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Research Article

Educators perception on integrating virtual reality in the classrooms

Nivine Aziz [1]
0009-0002-4962-9179

Rayya Younes [1*]
0000-0002-2371-1361

[1] Lebanese American University, Beirut, LEBANON
[*] Corresponding author: rayya.younes@lau.edu.lb

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ABSTRACT

Today's generation exhibits a strong affinity for video games, presenting an opportunity to harness this interest for educational purposes. Integrating gaming elements into education has the potential to captivate students while improving information retention. Virtual reality (VR), in particular, offers a transformative approach by creating immersive and interactive learning experiences. In our study, we investigated the feasibility of integrating VR into Lebanese classrooms (K-12). Data was collected through an online survey with 110 respondents and interviews with 14 educators. Findings reveal that educators are enthusiastic about VR's potential but express caution about its implementation. While acknowledging benefits such as enhanced student engagement, improved retention, and alignment with student preferences, they also highlighted challenges, including physical side effects, the need for teacher training, extensive preparation, and classroom management complexities. Additionally, educators proposed a comprehensive list of activities that could effectively utilize VR in educational settings, reflecting a balance between innovation and practical application. These insights underline the need for further exploration and structured planning to successfully integrate VR into the Lebanese educational system.

Keywords: virtual reality, Lebanon, challenges, opportunities, educators' perception

INTRODUCTION

Education is undergoing rapid transformations, driven by advancements in methods, techniques, and technologies aimed at enhancing student learning, retention, and career readiness. A key focus has been on personalizing education to integrate theory with practice, fostering student engagement, and stimulating a desire for continuous learning. Solutions such as multimedia resources, simulations, and educational games have emerged to bridge gaps in traditional instruction. Among these innovations, virtual reality (VR) has proven particularly impactful across fields like medicine, engineering, history, and business, offering immersive, practical learning experiences that enhance both technical skills and socio-emotional development. VR's ability to simulate real-world scenarios addresses educational gaps aligns with the evolving goal of providing adaptable, comprehensive education.

Traditional classroom settings often fail to engage students, leading to diminished motivation and poor retention compared to the immersive, detail-oriented focus seen in gaming environments. Passive learning methods, such as lectures and videos, have been shown to reduce learning outcomes (Shanab et al., 2012), while active, participatory approaches enhance information retention. Teachers face the challenge of re-engaging students while meeting curriculum demands. The integration of VR addresses these issues by offering immersive, interactive learning experiences that captivate attention, stimulate the senses, and facilitate active knowledge construction. VR transcends traditional educational limitations, allowing learners

to explore historical events, conduct scientific experiments safely, embark on virtual geographic tours, and unleash creativity in the arts, thus fostering deeper understanding and sustained motivation. VR simulations remain underutilized, with limited investment in VR technology and no comprehensive studies on its educational impact or teachers' readiness for implementation. Therefore, this study aimed to evaluate the perception of teachers in Lebanon towards integrating VR in the classrooms. In this study's context, the teachers' perception includes their understanding of VR, their readiness to integrate VR in their classrooms, and the factors that are affecting their readiness.

Previous research underscores the significance of grasping educators' viewpoints concerning the incorporation of technology within educational settings. Despite the rising popularity, accessibility, and affordability of VR technology in classrooms, there remains a scarcity of studies examining teachers' attitudes toward its integration into education, especially in Lebanon. The research questions that guided this study were as follows:

1. What are Lebanese teachers' perceptions of the use of VR technology in the classroom?
2. What is the status of VR integration in the schools in Lebanon?
3. What are the opportunities and challenges of integrating VR into education?

While teachers prioritize achieving learning outcomes, students emphasize motivation and engagement, making it critical to address educators' needs to ensure effective tool integration. This research examined Lebanese teachers' perceptions, knowledge, and readiness to integrate VR into their classrooms. The study aligns with Lebanon's ongoing curriculum review, conducted in collaboration with UNESCO and the Ministry of Education and Higher Education (MEHE), as part of a five-year higher education plan (2023-2027) aimed at enhancing university competitiveness, aligning graduates with market demands, and fostering sustainable development (MEHE, 2021; Sawahel, 2023). Despite these reforms, criticism has emerged over the lack of input from teachers and schools, with decisions made at bureaucratic levels (Sawahel, 2023). This research addressed this gap by evaluating teachers' readiness to adopt emerging technologies, emphasizing their critical role in implementing educational reforms. Insights gained inform targeted training, tailored support, and resource development to ensure the successful integration of VR in line with national educational objectives.

Lebanese Context

Lebanon is characterized by its cultural diversity, multilingualism, and a strong education system with high literacy rates (Bahous et al., 2011; Sedgwick, 2000). The country has 2,796 schools, with 44% public and 56% private (Center for Educational Research and Development [CRDP], 2021). Despite extensive research on culture and language, technology integration in Lebanese schools remains limited, hindered by slow, expensive internet access (Yehya et al., 2018). The COVID-19 pandemic accelerated the adoption of virtual applications in education, a trend that persists due to their effectiveness in enhancing learning. However, Lebanon's ongoing economic crisis raises concerns about the cost-effectiveness of VR in education, emphasizing the need to balance financial constraints with pedagogical value. Thus, research into VR's potential within Lebanon's educational landscape is both timely and essential.

Educational Technology Tools

The rapid growth of educational technology (EdTech) has significantly enhanced teaching and learning across various levels. EdTech tools, including virtual, augmented, and mixed realities, 3D printing, drones, Internet of Things, robotics, AI, holograms, wearable devices, virtual labs, and blockchain, offer diverse applications for instruction, assessment, modeling, and visualization (Hernandez-De-Menendez et al., 2019). These tools support both synchronous and asynchronous learning, providing educators with flexible approaches for different stages of their unit plans (Salame & Makki, 2021).

EdTech promotes personalized learning, allowing students to engage with content at their own pace, addressing individual strengths and weaknesses (Koedinger et al., 1997; Rodriguez-Segura, 2022; Roschelle et al., 2000). This approach boosts academic performance, self-confidence, and motivation, reducing disparity between learners of varying abilities. Also, EdTech enables educators to provide individualized feedback, overcoming challenges associated with large class sizes and ensuring tailored support for all students.

Virtual Reality in Education

As the development of instructional design and technology (IDT) continues to evolve, educators are increasingly recognizing the potential of VR to address the diverse needs of learners and overcome the limitations of traditional classroom instruction.

Virtual reality history and evolution

In 1954 (and later in 1958), Skinner (1954) introduced teaching machines that provided individualized, self-paced instruction–a precursor to integrating computers into education. In 1959, Donald Bitier expanded computer use in educational programs at the University of Illinois, and by 1972, the Office of Technology Assessment (1995) was established to support teachers' effective use of technology. As challenges in sharing digital resources emerged, the 1992 initiative by the Office of Science and Technology Policy expanded the US Internet to connect educational infrastructures, setting the stage for more immersive learning environments.

The evolution of VR began with its educational intent in 1991 (Rheingold, 1991) to let learners interact with artificial environments. Despite high costs and bulky equipment in the early 1990s, by 1994 digital video, VR, and 3D systems gained business interest, with the commercialization of the Internet in 1995 further driving growth. In 1996, Schroeder (1997) highlighted that computer-generated displays could evoke a sense of presence, leading to the emergence of collaborative VR communities by 2000 and the launch of Second Life® in 2003. By 2010, virtual worlds were defined as immersed 3D environments for learning (Kapp & O'Driscoll, 2009), followed by the USC Institute's smartphone VR viewer in 2012, the Oculus Rift between 2013-2016, and continued hardware innovations in 2015 and 2016 that made VR more accessible and interactive.

Virtual reality integration

As educators increasingly acknowledge the potential of utilizing various forms of VR for educational purposes, there has been a growing interest in integrating technology into teaching practices to create more effective learning environments (Keengwe & Onchwari, 2011; Merchant et al., 2014). However, the mere adoption of new technology without careful consideration can often result in ineffective instructional practices (Sweller, 2008). Effective utilization of VR in instruction necessitates its integration into well-designed contexts that align with theoretical approaches to achieve specific learning objectives (Mikropoulos & Natsis, 2011). Faculty members must acquire the ability to select and employ the most suitable technological tools to enhance their teaching proficiency. A significant challenge faced by faculty is not only acquiring technological knowledge and skills but also embracing potentially new pedagogical approaches centered around active learning. Simply using technology for its sake yields limited benefits. The true potential of technology, including VR, lies in its capacity to transform the teaching and learning process. Therefore, educators should strive to harness the power of VR to create immersive and engaging learning experiences that promote deeper understanding and retention of content.

Applications for Virtual Reality in Education

The integration of VR technology into educational settings has revolutionized traditional teaching practices, offering immersive and engaging learning experiences across various subjects and disciplines. From history to mathematics, and languages to physical education, VR has opened new avenues for educators to enhance student engagement, promote experiential learning, and foster a deeper understanding of complex concepts. For example, VR offers immersive methods for historical exploration with applications like *Time Machine VR* and *Ancient Rome VR* that enable users to traverse ancient civilizations and historical cities, and *Titanic VR* and the *VR Holocaust Memorial Experience* that provide interactive insights into significant historical events. Space exploration apps such as *Titans of Space Plus*, *Apollo 11 VR*, and *Mission ISS* immerse users in celestial experiences, while *Ocean Rift* explores marine ecosystems. *Calculus Virtual Reality* explores multi-dimensional calculus concepts, while *Data Visualization in Virtual Reality* allows for collaborative analysis in 3D environments. *Tilt Brush* and *Sculpture VR*, enabling 3D painting and world-building. Museums leverage VR for interactive experiences, such as the Louvre's *Mona Lisa: Beyond the Glass* and the Tate Modern's Modigliani studio recreation. Fully virtual museums like the *Kremer Museum* democratize access to global art collections.

Advantages of virtual reality

VR offers significant educational advantages by creating immersive three-dimensional environments that enhance user engagement (Lau & Lee, 2015). Through head-mounted displays and motion sensors, VR simulations bridge the gap between virtual and real-world experiences (Frederiksen et al., 2020). Avatars facilitate social and psychological connections among users, while real-time communication supports collaborative learning (Biocca et al., 2003; Hew & Cheung, 2010). VR promotes active, experiential learning, enabling learners to engage with content and choose personalized learning pathways, which improves academic outcomes (Al Musawi et al., 2025; Dickey, 2005; Hew & Cheung, 2010). Additionally, VR-based Virtual Learning Environments foster increased practice time and understanding, leading to higher achievements (Moro et al., 2017). In addition using VR in the classroom promotes engagement, motivation and curiosity (Al Musawi et al., 2025). Häfner et al. (2013) identified seven key benefits of VR in education: enhanced motivation, effective communication, improved visualization of complex phenomena, adaptability to individual needs, safety, environmental sustainability, and cost-effectiveness.

Disadvantages of virtual reality

Despite its benefits, VR in education presents several challenges. Cognitive overload can occur when users are overwhelmed with excessive information or tasks, leading to reduced learning outcomes (Makransky et al., 2019). Physical reactions such as dizziness or "cybersickness" may also arise from sensory mismatches, affecting user comfort and engagement (Kwon, 2019; Oak, 2018). Moreover, the high cost of VR hardware and content, along with limited customization options, hinder its widespread adoption (Al Musawi et al., 2025; Jensen & Konradsen, 2018). Additionally, the lack of knowledge on effective integration, insufficient professional development, and time constraints impede its use in educational settings (Alfalah, 2018; Minocha et al., 2017). Teachers face internal barriers, including attitudes and willingness to adopt new tools, and external challenges like limited resources and inadequate IT support (Ertmer, 1999). While VR is acknowledged for its potential to enhance learning through engagement, motivation, and visualization of complex concepts (Fransson et al., 2020), issues such as high costs, technical difficulties, and logistical constraints remain significant obstacles. Teachers call for continued professional development and institutional support to effectively implement VR in classrooms (Al Musawi et al., 2025; Fransson et al., 2020; Khukanlenko et al., 2022).

As EdTech continually evolves, the efforts of IDT persistently aim to furnish educators with the most effective tools for enhancing learning experiences. The recent inclusion of VR in educational settings represents a significant milestone in this ongoing endeavor. However, the successful integration of VR hinges crucially upon the readiness and willingness of teachers to embrace this technology. Teachers serve as the cornerstone in the effective implementation of VR in classrooms. Without their proficiency and enthusiasm for incorporating VR into their instructional practices, its potential benefits may remain unrealized.

METHODOLOGY

A mixed-method approach was used to explore the research questions, combining qualitative data from surveys and interviews with quantitative data from the same survey. This approach enables a comprehensive examination of teachers' motivation and readiness to implement VR in classrooms, integrating quantitative patterns with qualitative insights into participants' experiences and perceptions.

Participants

The survey was distributed to 110 educators of all subjects and grade levels (K-12), across all regions of Lebanon. Of these 110 educators, 87 were classroom teachers and the rest were either coordinators, administrators, or IT specialists in schools. This approach sought to ensure comprehensive coverage of the entire country and provide a holistic understanding of Lebanon's teachers' readiness regarding VR technology. In addition, participants were asked if they would like to participate in an interview at their convenience. A total of 14 educators agreed to participate in the interviews, comprising 12 in teaching positions and 2 principals. The sample was predominantly female (81.4%), with most participants aged below 40 (67.8%), and primarily from Beirut (44.1%) and Mount Lebanon (22%) governorates. Experience varied, with 21.2% having over 20 years and another 19.5% having 4-7 years. Most respondents teach classes of 21-30 students (63.6%)

and hold teaching positions (83.1%), with English (29.6%) and geography (16.3%) being the most common subjects taught. Altogether 41.8% of the participants taught STEM disciplines while 58.2% of the participants taught non-STEM disciplines. The full teacher demographics can be found in **Appendix A**. This diverse sample provides valuable insights into teacher readiness and the classroom dynamics for integrating VR in Lebanese schools

Data Collection

Data was collected from an online survey and interviews.

Online survey

The survey (**Appendix B**) consisted of 2 parts. The first part collected data about the teachers' demographics and background. The second part contained the items from pre-validated surveys from Khukalenkoet al. (2022) and Wozney et al. (2006). Wozney et al.'s (2006) original survey targeted implementing computer technologies. For this study "implementing computer technologies" was replaced by "using virtual reality in the classroom" A few questions were modified in this survey to meet Lebanon's medium. An optional open-ended question was included at the end of the survey. This question asked teachers to suggest activities related to their subject that could be carried out using VR. To test the reliability of the survey Chronbach's alpha was calculated for the Likert scale items ($\alpha = .884$).

Interviews

The questions of the interview pinpointed a higher focus on the participants' point of view and brought to the surface some ideas that the survey does not cover. The interviews occurred either online or live depending on the participants' preference. The participants who agreed to undergo an interview were divided into 2 categories depending on their position at the school: teachers and coordinators in one category, and the principals in another category.

Teachers and coordinators underwent the same interview, whereas principals had some different sets of questions. Having different interviews for teachers/coordinators, and principals allowed us to gather data from two distinct perspectives: one from individuals actively engaged on the ground, working directly in classrooms and interacting with learners, and the other from decision-makers who primarily operate in administrative roles, often spending more time in office settings than directly engaging with students. This differentiation is crucial as it enabled us to capture both the frontline perspective of those directly involved in educational practice and the broader strategic viewpoint of those responsible for shaping policy and decision-making. By incorporating these varied perspectives, we gained a more holistic understanding of the educational context, ensuring that the research findings accurately reflect the experiences and perspectives of all stakeholders involved in the educational process.

The survey was distributed following IRB approval, with informed consent provided at the beginning, and participants were informed of their right to withdraw at any time. A consent form was also obtained from interview participants prior to conducting interviews.

FINDINGS

First, the participants were asked to define VR by choosing one of 4 provided definitions in the survey. The definition of VR varied among respondents, reflecting different understandings of the technology. A majority comprising 55.9% (66 participants), identified VR as a technology that allows users to interact with computer-generated environments realistically. Additionally, 19.5% (23 participants) defined it as a form of augmented reality that overlays digital information in the real world. A smaller group, 14.4% (17 participants), perceived VR as a type of simulation used exclusively in gaming to create immersive experiences. Furthermore, 10.2% (12 participants) described it as a method of remote communication through lifelike avatars in a virtual space.

Teachers' Perceptions of the Use of Virtual Reality Technology in the Classroom

The responses to various statements regarding VR revealed a range of insights, as outlined in **Table 1**. The large number of respondents viewed VR positively, with 40.7% affirming its potential to enhance academic

Table 1. Educators' opinions regarding VR in the classroom

Using VR in the classroom …	Strongly agree	Agree	Slightly agree	Slightly disagree	Disagree	Strongly disagree
Improves student academic record.	7.6% (9)	33.1% (39)	29.7% (35)	14.4% (17)	12.7% (15)	2.5% (3)
Makes classroom management more difficult.	8.5 (10)	24.6% (29)	27.1% (32)	11.9% (14)	24.5% (29)	3.4% (4)
Promotes the development of communication skills.	8.5% (10)	28% (33)	23.7% (28)	13.6% (16)	19.5% (23)	6.8% (8)
Requires extra resources, time, and effort.	28.8% (34)	44.9% (53)	14.4% (17)	5.9% (7)	3.4% (4)	2.5% (3)
Is successful only if there's adequate teacher training in the use of VR technology in the classroom.	32.2% (38)	50.8% (60)	9.3% (11)	3.4% (4)	1.7% (2)	2.5% (3)
Is successful only if equipment is regularly maintained by IT personnel.	32.2% (38)	52.5% (62)	8.5% (10)	3.4% (4)	1.7% (2)	1.7% (2)
Is an effective tool for students of all abilities.	10.2% (12)	44.1% (52)	20.3% (24)	11.0% (13)	10.2% (12)	11.0% (13)
Effective if teachers participate in selection and implementation of VR technology.	13.6% (16)	48.3% (57)	27.1% (32)	5.1% (6)	4.2% (5)	1.7% (2)
Allows to accommodate individual attributes of students.	8.5% (10)	40.7% (48)	37.3% (44)	3.4% (4)	8.5% (10)	1.7% (2)
Motivates students to get more involved in learning activities.	23.7% (28)	40.7% (48)	22.9% (27)	4.2% (5)	5.9% (7)	2.5% (3)
Requires software training that is too time consuming.	11.9% (14)	41.5% (49)	19.5% (23)	13.6% (16)	11% (13)	2.5% (3)
Promotes the development of student interpersonal skills.	12.7% (15)	26.3% (31)	29.7% (35)	11% (13)	14.4% (17)	5.9% (7)
Effective only if extensive technical resources are available.	12.7% (15)	57.6% (68)	13.6% (16)	9.3% (11)	5.9% (7)	0.8% (1)
Requires extra time to plan learning activities.	16.9% (20)	51.7% (61)	16.9% (20)	8.5% (10)	2.5% (3)	3.4% (4)
Improves student learning of critical concepts and ideas.	14.4% (17)	34.7% (41)	19.5% (23)	8.5% (10)	17.8% (21)	5.1% (6)
Is unreasonable thanks to the existing of subject-specific software.	1.7% (2)	17.8% (21)	28.8% (34)	21.2% (25)	23.7% (28)	6.8% (8)

performance. However, opinions were mixed on classroom management, as 33.1% acknowledged challenges, while 27.9% disagreed with the notion that VR hinders management. Regarding communication skills, 36.5% believed VR contributes positively, though 26.3% disagreed, indicating a need for more evidence on its impact. A significant 73.7% highlighted the necessity of additional resources for VR integration, and 83% emphasized the importance of teacher training, underlining professional development as key to successful implementation. Similarly, 84.7% stressed the need for VR equipment maintenance, reflecting the logistical demands and reliance on IT support.

More than half (54.3%) of the educators saw VR as beneficial for students with varying learning abilities, opinions differed on its universal effectiveness. Furthermore, 61.9% supported educator involvement in VR decision-making, emphasizing the value of collaborative integration. Around half (49.2%) believed VR could meet diverse student needs, and 64.4% recognized VR's role in boosting student engagement. Nonetheless, 53.8% expressed concerns about the time required for software training. Perceptions of VR's role in developing interpersonal skills were divided, with only 39% supporting this view while 40.7% were close to neutral.

Additionally, 70.3% of respondents stressed the importance of technical resources, while 68.6% acknowledged the increased planning demands associated with VR use. Half of the educators (49.1%) believed VR enhances critical learning, though 22.9% disagreed. Only 19.5% considered VR redundant due to existing software, suggesting that most view it as a valuable educational tool.

Virtual Reality Availability and Teacher Preparation

Table 2 summarizes the status of VR procurement, usage and teacher preparation in Lebanon. Among respondents, 7.6% reported their institution has VR sets but is not using them, 12.7% are actively using VR in classrooms, 39% have not procured VR sets and do not plan to, 20.3% plan to procure VR sets in the future, and 20.3% are unsure about the procurement status. Regarding VR integration, 76.3% of teachers reported never using VR in their classrooms, indicating minimal adoption. Only 2 teachers (1.7%) reported frequent VR

Table 2. VR procurement, usage, and teacher preparation

		Count (N)	Percentage (%)
Institution procurement of VR sets	The institution I work in has procured the VR sets, and we are using them in class with our students.	15	12.7
	The institution I work in has not procured the VR sets, and they do not plan on procuring it so far.	46	39.0
	The institution I work in has procured the VR sets, but we are not using them yet.	9	7.6
	The institution I work in has not procured the VR sets but aim to procure them in the future.	24	20.3
	I don't know.	24	20.3
Usage of VR in classroom	Never	90	76.3
	Rarely	12	10.2
	When necessary	14	11.9
	Often	2	1.7
Workshop attendance	I never attended any workshop on VR in education.	71	60.2
	I have attended workshops on VR in education.	24	20.3
	I will attend a workshop.	23	19.5
Availability of IT personnel	Absent	18	15.3
	Always available	32	27.1
	Available upon request	68	57.6

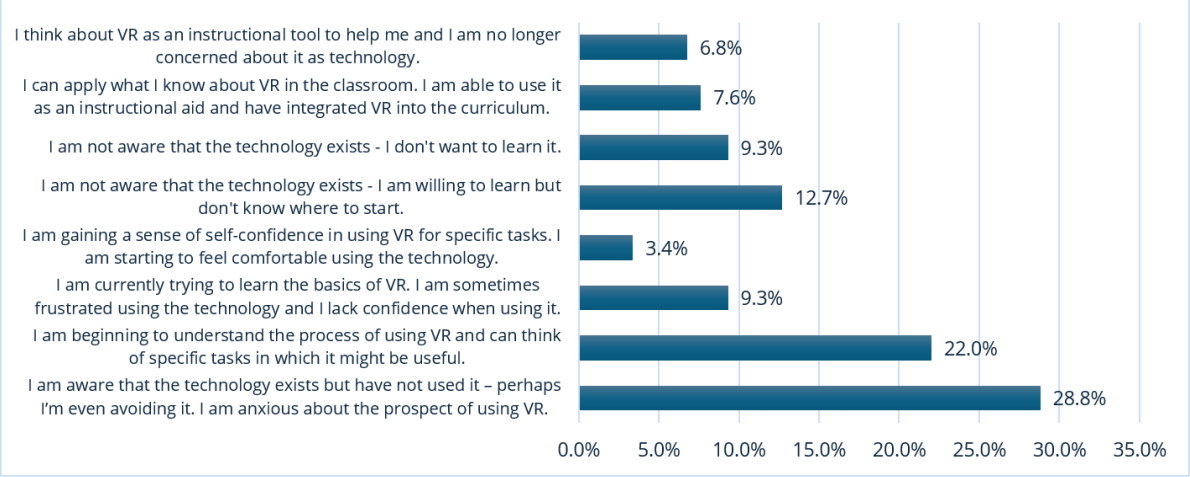

Figure 1. Status of integrating VR in Lebanese classrooms (Source: Authors)

use, highlighting a significant gap between VR's potential and its practical application in educational settings. Additionally, 60.2% of respondents have never attended a VR workshop, while 20.3% have participated in one and 19.5% have registered to attend a workshop. Of the participants, 57.6% reported IT personnel are available upon request, and consistent on-site support remains limited. This underscores the need for greater awareness, resources, and support to facilitate VR integration in teaching practices.

The responses regarding the status of integrating VR into educational practices reveal diverse levels of familiarity and comfort among educators as shown in **Figure 1**. While 28.8% (34 respondents) are aware of VR but have not used it and may feel anxious, 22% (26) are beginning to understand its application for specific tasks. A smaller group, 3.4% (4), expressed growing confidence in using VR, and 7.6% (9) reported successfully integrating it into their curriculum. Additionally, 12.7% (15) were unaware of VR but willing to learn, whereas 9.3% (11) showed no interest in the technology. Furthermore, 9.3% (11) are struggling with the basics, experiencing frustration and low confidence. These findings highlight the need for targeted professional development to support educators in adopting VR effectively.

Because our participants were from diverse backgrounds, we thought of dividing the participants into STEM and non-STEM teachers to see if STEM teachers were more willing to adopt VR in their classrooms. STEM teachers included teachers who taught mathematics, sciences, computer science and STEAM. The rest were considered non-STEM teachers (e.g., languages, social sciences, theater, etc.). This sample did not include

Table 3. STEM vs. non-STEM teachers

Variable		STEM	Non-STEM
Workshop	Attended	8 (19.5%)	12 (21.1%)
	Will attend	9 (22.0%)	13 (22.4%)
	Never	24 (58.5%)	32 (56.1%)
Use of VR in the classroom	Never	28 (68.3%)	44 (77.2%)
	Rarely	4 (9.8%)	7 (12.3%)
	When Necessary	8 (19.5%)	5 (5.5%)
	Often	1 (2.4%)	1 (1.8%)
Progress towards using VR	I am not aware that the technology exists–I don't want to learn it.	0 (0.0%)	2 (3.5%)
	I am not aware that the technology exists–I am willing to learn but don't know where to start.	5 (12.2%)	9 (15.8%)
	I am aware that the technology exists but have not used it–perhaps I'm even avoiding it. I am anxious about the prospect of using VR.	10 (24.4%)	18 (31.6%)
	I am currently trying to learn the basics of VR. I am sometimes frustrated using the technology and I lack confidence when using it.	5 (12.2%)	5 (8.8%)
	I am beginning to understand the process of using VR and can think of specific tasks in which it might be useful.	9 (22.0%)	16 (28.1%)
	I am gaining a sense of self-confidence in using VR for specific tasks. I am starting to feel comfortable using the technology.	1 (2.4%)	3 (5.3%)
	I can apply what I know about VR in the classroom. I am able to use it as an instructional aid and have integrated VR into the curriculum.	4 (9.8%)	4 (7.0%)
	I think about VR as an instructional tool to help me and I am no longer concerned about it as technology.	7 (17.1%)	0 (0.0%)

administrators who did not teach. In total we had 98 teachers, 41 STEM and 57 non-STEM. We focused on 3 variables a) teachers progress towards using VR in the classroom b) whether teachers attended or were planning to attend workshops related to VR and c) use of VR in the classroom. The results are presented in **Table 3**. There were no noticeable differences between STEM and non-STEM teachers in attending workshops and use of VR in the classroom. However, some differences were evident within the progress towards using VR or willingness to use VR. Mainly, there were no STEM teachers who were not willing to learn the technology while 2 of the non-STEM teachers were not willing to learn it. Moreover, 7 of the STEM teachers had reached the level where they considered VR as another instructional tool and were not concerned about it as a technology while none of the non-STEM teachers had attained that level yet.

Opportunities and Challenges

Teachers think VR is particularly effective in subjects requiring visualization of intricate processes. For example, science and biology teachers reported that VR deepens understanding of complex topics like pollination and immune response. Its interactive nature also engages younger students accustomed to digital experiences, making challenging concepts more accessible and engaging.

In the interviews, educators and administrators described VR as an innovative tool that enhances immersive learning. Teachers highlighted VR's ability to help students explore complex topics interactively, providing three-dimensional experiences that deepen understanding. Science instructors noted that VR makes inaccessible environments, such as volcanoes or cellular structures, accessible, while coordinators emphasized its role in making abstract concepts more relatable for digitally native students.

However, educators report that VR can cause disorientation and dizziness, especially in younger students, leading to classroom management challenges. Suggested solutions include limiting VR sessions to 10-15 minutes. Concerns also include VR's limited ability to foster higher-order thinking, its potential to isolate students, and health implications. Implementation challenges include the need for extensive preparation, training, and robust classroom management, compounded by the high costs of equipment, maintenance, and application fees.

While educators recognize VR's potential benefits, concerns about resources, training, and logistical support highlight the challenges in effectively integrating VR into educational environments. Participants agreed that limiting VR sessions to brief introductory or complex concept demonstrations helps ensure that students stay focused and benefit from the technology without overwhelming other learning approaches. In

addition, they advised that VR should "introduce topics interactively but not replace hands-on practice". Moreover, financial and infrastructural barriers hinder VR adoption in Lebanese schools. High equipment costs and maintenance pose significant challenges, particularly for public schools and those with limited budgets. While private institutions may gradually adopt VR, widespread feasibility depends on future cost reductions and improved accessibility, which principals predict may occur over the next decade.

Successful VR integration requires comprehensive training, institutional support, and infrastructure planning. Most educators lack formal VR training, relying instead on personal research and informal workshops. Institution-supported workshops, ongoing support, and IT resources are essential, especially as newer teachers are generally more comfortable with digital tools. Embedding VR into strategic plans, establishing dedicated VR labs, and adopting phased implementation approaches are also recommended. However, funding remains a significant obstacle due to high equipment costs, maintenance needs, and recurring software subscriptions, necessitating long-term financial planning for sustainable VR integration.

Suggested Classroom Activities

Both in the online survey and interviews, teachers were asked to suggest VR activities for classroom implementation. Teachers highlighted targeted VR activities as most beneficial, recommending VR's use for topics where visualization is essential. For art, for example, the "art movements exploration" activity allows students to experience styles like impressionism and surrealism, fostering creative experimentation in virtual studio settings. In biology, activities such as "journey through human body systems" and "virtual genetics lab" provide interactive dissections and practical insights into anatomy and genetics, enhancing conceptual understanding. In chemistry, activities like "abstract science concepts" allow students to explore atoms, bonds, and reactions in 3D, deepening comprehension through immersive virtual labs. The "physics exploration lab" enables hands-on learning of motion, forces, and energy, fostering experiential understanding without physical constraints.

VR also supports immersive language experiences. "Phonics and language learning" engages younger students, while the "language exchange program" fosters conversational skills through virtual interactions, building confidence in real-world language use and activities like "immersive storytelling" and "historical context in novels," enhancing comprehension and empathy by allowing interaction with characters and narrative environments.

VR offers virtual tours of significant sites and events, such as the Giza pyramids and Baalbek temples. Activities like "visit cultural centers and museums" and historical simulations deepen cultural understanding and historical empathy. VR promotes contextual learning in social studies and environmental education. "Farm tour for younger learners" and "local environmental issues" connect classroom learning to real-world environmental challenges, inspiring social responsibility.

VR helps visualize mathematical concepts. Activities like "3D graphs and geometry" and "applying theorems in real-world contexts" transform abstract theories into concrete experiences, improving spatial reasoning and problem-solving skills. VR enriches Arabic language learning through cultural immersion. Activities like "explore Arabic literature and folktales" and "grammar challenges in historical sites" connect linguistic skills with Lebanon's heritage, making learning culturally meaningful and engaging. Educators highlight VR's potential in a "virtual exam simulation," which fosters student comfort with testing environments by enhancing focus and engagement, offering dynamic learning experiences adaptable across subjects. While Lebanese educators recognize VR's potential across subjects, they lack formal training and logistical preparation for classroom integration. These findings highlight both the opportunities and challenges of VR implementation in Lebanese education.

DISCUSSION

VR has become indispensable across various fields, offering the unique advantage of transporting users to different places, times, or worlds without physical movement. In education, VR has been increasingly adopted to bridge the gap between the observable and the abstract (Alfalah, 2018; Fransson et al., 2020; Freina & Ott, 2015; Häfner et al., 2013; Hussein & Nätterdal, 2015; Jensen & Konradsen, 2018). Additionally, by

leveraging students' familiarity with interactive media, VR significantly boosts engagement and retention, leading to improved learning outcomes (Fransson et al., 2020).

The study reveals that Lebanese educators' perceptions of VR in the classroom are shaped by their exposure to the technology, available training opportunities, and overall comfort with adopting new digital tools. Although 28.8% of educators are aware of VR, many have not implemented it due to anxiety, lack of confidence, and insufficient formal training–forcing them to rely on personal research or sporadic workshops. This gap in training is compounded by a generational divide: younger teachers, more familiar with digital tools, are generally more comfortable with VR than their older counterparts, who require more intensive, targeted support.

To address these challenges, the study recommends a gradual, phased approach to VR integration. Key strategies include embedding VR within the school's strategic plan, providing comprehensive and differentiated training programs, and ensuring robust IT support during lessons. Additionally, establishing dedicated VR labs or controlled environments can help mitigate classroom disruptions and technical issues. With adequate institutional support and structured professional development, educators can build the necessary confidence and skills to effectively incorporate VR as a valuable instructional tool.

VR's immersive nature can lead to distraction and over-immersion. Effective management requires clear rules, structured activities, and small group rotations. Introductory training and IT support can further minimize disruptions. Students may become overly immersed, diverting focus from lesson objectives (Alfalah, 2018; Makransky et al., 2019; Minocha et al., 2017). To maintain engagement, teachers should design structured, goal-oriented VR activities with clear learning outcomes. Furthermore, mitigation strategies include limiting session duration, ensuring purposeful use, and integrating VR only when it enhances learning (Kawai & Häkkinen, 2019; Rebenitsch & Owen, 2016).

The high cost of VR equipment, software, and dedicated spaces poses challenges, particularly in Lebanon's budget-constrained schools (Jensen & Konradsen, 2018). Solutions include establishing centralized VR labs and forming partnerships with technology providers. As VR technology becomes more affordable, these barriers may diminish. Comprehensive training, IT support, and access to pre-designed, curriculum-aligned VR resources can alleviate this burden.

CONCLUSION

Educators in schools in Lebanon view VR as a promising tool to enhance classroom engagement and learning, yet its integration faces challenges. While VR is recognized for improving student engagement, concept visualization, and information retention, many educators lack the knowledge and confidence for effective implementation, highlighting the need for targeted training and professional development. Classroom management concerns include maintaining focus and minimizing distractions, with suggested strategies such as structured group activities and IT support during sessions. Financial constraints also hinder VR adoption, emphasizing the need for funding and partnerships. Successful VR integration requires comprehensive training, technical support, and financial investment to unlock its educational potential. The findings emphasize the need for schools to establish VR infrastructure and prioritize professional development and hands-on training to equip educators for effective VR use. Future research should focus on developing VR applications aligned with the national curriculum, using the activities and topics suggested by educators as a foundation. Collaboration among curriculum developers, VR specialists, and educators will be crucial to creating tools that enhance learning outcomes and meet the specific needs of Lebanese classrooms. While this study provides valuable insights, its scope is limited to a specific region, and further research is needed to explore whether the findings hold true in other contexts.

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REFERENCES

Al Musawi, A. S., Al Suhi, A., & Al Mamari, Z. (2025). Exploring EFL teachers' perceptions of using virtual reality in education. *Contemporary Educational Technology, 17*(2), Article ep562. https://doi.org/10.30935/cedtech/15835

Alfalah, S. F. (2018). Perceptions toward adopting virtual reality as a teaching aid in information technology. *Education and Information Technologies, 23*(6), 2633–2653. https://doi.org/10.1007/s10639-018-9734-2

Bahous, R., Bacha, N. N., & Nabhani, M. (2011). Multilingual educational trends and practices in Lebanon: A case study. *International Review of Education, 57*, 737–749. https://doi.org/10.1007/s11159-011-9250-8

Biocca, F. (2003). The evolution of interactive media: Toward "being there" in nonlinear narrative worlds. In M. C. Green, J. J. Strange, & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 97–130). Psychology Press.

CRDP. (2021). Schools guide 2021. *Center for Educational Research and Development*. https://www.crdp.org/sites/default/files/2021-11/Schools_guide_2021.pdf

Dickey, M. D. (2005). Three-dimensional virtual worlds and distance learning: Two case studies of Active Worlds as a medium for distance education. *British Journal of Educational Technology, 36*(3), 439–451. https://doi.org/10.1111/j.1467-8535.2005.00477.x

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development, 47*(4), 47–61. https://doi.org/10.1007/BF02299597

Fransson, G., Holmberg, J., & Westelius, C. (2020). The challenges of using head mounted virtual reality in K-12 schools from a teacher perspective. *Education and Information Technologies, 25*(4), 3383–3404. https://doi.org/10.1007/s10639-020-10119-1

Frederiksen, J. G., Sørensen, S. M. D., Konge, L., Svendsen, M. B. S., Nobel-Jørgensen, M., Bjerrum, F., & Andersen, S. A. W. (2020). Cognitive load and performance in immersive virtual reality versus conventional virtual reality simulation training of laparoscopic surgery: A randomized trial. *Surgical Endoscopy, 34*, 1244–1252. https://doi.org/10.1007/s00464-019-06887-8

Freina, L., & Ott, M. (2015). A literature review on immersive virtual reality in education: State of the art and perspectives. In *Proceedings of the international Scientific Conference eLearning and Software for education* (pp. 133–141). https://doi.org/10.12753/2066-026X-15-020

Häfner, P., Häfner, V., & Ovtcharova, J. (2013). Teaching methodology for virtual reality practical course in engineering education. *Procedia Computer Science, 25*, 251–260. https://doi.org/10.1016/j.procs.2013.11.031

Hernández-de-Menéndez, M., Vallejo Guevara, A., & Morales-Menendez, R. (2019). Virtual reality laboratories: A review of experiences. *International Journal on Interactive Design and Manufacturing, 13*(3), 947–966. https://doi.org/10.1007/s12008-019-00558-7

Hew, K. F., & Cheung, W. S. (2010). Use of three-dimensional (3-D) immersive virtual worlds in K-12 and higher education settings: A review of the research. *British Journal of Educational Technology, 41*(1), 33–55. https://doi.org/10.1111/j.1467-8535.2008.00900.x

Hussein, M., & Nätterdal, C. (2015). *The benefits of virtual reality in education: A comparison study* [Bachelor's thesis, Chalmers University of Technology].

Jensen, L., & Konradsen, F. (2018). A review of the use of virtual reality head-mounted displays in education and training. *Education and Information Technologies, 23*, 1515–1529. https://doi.org/10.1007/s10639-017-9676-0

Kapp, K. M., & O'Driscoll, T. (2009). *Learning in 3D: Adding a new dimension to enterprise learning and collaboration*. John Wiley & Sons.

Kawai, T., & Häkkinen, J. (2019). Ergonomic guidance for virtual reality content creation. In B. N. Muñoz (Ed.), *Proceedings of the 20th Congress of the International Ergonomics Association* (pp. 417–422). Springer. https://doi.org/10.1007/978-3-319-96059-3_47

Keengwe, J., & Onchwari, G. (2011). Fostering meaningful student learning through constructivist pedagogy and technology integration. *International Journal of Information and Communication Technology Education, 7*(4), 1–10. https://doi.org/10.4018/jicte.2011100101

Khukalenko, I. S., Kaplan-Rakowski, R., An, Y., & Iushina, V. D. (2022). Teachers' perceptions of using virtual reality technology in classrooms: A large-scale survey. *Education and Information Technologies, 27*(8), 11591–11613. https://doi.org/10.1007/s10639-022-11061-0

Koedinger, K. R., Anderson, J. R., Hadley, W. H., & Mark, M. A. (1997). Intelligent tutoring goes to school in the big city. *International Journal of Artificial Intelligence in Education, 8*(1), 30–43.

Kwon, C. (2019). Verification of the possibility and effectiveness of experiential learning using HMD-based immersive VR technologies. *Virtual Reality, 23*(1), 101–118. https://doi.org/10.1007/s10055-018-0364-1

Lau, K. W., & Lee, P. Y. (2015). The use of virtual reality for creating unusual environmental stimulation to motivate students to explore creative ideas. *Interactive Learning Environments, 23*(1), 3–18. https://doi.org/10.1080/10494820.2012.745426

Makransky, G., Borre-Gude, S., & Mayer, R. E. (2019). Motivational and cognitive benefits of training in immersive virtual reality based on multiple assessments. *Journal of Computer Assisted Learning, 35*(6), 691–707. https://doi.org/10.1111/jcal.12375

MEHE. (2021). Lebanon five-year general education plan 2021–2025. *Planipolis*. https://planipolis.iiep.unesco.org/en/2021/lebanon-five-year-general-education-plan-2021-2025-7480

Merchant, Z., Goetz, E. T., Cifuentes, L., Keeney-Kennicutt, W., & Davis, T. J. (2014). Effectiveness of virtual reality-based instruction on students' learning outcomes in K-12 and higher education: A meta-analysis. *Computers & Education, 70*, 29–40. https://doi.org/10.1016/j.compedu.2013.07.033

Mikropoulos, T. A., & Natsis, A. (2011). Educational virtual environments: A ten-year review of empirical research (1999–2009). *Computers & Education, 56*(3), 769–780. https://doi.org/10.1016/j.compedu.2010.10.020

Minocha, S., Tudor, A. D., & Tilling, S. (2017). Affordances of mobile virtual reality and their role in learning and teaching. In *Proceedings of the Electronic Visualisation and the Arts*. BCS Learning & Development. https://doi.org/10.14236/ewic/HCI2017.44

Moro, C., Štromberga, Z., Raikos, A., & Stirling, A. (2017). The effectiveness of virtual and augmented reality in health sciences and medical anatomy. *Anatomical Sciences Education, 10*(6), 549–559. https://doi.org/10.1002/ase.1696

Oak, J. W. (2018). Educational needs of nursing student in the development of a virtual reality-based program for medication education. *International Journal of IT-Based Public Health Management, 5*(1), 1–6. https://doi.org/10.21742/ijiphm.2018.5.1.01

Office of Technology Assessment. (1995). Teachers & technology: Making the connection (OTA-EHR-616). *USA Government Printing Office*. https://files.eric.ed.gov/fulltext/ED386155.pdf

Rebenitsch, L., & Owen, C. (2016). Review on cybersickness in applications and visual displays. *Virtual Reality, 20*, 101–125. https://doi.org/10.1007/s10055-016-0285-9

Rheingold, H. (1991). *Virtual reality: Exploring the brave new technologies*. Simon & Schuster Adult Publishing Group.

Rodriguez-Segura, D. (2022). EdTech in developing countries: A review of the evidence. *The World Bank Research Observer, 37*(2), 171–203. https://doi.org/10.1093/wbro/lkab011

Roschelle, J. M., Pea, R. D., Hoadley, C. M., Gordin, D. N., & Means, B. M. (2000). Changing how and what children learn in school with computer-based technologies. *The Future of Children, 10*(2), 76–101. https://doi.org/10.2307/1602690

Salame, I. I., & Makki, J. (2021). Examining the use of PhET simulations on students' attitudes and learning in general chemistry II. *Interdisciplinary Journal of Environmental and Science Education, 17*(4), Article e2247. https://doi.org/10.21601/ijese/10966

Sawahel, W. (2023). Minister unveils five-year plan to reform higher education. *University World News*. https://www.universityworldnews.com/post.php?story=20230127131917843

Schroeder, R. (1997). Networked worlds: Social aspects of multi-user virtual reality technology. *Sociological Research Online, 2*(4), 89–99. https://doi.org/10.5153/sro.291

Sedgwick, R. (2000). Education in Lebanon today. *World Education News & Reviews, 12*.

Shanab, S. A., Odeh, S., Hodrob, R., & Anabtawi, M. (2012). Augmented reality internet labs versus hands-on and virtual labs: A comparative study. In *Proceedings of the 2012 International Conference on Interactive Mobile and Computer Aided Learning* (pp. 17–21). IEEE. https://doi.org/10.1109/IMCL.2012.6396444

Skinner, B. F. (1954). The science of learning and the art of teaching. *Harvard Educational Review, 24*, 86–97.

Sweller, J. (2008). Human cognitive architecture. In D. Jonassen, M. J. Spector, M. Driscoll, M. D. Merrill, J. van Merrienboer, & M. P. Driscoll (Eds.), *Handbook of research on educational communications and technology: A project of the association for educational communications and technology* (3rd ed.) (pp. 369–381). Routledge.

Wozney, L., Venkatesh, V., & Abrami, P. (2006). Implementing computer technologies: Teachers' perceptions and practices. *Journal of Technology and Teacher Education, 14*(1), 173–207.

Yehya, F., Barbar, A., & Abou Rjeily, S. (2018). Diagnosing the barriers for integrating Educational Technology in Physics courses in Lebanese secondary schools. *Research in Social Sciences and Technology, 3*(2), 14–39. https://doi.org/10.46303/ressat.03.02.2

APPENDIX A: TEACHER DEMOGRAPHICS

Table A1. Demographics of participants who answered the online survey

		Count (N)	Percentage (%)
Gender	Female	96	81.4
	Male	22	18.6
Age range	Between 21 and 30 years old	42	35.6
	Between 31 and 40 years old	38	32.2
	Between 41 and 50 years old	24	20.3
	Between 51 and 65 years old	14	11.9
Grade level taught*	Early (before grade 1)	10	4.0
	Elementary (grade 1 to 5)	47	19.0
	Middle school (grade 6 to 9)	121	48.0
	High school (grade 10–12)	74	29.0
Years of experience	1 to 3 years	18	15.3
	4 to 7 years	23	19.5
	8 to 10 years	17	14.4
	11 to 15 years	16	13.6
	16 to 20 years	19	16.1
	More than 20 years	25	21.2
Teaching positions	Teaching Position	98	83.1
	Non-Teaching Position	20	16.9
Subject taught*	Arabic	4	4.1
	Art	4	4.1
	Biology	15	15.3
	Chemistry	10	10.2
	Civics	1	1.0
	Computer science	7	7.1
	English	29	29.6
	French	5	5.1
	Geography	16	16.3
	History	14	14.3
	Math	8	8.2
	Physical education	1	1.0
	Physics	6	6.1
	STEAM or technology	9	9.2
	Theater/drama	2	2.0
STEM	STEM disciplines	41	41.8
	Non-STEM disciplines	57	58.2

* Some teach more than one subject and more than one grade level

APPENDIX B: SURVEY

Section 1. General Information

1. Sex:
   - Male
   - Female

2. Age
   - Between 21 and 25 years old
   - Between 26 and 30 years old
   - Between 31 and 35 years old
   - Between 36 and 40 years old
   - Between 41 and 50 years old
   - Between 51 and 65 years old

3. The institution I work in is in:
   - Akkar Governorate
   - Baalbek-Hermel Governorate
   - Beirut Governorate
   - Beqaa Governorate
   - Keserwan-Jbeil Governorate
   - Mount Lebanon Governorate
   - Nabatieh Governorate
   - North Governorate
   - South Governorate

4. My current position(s) in the educational field is (are) …
   - School principal
   - Director
   - Coordinator
   - Teacher
   - IT specialist
   - Other…

5. Are you a principal, director, or IT specialist?
   - Yes
   - No

6. If you are a principal, director, or IT specialist, which level(s) are you responsible for?
   - I am the principal of the school
   - Nursery
   - Preschool
   - Elementary school
   - Middle school
   - Secondary school

7. Are you a teacher and/or a coordinator?
   - Yes (go to section 4–teaching details)
   - No (go to next section)

8. I have been in the education field for
   - 1 to 3 years
   - 4 to 7 years
   - 8 to 10 years
   - 11 to 15 years
   - 16 to 20 years
   - More than 20 years

9. Select the average number of students in the classes of the institution you work in.
   - Less than 10
   - 10 to 15
   - 16 to 20
   - 21 to 25
   - 26 to 30
   - More than 30

10. VR headsets procurement.
    - The institution I work in has procured the VR sets, but we are not using them yet.
    - The institution I work in has procured the VR sets, and we are using them in class with our students.
    - The institution I work in has procured the VR sets, and we are using them for teacher training only.
    - The institution I work in has procured the VR sets, and only the IT department is using them so far.
    - The institution I work in has not procured the VR sets but aim to procure them in the future.
    - The institution I work in has not procured the VR sets, and they do not plan on procuring it so far.
    - I don't know.

11. Select the statements that are true
    - I have attended workshops on VR in education.
    - I never attended any workshop on VR in education.

Section 2. Teaching Details

12. Which subject do you coordinate/teach? (You may select more than one subject).
    - English
    - Arabic
    - French
    - Geography
    - History
    - Civics
    - Biology
    - Physics
    - Chemistry
    - Math
    - Computer science
    - STEAM or technology
    - Art
    - Physical education
    - Theatre/drama

13. Which grade levels do you teach?
    - KG1 (kindergarten 1)
    - KG2 (kindergarten 2)

- KG3 (kindergarten 3)
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12

14. Which program do you teach?
    - Lebanese program
    - French program
    - IB program
    - German program
    - PYP
    - Other: …

Section 3. Teacher's Perceptions of the Use of Virtual Reality Technology in the Classroom

15. Select the definition that is the nearest to what you think VR is.
    - A technology that allows users to interact with computer-generated environments in a realistic way.
    - A form of augmented reality that overlays digital information onto the real world.
    - A type of simulation used exclusively in gaming to create immersive experiences.
    - A method of remote communication through lifelike avatars in a virtual space.

16. How often do you use VR in the classroom?
    - Never
    - Rarely
    - Often
    - When necessary
    - Always

17. How often is the IT personnel available?
    - Absent
    - Available upon request
    - Always available

18. The instructional approach I mostly follow in my classroom is:
    - Teacher-centered
    - More teacher-centered than student-centered (teacher in the center of a class, leading lectures, and discussions)
    - Balance between teacher-centered and student-centered approaches
    - More student-centered than teacher-centered
    - Mainly student-centered (cooperative learning, discovery learning)

19. Using VR in the classroom …:

Strongly disagree–disagree–slightly disagree–slightly agree–agree–strongly agree

Statements:

1. Improves student academic record.
2. Makes classroom management more difficult.
3. Promotes the development of communication skills (e.g., writing skills and presentation skills).
4. Requires extra resources, time, and effort.
5. Is successful only if there's adequate teacher training in the use of VR technology in the classroom.
6. Is successful only if equipment is regularly maintained by IT personnel.
7. Is an effective tool for students of all abilities.
8. Effective if teachers participate in selection and implementation of VR technology.
9. Allows to accommodate individual attributes of students.
10. Motivates students to get more involved in learning activities.
11. Requires software training that is too time consuming.
12. Promotes the development of student interpersonal skills.
13. Effective only if extensive technical resources are available.
14. Requires extra time to plan learning activities.
15. Improves student learning of critical concepts and ideas.
16. Is unreasonable thanks to the existing of subject-specific software.

20. Mention any ideas, positive or negative, that were not listed in the previous question (if any).

21. How do you evaluate your progress in VR integration in the classroom? Pick the statement that best describes you.
    - I am not aware that the technology exists–I don't want to learn it.
    - I am not aware that the technology exists–I am willing to learn but don't know where to start.
    - I am aware that the technology exists but have not used it–perhaps I'm even avoiding it. I am anxious about the prospect of using VR.
    - I am currently trying to learn the basics of VR. I am sometimes frustrated using the technology and I lack confidence when using it.
    - I am beginning to understand the process of using VR and can think of specific tasks in which it might be useful.
    - I am gaining a sense of self-confidence in using VR for specific tasks. I am starting to feel comfortable using the technology.
    - I think about VR as an instructional tool to help me and I am no longer concerned about it as technology.
    - I can apply what I know about VR in the classroom. I am able to use it as an instructional aid and have integrated VR into the curriculum.

22. Propose an activity for implementation in VR that you would like to utilize in your classroom. Make sure to mention the lesson it aligns with in your curriculum.