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"A Policy Framework: Integrating Virtual and Augmented Reality into UAE School Curricula"

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Abstract

Purpose: The goal of this study is to identify an actionable policy framework for integrating Virtual and Augmented Reality (VR/AR) into UAE School Curricula. The research investigated existing policy initiatives, identified gaps in policy and infrastructure, and reviewed international best practice examples to create a relevant framework for integration. The research is aligned with the UAE initiatives of embedding AI (i.e. Vision 2031) to produce recommendations for an actionable policy proposal.

Methodology: The study adopted a mixed-method research design, taking into account both quantitative and qualitative data. A survey questionnaire is used to collect the qualitative data from the 50 respondents working in 10 different schools in the UAE. The sample included School Teachers, students, Principal, department head, Curriculum Specialist and Technical Support Specialist. Whereas the qualitative data is collected from the 8 participants, such as EdTech Consultant, school IT Directors, Teachers, Policy Analyst, Curriculum Developer and Principals who are part of these schools, as well as the UAE education ministry. The quantitative data is analysed using the statistical package for the social sciences (SPSS) version 22 and Excel. The findings from the SPSS are presented in the form of tables, whereas the qualitative data are analysed using thematic analysis.

Findings: The survey results showed that integrating VR/AR into UAE school curricula is moderately positive, with a mean score of 3.11 (Std Dev 0.865). Respondents largely recognise VR/AR's potential to enhance learning experiences (50% strongly agree, 32% agree), boost student engagement (58% strongly agree), and prepare students for future careers (52% strongly agree). Key considerations include addressing infrastructure gaps (mean 2.46), providing critical teacher training (mean 3.42), managing costs (44% agree/44% strongly agree on needing government funding), and ensuring equitable access (concerns with a mean 2.52). Whereas the interview results found that policy frameworks should address factors such as high cost, technical skills, and resistance to change, necessitating policy frameworks, partnerships, and targeted support.

Unique Contribution to Theory, Practice and Policy: Theoretically, the study is informed by Constructivist Theory and Skinner's Behavioural theory, as the study is seen to examine the factors that influence VR/AR adoption in education in the UAE. Validation was achieved by evaluating the perception of the stakeholders through surveys and interviews, contextualising the two models to the educational context of the UAE. Practically, recommendations include providing targeted teacher professional development on VR/AR pedagogies, developing content aligned to the curriculum, and developing partnerships between schools and technology providers for effective implementation. Practitioners should concentrate on user-centred design in the VR/AR experience and support technical needs. Within policy, recommendations to policymakers include building a national VR/AR integration plan, establishing infrastructure and equity guidelines, creating data privacy and security standards, and cultivating public-private partnerships. Policy efforts should align with the goals of UAE Vision 2031, particularly around its focus on innovation and preparing students for a technology-driven future, and use it as a guide to systematic VR/AR adoption in UAE schools.

Keywords: *Technological Change and Growth, Innovation, Government Policy, Analysis of Education, Economic Development, Diffusion of VR and AR Technologies, Education and Research Institutions*

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INTRODUCTION

In recent years, the world has witnessed significant technological advancements, strongly impacting all aspects of life, especially the education sector. Traditional methods alone are no longer sufficient to meet the demands of the new generation of students, who have grown up in an interactive digital environment (Mohamed & Sicklinger, 2022). Modern technologies such as Virtual Reality (VR) and Augmented Reality (AR) have become among the most prominent tools that have revolutionised teaching and learning methods, creating a more engaging and effective educational environment (Mustafa et al., 2025). Therefore, this work explores the potential for making VR and AR mandatory in United Arab Emirates (UAE) schools. It investigates the current policy initiatives, identifies gaps in policy and infrastructure, and draws on international best practices to propose a relevant integration framework. The research aligns with the UAE initiatives of embedding AI (i.e. Vision 2031) and intends to provide actionable policy recommendations.

As per LaValle (2023), there is a big difference between VR and AR since both are responsible for promoting the interaction of people in a completely different environment. In this way, VR brings knowledge to a context that does not exist because it is virtual and moves away from reality, and AR adds a new, palpable vision of the real world, complemented with the incorporation of virtual 3D objects.

Table 1: Difference between VR and AR

Aspects	Virtual Reality (VR)	Augmented Reality (AR)
Educational experience	Provides immersive and simulated educational environments to improve the learning experience.	Improve education by overlaying digital information in the real environment, enriching the educational experience.
Interaction	Allows students to manipulate objects and explore virtual environments for practical learning.	Facilitates interaction with digital information in the real environment, promoting the active participation of the students.
Devices	Requires devices such as VR glasses and headphones to immerse students in virtual environments.	Can experience from mobile devices, such as smartphones, facilitate anywhere access.
Educational applications	Widely used in educational simulations, immersive virtual and practical visits.	Teaching employees complex concepts, displaying information enrichment lessons with digital elements.
Educational immersion	Offers total immersion in simulated educational settings, improving the retention and comprehension of the content.	Provides experience of a contextualised real world, facilitating understanding of abstract concepts through visual elements.
Examples	Educational simulators, virtual visits to museums, and virtual laboratory practices.	Applications of human anatomy visualisation, simulations of interactive lesson processes with digital elements.

Source: (Own Illustration)

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Research Objectives

- To identify the opportunities and benefits of VR/AR integration in UAE school curricula.
- To analyse the challenges and implementation considerations in policy framework for integrating VR/AR in UAE school curricula.
- To investigate the importance of content alignment with support and evaluation for integrating VR/AR in UAE school curricula.
- To provide insights and recommendations for policymakers, educators, and stakeholders on the opportunities, challenges, and best practices for integrating VR/AR in UAE school curricula.

According to the website of Market.US (2024), the K-12 (Kindergarten to 12th grade) education system in the United States has undergone a major change in the coming years, with the supporting and growing use of VR/AR technologies in education. By 2033, it is expected that over 75% of K-12 schools will be using VR/AR in some way, compared to less than 20% of K-12 schools in 2023, as shown in **Figure 1** below, which showcases a dramatic increase in awareness and recognition of the potential of VR/AR, and its ability to improve the learning experience through immersive, interactive and effective learning experiences. Therefore, it is a priority to explore new and inventive ways to implement and utilise AR/VR technologies as a tool for creating improved student outcomes and success in education, and these will likely shape the future education system globally.

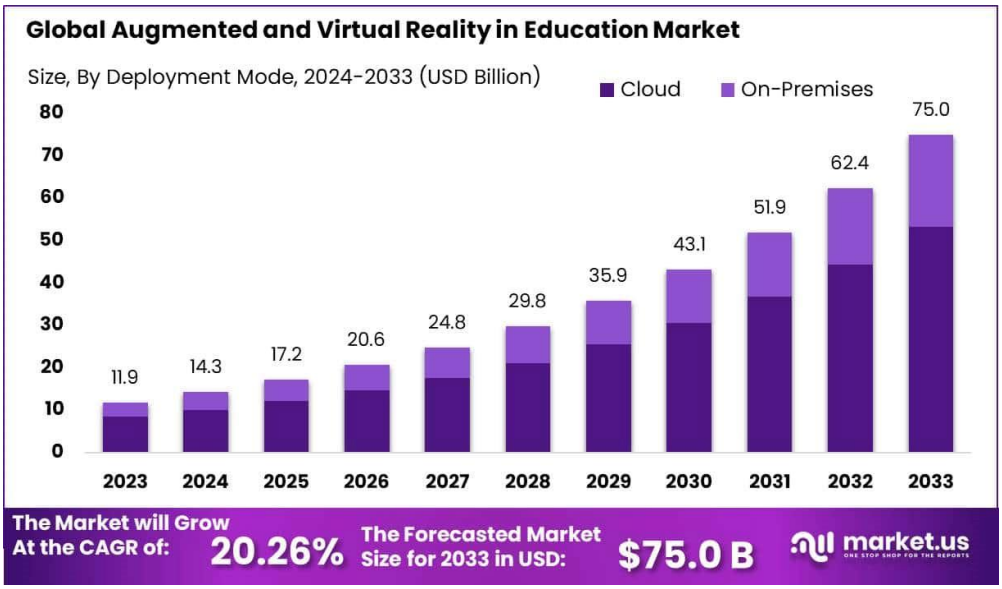

Figure 1: VR/AR Usage in USA K-12 Education

Source: (Market.US, 2024)

The use of VR/AR for education is growing, driven by the increasing use of immersive technologies within educational contexts. This growth is influenced by a desire for more engaging and interactive experiences that support student engagement and success. With VR/AR, educators have the potential to utilise these technologies to illustrate complex concepts, allowing students to interact with virtual simulations and environments that support their ability to learn and retain concepts (Scavarelli et al., 2021). Consequently, it is vital for countries such as the UAE to establish a policy framework for educational stakeholders to

deliberate on how to effectively incorporate VR/AR technology into UAE school curricula to enhance learning experiences

A well-structured framework would act as a foundation for infrastructure, teacher professional development, content development, and assessment approaches that are practical and equitable in their promotion (Al-Ansi et al., 2023). It would also assist in alignment with the national education agendas, encourage innovation, and provide considerations of accessibility, equity and cultural relevance. By establishing concrete policies and standards, the UAE can assure strategic, sustainable, positive VR/AR integration that will benefit students in line with the country's vision for educational excellence and innovation (Mohamed & Sicklinger, 2022)

Statement of the Problem

As per Perifanou et al. (2022), the implementation of virtual reality in education offers numerous advantages. In addition, VR/AR technologies offer unprecedented opportunities to overcome the fears that often accompany language learning. Results show that student confidence gradually increases and learning is more effective. Above all, it helps with behavioural learning, as students are exposed to immersive realities where they can observe and interact in everyday or specific activities (Al-Ansi et al., 2023).

However, there are various challenges to implementing these technologies in the school environment. Among the main barriers are technological and financial difficulties, assistance to adoption by educators and institutions, and the problems of accessibility and inclusion (Lampropoulos et al., 2022). One of the main obstacles presented by these technologies is the need for specialised hardware in the implementation of VR and AR, such as VR glasses, motion detectors and AR cameras, which all require major investment along with constant maintenance; and preferably also constant updates and replacement (Al-Ansi et al., 2023). A further notable issue is resistance by educators and schools to adopting VR and AR.

Furthermore, many teachers feel uncomfortable or insecure in their personal practice with new technologies. This is due to the lack of training programs on VR and AR that creates a perceived level of technical complexity (Mohamed & Sicklinger, 2022). The technological infrastructure is an additional challenge for schools (Scavarelli et al., 2021). Even when schools gain access to the right hardware, they need to have a strong IT infrastructure to implement VR and AR appropriately. This includes a reliable internet network and continuous technical support (Mustafa et al., 2025). This demonstrates an important priority in developing a policy framework to mitigate these challenges in supporting the effective development and implementation of VR/AR technologies into UAE schools' curriculum (Al-Ansi et al., 2023).

According to Al Ali (2024), the UAE is taking a proactive approach to the technology shift with initiatives such as the Mohammed Bin Rashid Smart Learning Program to stimulate classrooms equipped with immersive technologies. The country has also partnered with global technology players such as Microsoft, Lenovo, and EON Reality to provide a state initiative of VR and AR hardware and software for schools in the UAE. Furthermore, Schulte & Shemakov (2024) highlighted that GEMS Education's partnership with EON Reality provides an AI platform with 3D content solutions and virtual simulations with personalised learning.

However, though VR and AR technologies contributes to providing many advantages that have helped in raising the efficiency of the school curricula in different countries and part of UAE, however there are a number of challenges facing the application of augmented reality in

education, which are indicated and are classified into challenges facing by the teacher, the learners, and society, and material and technical challenges (Scavarelli et al., 2021).

LITERATURE REVIEW

Theoretical Framework

Constructivist Theory

Based on constructivist philosophy, students actively build their knowledge from experiences, combined with emerging technologies such as AR, VR, and artificial intelligence (AI), which are described as potentially interesting solutions to enhance the learning process, creating opportunities for more effective, and most importantly, personalised learning (Zajda, 2021). For example, AR and VR are facilitating immersive learning experiences that enhance the understanding of abstract concepts. These technologies not only make content more accessible but also increase student engagement and retention (Marougkas et al., 2023a).

As per Scavarelli et al. (2021), constructivist learning environments are closely linked to e-learning in general, and to VR and AR technologies in particular. Once the subject is presented using multimedia, it allows for the construction of concepts through personal activities and observation within rich interactive environments, which in turn leads to better learning.

One aspect of constructivist theory is that knowledge is created by the activity of the learner as they construct meaning. Therefore, introducing VR and AR technologies into the school curriculum may present challenges to constructivist principles such as autonomy, student-centred learning, and critical thinking. VR/AR experiences can be so immersive that they may inhibit a learner's autonomy (by making choices for them and requiring compliance to maintain proficiency) and student-selected ownership of their learning.

Moreover, VR/AR experiences are often subjected to a structure that imposes a type of guided rigidity, and does not provide students opportunities for exploration and critical thinking or problem solving in their own right, as they may depend too much on the technology to supply those answers instead of constructing knowledge (Zhang & Wang, 2021). In addition to this, VR/AR experiences could also promote a learning process that favours transmission-based learning design over constructivist design and could disrupt the aspirational outcomes of developing understanding and skills. Thus, to mitigate these challenges, educators must carefully design VR/AR experiences that promote autonomy, critical thinking, and active learning, ensuring that technology serves to enhance, rather than hinder, constructivist principles (Doerner & Horst, 2022).

Skinner's Behavioural Theory

According to Alrowaily (2022), Skinner's behavioural theory, behaviour is either learned or the result of modification through the learning process. Therefore, behavioural theory focuses on preparing the educational situation and providing the learner with stimuli that motivate him to respond, and then reinforcing this response. VR and AR technologies seek to prepare these educational situations through various media, which include those that act as learning stimuli. For example, Duolingo is one of the most popular language-learning app, known for its fun, game-like lessons. It offers courses in over 30 languages (from Spanish and French to Klingon and High Valyrian) and has attracted hundreds of millions of users worldwide with its free and addictive model. Duolingo turns language learning into a kind of game: users complete short exercises (translating sentences, matching words to pictures, listening and writing what they hear, etc.), earn points (XP), maintain streaks for daily practice, and level up through a skill

tree. This gamification genuinely motivates learners to come back each day. Duolingo's biggest strength is that it makes learning feel like playing. The app's bright visuals, friendly mascot, and quick progress feedback are highly motivating. The lessons are short (5–10 minutes), lowering the barrier to starting a study session. This format is great for creating a daily habit, which is crucial in language learning (Shortt et al., 2023).

Constructivism and behaviourism can be viewed as two separate educational theories based on differing epistemologies and pedagogical orientations. Constructivism embraces learner-centred and self-directed learning, and knowledge is constructed by means of experience and social interaction (Scavarelli et al., 2021). In contrast, behaviourism emphasises observable behavior and external stimuli, reinforcement, and conditioning to achieve the intended learning outcome (Alrowaily, 2022). Several authors discuss the co-existence of the two theories in a framework since they represent different pedagogical lenses (Zhang & Wang, 2021). Rabbani et al. (2023) argue that both theories can be used to inform practice in a useful and complementary manner, whereas Hinduja (2021) believes the two theories to be fundamentally incompatible. Thus, a nuanced understanding of both theories and their limitations is required to determine if the two theories can be integrated or if they are discrete learning approaches and context-dependent ways of learning.

With this in mind, a policy framework could connect both perspectives in a way that utilises the immersive and interactive aspects of VR/AR to promote active learning (Constructivist Element) and reinforces mechanisms (Behaviourist Element) to motivate learners. **Table 2** shows the key elements of both theories that schools in the UAE can develop a comprehensive framework that meets a range of learners' needs and facilitates the effective integration of VR/AR in the UAE school curricula.

Table 2: Key Theoretical Framework For Policy Integration

Key Elements of both Theories For Policy Framework Integration	
Constructivist Elements	**Behaviorist Elements**
Encourage active learning and knowledge construction through VR/AR experiences.	Utilise reinforcement mechanisms, such as rewards or feedback, to motivate learners
Foster social interaction and collaboration among learners	Focus on observable behaviours and measurable learning outcomes
Emphasise learner autonomy and self-directed learning	Incorporate conditioning techniques to promote desired learning behaviours.

Source: Own Illustration

Conceptual Framework

Successful adoption of VR/AR technologies in curricula across UAE schools is grounded by the interaction of several interacting factors in this context, such as "policy enablers, pedagogical alignment, technological readiness and stakeholder engagement". Policy enablers can include the provision of guidelines and support from the Ministry of Education in UAE; pedagogical alignment includes how VR/AR will match the objectives and outcomes of curriculum in the schools; technological readiness can involve the readiness of infrastructure, access (i.e., number of VR devices) and teacher digital capacity; stakeholder engagement includes the collaboration of teachers, students, policymakers and technology expert(s) on the implementation of the technology. This framework provided a convincing account that the

integration of immersive learning technologies like VR/AR could enhance learning experience, learning engagement and learning outcomes in UAE schools as shown in **Figure 2**.

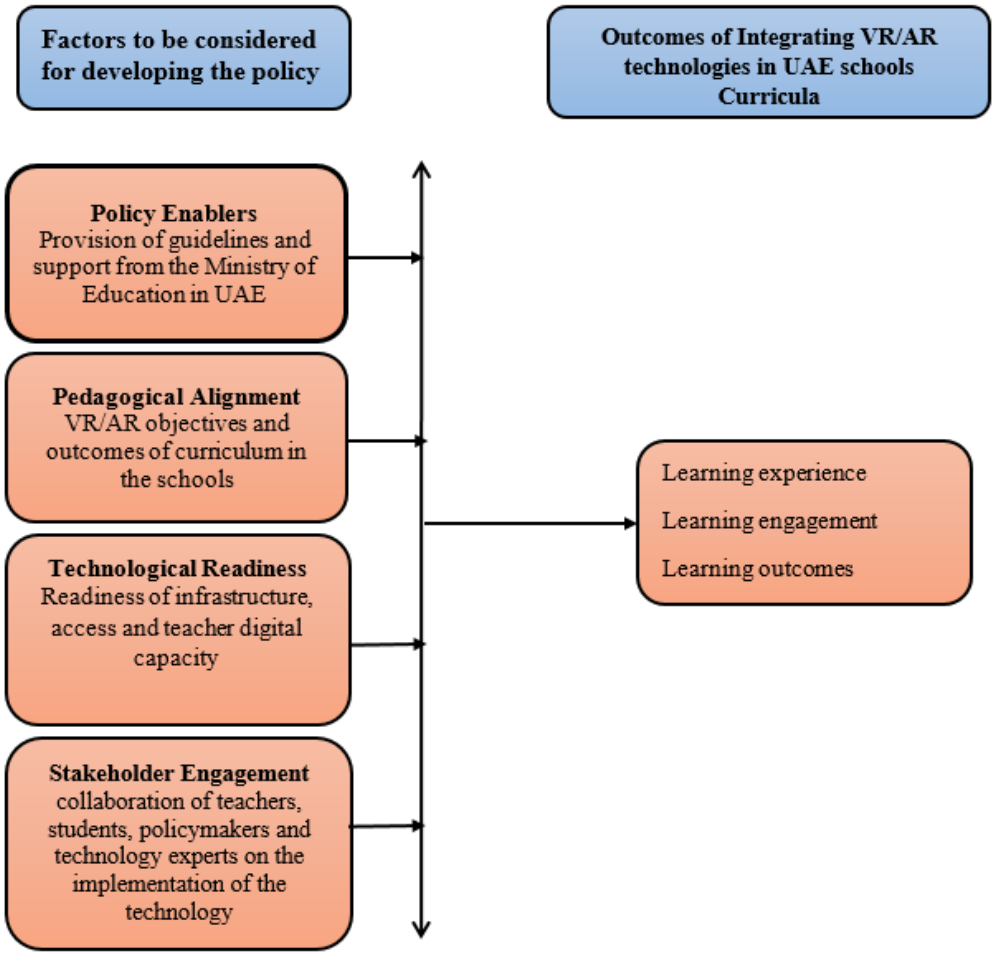

Figure 2: Conceptual Framework

Source: Own Illustration

Empirical Review

As noted by Zhao et al. (2023), applications of augmented and virtual reality technologies are an effective and important aspect of developing school-based curricula because they can measure the way each individual learner learns and facilitate the customisation of educational materials, based on their specific individual learning needs. In addition, Timotheou et al. (2023) indicated that VR and AR technologies assist curriculum developers in developing interactive, engaging and educational content and a personalised learning opportunity for students that reflects their individual learning progress, creating an imaginative experience for students and teachers as well as developing critical thinking and creativity (Liono et al., 2021). Mustafa et al. (2025) examined the efficacy of augmented and virtual reality technologies in support of curricula developed by educational organisations in the UK education system, and found that augmented and virtual reality technologies were an effective method of supporting and enhancing the educational process.

Tene et al.'s (2024) study demonstrated that VR and AR can benefit student engagement and motivation, thereby facilitating knowledge of complex learning environments, STEM (science, technology, engineering, and mathematics) learning as the primary focus. Also, Egunjobi & Adeyeye (2024) discovered that AR and VR facilitate learning and improvements to students' retention. Marougkas et al. (2024b) study noted retention improvement to be more than 70-75%.

Although VR and AR technologies contribute to providing many advantages that have helped in raising the efficiency of the school curricula in different countries and parts of the UAE, there are a number of challenges facing the application of VR and AR technologies in education. According to Iqbal et al. (2022), school teachers lack knowledge of VR and AR technologies, and a methodology to frame dealing with the flowing river of information delivered through these technologies in the school environment is lacking. Moreover, there is a lack of professional experts and designers to help teachers find the right content for VR and AR technologies that they can implement in the school's curricula.

In addition, Titchiev et al. (2023) discussed that the students do not have sufficient conviction in this type of education, and are not interactive as required. Moreover, using VR and AR technologies may not be an effective teaching strategy for some learners. Also, focusing on a large amount of overlapping information may affect the brain, leading to distraction for the learner. Thus, learners' abilities to deal with modern technologies (VR and AR technologies) vary (Mhlongo et al., 2023).

Furthermore, many schools face financial inability to start a project using modern technology such as VR and AR (Titchiev et al., 2023). Also, heavy reliance on VR and AR technologies for communication makes these technologies highly cost-intensive (Iqbal et al., 2022). In addition, the rapid and continuous development of these technologies and models makes keeping up a difficult task to manage. Timotheou et al. (2023) further highlighted that there are ethical concerns raised by VR and AR technologies in general that make parents and students both sceptical about the effectiveness of these technologies compared to traditional methods of school circular.

Research Gaps

There are several research gaps in developing a policy framework for the implementation of VR and AR in school curricula in the UAE. The majority of studies to date have been small-scale trials, leaving a gap for large-scale studies, understanding how integration of these technologies can be scaled up in future and their long-term impact (Al Mohsen & Mohebi, 2024). Moreover, the lack of opportunities for teachers' training and readiness in the country, considering the use of digital technologies in education, is an important gap to support effective integration of VR and AR technologies in schools (Hojeij et al., 2024).

In addition, curriculum alignment is an obstacle that requires further research on aligning VR and AR content with existing national school curricula of the UAE (Shihab, 2022). Moreover, infrastructure and accessibility issues, including significant costs, currently reduce the widespread adoption of VR and AR technologies (Al Mohsen & Mohebi, 2024). In addition, there is a lack of studies on the long-term impact that measures the sustained implications these technologies on student learning outcomes. Also, the pedagogical frameworks and content development require further research, including producing culturally relevant, curriculum-supporting VR and AR content.

Therefore, considering these gaps in the literature, this study aims to provide a comprehensive roadmap for policymakers, educators, and stakeholders to effectively integrate VR and AR into school curricula, ensuring alignment with national education goals and standards. By investigating the benefits, challenges, and best practices of VR and AR integration, this research informs evidence-based decision-making, promotes innovative teaching methods, and ultimately improves student engagement, motivation, and academic achievement. Furthermore, the study's findings will contribute to the development of a forward-thinking education system that prepares students for future challenges and opportunities, aligning with the UAE's vision for a knowledge-based economy and sustainable development.

METHODOLOGY

This study used a mixed-method approach. In various stages of the research process, a mixed methodology entails philosophical presumptions that direct the gathering, examination, and blending (mixed) of qualitative and quantitative methodologies, according to Taherdoost (2022). Therefore, the main reason for choosing mixed methods was to have a greater knowledge of the research topic by combining both qualitative and quantitative methods. Furthermore, the study adopted a convergent parallel research design that includes the data collection and analysis of both quantitative and qualitative data that occur simultaneously and are analysed separately.

Furthermore, purposive sampling is chosen as a suitable approach for this study as it allowed the deliberate selection of participants with specific expertise and experience in VR/AR technologies and education policy implementation in UAE schools. By targeting key stakeholders such as policymakers, educators experienced with VR/AR, technology experts, and school administrators at 10 different schools based in the UAE, the researcher has gathered rich and in-depth insights for informing an effective VR/AR policy framework for UAE school curricula.

Moreover, for qualitative interviews, a sample size of 8 participants is considered adequate for thematic saturation, focusing on EdTech Consultants, school IT Directors, Teachers, Policy Analysts, Curriculum Developers and Principals in the UAE school context. For quantitative surveys, a sample size of 50 participants is considered, taking into account School Teachers, students, Principal, department head, Curriculum Specialist and Technical Support Specialist. Data for both the interviews were collected online using the Zoom platform, whereas the data for the survey questionnaire were collected using a Google Form that was shared with the participants through email.

The qualitative data from the interviews are analysed using the thematic analysis method. The main reason for choosing thematic analysis is that it allows for systematic identification, coding, and categorisation of patterns or themes within data from interviews (Squires, 2023).

The statistical package for social sciences (SPSS) software is used to analyse the raw data that was gathered from the survey questionnaire. Data was coded before being used by SPSS. Moreover, the characteristics of the variables were analysed using descriptive statistics, which included standard deviations, mean scores, and frequencies. According to Green (2023), descriptive statistics offer the fundamental characteristics of the gathered data. In addition, themes are used to present the study's qualitative findings, and tables and figures are used to provide the quantitative results.

RESULTS

Survey Results

Table 3: Descriptive Analysis

Statement	SD	D	A	SA		
	%	%	%	%	Mean	Std Dev
Virtual and Augmented Reality technologies can enhance the learning experience in UAE schools	12	6	32	50	3.20	1.010
UAE schools have the necessary infrastructure to support the integration of VR/AR technologies.	24.0	30.0	22.0	24.0	2.46	1.110
Teachers in UAE schools require training to effectively integrate VR/AR technologies into their teaching practices.	2.0	2.0	48.0	48.0	3.42	0.642
The use of VR/AR technologies can increase student engagement and motivation in learning.	4.0	2.0	36.0	58.0	3.48	0.735
The integration of VR/AR technologies into UAE school curricula is extremely costly and requires a lot of government funding	6.0	6.0	44.0	44.0	3.26	0.828
The integration of VR/AR technologies into UAE school curricula should be aligned with the country's vision for embedding AI and innovation.	-	2.0	54.0	44.0	3.42	0.538
VR/AR technologies can be accessed by all students in UAE schools, regardless of their socio-economic background.	22.0	26.0	30.0	22.0	2.52	1.074
UAE schools should prioritise VR/AR integration as part of their digital transformation strategies	18.0	18.0	36.0	28.0	2.74	1.065
The integration of VR/AR technologies into UAE school curricula required a lot of changes in the current curriculum standards.	6.0	2.0	52.0	40.0	3.26	0.777
The integration of VR/AR technologies into UAE school curricula prepares students for future careers and innovations.	8.0	2.0	38.0	52.0	3.34	0.872
Overall					**3.11**	**0.865**

The data interpretation reveals insightful perspectives on the policy framework for integrating VR/AR into UAE school curricula. A significant majority of respondents strongly agree (50%) or agree (32%) that VR/AR technologies can enhance the learning experience in UAE schools, reflected in a mean score of 3.20 (Std Dev 1.010), indicating a generally positive perception of VR/AR's educational potential. However, there's a mixed view on infrastructure readiness, with 24% strongly disagreeing and 30% disagreeing that UAE schools have the necessary infrastructure, yielding a moderate mean of 2.46 (Std Dev 1.110), suggesting infrastructure gaps.

Respondents largely agree (48%) or strongly agree (48%) that teachers require training for effective VR/AR integration (mean 3.42, Std Dev 0.642), highlighting training as a critical

factor. There's strong endorsement for VR/AR increasing student engagement (58% strongly agree, mean 3.48, Std Dev 0.735) and preparing students for future careers (52% strongly agree, mean 3.34, Std Dev 0.872). Views on cost indicate 44% agree and 44% strongly agree on high costs needing government funding (mean 3.26, Std Dev 0.828). Alignment with the UAE's vision for AI and innovation is supported (54% agree, 44% strongly agree, mean 3.42, Std Dev 0.538). Concerns exist about equitable access (22% strongly disagree, 26% disagree, mean 2.52, Std Dev 1.074).

Overall, respondents moderately support VR/AR integration priorities (mean 3.11, Std Dev 0.865), suggesting a leaning towards embracing VR/AR in UAE education with considerations for infrastructure, training, cost and equity, and aligning with national innovation goals.

Interview Results

Theme 1: Opportunities and Benefits of VR/AR Integration in UAE School Curricula

VR/AR technologies offer exciting possibilities for adding valuable experiential learning into UAE schools, greatly increasing student engagement with subjects like history and sciences (Biology, Chemistry, Physics). Respondents indicated that VR/AR can enable students to visualise complex concepts, provide ways for virtual exploration of places that are otherwise inaccessible, and even increase student engagement and motivation. Students take advantage of virtual experiments and examinations that can increase effective learning in the classroom. In addition, VR/AR technologies have been shown to have a significant impact on student motivation and engagement in the learning process. These technologies offer practical experiences that stimulate active participation, improving interest and knowledge retention.

Theme 2: Challenges and Implementation Considerations in Policy Framework for Integrating VR/AR in UAE School Curricula

The main key challenges identified by the interviewee include, firstly, the purchasing and high cost challenge for maintaining VR/AR hardware, especially for UAE schools with limited resources. Secondly, bringing VR/AR into the UAE schools requires certain technical skills from both teachers and students, which creates barriers to its use. Also, not all students have access to the necessary devices or high-speed internet. Thirdly, implementing VR/AR technology may be met with resistance from teachers or students who are accustomed to more traditional teaching methods. Therefore, most of the interviewees suggested that for addressing these issues, the UAE Ministry of Education, along with schools' management, should assess infrastructure requirements, foster partnership between schools and technology developer companies, develop policies for supporting schools in funding for VR/AR technologies along with developing policies on training programs for teachers on incorporating VR/AR in school's curriculum.

Theme 3: Content Alignment, Support, and Evaluation for Integrating VR/AR in UAE School Curricula

VR/AR content is required to closely align with national curriculum aims and multicultural considerations (culture, language, values). The UAE Ministry of Education can foster national adoption by establishing guidelines for implementation, facilitating partnerships, and showcasing successful practices domestically and internationally. Teacher training is an essential factor in supporting effective use and integrating VR/AR contexts with curriculum objectives and standards. The suggested evaluation measures can be summarised as follows: evaluating learning metrics could align with student engagement, participation levels, and an

assessment of how effective creating VR/AR environments are compared to existing means of teaching in a more traditional way, using surveys and observational data in UAE schools.

CONCLUSION AND RECOMMENDATIONS

Summary

The research is centred around an exploration of the application of VR/AR to the UAE's school curriculum. This aligns with the UAE's Vision 2031 priority on AI and innovation for the future. In general, the study findings indicated potential increases in learning experiences with VR/AR integration, more engagement for students, and improved preparedness of students in their future careers. Conversely, the results indicated limitations, including underdeveloped infrastructure in UAE schools, the need to train teachers for professional development, cost factor, and equitable access to the affordances of VR/AR technology. The stakeholder engagement with regard to support for VR/AR integration was moderate across different stakeholder groups, while the perceived benefit of VR/AR was higher, specifically in regard to experiential learning. Thus, the research found several key considerations to consider when developing an effective policy framework for the integration of VR/AR in UAE school curricula.

Conclusion

VR/AR are changing education by creating immersive and personalised experiences that improve retention and understanding of knowledge. Adaptiveness to different learning styles and individual needs provides a strong base to improve educational quality. The study noted that VR/AR could enhance students' learning experiences by facilitating student understanding of conceptualised content. Overall, a range of issues, including but not limited to infrastructure readiness, teacher training, cost and accessibility for learner engagement, require consideration for implementation success. The result showed that all stakeholders involved in policy-making for the UAE schools' circular must also develop the capacity to design learning conduct that optimises the potential of these technologies - this requires understanding pedagogical practice and being able to create learning content or learning activity based on pedagogical practice and digital tools.

Recommendations

There are numerous actions that could promote the effective incorporation of VR/AR technology into the school curriculum in the UAE. The UAE Ministry of Education should develop a national policy framework that outlines formal guidelines for the use of VR/AR technology in schools. Specific professional development related to the pedagogies of VR/AR and the incorporation of VR/AR technology into the curriculum will need to take place. Assess and upgrade the school's facilities to accommodate VR/AR technology. VR/AR content must be appropriately designed for the local culture, language, and values, to meet the intended learning outcomes of the UAE national curriculum. Fostering collaboration among schools, technology developers, and policymakers is vital for implementing VR/AR strategies effectively. The resource gap between schools needs to be addressed for students to have equal access to VR/AR tools. Furthermore, UAE schools should employ different metrics to measure the impact of VR/AR integration in the institutions, such as student engagement and participation or their effectiveness compared to traditional teaching methods or future improvements.

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