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READINESS FOR VIRTUAL REALITY IMPLEMENTATION IN EDUCATION ACROSS SOUTH BOHEMIA AND UPPER AUSTRIA

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Abstract/Izvleček
This study examines the readiness of schools in South Bohemia and Upper Austria to integrate virtual reality into teaching. Drawing on structured interviews with representatives from sixty-six schools, we analyse institutional attitudes, equipment levels, organisational models, and perceived barriers. The results reveal significant regional differences in adoption (64% AT vs 13.6% CZ), with distinct procurement strategies: bulk "classroom sets" versus project-based approaches with specialised equipment. Three readiness profiles reflect experience, motivation, and implementation capacity. The findings are situated within the TPACK, SAMR, and TAM frameworks. The results lead to recommendations, including methodological support, systematic teacher training, and sustainable funding.

Pripravljenost za uvedbo virtualne realnosti v izobraževanju v Južni Bohemiji in Zgornji Avstriji

V študiji analiziramo pripravljenost šol v Južni Češki (Češka republika) in Zgornji Avstriji za vključevanje navidezne resničnosti v pedagoški proces. Na podlagi strukturiranih intervjujev s predstavniki 66 šol je bila izvedena analiza institucionalnih stališč, ravni tehnične opremljenosti, organizacijskih modelov ter zaznanih ovir pri uvajanju tehnologije. Rezultati kažejo na izrazite regionalne razlike v stopnji implementacije (64 % v Avstriji v primerjavi s 13,6 % na Češkem) ter na različne strategije nabave opreme: na eni strani množični nakupi t. i. *učilniških kompletov*, na drugi pa projektno usmerjeni pristopi z uporabo specializirane opreme. Na podlagi empiričnih podatkov so bili identificirani trije profili institucionalne pripravljenosti, ki odražajo raven izkušenj, stopnjo motivacije ter zmožnost dejanske implementacije. Ugotovitve so interpretirane v okviru teoretičnih modelov TPACK, SAMR in TAM.

Ključne besede:
navidezna resničnost, vključevanje tehnologije, usposabljanje učiteljev, čezmejna študija.

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Introduction

Virtual reality (VR) is attracting growing attention in primary and secondary education, and several studies have examined its use in these settings. A survey by Herwin et al. (2022) examines the implementation of a VR-based teaching management system for primary school pupils. The findings suggest that VR can significantly enhance the effectiveness of online teaching, particularly when the traditional classroom environment is disrupted. This points to VR's potential to meet the needs of younger students and improve educational outcomes in primary education. Similarly, Kenedi's research examines the impact of VR on the geometric skills of primary school students. The study concludes that VR-supported games can facilitate more effective mathematics teaching, demonstrating the applicability of this technology in improving specific skills within the K-12 curriculum (Kenedi, 2023). Allcoat and Mühlenen's study highlights the effects of VR on student performance, emotions, and engagement, suggesting that the immersive nature of VR can lead to improved educational experiences for students at all levels, including K-12 (Allcoat & Mühlenen, 2018).

In contrast, most existing literature, including the systematic reviews by Kavanagh et al. (2017), Pinto et al. (2021) and Krishnan and Lazo (2022), focuses primarily on higher education, indicating that VR applications are explored within this demographic. These studies show that while VR holds promise for improving academic achievement and motivation among college students, empirical evidence on its effectiveness in K-12 settings is limited. Furthermore, the review by Lie et al. (2023) reinforces that while VR has significant potential to enhance educational experience, most current research focuses on the higher education context. AlGerafi's research highlights that while integrating VR into K-12 STEM education shows promising potential, challenges remain, including the need for personalised learning materials and usability considerations (Al Gerafi, 2023). Drakopoulos & Sioulas (2021) find that in primary school education, incorporating virtual or augmented reality could be a transformative element, potentially changing the future of current teaching and learning methods. This suggests that while VR holds promise, careful planning and implementation are necessary to maximise its benefits in educational settings (Meccawy, 2023).

This study presents an exploratory investigation of a networking project mapping institutional awareness (familiarity with VR/AR) and readiness for digital innovation in schools. The research adopts a focused approach, examining the preparedness of

schools in South Bohemia and Upper Austria to integrate VR technologies into teaching. Specifically, it aims to identify systemic and organisational factors influencing adoption, highlight regional differences, and uncover perceived barriers and needs. The study is therefore twofold: first, to provide a comprehensive assessment of technological readiness and institutional attitudes towards VR in primary and secondary education, and second, to generate evidence-based insights that inform the subsequent development of targeted VR applications and methodological frameworks for specific school segments.
To achieve this aim, the research addresses three key questions: What are the differences in the extent of VR implementation and use between schools in both regions? What influences schools' willingness to adopt and integrate these technologies into teaching? What specific obstacles and needs do schools perceive when integrating VR into education? These questions form the analytical framework for interpreting the findings and enable a deeper understanding of regional differences and systemic challenges.

Theoretical Background

Integrating VR into educational settings requires a comprehensive understanding of both pedagogical and technological dimensions, particularly through frameworks such as Technological Pedagogical Content Knowledge (TPACK) and the Technology Acceptance Model (TAM)(Dobi Barišić & Brust Nemett, 2023). The TPACK framework emphasises that effective VR use depends on teachers' ability to blend technological knowledge (TK), pedagogical strategies (PK), and content knowledge (CK). TPACK holds that these three knowledge domains are interconnected and essential for successful technology integration in education (Baran & Uygun, 2016). Because VR represents a sophisticated intersection of technology and education, teachers must be adept at navigating these relationships to design impactful learning experiences. Voogt et al. (2012) underscore the importance of this integration, asserting that technology should support students in learning both conceptual and procedural knowledge within specific subject areas. Adapting pedagogical methods and curricular content to leverage VR's immersive capabilities is thus crucial for maximising its educational impact (Al-Ansi, 2023).
The TPACK framework can be examined through the SAMR model, which assesses technology's depth in education. SAMR highlights VR's potential to go beyond substitution to enhance learning (Tunjera & Chigona, 2020).

Applying this model helps educators use VR to support curriculum and innovate the learning process, requiring ongoing professional development (Belda-Medina & Calvo-Ferrer, 2022). Lemut Bajec (2023) advocates merging formal and informal approaches to improve learners' tech skills, emphasising collaborative and experiential strategies when integrating VR. However, the adoption of VR in educational contexts is significantly influenced by factors outlined in the TAM framework, in which perceived usefulness and ease of use are critical determinants of technology uptake among educators. TAM posits that teachers' beliefs about the utility of VR tools and the perceived ease of engaging with these technologies significantly shape their intentions to incorporate these into instruction (Qiu et al., 2024). Strong correlations exist between teacher confidence, institutional support, and the likelihood of effective VR implementation (Cheung et al., 2018). Thus, fostering a supportive environment in which educators feel competent in their technological abilities is essential for leveraging innovations such as VR to enhance learning experiences. The importance of a robust support system is further emphasised in K–12 settings, where educators often face additional challenges, such as curriculum alignment and resource availability, that directly affect their willingness and ability to integrate such advanced technologies (Pappa et al., 2024).

Despite the theoretical advantages highlighted by the TPACK and TAM frameworks, practical challenges persist that hinder the widespread adoption of VR in educational settings. Prominent barriers include the high cost of VR equipment, insufficient professional development and training, and a lack of curriculum-aligned VR content (Mohebi, 2021). Studies report that these factors make teachers reluctant to adopt VR tools, thereby limiting their potential to transform learning experiences (Sulistiani et al., 2023). Additionally, concerns about data security and user accessibility present further obstacles, particularly in K–12 contexts, where regulatory constraints often complicate technology integration (Drugova et al., 2021). To address these challenges effectively, educational institutions must prioritise investment in both technological resources and educator training, while also developing relevant VR content tailored to specific curricular needs. Through this dual-faceted approach, the full potential of VR as a transformative educational tool can be realised, leading to enhanced student learning outcomes and engagement (Cao et al., 2024).

In summary, theoretical models such as TPACK, SAMR, and TAM provide valuable lenses for understanding the potential and limitations of integrating VR in education.

They highlight that successful adoption depends not only on technological availability but also on pedagogical alignment, teacher confidence, and perceived usefulness. However, these frameworks cannot fully capture the contextual factors that shape implementation across specific regions and school types. To address this gap, the present study employs an empirical approach based on structured interviews with school representatives. This design enables a detailed examination of readiness, barriers, and motivational factors, offering insights that complement and extend the theoretical perspectives outlined above.

Methods

The study involved representatives from primary and secondary education institutions, including general grammar schools, vocational schools, and technical secondary schools. The schools were located in urban areas. After data cleaning and validation, the final N=66 interviews, conducted between March and July 2021 using a structured interview, were analysed in South Bohemia (n=44) and Upper Austria (n=22). Schools were selected for their potential interest in VR technologies, based on a focus on technical education or digital innovation. All participants provided informed consent before data collection. Schools and respondents were anonymised, and identifiers were replaced with codes to ensure confidentiality. The study adhered to ethical standards for research involving human participants, including compliance with data protection regulations and transparency regarding the purpose and scope of data processing.

For the quantitative analysis, responses to closed-ended items were coded on a five-point agreement scale: Definitely Yes, Rather Yes, Rather No, Definitely No, and Not Applicable/Don't Know. These categories were used to generate frequency distributions and comparative tables for both regions.

Open-ended responses were thematically coded to derive school readiness profiles for VR integration. After transcription, statements were segmented into meaning units and assigned initial codes (e.g., awareness, prior experience, availability of curricular exemplars, organisational capacity, perceived barriers)(Lindof & Taylor, 2002). These codes were then grouped in MS Excel into three profiles reflecting typical combinations of familiarity, motivation, and implementation capacity (Neuendorf, 2017). Schools were assigned to profiles based on the following indicators observed in the interviews:

- Familiarity & experience: none/initial | general familiarity without regular use | documented, repeated use in teaching.
- Motivation & perceived usefulness (TAM): low/unsure | motivated but seeking persuasion for colleagues | high and oriented to specific subjects.
- Implementation capacity (TPACK/SAMR): no subject-aligned exemplars | seeking practical exemplars/motivational cases | requiring subject-specific scenarios and organisational models to scale.

The interviews were always conducted by the same person (a Czech researcher for schools in South Bohemia and an Austrian researcher for schools in Upper Austria) according to a standardised syllabus. Each interview had three parts.
The first part of the interview focused on general attitudes towards virtual reality. Participants were asked whether they knew the terms "virtual reality" and "augmented reality", where they obtained information about these technologies, and whether they had tried them. They were also asked whether they had collaborated with any institution (school, company, etc.) equipped with VR technologies, and whether they would be interested in such collaboration. If so, what would their expectations be from such collaboration? At the end of this part, participants were presented with various statements about AR/VR, and their feedback was requested on a scale from "strongly agree" to "strongly disagree".
The second part of the interview focused on the use of VR technologies in schools. Participants were asked whether their school had VR technology. If not, the questions continued with the demand for VR from teachers, students, or parents, and whether the school was considering purchasing this equipment. If so, who would decide on the purchase, on what basis the decision would be made, when they planned to purchase, and what budget they had for it. They were also asked how the school would obtain the necessary funds and which subjects VR would be used for. If the school had VR technology, the questions focused on the type of equipment, satisfaction with it, any shortcomings, the age of the equipment, who decided to purchase it, and on what basis. They also asked how much money the school spent on VR, how it obtained the funding, and whether it had purchased the equipment repeatedly. Finally, they were interested in educational and leisure VR software and whether the school purchased VR software regularly or only once.

The third part of the interview focused on the organisation of VR technologies in schools. Participants were asked who was responsible for the VR equipment in the school: a single person, several people, or an external company. They were also asked how teachers could organise the use of VR equipment in the classroom, for example, whether there was a dedicated VR laboratory, a computer laboratory where VR equipment could be used, or a mobile kit that could be brought into the classroom. They were also asked whether students could use VR outside of class, in what way (games, learning), how often, whether the equipment was freely accessible or supervised, and whether use outside of class was unrestricted or for a fee. Finally, they were asked why some colleagues hesitated to use VR in the classroom for organisational reasons, uncertainty about use, lack of suitable software, or too many classes.

Findings

Perceptions and Expectations:

The first part of the interviews revealed that perceptions and expectations of AR and VR technologies are broadly similar. While VR is known in both regions, there are few concrete examples of meaningful educational use, and the perceived benefits and value for the education system remain limited or poorly disseminated. VR is rarely used in schools (or, in some cases, is entirely unfamiliar), except in technical institutions that maintain close partnerships with industrial enterprises. Table 1 provides a comparative overview of attitudes towards AR/VR technologies in South Bohemia and Upper Austria. Both regions strongly agree that AR/VR opens new opportunities for education and the economy, with 88.6% and 93.2% agreement in Czechia, and 95.4% and 90.9% in Austria, respectively. However, significant differences emerge in the perceived cost-benefit ratio: only 43.2% of Czech respondents believe the benefits outweigh the costs, compared with 72.7% in Austria. Similarly, Austrian respondents perceive AR/VR as easier to use (77.3%) than their Czech counterparts (61.4%). Concerns about potential health risks are relatively low in both countries, indicating general trust in the safety of these technologies. Overall, the table suggests that despite regional differences, both countries strongly support integrating AR/VR into various sectors, indicating a promising future for these technologies.

Table 1
Comparison of attitudes towards VR/AR in schools in the South Bohemian Region (n=44) and Upper Austria (n=22) (Authors, 2025)

Question	South Bohemia (in %)					Upper Austria (in %)				
	D Yes	R Yes	R No	D No	NA	D Yes	R Yes	R No	D No	NA
AR/VR opens up many new opportunities for the economy.	33.5	54.5	7	0	5	81	14	0	0	5
AR/VR opens up many new opportunities for education.	52	41	7	0	0	41	49	5	0	5
The use of VR/AR should be taught in schools.	27	61	9	1	2	32	49	14	0	5
The benefits of AR/VR outweigh the costs/effort	20	23	11	1	45	32	41	5	8	14
AR/VR is too questionable for the health of its users.	0	7	45	23	25	0	18	36	23	23
AR/VR is relatively easy to use.	9	52	18	5	16	23	54	18	0	5
I am generally interested in VR/AR.	52	43	5	0	0	68	27	0	0	5
The primary purpose of AR/VR is entertainment/gaming	7	23	43	27	0	5	27	36	27	5
I will probably use VR/AR in my work in the next three years.	27	57	14	0	2	50	14	9	18	9

Based on thematic coding, responses cluster into three readiness profiles that capture typical needs and barriers at different stages of VR adoption. Profiles were assigned using a simple decision rule (practical experience × equipment), so they indicate relative positioning rather than fixed labels. We use these profiles to interpret differences in perceived usefulness/ease (TAM) and pedagogical–technological integration (TPACK/SAMR), and to tailor recommendations: awareness-building for

Group 1, persuasive exemplars and mentoring for Group 2, and subject-specific scenario catalogues plus management standards for Group 3:

- Group 1 (Initial awareness): Schools with only vague or elementary experience. They primarily seek general information for teachers and students to broaden horizons, yet also expect subject-relevant examples. E.g. "Teachers may know they want to present, for example, the heart in biology in an innovative way, but they are not familiar with AR/VR — this topic simply isn't anchored in their minds."
- Group 2 (Motivation-seeking implementation): Schools familiar with VR capabilities but uncertain how to motivate colleagues for broader adoption. They welcome motivational and practical exemplars that can support decisions on acquisition and integration. E.g. "We need important information for proper use in classrooms and guidance on purchasing efficiently — what exactly to choose in terms of performance-to-price ratio. Above all, how to persuade colleagues who are not really interested."
- Group 3 (Implementation-oriented): Schools with more in-depth experience. They are motivated to use VR and need concrete, subject-specific strategies and scenarios to embed VR effectively into the curriculum. E.g., "Headsets are under central management. The teacher can see what students are doing, send content before class, and create playlists. There is sufficient teaching material (science, mathematics, geography). It meets simplicity requirements and is probably closest to what teaching needs."

The distribution of schools into individual clusters is clearly shown in Table 2. The South Bohemia distribution is weighted toward early- and mid-stage readiness, whereas the Upper Austrian sample concentrates at the implementation stage. This asymmetry mirrors the adoption gap and the contrasting deployment logics observed in the interviews (bulk "classroom-set" purchases vs selective, project-driven deployment).

Table 2

Distribution of schools across VR readiness profiles in South Bohemia and Upper Austria. (Authors, 2025)

Profile	CZ (n=44)	AT (n=22)	Total (n=66)
Group 1 – Initial awareness	20 (45.5%)	2 (9.1%)	22 (33.3%)
Group 2 – Motivation-seeking	18 (40.9%)	6 (27.3%)	24 (36.4%)
Group 3 – Implementation-oriented	6 (13.6%)	14 (63.6%)	20 (30.3%)

Perceptions and Expectations:
Quantitative analysis of the gathered data reveals a pronounced disparity in the penetration of VR technology. While 64% of the surveyed schools in Upper Austria reported being equipped with VR hardware, only 13.6% of the South Bohemian cohort had integrated such technologies. Beyond mere adoption rates, the qualitative data elucidate a fundamental divergence in procurement strategies and deployment philosophies between the two regions:

- South Bohemia (The "Classroom" Model): Institutions in this region predominantly favour a bulk-acquisition strategy. Schools typically purchase headsets in larger quantities, aiming for sets of 8 to 10 devices to facilitate synchronous group interaction and integrate VR into standard pedagogical workflows. This focus on scalability is evident in the prevalence of "Class VR" systems and Oculus Quest units, which are optimised for classroom management.
- Upper Austria (The "Project" Model): Conversely, Austrian schools maintain smaller hardware inventories, often tied to specific projects or strategic partnerships with private-sector entities. Interview data indicate that such collaborations are significantly more prevalent in Austria, driving the selection of high-fidelity, specialised devices (e.g., Oculus Rift, Microsoft HoloLens) over mass-market classroom sets.

The inventory detailed in Table 3 corroborates these strategic differences. Czech schools utilise a broad range of scalable devices, whereas Austrian schools prefer PC-tethered, high-performance systems and Mixed Reality (MR) devices. This extensive heterogeneity suggests that AR/VR implementation remains in a nascent stage, characterised by a lack of standardised hardware protocols. While South Bohemian schools prioritise volume to achieve "virtual classroom" capabilities, Austrian schools prioritise technical specificity, likely driven by higher capital investment in individualised or vocational applications.

Table 3
Comparison of the number and type of VR units (headsets) in South Bohemia and Upper Austria (Authors, 2025)

Region	Class VR	Oculus Quest	HTC Vive	HTC Vive Pro	HP Reverb	Oculus Rift	VR Headset (unknown brand)	Gear VR	Microsoft Ho-lolens
South Bohemia	15	16	0	3	1	0	0	0	0
Austria	0	2	1	1	0	8	1	6	1

Organisation and satisfaction:
Qualitative feedback indicates a positive reception of AR/VR technologies across both regions, although specific operational challenges persist. In South Bohemia, educators particularly value the pedagogical control offered by current systems, citing the ability to monitor student activity and distribute content centrally as key advantages. However, the hardware inventory is frequently cited as a limiting factor; schools emphasise the need to scale up to equip at least a quarter to half a class simultaneously to facilitate effective group work. Furthermore, a significant impediment in the Czech context is the paucity of specialised educational software, particularly for STEM subjects (Mathematics and Natural Sciences).

In Upper Austria, the adoption of VR is perceived to be in a nascent phase ("infancy"), yet there is a strong strategic intent to establish dedicated "Future Labs." While current hardware performance is deemed adequate, respondents highlighted a critical need for high-performance GPUs and further professional development for staff. The Austrian approach remains selective and project-oriented, with a specific demand for Mixed Reality devices such as the Microsoft HoloLens, although budgetary constraints remain the primary obstacle to expansion.

The analysis reveals substantial disparities in fiscal scale and funding mechanisms between the two regions. In Czechia, investment varied moderately, from €3,700 to €22,300. Funding strategies were characterised by resourcefulness, relying on a patchwork of support projects, sponsorships, and allocations from regular school budgets. By contrast, Austria showed a much wider range of investment, from €600 to €370,000. This reflects a dichotomy in which some institutions rely on borrowed equipment or minor public grants, while others (likely specialised technical colleges) secure substantial capital through public authorities and major project grants.

Ultimately, the absence of systematic, centralised financial support for immersive technologies forces institutions in both countries to rely on ad hoc funding and external sponsorship, necessitating complex financial engineering to secure the necessary hardware.

While awareness of VR's potential is high in both regions, its integration into teaching remains limited. This discrepancy can be attributed to differences in institutional support and the regulatory environment for digital competences. A critical factor shaping these adoption patterns is the divergence in national curricular frameworks. Austrian education operates within the "digi.komp" framework (Bundesministerium für Bildung, Wissenschaft und Forschung, n.d.), which provides a structured, standardised scaffolding for developing digital skills across the education system. In contrast, the Czech educational system lacks a standalone framework of this nature; instead, digital literacy is embedded transversely within the national Framework Educational Programme for Complementary Education (RVP) as a key competence, without the same level of structural specificity as the Austrian model. Consequently, the higher acceptance and specialised use of VR in Austria may correlate with the structured guidance of digi.kompP and specialised project funding. In the Czech context, where the RVP allows broader interpretation, successful implementation often hinges on the individual enthusiasm of "early adopter" educators rather than systemic mandates. This suggests that technological readiness must be accompanied by a shared strategic vision and clear curricular guidance to bridge the gap between hardware acquisition and pedagogical utility.

Conclusion

This cross-border study assessed how primary and secondary schools in South Bohemia and Upper Austria understand and are prepared to integrate VR into teaching and identified the organisational and systemic conditions shaping adoption. The analysis drew on structured interviews with representatives of sixty-six schools conducted in 2021. The study used convenience sampling and relied on a single informant per school; results are based on self-reports and reflect the state of technology in 2021 in a fast-moving field. These factors, together with limited N for some device categories, warrant caution in generalisation.

The study found a clear adoption gap: 64% of surveyed schools in Upper Austria reported owning VR hardware, compared with 13.6% in South Bohemia. Beyond penetration rates, procurement and deployment strategies diverge.

Czech schools typically pursue a "classroom set" model (bulk purchase of 8–10 headsets for synchronous use). In contrast, Austrian schools more often follow a selective, project-based model linked to partnerships and specialised, higher-fidelity devices.

Willingness is co-determined by perceived usefulness and ease of use, as well as by institutional support that translates interest into practicable routines. Austrian respondents more frequently perceived a favourable cost–benefit ratio and higher ease of use; schools in both regions valued organisational affordances (e.g., monitoring student activity and centrally distributing content), but expansion depended on available funding, ICT support capacity, and access to relevant curricular content. These findings are consistent with Schwaiger (2021).

Across regions, schools highlighted (i) limited subject-aligned VR content and exemplars, (ii) time and competence demands on teachers, (iii) budget constraints (including recurrent costs for software and upgrades), and (iv) the need for clear organisational models (labs vs mobile kits, device stewardship, scheduling). Many schools do not develop their own VR scenarios and rely on off-the-shelf applications, underscoring demand for shareable, quality-assured resources.

Findings suggest that many schools operate at the substitution and augmentation levels (SAMR) rather than at the curriculum-level goals of modification and redefinition, primarily because teachers lack the pedagogical–technological integration expertise (TPACK) and perceive low usefulness and ease in everyday conditions (TAM) when content and support are scarce. Strengthening teacher competence and institutional support is thus central to moving beyond pilots to transformative uses.

The study provides one of the few empirical, practice-proximate comparisons of K-12 VR readiness across a Czech–Austrian border region, with transparent reporting of sample and adoption rates. It identifies two distinct deployment logics ("classroom sets" vs. "project/specialised"), with distinct implications for sustainability, timetabling, and cost. It distils three school readiness profiles that can guide targeted support (from basic awareness-building to subject-specific implementation). Finally, it connects these patterns to established technology integration frameworks to explain "why" adoption remains uneven. Mapping schools into three readiness profiles (Groups 1–3) clarifies the adoption dynamics

behind the CZ–AT differences (RQ1), specifies the institutional and perceptual drivers of willingness to integrate VR (RQ2), and sharpens the picture of obstacles and needs (RQ3). Accordingly, recommendations are differentiated: awareness-building and basic exemplars for Group 1; persuasive, ready-to-use scenarios and mentoring for Group 2; and subject-specific scenario catalogues, device-management standards, and funding for software/methodological support for Group 3. These three readiness profiles help explain why most schools operate at substitution/augmentation levels (SAMR): Group 1 and Group 2 lack subject-aligned exemplars and organisational routines that would enable modification/redefinition. In TPACK terms, as described by Dobi Barišić and Brust Nemett (2023), technological and pedagogical–technological components are underdeveloped, even where general content knowledge is strong. Consistent with TAM, lower perceived usefulness and ease of use in everyday conditions (limited content, time, and support) depress the intention to use among Group 1–2, whereas Group 3 signals readiness to scale, provided subject-specific scenarios and management standards are available.
Based on the results, the following can be recommended as a suitable continuation of the research: (i) longitudinal tracking of adoption trajectories across the readiness profiles (range 2-3 years), (ii) experimental or design-based evaluation of learning outcomes and teacher workload in core subjects, (iii) comparative cost–benefit analyses of "classroom-set" versus "project/specialised" deployment models, and (iv) studies of schools' content co-creation capacity and its relationship to sustained use. As a practical implication for follow-up projects and school practise, it is good to embed VR systematically in pre-service teacher education (including micro-credentials) so that "general awareness" includes realistic classroom affordances and procurement/training pathways; to build an open, quality-assured catalogue of ready-to-use, curriculum-aligned scenarios with shared or institutional licences; to provide ongoing in-service training and mentoring via professional learning communities; and to design funding instruments that cover not only hardware but also software, content, and methodological support.

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Statements and Declarations

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Consent Statement

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Faculty of Education, University of South Bohemia. Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The article is based on data fully presented and discussed within the article itself; therefore, no additional data archiving is required.

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