Asatiza : Jurnal Pendidikan
P-ISSN: 2721-0723 | E-ISSN: 2716-3202
https://ejournal.stai-tbh.ac.id/index.php/asatiza

Immersive Learning for Early Religious Diversity Education: Evaluating Virtual Reality's Effectiveness in Teaching Places of Worship to Young Children

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ARTICLE INFORMATION

Article History:
Received : 30/07/2025
Revised : 08/08/2025
Accepted : 12/08/2025
Published : 30/09/2025

***Keywords*:**
Conceptual Understanding; Educational Technology; Early Childhood Education; Virtual Reality (VR); Student Engagement

DOI:
https://doi.org/10.46963/asatiza.v6i3.3127

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Abstract
This study investigates the effectiveness of Virtual Reality (VR) as a tool for enhancing early childhood engagement and conceptual understanding of diverse places of worship. Employing a mixed-methods approach, the research evaluated three core dimensions: (1) levels of child engagement, (2) conceptual understanding as assessed through Student Worksheets (LKPD), and (3) teacher perceptions of practicality. The study involved 42 children (aged 5–6) and 10 teachers from five early childhood education institutions. Data were collected via structured observations, artifact analysis of worksheets, and teacher questionnaires. The results demonstrated that the VR intervention elicited active, enthusiastic engagement in 100% of the participating children. Furthermore, quantitative assessment revealed exceptionally high understanding (99% average score), with children successfully identifying specific worship sites and their associated attributes. Teachers rated the media as highly practical (87.8% on a practicality scale), highlighting its ease of use, time efficiency, and minimal technical skill requirements. The findings suggest that the immersive, multi-sensory experience of VR is a significant factor in facilitating deeper conceptual understanding compared to conventional two-dimensional media. While the results are promising, further research employing controlled, comparative designs is recommended to validate its long-term efficacy against traditional pedagogical methods.

How to cite this article:
Miranda, D., Perdina, S., Lukmanulhakim, L., Novitasari, D., & Utami, N. M. (2025). Immersive learning for early religious diversity education: evaluating virtual reality's effectiveness in teaching places of worship to young children. *Asatiza: Jurnal Pendidikan, 6*(3), 278-286. https://doi.org/10.46963/asatiza.v6i3.3127

INTRODUCTION

Early childhood education (ECE) is widely recognized as a critical period for establishing an individual's foundational character and worldview (Wulandari, 2022; Yuliana, 2015; Amaliah & Hasibuan, 2023). During this stage of rapid cognitive and socio-emotional development, children require learning methodologies that are not only engaging but also aligned with their concrete, experiential perception of the world. A key

concept to introduce during this formative period is diversity, including an appreciation for different religious beliefs and practices. Introducing various places of worship, for instance, is a strategic approach to foster an early understanding that differences are to be respected and valued, not feared (Pitaloka et al., 2021; Rusmiati, 2023).

Familiarizing children with diverse religious sites—such as mosques, churches, temples, and viharas—helps them recognize the unique values, cultures, and narratives associated with each. This early exposure can lay the groundwork for mutual respect and peaceful coexistence within a pluralistic society. Empirical support for this approach is provided by Widyawati (2021), whose research indicates that individuals introduced to different places of worship in their youth develop more positive attitudes toward religious out-groups.

A persistent challenge in ECE, however, is that conventional teaching methods like pictures or storytelling often fail to fully capture and sustain young learners' attention. Children at this age learn best through tactile, visual, and exploratory experiences, necessitating more creative pedagogical approaches. The integration of technology, particularly within religious education (PAI), presents a significant opportunity to enhance the learning process (Anggraini et al., 2024). Among technological solutions, Virtual Reality (VR) offers a uniquely immersive experience, enabling children to feel a sense of presence within a virtual environment such as a house of worship (Cahyaningtyas, 2020; Rawanti et al., 2023). Unlike conventional unisensory media, VR provides multisensory stimulation by engaging visual and auditory senses, as well as motor and kinesthetic systems through interactive exploration (e.g., head movements to navigate a virtual space).

Through VR, children can virtually explore architectural details, absorb ambient sounds, and experience the atmosphere of various sacred spaces without the need for physical travel. As Chavan (2016) explains, VR's capacity to generate seemingly authentic experiences is highly congruent with the concrete, experiential learning needs of preschool-aged children (Rahmawati, 2020). This technology also offers a practical solution to logistical and security constraints that often complicate real-world field trips, a advantage that has become increasingly salient in the post-pandemic educational landscape (Arsadhana et al., 2022).

Despite its potential, the implementation of VR in resource-constrained Indonesian PAUD (Early Childhood Education) settings faces significant barriers, including high hardware costs and a demand for technical expertise among educators (Papanastasiou et al., 2023). Furthermore, scholarly literature cautions against potential drawbacks, such as addictive usage patterns, reduced social interaction, and a lack of authentic communicative exchange (Jindal et al., 2024). Therefore, the application of VR for introducing religious diversity must be evaluated beyond its technological novelty; it requires careful consideration of pedagogical

effectiveness, age-appropriate design, and practical utility.

Grounded in established principles of multimedia learning (Clark & Mayer, 2012; Dede, 2009), this study asserts that any new learning medium must be rigorously evaluated to ensure it optimally supports intended educational outcomes. To address the identified research gap, this study will therefore assess the implementation of VR media by focusing on two primary outcomes: children's engagement and their conceptual understanding of places of worship, alongside investigating teacher perceptions of its practicality in authentic ECE settings.

METHOD

This study employed a field trial to evaluate the effectiveness of virtual reality (VR) media depicting various houses of worship. A convergent mixed-methods design (Creswell & Plano Clark, 2018) was utilized to provide a comprehensive analysis of the media's impact. This approach facilitated the collection of both quantitative and qualitative data concurrently, enabling the researchers to not only measure the extent of the media's effectiveness but also to explore the contextual dynamics of its implementation and the underlying reasons for its outcomes. Quantitative data, comprising structured observations of children's engagement, scores from student worksheets (LKPD), and teacher responses on a practicality questionnaire, were collected alongside qualitative data from field notes and semi-structured teacher interviews. These datasets were integrated during the analysis phase to identify convergent and divergent patterns, thereby offering a nuanced understanding of the VR media's pedagogical value.

Participants were recruited from five early childhood education (ECE) institutions in Pontianak, Indonesia. From each institution, a sample of 6 to 10 children was selected from B-level classes (typically 5-6 years old), resulting in a total participant pool of 42 children. In addition, two teachers from each participating class (10 teachers total) were included in the study. The teachers acted as facilitators during the VR implementation and provided data on the practicality of the media.

Data were gathered through multiple techniques to ensure triangulation:

1. Semi-structured interviews were conducted with teachers following the implementation to gain in-depth insights into their user experiences, including perceptions of operational ease, time requirements, device availability, encountered challenges, and perceived benefits.
2. Structured observations were conducted to assess children's behavioral and cognitive engagement while interacting with the VR media. Specific observed behaviors are detailed in the measures section.
3. Artifact analysis was performed using student worksheets (LKPD) designed to evaluate children's understanding of the names, attributes, and worship activities associated with each house of worship. To establish a baseline, direct interviews were also conducted with children prior to the VR

experience to ascertain their prior knowledge of the topic.

The analysis followed a structured process. Quantitative data from observations, worksheets, and questionnaires were analyzed using descriptive statistics. Qualitative data from interview transcripts and field notes were analyzed through a thematic analysis process. This involved transcribing the data, applying a coding scheme to identify essential information, grouping codes into themes, and drawing conclusions to interpret the overall meaning. Finally, the quantitative results and qualitative themes were integrated to provide a consolidated interpretation of the findings.

The effectiveness of the VR media was evaluated against three primary indicators:

1. Children's Engagement: Measured through structured observation of active behaviors, including asking questions, requesting navigation to different virtual rooms, repeating sections, and maintaining concentration for a duration exceeding 10 minutes.
2. Children's Conceptual Understanding: Assessed through scores on student worksheets (LKPD) that evaluated knowledge of three aspects: the names of different houses of worship, their key attributes, and the forms of worship conducted within them.
3. Teacher-Perceived Practicality: Gauged via a questionnaire and follow-up interviews, focusing on teachers' assessments of the media's complexity, the time efficiency of its use, and the feasibility of managing the required equipment within a typical classroom setting.

RESULT AND DISCUSSION

Children's Engagement with the VR Environment

Field trials demonstrated a markedly high level of engagement and interaction among children using the VR media. Observations across all five early childhood education (ECE) classes revealed that every child participated actively and enthusiastically. The children exhibited pronounced curiosity, exploring the various rooms, artifacts, and depictions of worship practices within the virtual environments. Despite the teacher-led, projector-based delivery method, the children's enthusiasm was not diminished. They consistently prompted the teacher to navigate to different areas, asked questions, and requested to revisit specific sections. Although the classroom environment became more dynamic, teachers maintained order, and the children remained disciplined while awaiting their turns. Critically, no children were observed to be disengaged or distracted; the attention of the entire class was consistently focused on the VR experience.

As detailed in Table 1, observational data quantified this engagement across four key indicators. For every type of house of worship presented (Mosque, Church, Vihara, Pura, Temple), 100% of observed children met each indicator: maintaining focus, showing enthusiasm, asking questions or requesting exploration, and persisting with the activity for more than 15 minutes.

Table 1. Children's Engagement with the Houses of Worship VR Media

Indicator	A	%	B	%	C	%	D	%	E	%	Total
1	8	100	6	100	8	100	10	100	10	100	
2	8	100	6	100	8	100	10	100	10	100	
3	8	100	6	100	8	100	10	100	10	100	
4	8	100	6	100	8	100	10	100	10	100	

Children's Understanding of the Concept of Houses of Worship

Children's conceptual understanding was assessed through an analysis of completed student worksheets (LKPD), which evaluated their knowledge of the names, architectural forms, internal sections, attributes, and worship activities associated with each house of worship. Prior to the intervention, interviews indicated that most children could only identify and describe the place of worship associated with their own religion in simple terms.

Post-intervention LKPD scores revealed excellent comprehension. As shown in Table 2, average scores ranged from 98 to 100 on a scale of 0 to 100, indicating that children successfully acquired new knowledge about the architectural forms, specific sections, and religious attributes of all five houses of worship.

Table 2. Children's Understanding of the Concept of Houses of Worship

Virtual Reality (VR) Media	Children's Average Understanding (Score)
Mosque	100
Church	100
Vihara	100
Pura	98
Temple	98

Observational data corroborated these quantitative results. Children were heard verbally repeating the names of attributes and rooms that captured their attention. They engaged deeply with the explanatory videos within the VR media, and when a child asked a question, the teacher's use of the media to immediately show a relevant video or audio segment facilitated peer discussions and appeared to reinforce information retention.

Teacher Responses on the Practicality of VR Media

Teacher perceptions of the media's practicality, gathered via a 5-point Likert scale questionnaire (1=Impractical, 5=Very Practical), yielded a high mean score of 4.39. Scores for each VR module consistently fell between 4 ("Practical") and 5 ("Very Practical"), as detailed in Table 3.

Table 3. Practicality Score of the VR Media

Virtual Reality (VR) Media	Mean Practicality Score
Mosque	4,9
Church	4,25
Vihara	4,05
Pura	4,5
Temple	4,25
Average	4,39

Qualitative data from interviews, however, revealed implementation constraints. The primary challenge was a scarcity of devices, which necessitated a teacher-led, whole-class format rather than individual use. This sometimes led to children competing for the teacher's attention to explore specific virtual spaces. Limited access to peripherals like speakers and projectors also required sharing among schools. Despite these logistical hurdles, all teachers reported that the media itself was exceptionally user-friendly and operationally simple. They also noted that the sessions were time-

efficient once the equipment was prepared, positioning VR as a viable alternative to physical field trips.

Discussion

This study evaluated the effectiveness and practicality of a Virtual Reality (VR) medium for introducing young children to diverse places of worship. The findings indicate that the intervention was highly successful, yielding positive outcomes in student engagement, conceptual understanding, and teacher-perceived practicality. These results are interpreted below within the context of existing educational theory and literature.

The most salient finding was the exceptional level of student engagement. Children were not passive recipients but active, enthusiastic participants who demonstrated sustained focus, curiosity, and a drive to explore. This finding powerfully aligns with established literature confirming that immersive, VR-based learning significantly enhances student motivation and participation, often surpassing conventional methods (Huang et al., 2023; Parong & Mayer, 2018). The mechanism for this engagement can be attributed to VR's capacity to facilitate active, exploration-based learning (Freina & Ott, 2015). Despite the teacher-controlled navigation in this study, children were empowered to direct their own learning paths by requesting specific explorations, effectively making the experience learner-centric. This is particularly impactful for teaching religious diversity, as it provides an authentic, exploratory experience of sacred spaces that is logistically challenging to achieve through traditional means.

The high engagement directly facilitated strong learning outcomes, as evidenced by the near-perfect LKPD scores. This success can be explained by Mayer's (2021) Cognitive Theory of Multimedia Learning, which posits that learning is enhanced when information is processed through dual visual and auditory channels. The VR medium provided a rich, multi-sensory experience that made abstract concepts concrete and tangible. By virtually inhabiting a mosque, church, or temple, children could form robust mental models, linking verbal explanations to direct visual and auditory evidence. This supports research associating immersive experiences with improved concentration, motivation, and knowledge retention (Akgün & Atici, 2022; Queiroz et al., 2022). The ability to control the pace of exploration—requesting repeats and revisits—further reinforced understanding, a key advantage of interactive media noted in prior studies (Bacca et al., 2014; Merchant et al., 2014).

Finally, the study found the VR media to be highly practical from the teachers' perspective, aligning with frameworks that emphasize usability and feasibility for successful technology integration (Dede, 2009; Selwyn, 2011). The high quantitative practicality scores underscore the tool's user-friendliness. However, the qualitative data reveals a critical distinction between a tool's inherent usability and the broader ecosystem required for its implementation. Logistical constraints, such as device scarcity and unstable connectivity,

emerged as significant barriers to optimal, individualized use. This highlights a common challenge in educational technology: a tool's theoretical potential can be limited by infrastructural realities (Howard et al., 2021; Radianti et al., 2020). To overcome these obstacles, teachers suggested practical strategies such as scheduling device use and sharing media links with parents for home exploration. These adaptive strategies point to the VR media's flexibility and potential for use in both school and home-learning environments, mitigating the impact of limited resources.

CONCLUSION

This study demonstrates that Virtual Reality (VR) is an effective and practical innovative medium for introducing early childhood students to diverse houses of worship. The findings confirm that the immersive nature of the VR experience successfully fostered high levels of student engagement, enthusiasm, and conceptual understanding. This was evidenced by robust observational data, which documented active participation and curiosity, and quantitatively validated by the excellent results from the Student Worksheets (LKPD). Furthermore, teachers rated the media as highly practical, noting its user-friendly operation, time efficiency, and ability to function without highly specialized equipment, underscoring its potential for broader classroom application.

Notwithstanding these positive outcomes, several limitations of this study must be acknowledged. Primarily, the absence of a control group using traditional teaching methods means the findings, while promising, cannot be presented as conclusive evidence of VR's superior efficacy. This methodological gap presents a clear avenue for future comparative research. Furthermore, the study's implementation faced significant logistical constraints. The limited availability of devices and unstable internet connectivity necessitated a teacher-guided, whole-class format rather than individualized exploration. This scarcity of essential peripherals, such as projectors and speakers, highlights a critical contextual challenge that may impede the optimal deployment of this technology in resource-constrained settings. Future efforts should therefore focus not only on the development of educational VR content but also on strategies to address these infrastructural barriers to ensure equitable and effective implementation.

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