universities, coupled with societal and cultural impediments, as major challenges. Furthermore, the inherent cost to education and society arising from reduced face-to-face interactions, limited accessibility for practical exercises, and the need for suitable evaluation methods remain concerns.

This study addresses a significant research gap as no prior research has been conducted on the application and perception of Augmented Reality (AR) technology specifically within the Palestinian higher education system, particularly in the field of media and communication education. By exploring the perceptions and usage of AR among Palestinian media and communication students, this research pioneers an investigation into an underexplored area, shedding light on the potential benefits, challenges, and factors impacting the implementation of AR in this unique context. The findings of this study will contribute to filling this gap in the literature and provide valuable insights for educators, policymakers, and researchers interested in integrating AR technology in the Palestinian higher education system. Furthermore, the goal of this study is to address the research gap by investigating the perceptions and usage of AR technology among media and communication students in Palestinian academic institutions. The study aims to assess the barriers and factors that could impact the implementation of AR within the Palestinian higher education system, particularly in the context of media education. By exploring these aspects, the research aims to provide insights into the potential of AR in enhancing the quality and effectiveness of education within the unique opportunities and challenges of the Palestinian context.

To address this gap, this study aims to investigate the perceptions and usage of AR technology among media and communication students in various Palestinian academic institutions. In doing so, the study will assess the barriers and factors that could impact the implementation of AR within the Palestinian higher education system. By focusing on media and communication students, who are often at the forefront of technological adaptation, this study endeavors to provide insights into the potential of AR in enhancing the quality and effectiveness of education within a context that is characterized by both unique opportunities and challenges.

## **2- Literature Review**

### ***2-1- Technology Integration in the Palestinian Higher Education***

It is important to accentuate, in this context, that the higher education system in Palestine has significantly shifted in recent years. The Palestinian educational field has witnessed great developments by means of growing modern technology. The integration of new technologies with shifting to online learning has become increasingly challenging in this situation for both students and educators [12, 13].

However, Shraim & Crompton (2020) [14] pointed out that Palestine has not yet fully embraced the digital revolution in higher education. The move to a dynamic skills-based society is still difficult, but it is gradually improving. In general, Palestinian universities see digital transformation as a technology tool rather than a strategic element that might help them achieve their corporate objectives. The focus on integrating digital tools is restricted to the use of instructional videos, emails, automated tests, and the publication of instructional content on LMS without interaction [7].

In the same vein, Abu Mukh & Salhab (2021) [8] believed that the shift towards digital transformation is an ongoing process that has yet to fully manifest itself and noted that the country continues to strive towards becoming a knowledge-based society. However, there are signs of gradual improvement. Unfortunately, Palestinian universities tend to perceive digital transformation as a mere technological implementation and fail to fully integrate it as a strategic component of their organizational objectives. Haleem et al. (2022) [15] found that the focus on incorporating new digital technology methods is primarily limited to the utilization of educational software and applications.

Aburub & Assaf (2022) [9] noted that the integration of new technologies in higher education is an important trend in Palestine. Technology has the potential to transform the way one teaches and learns, and it can help improve educational outcomes and increase access to education. Despite the utilization of AR within the Palestinian higher education system, this technology remains underexplored. Nevertheless, certain academic institutions, such as Birzeit University, have implemented initiatives aimed at promoting its usage, such as the establishment of the Virtual Reality/Augmented Reality Innovation Lab in 2019 (Birzeit University, 2023) [16]. This laboratory provides Palestinian students, researchers, and businesses with the means to create virtual reality (VR) and AR applications. The initiative has drawn attention to the potential utilization of augmented reality in education by establishing an innovation lab that offers training programs and workshops focused on VR and AR. Additionally, it provides an incubation program that aims to foster and cultivate nascent VR and AR applications in collaboration with Palestinian universities and corporations.

## ***2-2-AR in Media and Communication Education***

AR is a technology that seamlessly integrates computer-generated images, sounds, and other sensory inputs into the physical world, thereby creating an augmented or enhanced version of reality. This innovative technology holds immense potential to transform the way education is imparted and the way individuals interact with the environment around them, particularly in the higher education sector [17].

Scholars from various academic disciplines within the higher education sector have extensively studied the implementation of AR in education [18–27]. These studies highlighted the benefits of incorporating new technologies, such as AR, as pedagogical tools in university classrooms. According to these studies, AR can be incorporated into higher education using interactive textbooks and course materials. Instead of being limited to reading static pages in a traditional textbook, students can now access AR content on their smartphones or tablets that brings the subject matter to life. For instance, an AR app could enable students to explore a virtual replica of a historical site or observe a 3D animation of a cell undergoing division. Such immersive learning experiences can foster greater understanding and retention of information, as students can engage with the material more interactively and experientially.

Toledo-Morales & Sanchez-Grazia (2018) [24] proposed that AR can be used in higher education through virtual field trips and lab simulations. Students can visit far-off locations or participate in experiments that would otherwise be impossible or extortionate to experience in real life.

In addition to enhancing traditional classroom learning, AR can also be used to create new learning experiences that would not be possible without the technology, as students could use AR to participate in VR simulations or simulations of real-world scenarios, such as responding to a natural disaster or managing a virtual business [21, 24, 28]. These types of experiences can help students develop problem-solving skills and prepare for careers in a variety of fields.

Various researchers have pinpointed the challenges associated with the implementation of AR in higher education. For instance, note the expenses associated with procuring and maintaining the required technology, such as smartphones or tablets equipped with AR capabilities. Furthermore, the adoption of this technology may involve a learning curve for both students and faculty as they acclimate to the effective use of AR in their academic pursuits. Moreover, there are privacy and security issues related to the collection and utilization of data generated through AR experiences [3, 17, 28, 29].

Farid Kamal Heikal (2021) [30] and Babkin et al. (2021) [28] believed that the integration of AR in higher education has the capacity to revolutionize the way one approaches learning and interacts with the physical world. The creation of immersive and interactive learning experiences through AR can aid students in comprehending and retaining information and equip them for careers in diverse fields. Nevertheless, Alkhabra et al. (2023) [1] stated that it is vital to tackle the challenges and address the concerns that surround the implementation of AR technology to fully leverage its potential.

The use of AR in media education is a cutting-edge development that provides students with a more immersive and interactive learning experience Elfitra et al. (2021) [31]. Alrimawi & Haddad (2020) [32] clarified that AR technology allows media educators to integrate digital information and media into the physical world, making it easier for students to understand and engage with complex concepts.

By using AR, media educators can create interactive and dynamic learning environments that foster creativity, critical thinking, and collaboration [20, 33]. One can notice that students can use AR to explore virtual environments, manipulate digital media, and engage in hands-on, experiential learning activities that enhance their understanding of media production and consumption.

Moreover, the AR provides media educators with new tools for assessment and evaluation, enabling them to better track student progress and provide more meaningful feedback [4, 22, 34]. Similarly, Alrimawi & Haddad (2020) [32] stated that the use of AR in media education has the potential to revolutionize the way students learn and is a promising development for the future of media education.

### ***2-3- Factors Affecting Student Perception***

Perceptions of students towards the utilization of new technology in their higher institutes exhibit diversity Cramarenco et al. (2023) [35]. Some students consider the integration of AR as a thrilling prospect to facilitate active participation in the learning process through an innovative approach. Youssef et al. (2020) [36] believed that the incorporation of AR technology can elevate the educational experience by rendering the course material more engaging and immersive, thereby facilitating the students to comprehend and retain the information more effectively. For instance, instead of just perusing a historical event from a conventional textbook, pupils can avail AR content that renders the subject matter more vivid and tangible.

However, other scholars argued that not all students have the same positive perception of AR technology in the classroom [2, 3, 37-39]. Accordingly, the perspectives of students towards the integration of innovative technologies in the university classrooms of Palestine are varied. Shraim & Crompton (2020) [14] revealed that while some students embrace the potential of new technologies like AR to enhance their learning experience, others may encounter difficulties and anxieties related to its implementation. Educational institutions and instructors must acknowledge these divergent outlooks and address any barriers to optimize the full potential of cutting-edge technologies, such as AR, within the classroom setting [40]. Moreover, universities have a responsibility to provide students with the appropriate training and support to foster their competency in using AR, thereby; enabling them to fully benefit from it [41].

### ***2-4- TAM Model and Augmented Reality***

The Technology Acceptance Model (TAM) is a model that helps explain how individuals evaluate and adopt new technology [42]. It consists of two key factors: perceived usefulness and perceived ease of use. Based on TAM, perceived usefulness refers to an individual's belief that using a particular technology will help them to achieve their goals or perform the given tasks more effectively. Meanwhile, perceived ease of use refers to an individual's belief that using a particular technology is simple.

In the context of AR, Elshafey et al. (2020) [43] noted that the TAM model can be used to understand how individuals evaluate and decide to use AR technology. One can identify that if individuals perceive AR as being useful and easy to use, they are more likely to accept and adopt it. On the other hand, Al-Adwan et al. (2023) [44] stated that if they perceive AR as being difficult to use or not useful, they may be less likely to use it. It is important to focus on increasing perceived usefulness and perceived ease of use.

Koçak et al. (2019) [45] believed that this can be done through several strategies for higher education institutions, such as providing training and support to help users become comfortable with the technology, demonstrating the relevance of AR to specific tasks or goals, and designing the technology to be as user-friendly as possible. Additionally, Liao et al. (2018) [46] noted that the TAM model can be a useful tool for understanding and predicting the acceptance of AR technology by individuals. Oyman et al. (2022) [47] found that by focusing on increasing perceived usefulness and perceived ease of use, educators and designers can help to encourage the adoption of AR and maximize its potential to enhance learning and performance.

The acceptance of new technology in higher education in Palestine has been a positive development that has greatly benefited both students and educators [48]. The shift to digital learning has enabled a more flexible and efficient education system, and it is likely that the use of other new technology will continue to play an increasingly important role in the delivery of education in Palestine in the years to come [49, 50].

### ***2-5- Current Study***

The objective of this study is to explore the possibilities and capabilities of using AR in the higher education sector in Palestine, while also attempting to comprehend the perception of Palestinian students towards incorporating AR into their educational process. Furthermore, the paper seeks to examine the factors that could impact the implementation of AR within higher education in Palestine. Accordingly, the current study will attempt to answer the following research questions:

***RQ1:*** How has the COVID-19 pandemic contributed to the use of technology in higher education in Palestine?

***RQ2:*** What are the perceptions of Palestinian university students towards the use of AR in their learning process?

***RQ3:*** How do Palestinian university students perceive the ease of use and usefulness of AR in higher education in Palestine?

***RQ4:*** What are the factors that could negatively impact the utilization of AR in higher education in Palestine?

***RQ5:*** How do Palestinian university students use AR?

### 3- Methods and Procedures

The study employed a quantitative research methodology that allows valid interpretations to be inferred by comparing numerical data [51]. To gather data, the researchers conducted a cross-sectional web-based survey utilizing a questionnaire. The selection of a web-based survey was motivated by its capacity to collect a substantial amount of data and overcome temporal and spatial constraints, as well as its ease of data entry [52]. Additionally, it was deemed cost-effective to develop and disseminate the survey through an internet link [53]. See Figure 1 for research methodology flow chart.

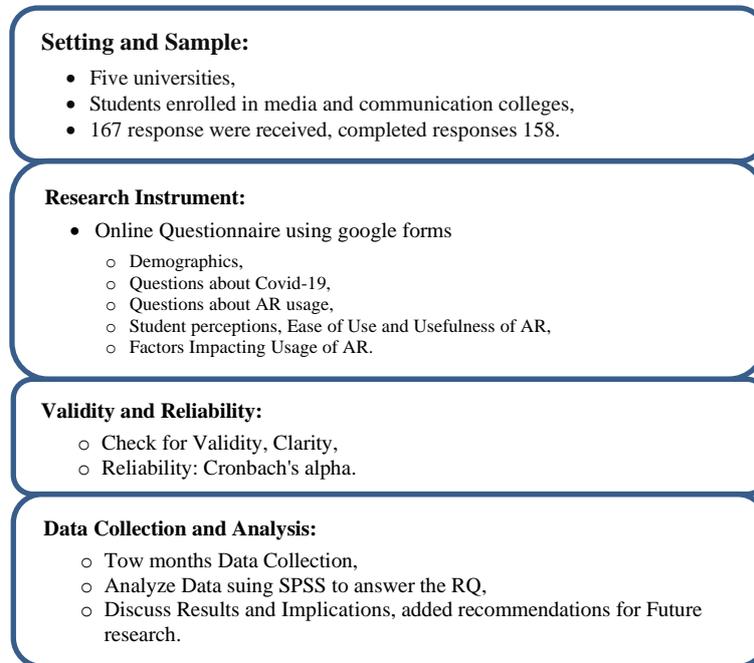


Figure 1. Research methodology flow chart

#### 3-1- Setting and Sample

This study was conducted across five universities in Palestine. The participants were students enrolled in media and communication colleges. A total of 167 responses were received; however, after deleting the participants who did not fully answer the questionnaires, the final number of completed responses was 158.

#### 3-2- Research Instrument

The researchers used an online questionnaire to collect data, which was administered using Google Forms and then was sent electronically to the participants. The questionnaire consisted of six sections; (1) participants' personal information, (2) one question about the COVID-19 pandemic's contribution to the use of technology in higher education in addition to comments field for the participants to provide their opinions, (3) questions about AR usage (seven sentences), (4) questions about the students' perceptions (five sentences), (5) questions about the ease of use and usefulness of AR (ten sentences), and (6) questions about the factors impacting usage of AR (five sentences). The measuring scale used is a five-point Likert scale, ranging from strongly disagree to strongly agree.

#### 3-3- Validity and Reliability

A group of professional and academic arbitrators verified the questionnaire's validity to ensure its wording, clarity, and comprehensibility. Based on their advice and feedback, the researchers made the recommended changes either by rephrasing, re-arranging, or deleting some sentences. The questionnaire's reliability was measured using Cronbach's Alpha, which is a measure of internal consistency with potential values between 0-1 indicating a lack of, low, medium, high, to perfect consistency [52]. The internal consistency for the questionnaire was high with (Cronbach's  $\alpha = 0.936$ ), which indicates that it was appropriate for this study.

#### 3-4- Data Collection and Analysis

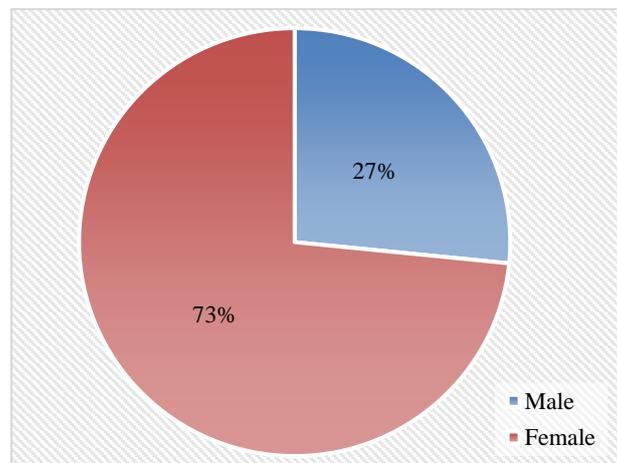
To gather data, the researchers distributed a questionnaire link to the participants, providing an explanation of the study's objectives and inviting voluntary participation. Data collection continued for a period of two months. Following the conclusion of the data collection phase, the data were imported from Google Sheets to SPSS, where statistical tests were performed to evaluate the reliability and address the research questions. Descriptive statistics such as mean scores, frequencies, percentages, and standard deviations were utilized to determine the sample demographics and answer the research questions.

## 4- Results

The first section of the survey elicited the population demographic characteristics, which are shown in Table 1. And Figure 2. As can be seen, most of the participants were females with more than 73%, across different year levels. More than 60% of the participants have more than six years of experience in using smart gadgets, while the rest have 1-6 years of experience. Additionally, around half of the participants indicated having used the Internet and different mobile applications for more than six hours daily.

**Table 1. Participants' Information**

Category		Frequency	Percentage
Gender	Male	42	26.6
	Female	116	73.4
Academic Year	One	28	17.7
	Two	32	20.3
	Three	29	18.4
	Four	56	35.4
	Five or more	13	8.2
Years of experience using smart gadgets	Less than 1 yr	3	1.9
	1-3 yrs	22	13.9
	4-6 yrs	31	19.6
	Above 6 yrs	102	64.6
Duration spent on using the Internet & mobile apps daily	1-3 hours	22	13.9
	4-6 hours	55	34.8
	Above 6 hrs	81	51.3



**Figure 2. Gender**

In order to answer RQ1: [Has COVID-19 pandemic contributed to the use of technology in higher education in Palestine and how?], the participants were asked whether the pandemic contributed to the use of technology in higher education, and then they were asked to answer an open-ended question regarding Covid-19 contribution to the usage of technology in HE and to state in their own words the way they see that contribution. The results of the open-ended question, showing that 144 of the participants (91.1%) answered yes, while 12 of them answered no (7.6%), and only two participants (1.3%) said the contribution was to some extent.

While giving their opinions on how Covid-19 has contributed in using technology in HE, some of the participants stated 'by increasing technology role in many areas of life such as education', 'through electronic lectures and homework that need smart devices', 'it contributed to distance learning, specifically using Zoom program and panel discussions on the university portal', 'enhanced and increased my experience in technology', 'contributed significantly to the reliance of education on technology', 'Online classes have become very popular after Covid' and 'On the one hand, it has contributed to raising awareness of self-learning and self-reliance for skills development, and on the other, it has helped to use technology in one way or another, despite the errors caused by several factors, including poor Internet infrastructure in Palestine'. However, one participant stated that using technology has failed, especially for elementary students, creating a cumulative ignorance that would influence future generations.

To answer RQ2: [What are the perceptions of Palestinian university students towards the use of AR in their learning process?], Data in Table 2 shows that university students have a positive perception of the use of augmented reality (AR) in their learning process. The mean scores for all four statements are above 3.5, which indicates that a majority of students agree or strongly agree with the statements.

**Table 2. Participants' Perception of AR Use in Learning Process**

	Statement	SA	A	N	D	SD	Mean	St.D
1	AR techniques increase my practical skills in my specialization field	62	62	20	6	8	4.04	1.064
2	AR increases my professional competence in my specialization field	53	67	25	10	3	3.99	0.961
3	Use of AR is very relevant to my job tasks	37	64	39	15	3	3.74	0.985
4	I believe the results of using AR are excellent	32	70	35	19	2	3.70	0.968
5	I use AR in my study and career development	33	67	41	12	5	3.70	0.987

The statement with the highest mean score is "AR techniques increase my practical skills in my specialization field," with a mean of 4.04. This suggests that students believe that AR can help them to develop the skills they need to be successful in their chosen field. The second highest mean score is "AR increases my professional competence in my specialization field," with a mean of 3.99. This suggests that students believe that AR can help them to become more knowledgeable and experienced in their field.

The third highest mean score is "Use of AR is very relevant to my job tasks," with a mean of 3.74. This suggests that students believe that AR can be used to help them to perform their job tasks more effectively. The fourth highest mean score is "I believe the results of using AR are excellent," with a mean of 3.70. This suggests that students are satisfied with the results of using AR in their learning process.

The final statement, "I use AR in my study and career development," has a mean of 3.70. This suggests that many students use AR in their study and career development, but there is still room for improvement.

Overall, the data suggests that students have a positive perception of the use of AR in their learning process. They believe that AR can help them to develop practical skills, increase their professional competence, and be more relevant to their job tasks. However, there is still room for improvement in the use of AR in education.

To answer RQ3: [How do Palestinian university students perceive the ease of use and usefulness of AR in higher education in Palestine?], the participants were asked to indicate their agreement regarding ten sentences. The descriptive statistics of frequencies, mean and standard deviation scores were used, with the results shown in Table 4 below. As for ease of use, the mean scores ranged from 3.59 for 'I use AR programs constantly and continuously' to 3.87 for 'I am confident that I can manage AR apps. The results show that the participants highly agreed with all sentences, indicating that they perceive AR technology as easy to be used. As for usefulness, the mean scores ranged from 3.25 for 'My colleagues think I should use AR apps' to 3.96 for 'I feel creative when using the computer and phone in AR apps'. The results show that the participants moderately to highly agreed with all sentences, indicating that they perceive AR technology by some means useful. The results generally reflect that the participants have a favorable perception of AR in terms of ease of use and usefulness (Table 3).

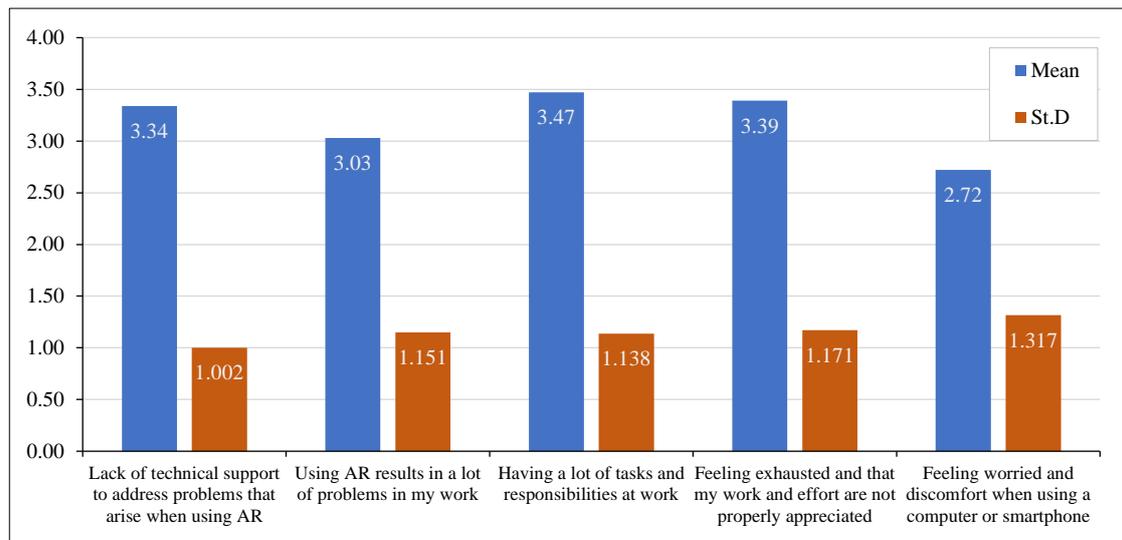
**Table 3. Students' Perceptions of AR Ease of Use and Usefulness**

	Statement	SA	A	N	D	SD	Mean	St.D
<i>Ease of use</i>								
1	I think AR techniques are easy to use	31	70	42	10	5	3.71	0.960
2	I am confident that I can manage AR apps	43	69	33	8	5	3.87	0.978
3	I think I won't have a problem explaining the advantages of using AR to someone else	27	76	33	16	6	3.65	1.004
4	I use AR programs constantly and continuously	30	62	43	18	5	3.59	1.002
5	I feel content when using AR programs	35	68	36	13	6	3.72	1.023
<i>Usefulness</i>								
1	I feel creative when using the computer and phone in AR apps	59	53	31	10	5	3.96	1.055
2	My colleagues think I should use AR apps	17	42	73	15	11	3.25	1.008
3	University administration and teachers urge us to use AR techniques	31	67	39	10	11	3.61	1.087
4	I use AR programs to accomplish a lot of practical and life tasks	40	59	36	17	6	3.70	1.081
5	I make full use of the University's AR programs	42	73	22	15	6	3.82	1.050

To answer RQ4: [What are the factors that could negatively impact the utilization of AR in higher education in Palestine?], the participants were asked to indicate their agreement with five sentences. The descriptive statistics of frequencies, mean and standard deviation scores were used. Table 4 and Figure 3 displays the results of the participants' responses showing the mean scores ranging from 2.72 for 'Feeling worried and discomfort when using a computer or smartphone' to 3.47 for 'Having a lot of tasks and responsibilities at my work'. The results show that the participants moderately agreed with all sentences, where their responses varied from strongly disagree to strongly agree.

**Table 4. Factors Influencing Utilization of AR in HE**

	Statement	SA	A	N	D	SD	Mean	St.D
1	Lack of technical support to address problems that arise when using AR	19	53	54	27	5	3.34	1.002
2	Using AR results in a lot of problems in my work	18	34	58	30	18	3.03	1.151
3	Having a lot of tasks and responsibilities at my work	29	59	39	20	11	3.47	1.138
4	Feeling exhausted and that my work and effort are not properly appreciated	33	41	48	26	10	3.39	1.171
5	Feeling worried and discomfort when using a computer or smartphone	20	24	41	37	36	2.72	1.317



**Figure 3. Means and ST. D of Factors Influencing Utilization of AR in HE**

To address RQ5: [How do Palestinian university students use AR?], The participants were requested to express their level of agreement with six statements. Descriptive statistics, including frequencies, mean scores, and standard deviations, were performed to analyze the data. As demonstrated in Table 5, the mean scores varied between 3.52 for statements such as 'I use AR technology to share daily information with my colleagues such as lecture location' and 'I use AR technology through games', and 3.97 for the statement 'I use AR technology to translate texts on Google Translate'. The outcomes suggest that the participants demonstrated strong agreement with all the statements, indicating that the students have a good understanding of AR applications and actively use them.

**Table 5. Participants' Usage of AR**

	Statement	SA	A	N	D	SD	Mean	St.D
1	I use AR technology to share daily information with my colleagues such as lecture location	32	59	37	19	11	3.52	1.149
2	I use AR technology to locate roads on Google Maps, Drop, or Waze	39	45	48	15	11	3.54	1.165
3	I use AR technology to translate texts on Google Translate	55	63	26	9	5	3.97	1.015
4	I use AR technology through games	29	56	47	20	6	3.52	1.051
5	I use AR technology through textbooks	41	53	40	19	5	3.67	1.085
6	I use AR technology through interactive stories	38	57	44	14	5	3.69	1.034
7	I use AR technology from Snapchat Filter	51	45	32	16	14	3.65	1.272

## 5- Discussion

The results of the current study reveal a generally positive perception and wide application of AR by Palestinian university students in their education. While there are some concerns related to technical support and the potential problems associated with AR use, the overall sentiment towards AR is favorable. The results of this study provide several valuable insights into the use of Augmented Reality (AR) in higher education among Palestinian university students, particularly against the backdrop of the COVID-19 pandemic. In fact, most of the respondents (91.1%) affirmed that the pandemic has indeed accelerated the use of technology in higher education.

Many participants credited the pandemic with enhancing their technological skills and making online classes more prevalent. They perceived this development as a mechanism that increased the reliance on technology in education and enhanced self-learning and self-reliance for skills development. The present study aligns well with previous research in highlighting the positive perception of AR in education and identifying similar barriers. However, it adds valuable insights into the actual use of AR among media students in Palestine and suggests an opportunity for more systematic integration of AR in education to maximize its potential. Additionally, the study points to the accelerated adoption of technology due to the COVID-19 pandemic, which can be an impetus for educational institutions to innovate and incorporate emerging technologies like AR in learning processes.

**Acceleration of Technology Adoption due to Pandemic:** the present study indicates that 91.1% of the participants believe that the COVID-19 pandemic accelerated the use of technology in higher education, to compare with Bozkurt & Sharma (2020) [12], and Rapanta et al. (2020) [13]. This result aligns with the observations made by these studies which highlight the integration of new technologies and the shift to online learning in response to the pandemic.

**Perception of AR in Education:** our study showed that students perceived AR positively, recognizing its relevance and benefits in academic tasks and career development. They were confident in managing AR apps and found them useful this aligns with the findings of Youssef et al. (2020) [36] and Haleem et al. (2022) [15] which suggest that integrating AR technology can elevate the educational experience by making course material more engaging and immersive.

**Ease of Use and Usefulness of AR:** the study found that the participants perceived AR as easy to use and useful. This indicates that perceived complexity might not be a significant barrier to AR adoption with the Comparison with the Technology Acceptance Model (TAM) discussed by Davis (1989), Venkatesh & Davis (2000) [42], and Liao et al. (2018 [46]): This supports the TAM, which posits that perceived usefulness and ease of use are essential factors for technology acceptance.

**Barriers to AR Adoption:** the present study identified several barriers to AR usage, including a lack of technical support and discomfort when using technology this aligned with a study of Babkin et al. (2021) [28], Gurevych et al. (2021) [17] and Akçayır & Akçayır (2017) [3] which addressed the challenges noted in these previous studies. The current study echoes the need for addressing barriers through adequate technical support and training.

**Actual Usage of AR:** the study demonstrated moderate to high usage of AR among Palestinian students, especially for translating texts using Google Translate, but suggests that usage patterns are more individual-oriented and less integrated into formal educational practices. This reflects an important gap where despite the positive perception and personal adoption, formal integration in educational curricula is still lacking. This points to an opportunity for educational institutions to systematically integrate AR technologies in the learning process to fully leverage their benefits. the findings are analysed in relation to different aspects such as the acceleration of technology adoption due to the pandemic, the positive perception of AR, barriers to AR adoption, and infrastructure challenges. The aspect of AR being used more on an individual basis and not being well-integrated into the formal curriculum seems to be a unique observation from the present study, at least based on the text provided. Therefore, the finding concerning the actual usage of AR, especially its individual-oriented usage and lack of formal integration in educational curricula, does not appear to be directly aligned with any other studies mentioned in the text. This finding could potentially be an original contribution of the present study to the body of knowledge on AR usage in higher education. This highlights the need for educational institutions to recognize the gap between individual adoption and formal curriculum integration and to take steps to bridge this gap for maximizing the benefits of AR in higher education.

**Infrastructure Challenges:** the study suggests there are challenges such as poor internet infrastructure that need to be addressed. This compared with Aldahdough et al., (2022) [5]. Shraim & Crompton (2020) [14]: This finding is consistent with Shraim and Crompton's study [14] which highlighted the necessity for improvements in infrastructure for the effective integration of technology in education.

## 6- Conclusion

The present paper aimed to investigate the use and perception of Augmented Reality (AR) technology in higher education among media students in Palestine. The choice of using a quantitative approach through a web-based survey was appropriate, given the necessity of data collection and the study's focus on technology usage. The focus on media students, who are more likely to be familiar with technology, was beneficial in this context. However, the exclusion of other disciplines might have limited the study's generalizability. Future research could consider including students from various fields to provide a more comprehensive understanding of AR perception and usage in higher education.

The positive perception of AR among respondents is promising and indicates a potential openness among students to embrace AR in their education. This is consistent with the findings of Youssef et al. (2020) [36], who argued that incorporating AR technology can elevate the educational experience by making the course material more engaging and

immersive. However, it is crucial to explore whether this positive perception translates to consistent and effective usage of AR, as a favorable perception does not guarantee actual adoption. Furthermore, the TAM model, discussed by Davis (1989), Venkatesh & Davis (2000) [42], and Liao et al. (2018) [46], states that perceived usefulness and ease of use are essential factors for technology acceptance. The results of this study support this notion, as participants perceived AR as easy to use and useful, suggesting that perceived complexity might not be a significant barrier to AR adoption.

Given the positive perception and usage of AR by students, universities should consider integrating AR more formally into their curricula. This could involve incorporating AR-based projects or assignments or using AR to explain complex concepts. Future research could explore specific ways AR is being used in education, especially in underdeveloped countries such as Palestine, the outcomes of those applications, and strategies for enhancing the integration of AR in the learning process.

In conclusion, this study provides valuable insights into the use and perception of AR technology among media students in Palestine. The generally positive perception of AR and its moderate to high usage suggests that there is potential for further integration of AR in higher education. Addressing the identified barriers and providing adequate support and training will be crucial for maximizing the benefits of AR in the learning process. Future research should continue to investigate the implementation and outcomes of AR usage in various educational contexts to advance our understanding of its potential and limitations.

## 7- Declarations

### 7-1-Author Contributions

Conceptualization, S.T. and E.A.; methodology, S.T.; software, H.S.; validation, E.M.A., E.A., and S.T.; formal analysis, H.S.; investigation, J.Q.; resources, A.B.; data curation, H.S.; writing—original draft preparation, S.T.; writing—review and editing, S.D. and E.M.A.; visualization, A.B.; supervision, E.A.; project administration, S.D. All authors have read and agreed to the published version of the manuscript.

### 7-2-Data Availability Statement

Data sharing is not applicable to this article.

### 7-3-Funding

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### 7-4-Institutional Review Board Statement

Not applicable.

### 7-5-Informed Consent Statement

Approvals were obtained from the Universities where the study was conducted.

### 7-6-Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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