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BRIDGING THE READINESS-EXPERIENCE GAP: A NEEDS ANALYSIS FOR VIRTUAL REALITY INTEGRATION IN INCLUSIVE EDUCATION

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Abstract:

This study examines students' readiness, knowledge, acceptance and learning needs regarding the integration of Virtual Reality (VR) in inclusive education, with the aim of informing the development of a VR-based instructional module known as InclusiveVR. Employing a quantitative survey design within Phase 1 (Needs Analysis) of the Design and Development Research (DDR) framework, data were collected from 405 undergraduate students enrolled in inclusive

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education-related programmes at Universiti Pendidikan Sultan Idris (UPSI). The instrument consisted of five constructs: technology access and readiness, VR knowledge and literacy, acceptance of VR, inclusive education content needs, and VR design and learning experience. The findings indicate that students demonstrate high levels of technological readiness (M = 4.33) and acceptance of VR (M = 4.20), but only moderate levels of VR knowledge and practical experience (M = 3.54). Notably, very high mean scores were recorded for inclusive education content needs (M = 4.49) and preferences for immersive and interactive learning design (M = 4.44). These findings reveal a critical readiness–experience gap, where students are prepared and willing to engage with VR but lack meaningful exposure to its pedagogical application. The study contributes to the literature on immersive learning and inclusive pedagogy by providing empirical evidence supporting the integration of VR within inclusive education contexts. The findings also offer practical implications for instructional design, particularly within the frameworks of DDR and ADDIE, by highlighting the need for structured, experiential and user-centred VR-based learning environments. The development of InclusiveVR is therefore positioned as a pedagogically grounded intervention to transform inclusive education from traditional, lecture-based instruction to immersive and practice-oriented learning.

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Introduction

The rapid advancement of digital technologies has significantly reshaped pedagogical practices in higher education, particularly in response to the learning characteristics of Generation Z students. As digital natives, Generation Z students are increasingly shaped by technology-mediated environments, leading to a preference for interactive and visually engaging learning experiences, which in turn challenges the continued reliance on traditional lecture-based instruction (Chan & Lee, 2023). This shift presents a critical challenge to traditional teacher-centred approaches, such as the conventional "chalk-and-talk" method, which often emphasises passive knowledge transmission and provides limited opportunities for experiential and authentic learning. Consequently, higher education institutions are increasingly required to transform instructional practices towards more interactive, student-centred and technology-enhanced pedagogies.

One of the emerging technologies that has gained significant attention in this transformation is Virtual Reality (VR). VR offers immersive, interactive and visual learning environments that enable students to engage with simulated experiences rather than merely receiving information through static or text-based materials. Systematic reviews have consistently demonstrated that VR can enhance student engagement, motivation, spatial understanding and experiential learning when supported by sound instructional design (Radianti et al., 2020; Hamilton et al., 2021; Kavanagh et al., 2017). Unlike traditional digital tools, VR allows learners to interact with three-dimensional environments, make decisions in real-time contexts, and construct knowledge through active participation, thus aligning with experiential and constructivist learning principles.

In the context of inclusive education, the integration of VR is particularly relevant. Inclusive education requires future teachers to develop competencies in understanding diverse learners, including students with special educational needs, as well as the ability to apply differentiated and responsive pedagogical strategies. However, these competencies are difficult to develop through lecture-based approaches alone, as inclusive classrooms involve complex, dynamic and context-dependent situations. Immersive technologies such as VR provide opportunities to simulate real-life classroom scenarios in a safe and controlled environment, enabling pre-service teachers to experience, observe and reflect on inclusive teaching practices. Previous studies have shown that VR can support empathy development, social understanding and practical decision-making skills in teacher education, particularly in special and inclusive education contexts (Dechsling et al., 2024).

Despite its strong pedagogical potential, the actual implementation of VR in higher education remains limited. Existing literature indicates that although awareness and interest in VR are increasing, its adoption is often constrained by limited exposure, lack of pedagogical integration, insufficient instructional design expertise, and accessibility challenges (Radianti et al., 2020; Hamilton et al., 2021). In the context of the present study, the preliminary proposal identified a lack of VR-based teaching materials specifically designed for inclusive education courses. As a result, there exists a clear gap between students' readiness and interest in using emerging technologies and their actual experience in engaging with immersive learning environments.

From a theoretical perspective, the use of VR in education can be explained through the Cognitive Affective Model of Immersive Learning (CAMIL), which posits that immersion and interactivity influence learning outcomes through cognitive and affective processes such as presence, motivation and self-efficacy (Makransky & Petersen, 2021). In inclusive education, these elements are particularly important, as learners require not only conceptual understanding but also experiential exposure to realistic classroom situations involving diverse learners. Therefore, the integration of immersive, interactive and visual technologies is essential in supporting meaningful and authentic learning experiences.

Given these considerations, there is a clear need to develop a structured VR-based instructional module that aligns with students' learning preferences and the pedagogical demands of inclusive education. Thus, this study aims to conduct a needs analysis to inform the development of a Virtual Reality-based Digital Teaching Module, known as InclusiveVR. Specifically, the study examines students' access to technology, knowledge of VR, acceptance of VR, inclusive content needs, and preferred learning design. The findings are expected to provide empirical justification for the development of InclusiveVR as an innovative pedagogical intervention that bridges the gap between technological readiness and practical implementation in inclusive education.

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Literature Review

There are five points will be discussed in LR which are virtual reality in education, the concept of inclusive education, experiential learning, Needs Analysis and Instructional Design in Curriculum Development.

Virtual Reality in Education

Virtual Reality (VR) has emerged as a transformative technology in education, offering immersive, interactive and visually rich learning environments that simulate real-world experiences. Unlike traditional instructional approaches, VR enables learners to actively engage with content through three-dimensional environments, fostering experiential and situated learning. Recent systematic reviews have consistently highlighted the pedagogical benefits of VR, including increased student engagement, motivation, spatial understanding and conceptual learning (Radianti et al., 2020; Hamilton et al., 2021). These immersive affordances allow learners to interact with dynamic scenarios, make decisions in context, and construct knowledge through experience rather than passive observation.

In addition, the Cognitive Affective Model of Immersive Learning (CAMIL) explains that immersion and interactivity in VR can enhance learning outcomes through psychological mechanisms such as presence, attention, and motivation (Makransky & Petersen, 2021). Empirical studies further demonstrate that VR can support deeper understanding and long-term retention when learning environments are designed with appropriate instructional strategies (Parong & Mayer, 2018).

Despite these advantages, the integration of VR in higher education remains inconsistent. Studies indicate that many institutions are still in the early stages of adoption, with challenges related to cost, accessibility, technical expertise, and pedagogical integration (Radianti et al., 2020). More critically, there is limited emphasis on designing VR applications that are aligned with specific curricular needs, particularly in specialised domains such as inclusive education. This indicates a clear gap between the technological potential of VR and its meaningful pedagogical implementation.

Inclusive Pedagogy and Experiential Learning

Inclusive pedagogy is grounded in the principle that all learners, regardless of ability or background, should have equitable access to meaningful learning opportunities. It emphasises flexibility, responsiveness and the recognition of learner diversity within the teaching and learning process (Florian & Black-Hawkins, 2011). In this context, teachers are required not only to understand diverse learner needs but also to apply differentiated instructional strategies that support inclusion.

The Universal Design for Learning (UDL) framework provides a structured approach to inclusive pedagogy by advocating multiple means of representation, engagement and expression (Rose & Meyer, 2002). UDL emphasises the importance of designing learning environments that are accessible and adaptable to diverse learners from the outset, rather than making adjustments retrospectively.

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Experiential learning theories, particularly those proposed by Kolb (1984), further reinforce the need for active and authentic learning experiences. In inclusive education, experiential learning is critical because it allows learners to engage with real-life contexts, reflect on their experiences, and apply theoretical knowledge in practical situations. However, traditional instructional approaches, such as lecture-based teaching, often fail to provide opportunities for such experiential engagement.

VR offers a unique solution by enabling the simulation of realistic classroom scenarios involving diverse learners, including students with special educational needs. Through immersive simulations, learners can develop empathy, decision-making skills and practical teaching competencies in a safe and controlled environment. Studies have shown that VR can enhance social understanding and inclusive awareness, particularly in teacher education programmes (Dechsling et al., 2024).

Nevertheless, existing research in inclusive education has predominantly focused on general digital tools such as learning management systems (LMS) and multimedia resources, with limited exploration of immersive technologies such as VR. This suggests a significant gap in the literature regarding the integration of VR within inclusive pedagogical frameworks.

Needs Analysis and Instructional Design in Curriculum Development

Needs analysis is a fundamental phase in instructional design, as it identifies gaps between current competencies and desired learning outcomes. Within the context of Design and Development Research (DDR), needs analysis serves as the foundation for developing effective and contextually relevant instructional products (Richey & Klein, 2007). It ensures that the design of instructional materials is informed by learners' needs, technological readiness and contextual constraints.

In addition to DDR, the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) remains one of the most widely used instructional design frameworks. The analysis phase, in particular, plays a critical role in determining learners' characteristics, technological access, prior knowledge and learning needs (Branch, 2009). Without a rigorous needs analysis, instructional interventions may fail to address actual learning challenges or align with learners' expectations.

Previous studies on needs analysis in curriculum development have demonstrated that identifying learners' requirements, preferences and challenges is essential for designing effective training models and instructional modules. For example, Markus et al. (2021) demonstrated that the needs analysis phase in DDR can be used to identify discrepancies between current instructional practices and desired learning conditions, thereby providing empirical justification for the development of an instructional module.

However, within the context of VR-based learning, there remains a lack of comprehensive needs analysis studies that specifically examine learners' readiness, knowledge, acceptance and design preferences for immersive technologies. This gap is particularly evident in inclusive education, where the complexity of learner diversity requires carefully designed instructional interventions.

Therefore, there is a clear need to conduct a systematic needs analysis to inform the development of VR-based instructional modules that are pedagogically sound, technologically feasible and aligned with the principles of inclusive education. The present study addresses this gap by examining students' needs in relation to VR integration in inclusive education, thereby providing a foundation for the development of the InclusiveVR module.

Methodology

This study employed a quantitative survey design as part of Phase 1 (Needs Analysis) within the Design and Development Research (DDR) framework proposed by Richey and Klein (2007). The needs analysis phase is essential in DDR as it systematically identifies gaps between current practices and desired instructional outcomes, thereby providing empirical justification for the development of instructional innovations.

Research Design

A cross-sectional survey design was utilised to examine students' readiness, knowledge, acceptance and needs regarding the integration of Virtual Reality (VR) in inclusive education. This design is appropriate for needs analysis studies as it enables the collection of large-scale data to identify patterns and inform instructional design decisions (Creswell, 2014).

Population and Sample

The population of this study consisted of 2,294 undergraduate students enrolled in inclusive education-related programmes at Universiti Pendidikan Sultan Idris (UPSI). From this population, a total of 405 students were selected as respondents.

A purposive sampling technique was employed to ensure that participants had relevant exposure to inclusive education courses. The sample size is considered adequate for descriptive and needs analysis studies, allowing for reliable interpretation of students' perceptions and learning needs.

Instrumentation

Data were collected using a structured questionnaire developed based on relevant literature in educational technology, inclusive pedagogy and immersive learning. The instrument comprised five constructs:

1. Technology Access and Readiness
2. VR Knowledge and Literacy
3. Acceptance of VR
4. Inclusive Education Content Needs
5. VR Design and Learning Experience

All items were measured using a **five-point Likert scale** ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Content validity was ensured through alignment with established theoretical frameworks, including immersive learning theory (Makransky & Petersen, 2021), inclusive pedagogy (Florian & Black-Hawkins, 2011), and instructional design principles.

Content Validation

Content validation was conducted to ensure that the items adequately represented the intended constructs and were appropriate for the context of Virtual Reality-based inclusive education. A panel of six experts with relevant expertise in educational technology, inclusive education, and instructional design was selected to evaluate the instrument. The selection of experts was based on their academic qualifications, research experience, and professional involvement in the respective fields.

The experts were asked to assess the relevance of each item using a four-point rating scale, ranging from 1 (not relevant) to 4 (highly relevant). The Content Validity Index (CVI) was computed at both the item level (I-CVI) and the scale level (S-CVI) to quantify the degree of agreement among experts (Polit et al., 2007; Yusoff, 2019).

The I-CVI was calculated as the proportion of experts who rated an item as either 3 or 4, indicating that the item is relevant. Items with I-CVI values of 0.78 and above were considered acceptable, while items below this threshold were revised or removed. The S-CVI was computed as the average of all I-CVI values, with values above 0.80 indicating satisfactory content validity.

Based on the analysis, all items achieved acceptable I-CVI values, and the overall S-CVI exceeded the recommended threshold, indicating that the instrument demonstrates good content validity. Minor revisions were made to several items based on qualitative feedback from experts to improve clarity, wording and contextual relevance

Data Collection Procedure

The questionnaire was administered online via a digital survey platform. Participation was voluntary, and respondents were informed about the purpose of the study, confidentiality, and anonymity of their responses. Ethical considerations were adhered to throughout the data collection process.

Data Analysis

The questionnaire was developed based on established theoretical frameworks and relevant literature in immersive learning, inclusive pedagogy and instructional design. As the focus of this study is on needs analysis, the present paper reports descriptive findings related to students' readiness, acceptance and learning needs. The psychometric validation of the instrument will be reported in a separate study.

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS). The analysis comprised four main components:

Descriptive Analysis

Descriptive statistics, including frequency, percentage and mean scores, were used to analyse demographic data and determine the level of each construct.
The interpretation of mean scores followed standard guidelines:

- 1.00–1.80 = Very Low
- 1.81–2.60 = Low
- 2.61–3.40 = Moderate
- 3.41–4.20 = High
- 4.21–5.00 = Very High

Demographic Analysis

Demographic analysis was conducted to describe respondents' profiles based on gender, year of study and faculty. This analysis is important in understanding the distribution of respondents and ensuring representativeness of the sample.

Findings

Demographic Profile of Respondents

A total of 405 undergraduate students from inclusive education-related programmes at Universiti Pendidikan Sultan Idris (UPSI) participated in this study. The demographic distribution provides an overview of the respondents' background, ensuring the representativeness of the sample.

Table 4.1: Distribution of Respondents by Gender

Gender	Frequency (n)	Percentage (%)
Male	**132**	**32.6**
Female	**273**	**67.4**
Total	**405**	**100**

The results indicate that the majority of respondents were female students, which is consistent with the general trend in education-related programmes.

Table 4.2: Distribution of Respondents by Year of Study

Year of Study	Frequency (n)	Percentage (%)
Year 1	98	24.2
Year 2	112	27.7
Year 3	105	25.9
Year 4	90	22.2
Total	**405**	**100**

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The distribution across year of study was relatively balanced, indicating that the findings reflect perspectives from students at different stages of their academic progression.

Reliability Analysis

To examine the internal consistency of the InclusiveVR instrument, Cronbach's Alpha coefficients were calculated for each construct. The results indicate that all constructs demonstrated satisfactory to excellent levels of reliability. Specifically, Technology Readiness (α = 0.856), VR Knowledge (α = 0.809), and VR Design and Learning Experience (α = 0.836) showed good reliability, while Acceptance of VR (α = 0.927) and Inclusive Content Needs (α = 0.943) demonstrated excellent internal consistency. The overall Cronbach's Alpha for the instrument was 0.940, indicating a very high level of internal consistency.

Table 4.3: Cronbach's Alpha Finding

Construct	Cronbach's Alpha	Interpretation
Technology Readiness	0.856	Good
VR Knowledge	0.809	Good
Acceptance of VR	0.927	Excellent
Inclusive Content Needs	0.943	Excellent
VR Design & Learning Experience	0.836	Good
Overall Instrument	**0.940**	**Excellent**

According to Tavakol and Dennick (2011), Cronbach's Alpha values above 0.70 are considered acceptable, while values above 0.80 indicate good reliability. Therefore, the InclusiveVR instrument can be considered highly reliable for measuring students' readiness, knowledge, acceptance and learning needs related to VR integration in inclusive education.

Descriptive Analysis by Construct

Descriptive analysis was conducted to determine the level of each construct based on mean scores.

Table 4.4: Mean Scores by Construct

Construct	Mean	Level
Technology Access and Readiness	4.33	High
VR Knowledge and Literacy	3.54	Moderate
Acceptance of VR	4.20	High
Inclusive Content Needs	4.49	Very High
VR Design and Learning Experience	4.44	Very High

The findings indicate that students demonstrated high levels of technological readiness and acceptance of Virtual Reality. However, their knowledge and practical experience with VR were only moderate. Notably, very high mean scores were recorded for inclusive content needs and VR design preferences, indicating strong demand for experiential and immersive learning.

Technology Access and Readiness

Table 4.5: Mean Scores for Technology Access and Readiness

Item	Mean
Access to digital devices	4.54
Stable internet connection	4.01
Comfort using technology	4.32
Use of digital applications	4.38
Readiness for new technologies	4.40

Students demonstrated a high level of access to digital devices and readiness to adopt new technologies. The highest mean score was recorded for access to digital devices, indicating that most respondents are well-equipped for digital learning. However, the relatively lower mean score for internet stability suggests that minor infrastructural challenges remain.

VR Knowledge and Literacy

Table 4.6: Mean Scores for VR Knowledge and Literacy

Item	Mean
Understanding of VR concepts	3.60
Experience using VR	3.00
Understanding VR in education	3.56
Awareness of VR potential	3.99

The results show that students possess moderate knowledge of VR. While awareness of VR's potential is relatively high, actual experience using VR remains limited. This indicates a gap between conceptual understanding and practical exposure.

Acceptance of Virtual Reality

Table 4.7: Mean Scores for Acceptance of VR

Item	Mean
Confidence in learning VR	4.10
VR improves understanding	4.28
VR enhances engagement	4.25
Interest in using VR	4.22
VR enhances interaction	4.16

Students demonstrated a high level of acceptance of VR. The findings indicate that respondents perceive VR as a valuable tool that can enhance engagement, interaction and understanding in learning environments.

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Inclusive Education Content Needs

Table 4.8: Mean Scores for Inclusive Content Needs

Item	Mean
Willingness to use VR	4.30
Need for real-life exposure	4.55
Need for teaching strategies	4.50
Need for practical training	4.52
Need for classroom simulation	4.58

This construct recorded the highest mean scores, indicating a very strong demand for experiential learning. Students expressed a clear need for practical exposure, realistic simulations and applied teaching strategies in inclusive education.

VR Design and Learning Experience

Table 4.9: Mean Scores for VR Design and Learning Experience

Item	Mean
Inclusive content design	4.45
Preference for interactive learning	4.48
VR improves understanding	4.46
Preference for visual learning	4.50
Immersive learning effectiveness	4.42
User-friendly design	4.55

Students demonstrated strong preferences for interactive, visual and immersive learning environments. The findings also highlight the importance of user-friendly design in VR-based instructional modules.

Summary of Findings

Overall, the findings reveal a consistent pattern across all constructs. Students demonstrate high levels of technological readiness and positive attitudes towards VR, but only moderate levels of knowledge and experience. At the same time, they express very strong needs for experiential, interactive and immersive learning environments.

This indicates a clear gap between readiness and practical exposure, suggesting that while students are prepared and willing to adopt VR, they lack sufficient opportunities to engage with it meaningfully. These findings provide strong empirical support for the development of the InclusiveVR module.

Discussion

The findings of this study reveal a critical paradox in the context of Virtual Reality (VR) integration in inclusive education. Although students demonstrated a high level of technological readiness, their knowledge and practical experience with VR remained only moderate. This indicates that the primary challenge is not related to learners' willingness or digital capability, but rather to the lack of structured and meaningful exposure to immersive learning environments. Therefore, the issue is better understood as a readiness–experience gap, where students are prepared to adopt technology but are not provided with sufficient opportunities to engage with it in pedagogically meaningful ways.

While previous studies have consistently highlighted the pedagogical potential of immersive VR (Radianti et al., 2020; Hamilton et al., 2021), the present findings extend this understanding by demonstrating that the limitation lies not in the technology itself, but in its pedagogical integration. In other words, VR remains underutilised not because students are resistant, but because its implementation has not been systematically embedded within instructional design. This shifts the focus from technological adoption to instructional alignment, suggesting that the success of VR in education depends more on how it is designed and integrated rather than its availability alone.

The strong demand for inclusive education content further reinforces this argument. Inclusive pedagogy requires teachers to develop practical competencies in addressing learner diversity, which cannot be effectively achieved through theoretical instruction alone (Florian & Black-Hawkins, 2011). The high mean scores for content needs suggest that students are not merely seeking more information, but rather more authentic and experience-based learning opportunities. This finding highlights a fundamental limitation of traditional lecture-based approaches, which often fail to simulate the complexity of real classroom situations. Thus, the need for VR should not be interpreted as a preference for technology per se, but as a demand for more experiential and practice-oriented pedagogy.

This interpretation is further supported by the principles of Universal Design for Learning (UDL), which emphasise the need for flexible and inclusive learning environments that accommodate diverse learner needs (Rose & Meyer, 2002). The preference for visual, interactive and immersive learning suggests that students expect learning environments that go beyond passive content delivery. However, the findings also indicate that such expectations are not currently being met, pointing to a misalignment between pedagogical design and learner needs. Therefore, VR should not be treated as an add-on technology, but as a pedagogically driven tool that supports inclusive and differentiated learning.

From the perspective of immersive learning theory, the findings can be interpreted through the Cognitive Affective Model of Immersive Learning (CAMIL). Although students showed high acceptance of VR, their moderate level of VR literacy suggests that the psychological benefits associated with immersive learning—such as presence, engagement and self-efficacy—cannot be fully realised without guided experience (Makransky & Petersen, 2021). This highlights an important implication: exposure alone is insufficient. Instead, structured and scaffolded learning experiences are necessary to activate the cognitive and affective mechanisms that underpin immersive learning.

Furthermore, the findings suggest that students expect VR to provide realistic and contextually relevant learning experiences, particularly in relation to inclusive classroom practices. This aligns with recent research emphasising that the effectiveness of VR in special and inclusive education depends on usability, contextual relevance and pedagogical appropriateness (Dechsling et al., 2024). Therefore, the development of the InclusiveVR module should prioritise not only technological sophistication, but also instructional authenticity and user-centred design.

From an instructional design perspective, the findings provide strong empirical support for the importance of the analysis phase in the ADDIE model. As highlighted by Branch (2009), the analysis phase is crucial for identifying learner characteristics, learning gaps and contextual needs before proceeding to design and development. In this study, the identification of the readiness–experience gap offers a clear justification for the development of a VR-based instructional module. More importantly, it demonstrates how needs analysis can move beyond descriptive reporting to inform evidence-based instructional design decisions.

In summary, this study contributes to the literature by shifting the discourse from the potential of VR to the conditions required for its effective implementation. The identification of a readiness–experience gap highlights the need for structured, immersive and pedagogically grounded learning environments. Therefore, the development of the InclusiveVR module should focus on bridging this gap by providing guided, authentic and interactive learning experiences that align with the principles of inclusive pedagogy and immersive learning.

Conclusion

This study set out to examine students' readiness, knowledge, acceptance and needs regarding the integration of Virtual Reality (VR) in inclusive education, with the aim of informing the development of the InclusiveVR module. The findings reveal a consistent and meaningful pattern across all constructs, highlighting both the opportunities and challenges associated with the adoption of immersive technologies in teacher education.

Overall, the results indicate that students demonstrate a high level of technological readiness and a positive acceptance of VR as a learning tool. However, their level of knowledge and practical experience with VR remains moderate, suggesting that exposure to immersive technologies in current instructional practices is still limited. At the same time, students expressed very strong needs for experiential, interactive and immersive learning environments, particularly in the context of inclusive education.

These findings point to a critical **readiness–experience gap**, where students are prepared and willing to engage with VR, yet lack meaningful opportunities to experience its pedagogical application. This gap underscores the limitations of traditional instructional approaches, particularly lecture-based methods, in supporting the development of practical competencies required in inclusive education.

From a theoretical perspective, this study contributes to the growing body of literature on immersive learning by providing empirical support for frameworks such as the Cognitive Affective Model of Immersive Learning (CAMIL) and Universal Design for Learning (UDL). The findings suggest that immersive, interactive and visually rich learning environments are not only preferred by students but are also necessary for supporting meaningful learning in inclusive education contexts.

Practically, the study provides strong justification for the development of the InclusiveVR module as a structured, pedagogically grounded intervention. By integrating immersive technology with inclusive pedagogy and experiential learning principles, InclusiveVR has the

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potential to transform the teaching and learning of inclusive education from passive knowledge transmission to active, practice-oriented learning.

However, this study is not without limitations. The use of a quantitative survey design provides a broad overview of students' perceptions but does not capture in-depth insights into their experiences. Future research is therefore recommended to incorporate qualitative approaches, such as interviews or classroom observations, to further explore how VR can be effectively implemented in inclusive education.

In addition, future studies may extend this research by evaluating the effectiveness of the InclusiveVR module through experimental or quasi-experimental designs, as well as examining its impact on teaching competencies, empathy development and learning outcomes.

In conclusion, this study highlights the urgent need to bridge the gap between technological readiness and pedagogical implementation. The development of InclusiveVR is not merely an innovation, but a necessary step towards creating more inclusive, experiential and future-ready learning environments in teacher education.

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Author Contribution Statement:	All authors contributed significantly to this study. Nik Muhammad Hanis led the conceptualisation, methodology and overall supervision. Mohd Muslim Md Zalli and Mohd Ridhuan were involved in data collection and analysis. Syaza Hazwani and Mohd Afifi Bahurudin Setambah contributed to literature review and manuscript drafting. All authors reviewed and approved the final manuscript.

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