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# FORMULATING DESIGN GUIDELINES FOR AN IMMERSIVE VIRTUAL REALITY ENVIRONMENT IN MUSLIM FUNERAL MANAGEMENT EDUCATION IN MALAYSIA

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## ABSTRACT

In Malaysia, Islamic funeral rites hold deep cultural and religious significance. Upon a person's passing, specific rituals rooted in Islamic traditions are observed. However, despite the importance of these practices, many students especially teenagers in Malaysia lack of knowledge and understanding about Islamic funeral management and practices. A preliminary study conducted among 27 teenagers aged 21 to 25 from *Universiti Utara Malaysia (UUM)* revealed significant gaps in understanding key aspects such as *Taharah* (ritual washing), *Solat Jenazah* (funeral prayer), and *Kafan* (shrouding). This lack of knowledge could have implications for the preservation and practice of Islamic traditions within younger generations. With the rapid integration of digital technologies, there is need to find alternative way, and this refer to the utilization of Immersive Virtual Reality (IVR) Technology in addressing this problem. To bridge this gap, the study proposes formulating design guidelines for an IVR environment focused on Islamic funeral management education in Malaysia. This research aligns with Sustainable Development Goal 4 (SDG 4) by promoting quality education through digital innovation. The objectives include identifying core components for the IVR environment, developing comprehensive design guidelines, and validating these guidelines through expert review. The study employs the Design Science Research Methodology (DSRM), encompassing stages such as awareness, suggestion, development, evaluation, and conclusion. The significance lies in exploring innovative, interactive approaches for teaching Islamic funeral practices, offering an immersive learning experience that enhances student engagement, comprehension, and retention. Ultimately, this research contributes to the development of IVR applications that support effective, technology-based education in alignment with the MADANI Economy vision.

**Keywords:** Design guidelines, immersive virtual reality, immersive learning, muslim funeral management, cultural education.

## INTRODUCTION

The management of Islamic funeral rites requires specific knowledge and skills that are traditionally taught through in-person training (Zakaria & Abdullah, 2023). However, there are limitations to this traditional approach, as it is often difficult to provide comprehensive and practical training opportunities for all individuals involved in the management of Islamic funerals in Malaysia (Suhaimi & Mirza, 2019). Where Islamic funeral rites carry profound cultural and religious significance, a concerning gap exists in the knowledge and understanding of these practices among contemporary teenagers, particularly university students. Despite the importance of Islamic funeral management and practices, evidenced by a preliminary study among 27 students aged 21 to 25 from *Universiti Utara Malaysia (UUM)*, significant deficiencies persist in grasping essential aspects such as *Taharah*, *Solat Jenazah*, and the process of shrouding (*Kafan*) the deceased. This knowledge gap poses challenges for the preservation and transmission of Islamic traditions within younger generations, potentially undermining the sustainability of cultural heritage and religious practices (Saany et al., 2021). The lack of understanding among teenagers regarding Islamic funeral rites in Malaysia is a multifaceted issue with far-reaching implications. Firstly, it reflects a broader trend of disconnect between contemporary youth and traditional cultural and religious practices, fuelled by factors such as globalization, urbanization, and the influence of digital technologies (Zakaria & Abdullah, 2023). Secondly, inadequate education and awareness programs contribute to this knowledge gap, as evidenced by the findings of the preliminary study conducted at UUM. Without a comprehensive understanding of Islamic funeral management, teenagers' risk being ill-prepared to fulfil their religious obligations and participate meaningfully in community rituals during times of bereavement. This lack of knowledge not only undermines individual spiritual well-being but also hampers the cohesion and resilience of Islamic communities.

To address this issue, this study explores the integration of Immersive Virtual Reality (IVR) technology as a potential solution for enhancing Islamic Funeral Management Education in Malaysia. Virtual Reality (VR) technology has transformed education by breaking the confines of traditional learning environments. Through advanced hardware and software systems, VR creates immersive digital environments that simulate real-world experiences, enabling users to interact with and navigate through computer-generated worlds in ways that closely resemble real-life interactions (Rojas-Sánchez et al., 2023; Schepers et al., 2014). This technology's ability to immerse students in lifelike scenarios offers a promising approach to bridging the knowledge gap in Islamic funeral practices among the younger generation. In the context of education, VR has sparked a paradigm shift, offering unparalleled opportunities for immersive and interactive learning experiences. VR facilitates experiential learning by allowing students to immerse themselves in virtual environments that simulate real-world scenarios. This method enhances engagement, motivation, and retention, as students are not merely passive recipients of information but active participants in their learning journey (Paszkiewicz et al., 2021). Moreover, VR democratizes access to education by overcoming geographical barriers and providing equitable learning opportunities for students regardless of their location or socioeconomic background. It also enables educators to customize learning experiences to meet the unique needs and preferences of individual students, while fostering global collaboration by enabling interaction in virtual environments across distances (Marougkas et al., 2023).

An Immersive Virtual Reality Environment (IVRE) is a computer-generated simulation designed to engage multiple senses, creating a convincing and realistic experience that effectively transports users into a digital world (McGovern et al., 2020). By combining technologies such as head-mounted displays (HMDs), motion tracking, spatial audio, and haptic feedback, IVREs create a sense of presence and embodiment within the virtual environment. This immersive experience allows users to explore virtual spaces, manipulate objects, and interact with virtual entities in real-time, blurring the boundaries between the physical and virtual worlds(Conrad et al., 2024; Jensen & Konradsen, 2018). By harnessing these

technologies, this study aims to develop compelling and engaging IVR experiences that can effectively enhance the understanding and practice of Islamic funeral rites among the youth in Malaysia. Immersive learning, powered by VR technology, revolutionizes traditional education by offering students interactive and experiential opportunities to engage deeply with course material. Unlike conventional methods, VR enables students to step beyond textbooks and classrooms, immersing them in virtual environments where they can actively participate in learning activities. This hands-on approach fosters a deeper understanding of complex concepts and enhances retention through sensory-rich experiences that cater to multiple learning styles (Castronovo et al., 2013). In the context of Islamic funeral management education in Malaysia, developing design guidelines for immersive VR technology holds significant potential to address knowledge gaps among contemporary teenagers. The traditional methods of teaching Islamic funeral rites, often relying on in-person instruction and physical demonstrations, face several limitations. These methods can be resource-intensive, geographically restrictive, and less engaging for contemporary students accustomed to digital learning environments. To bridge this gap, the study proposes the development of design guidelines for an Immersive Virtual Reality (IVR) environment focused on Islamic funeral management education. IVR technology offers a unique solution by creating immersive, interactive, and contextually rich learning experiences that can effectively convey the intricacies of these rituals. By simulating real-life scenarios, IVR allows students to actively participate in and practice funeral rites in a safe, controlled environment, enhancing their understanding and retention. By leveraging VR, educational institutions can create virtual simulations that guide students through essential rituals such as *Taharah, Solat Jenazah*, and *Kafan,* allowing them to experience these practices firsthand in a controlled, virtual setting (Mystakidis & Lympouridis, 2023). This immersive experience not only deepens students' appreciation for the cultural and religious significance of Islamic funeral practices but also equips them with practical skills in a safe environment.

The development of these design guidelines requires careful consideration of cultural sensitivities, religious traditions, and educational objectives. Collaboration with religious scholars, funeral practitioners, and educators is crucial to ensure that virtual simulations accurately reflect Islamic teachings and cultural norms. These stakeholders can provide valuable insights into the nuances of Islamic funeral practices, ensuring that the virtual experiences are not only accurate but also respectful of the traditions they represent. Additionally, elements such as user interface design, interaction mechanics, and narrative storytelling play vital roles in creating engaging and effective immersive learning experiences (Parong & Mayer, 2018). A well-designed user interface will ensure that the technology is accessible and intuitive, allowing students to focus on the content rather than grappling with the mechanics of the VR system. By integrating these principles, immersive VR technology can transform Islamic funeral management education, bridging the knowledge gap among younger generations and preserving Islamic traditions. Furthermore, the design guidelines for IVR environments must balance technical and non-technical aspects, ensuring that the virtual experience is both technically robust and emotionally engaging. Prioritizing user comfort, accessibility, and realistic interactions, these guidelines will help create inclusive and captivating VR experiences that resonate with diverse learners and empower them to become knowledgeable and culturally sensitive practitioners (Beck et al., 2024). Besides, the immersive nature of IVR environments captures students' attention and keeps them actively engaged in the learning process (Mulders et al., 2020). By participating in virtual simulations, students can experience Islamic funeral practices first-hand, which helps in better retention and understanding of the material .Furthermore, the IVR environments allow educators to simulate complex and resource-intensive practices without the need for physical materials or spaces (Wetzel & Farrow, 2023). This is particularly beneficial in contexts where replicating real-life scenarios would be challenging or costly. In the context of Islamic funeral management, such an approach can ensure that the sacredness of the rituals is maintained while providing a modern, effective educational tool that resonates with today’s technologically savvy youth.

In conclusion, the integration of immersive VR technology into Islamic funeral management education in Malaysia offers a promising solution to the knowledge gaps observed among contemporary students. By creating engaging, realistic simulations that reflect the cultural and religious significance of these practices, educators can ensure that the younger generation is well-prepared to carry forward these important traditions. The careful development of design guidelines, in collaboration with experts and stakeholders, will be crucial to the success of this initiative, ultimately helping to preserve Islamic funeral rites for future generations.

## BACKGROUND AND RELATED WORK

The integration of Virtual Reality (VR) into educational environments is explored through various frameworks, each emphasizing different aspects of the learning experience, from pedagogical principles to technological design. Zhou et al., (2018) present a model that merges VR features with constructivist principles to enhance learning, focusing on immersion, usability, and emotional engagement. While this model provides a robust structure for aligning VR experiences with educational goals, it may lack specificity in addressing diverse learning contexts. Stieglitz et al., (2010) offer a complementary framework centred on experiential learning within virtual worlds, categorizing learning scenarios by levels of interaction and immersion. Although effective in virtual settings like Second Life, this approach may not fully translate to more immersive VR platforms. Yigitbas et al., (2023) extend VR's utility into collaborative environments, specifically for UML modeling, demonstrating VR's potential for synchronous, real-time collaboration. However, the study's focus on technical synchronization overlooks broader pedagogical implications. Sauri (2023) introduces a comprehensive design model for VR-based education in road safety, emphasizing user engagement and cybersickness reduction, which is critical for younger audiences. Yet, the model could benefit from a more nuanced exploration of content personalization. Lastly, Mulders et al., (2020) critique the technology-centric focus of many IVR implementations, advocating for a framework grounded in the Cognitive Theory of Multimedia Learning (CTML) to ensure that educational outcomes are prioritized alongside technological innovation. While these studies collectively advance the field, they reveal a recurring challenge: balancing immersive technology with pedagogical effectiveness, particularly in designing environments that mitigate cybersickness and enhance user experience. The synthesis of these approaches, with attention to both educational theory and practical design considerations, is crucial for developing VR applications that are both technically robust and educationally impactful, especially in culturally sensitive areas like Islamic funeral management education.

On the other hand, as VR technology continues to evolve, addressing issues like simulator and cybersickness has become critical, particularly in the context of developing an Immersive Virtual Reality (IVR) Environment for Islamic Funeral Management Education in Malaysia. Numerous researchers and industry leaders have proposed guidelines to mitigate these issues, which are essential to incorporate into this educational framework. The first set of guidelines, proposed by Porcino et al., (2016), emphasizes the importance of software development practices that directly influence cybersickness. Key factors identified include acceleration, the level of user control, duration of use, field of view (FOV), and movement within the virtual environment. These elements are crucial for minimizing discomfort and enhancing user experience, particularly in educational settings where prolonged engagement is often required. L. Rebenitsch and Owen (2016) offered a second set of guidelines that closely align with Porcino et al., (2016), reinforcing the importance of controlling duration, FOV, and movement speed within the VR environment. The consistency between these guidelines highlights their importance in reducing the risk of VR-induced discomfort. Additionally, Oculus, (2017) provides comprehensive guidelines focusing on software development aspects, particularly the use of Head-Mounted Displays (HMDs). This guideline covers a broad range of technical considerations, including rendering, latency, head tracking, positional

tracking, acceleration, and sound design. The overlap in recommendations, especially regarding movement speed, acceleration, and latency, underscores their critical role in creating a comfortable and immersive VR experience. These guidelines collectively offer a robust framework for addressing cybersickness in the development of IVR applications. By prioritizing elements such as acceleration control, optimized movement speed, and careful FOV management, the design of an IVR environment for Islamic Funeral Management Education can be significantly enhanced. This approach not only ensures a more comfortable user experience but also supports the educational goals by allowing learners to engage deeply with the material without the distraction of discomfort. As such, these guidelines will be integral to the development of effective and user-friendly IVR experiences in this culturally and religiously sensitive domain. The practical implementation of these IVR design guidelines provides substantial benefits to both educators and students. By creating immersive, engaging, and culturally accurate learning experiences, these guidelines help educators deliver effective instruction and support students in developing practical skills and cultural competence. On the other hand, this study on using Immersive Virtual Reality (IVR) for Islamic funeral management education shares similarities with previous VR educational research, such as increased student engagement and retention, as found in studies by Parong and Mayer (2018), and the benefits of interactive learning highlighted by Jensen and Konradsen (2018). Additionally, like McGovern et al. (2020), our study demonstrates how VR can overcome geographical barriers, making specialized education more accessible. However, it uniquely contributes by focusing on a culturally and religiously specific topic, with guidelines ensuring the accuracy and respectfulness of Islamic funeral rites, an area not typically covered in previous VR studies. Our study also addresses cybersickness mitigation, tailored to this specific context, and emphasizes practical skill development, preparing students for real-world applications. Moreover, it considers the broader social impact by preserving and teaching important cultural practices, thus highlighting the broader applicability of IVR in specialized and culturally sensitive educational domains.

## RESEARCH METHODOLOGY

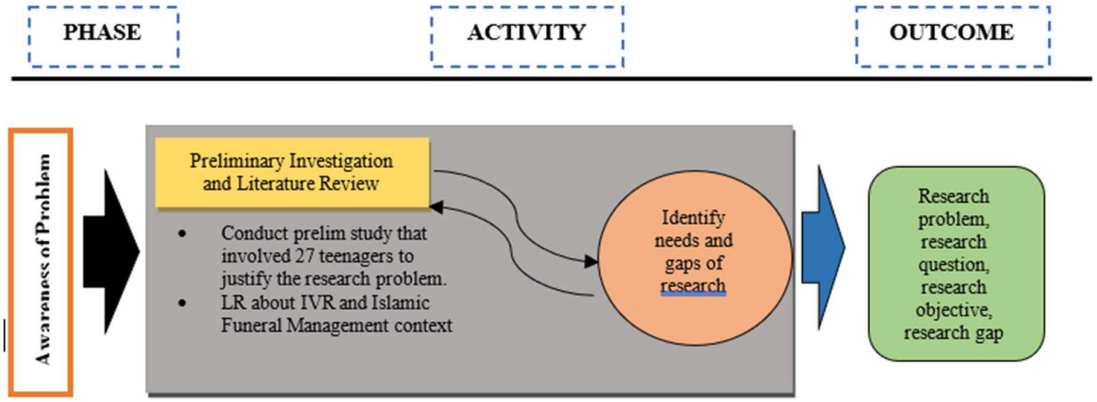
Design science research methodology is an iterative and problem-solving approach commonly used in fields such as multimedia application, information systems, engineering, and computer science to create and evaluate innovative solutions to complex problem (Dresch et al., 2015). This methodology involves a cyclical process of design, implementation, evaluation, and refinement, guided by established research objectives and principles (Piedrahita-Ospina & Moreno-Cadavid, 2019). The methodology is appropriate for the study because it aligns with the main objective, which is to develop a design guideline as an artifact. As mentioned by Muntean and Militaru (2022), the artefact could be in the form of the algorithm, prototypes, design guidelines, user interfaces, methodologies, and functional or conceptual models. To summarize the concept, Norshuhada and Shahizan (2010), emphasize the utilization of Iterative Triangulation Methodology (ITM) within design science research. This approach integrates theoretical, developmental, and empirical aspects, achieved through triangulation. The process begins with theoretical exploration, involving communication with experts and content analysis. Subsequently, contextual understanding is developed, identifying relevant theories, models, and technologies to inform the design guidelines. (Ariffin, 2009) and (Mahfuzah, 2011) further elaborate on ITM's basis, emphasizing triangulation across data sources, methods, theories, and analyses, with iterative implementations. The DSRM was originally proposed by Vaishnavi and Kuechler (2015) . It compromises five phases, (i) awareness of the problem, (ii) suggestion, (iii) development, (iv) Evaluation, and (v) conclusion.

## Awareness of the Problem

In the initial phase of the design science research methodology, the focus was on pinpointing a specific challenge within the realm of Islamic Funeral Management Education in Malaysia and the immersive virtual reality (IVR) environment. Through a meticulous content analysis conducted via extensive literature reviews, the aim was to precisely define the problem statement, its scope, context, and objectives (refer Figure 1). This involved a systematic exploration of diverse sources, including books, articles, conference proceedings, journals, newspapers, and doctoral theses, accessed through online databases. The gathered information was organized into tables and flowcharts, facilitating a comprehensive understanding of the identified problem, and elucidating the areas requiring solutions. Furthermore, to bolster the research problem, preliminary investigations were undertaken involving 27 teenagers aged between 21 to 25 from *Universiti Utara Malaysia (UUM)*. A Google Form questionnaire was utilized to gauge the teenagers' level of knowledge and familiarity with Islamic funeral practices. Subsequent data analysis uncovered noteworthy insights, revealing significant gaps in understanding among the surveyed individuals.

**Figure 1**

*Summary of awareness of problems phase*

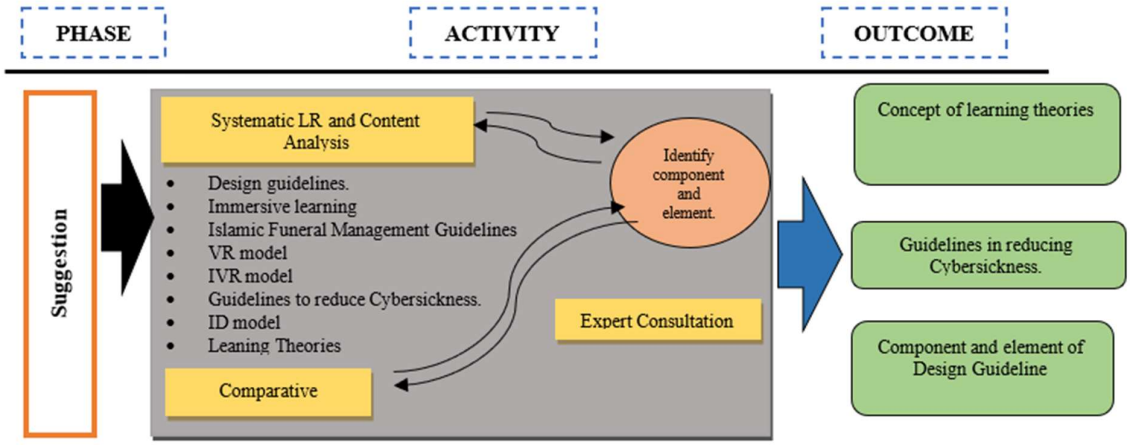



## Suggestion

Following the identification of the research problem, gaps, objectives, and scope, the study advances to its second phase: the suggestion (refer Figure 2). This phase involves a series of research activities, including systematic literature reviews, content analysis, comparative analysis, and expert consultation, all aimed at identifying suitable design guidelines for the study. These activities encompass a wide range of concepts such as design guidelines, immersive learning, Islamic funeral management, VR and IVR models, cybersickness reduction, instructional design models, and learning theories. This broad scope ensures the selection of appropriate learning theories, specific IVR components, and elements crucial for formulating the Design Guidelines of an IVR Environment in Islamic Funeral Management Education in Malaysia, addressing aspects like cybersickness, immersion, navigation, and interaction.

**Figure 2**

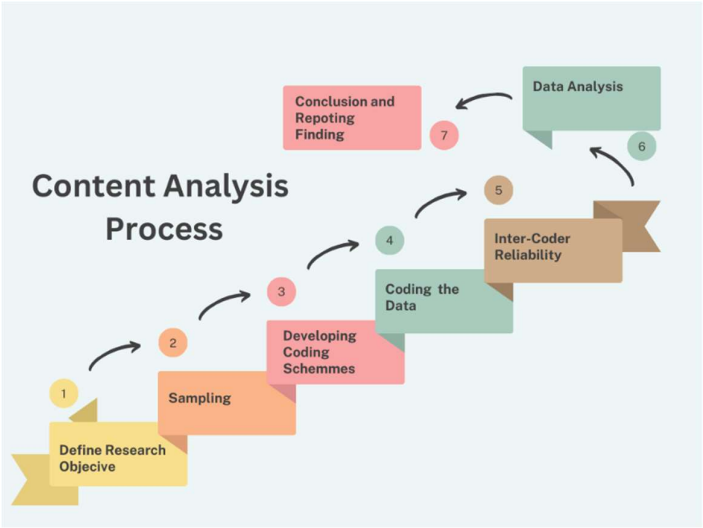
*Summary of suggestion phase*




Content analysis, a key research technique in this phase, systematically analyzes and interprets textual, visual, or audio content to identify patterns, themes, and meanings within the data. Guided by existing literature from Figure 3, the content analysis process begins with defining research objectives and sampling, followed by developing coding schemes, coding the data, and assessing inter-coder reliability to ensure consistency. Researchers then analyze the data to uncover patterns and draw conclusions that address the research questions, providing valuable insights and identifying avenues for further research. Expert consultation further validates the relevance of identified problems, ensuring alignment and the validity of the proposed design guidelines. The findings are reported comprehensively, contributing to knowledge dissemination in the field.

**Figure 3**

*Content analysis process*

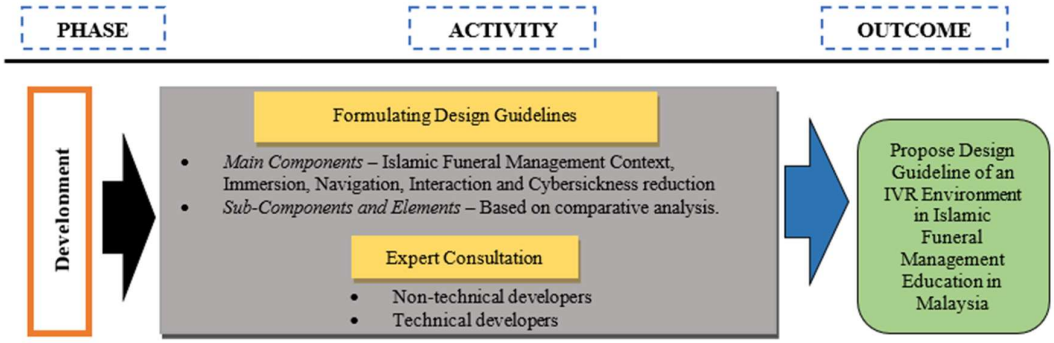


## Development

In this phase, the objective is to finalize and compile all the relevant components and elements that will be integrated into the Design Guidelines of an IVR Environment in Islamic Funeral Management Education in Malaysia (refer Figure 4). After proposing the design guidelines, the proposed design guidelines underwent verification through expert consultation sessions involving two distinct groups of experts. The first group comprised content and instructional experts who were actively engaged in formulating the design guidelines, while the second group consisted of multimedia or industry experts with specialized experience in IVR technology. These expert meetings were pivotal activities during this phase, facilitating comprehensive feedback and insights. The verification process was iterative, with feedback meticulously incorporated to enhance the model's effectiveness. Depending on the recommendations and suggestions provided by the experts, the design guidelines undergo redesigning to ensure alignment with the established objectives and user requirement.

**Figure 4**

*Summary of development phase*



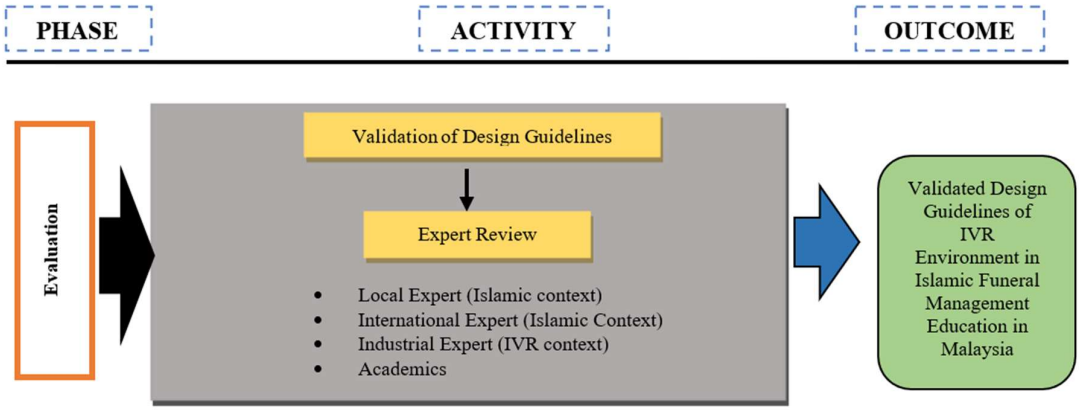

## Evaluation

In the evaluation phase (refer Figure 5), the design guidelines undergo a rigorous review by a diverse panel of experts, including both local and international authorities on Islamic Funeral Management Education, industry specialists in IVR technology, and esteemed academics. The expert consultation process significantly shaped the final IVR design guidelines by incorporating feedback from cultural and religious scholars to ensure accuracy and cultural relevance, and from multimedia and IVR technology specialists to enhance technical quality and user experience. The scholars ensured that Islamic funeral rites were correctly and respectfully represented, while the technology experts optimized user interactions and reduced cybersickness. This collaborative approach ensured that the guidelines are both culturally sensitive and effective in providing an immersive educational experience. For this study, the evaluation process begins with the dissemination of the guidelines to these experts, who meticulously analyze the content for relevance, applicability, and alignment with established standards. Each expert contributes valuable feedback based on their area of expertise, ensuring a comprehensive and iterative refinement process. This evaluation not only validates the guidelines but also enhances their credibility and utility within the domain of Islamic Funeral Management Education and IVR technology. Following this expert review, the guidelines are further tested through evaluation with 10 developers proficient in IVR application development. Using questionnaires and interviews as primary data collection methods, the evaluation assesses both the content and practical utility of the guidelines. Participants first complete a questionnaire based on the validated model, featuring Likert-scale questions for quantitative assessment and open-ended

questions for detailed feedback. Subsequent semi-structured interviews provide deeper insights into participants' perceptions and experiences, allowing for flexibility while maintaining consistency across discussions. This systematic approach, grounded in a five-step framework for semi-structured interviews as outlined by Piper et al., (2018): ensures that qualitative data is effectively gathered, facilitating meaningful discussions and enhancing the design guidelines' effectiveness and applicability. On the other hand, Sampling, the process of selecting a subset of elements from the population, is pivotal in enabling generalizations from the sample to the entire population (Sekaran & Baugie, 2016). This study employs a non-probability sampling method, specifically purposive sampling, which is characterized by its focus on specific characteristics of the population. This method results in a homogeneous sample, effectively representing the research population (Nurulnadwan, 2015). The research is conducted across multiple locations, each carefully chosen to align with the study's objectives and context.

**Figure 5**

*Summary of evaluation phase*

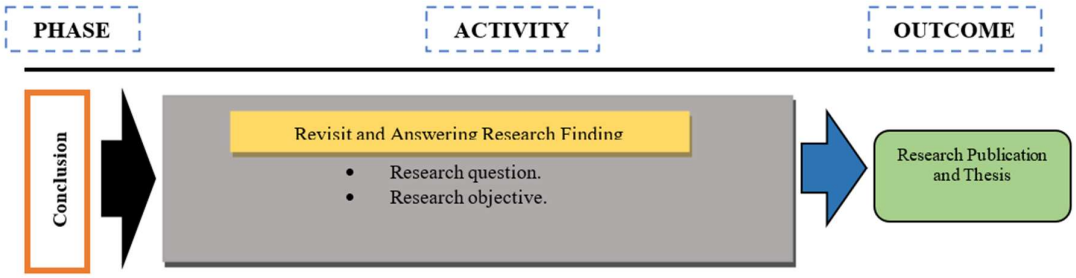



## Conclusion

In the final phase (refer Figure 6)., the researcher describes and documents all the findings amassed throughout the previous phases. This involves revisiting and addressing each research question and objective methodically. Additionally, the insights gleaned from the study may also be disseminated through scholarly publications, thereby contributing valuable knowledge to the academic community, and advancing the field's understanding of Islamic Funeral Management Education and immersive virtual reality environments.

**Figure 6**

*Summary of conclusion phase*



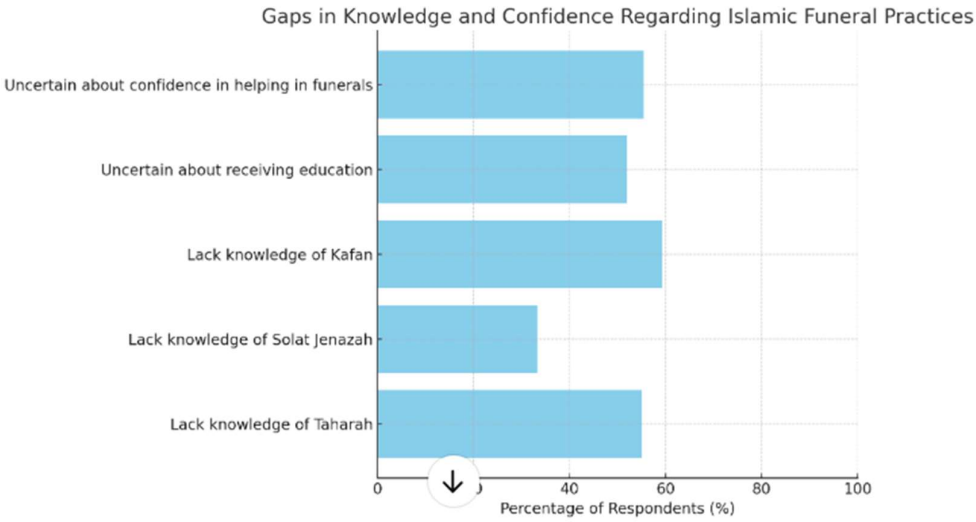

## DISCUSSION

This section discussed the result from the preliminary investigation about the level of knowledge and familiarity of teenagers about Islamic funeral practice and to gather insight on the potential efficacy and appropriateness of employing immersive virtual reality technology in educating them on the intricacies in Islamic funeral management. In the preliminary investigation, we engaged 27 teenagers aged 21 to 25 from *Universiti Utara Malaysia (UUM)* through a Google Form questionnaire to assess their knowledge and familiarity with Islamic funeral practices, as well as their perspectives on using immersive virtual reality (IVR) technology for educational purposes. This method facilitated efficient data collection from a diverse group within the specified age range, ensuring a broad representation of the target demographic. The primary objective of this preliminary study was to evaluate the participants' understanding of traditional burial rites and their awareness of religious guidelines associated with Islamic funeral management. Additionally, the study aimed to gauge the perceived effectiveness and appropriateness of employing IVR technology to enhance education in this domain. The questionnaire was structured into three sections. Section A collected demographic information, including age and gender. Section B and C comprised six questions designed to assess participants' knowledge of Islamic funeral management practices. Participants indicated their familiarity with these practices using responses such as "Tahu" (Know), "Tidak Tahu" (Don't Know), or "Tidak Pasti" (Uncertain). Section C, also consisting of six questions, focused on evaluating participants' perceptions of using IVR technology in teaching Islamic funeral management. Responses were rated on a scale from 1 to 5, ranging from "Sangat Tidak Setuju" (Strongly Disagree) to "Sangat Setuju" (Strongly Agree). The use of Google Forms ensured anonymity and ease of participation, encouraging honest and comprehensive responses. This approach provided valuable insights into the participants' knowledge levels and their openness to innovative educational methods. The data collected will inform the development of design guidelines for incorporating IVR technology into Islamic funeral management education, laying a foundation for subsequent research phases.

## Analysis of Preliminary Investigation

**Figure 7**

*Section A (Gaps in knowledge and confidence regarding Islamic funeral practice)*




The preliminary investigation among 27 teenagers aged 21 to 25 from *Universiti Utara Malaysia (UUM)* uncovered significant gaps in their understanding of Islamic funeral practices. As shown in Figure 7 (Section A), a notable 55% of the respondents were unfamiliar with *Taharah*, the ritual washing of the deceased, while 33.3% did not know the correct steps for performing *Solat Jenazah,* the funeral prayer. Additionally, 59.3% of the participants lacked knowledge about the proper method of *Kafan* or shrouding the deceased. Furthermore, 51.9% were uncertain whether they had received adequate education on funeral management from reliable sources, and 55.5% were unsure about their confidence in assisting with funeral management within their families or communities. These findings highlight a clear need for improved educational initiatives to address these knowledge gaps, ensuring teenagers are better equipped to understand and participate in Islamic funeral traditions. By making reliable, accessible resources available, teenagers can gain a deeper understanding of these practices and be more confident in contributing to funeral management.

In the context of suitability in implementing of IVR technology in teaching Islamic funeral management (Section B & C), the analysis of the data reveals that most respondents, 70.4%, agreed that VR technology could improve their comprehension of these processes, indicating a positive attitude towards its potential educational benefits. Similarly, 66.7% expressed interest in utilizing VR applications or experiences specifically designed to teach about Islamic funeral management, demonstrating a willingness to engage with innovative educational tools in this domain. Moreover, 70.4% of respondents believed that VR technology could aid in better retention of knowledge about Islamic funeral management compared to conventional methods like reading books or watching videos, highlighting the perceived efficacy of VR in enhancing learning outcomes. Interestingly, while over half of the respondents (51.9%) agreed that they intend to seek out VR applications or experiences related to Islamic funeral management to enhance their knowledge in this area, an equal percentage expressed a similar intention to share their experiences or knowledge gained through VR technology with friends or family. This suggests not only a personal interest in utilizing VR for educational purposes but also a desire to share newfound knowledge and experiences with others, potentially fostering greater awareness and understanding within their social circles.

Furthermore, most respondents (74.1%) believed that the use of VR technology would make the learning process about Islamic funeral management more engaging and effective for teenagers. This indicates a perceived alignment between VR technology and the preferences and needs of the teenage demographic, suggesting that immersive and interactive learning experiences could be particularly impactful in this context. As a conclusion, the result from this finding shows positive attitude towards the use of VR technology for educating teenagers about Islamic funeral management processes. Respondents expressed interest, intention, and belief in the efficacy of VR technology as an educational tool, highlighting its potential to enhance understanding, engagement, and knowledge retention in this important aspect of Islamic tradition. These findings support the exploration and development of VR-based educational resources to cater to the learning needs and preferences of teenagers in this domain.

In conclusion, the analysis of the data from both section reveals significant gaps in teenagers' knowledge about Islamic funeral practices, with a notable lack of understanding across various essential aspects such as *Taharah*, *Solat Jenazah*, and *Kafan*. These findings underscore the need for comprehensive educational initiatives to address these knowledge gaps and ensure that individuals are adequately informed about Islamic funeral rites and responsibilities. Furthermore, the data highlights a positive attitude among teenagers towards the use of virtual reality (VR) technology as an educational tool in this domain. Most respondents expressed interest, intention, and belief in the efficacy of VR technology to enhance their understanding and engagement with Islamic funeral management processes. This suggests that VR-based educational resources have the potential to effectively address the identified knowledge gaps and provide engaging and immersive learning experiences for teenagers, ultimately contributing to a more informed and respectful approach to Islamic funeral practices within their communities. On the other hand, in the broader context, the proposed guidelines also can be beneficial and can be adapted to other cultural contexts. For instance, these guidelines could be applied to develop IVR educational programs for other religious rites, such as Hindu cremation ceremonies, Buddhist funeral practices, or Christian sacraments. By collaborating with cultural and religious experts from different communities, the guidelines can be modified to respect and accurately represent the specific traditions and practices of those cultures.

## CONCLUSION AND FUTURE WORK

This research explores the potential of integrating immersive virtual reality (IVR) technology into Islamic funeral management education, aiming to establish design guidelines tailored to the specific needs of this field. Through a preliminary study involving 27 teenagers from *Universiti Utara Malaysia (UUM)*, we gained valuable insights into their understanding of Islamic funeral practices and their receptiveness to using IVR as an educational tool. The results revealed a solid familiarity with traditional burial rites among participants and a favorable attitude towards the application of IVR technology for educational purposes. The study led to the development of comprehensive design guidelines that focus on critical aspects such as reducing cybersickness, enhancing immersion, and optimizing interaction and navigation within IVR environments. These guidelines are crafted to improve the effectiveness and user experience of IVR applications in teaching Islamic funeral management. Subsequent expert reviews and evaluations have further affirmed the relevance and applicability of these guidelines, ensuring they meet both academic standards and practical needs. Overall, this research contributes to the advancement of educational technology by providing a framework for the effective use of IVR in culturally sensitive and specialized training contexts, laying the groundwork for future developments in this area. For the future work, this research could extend the focus on several important areas to build on the findings of this study. First, expanding user testing to include diverse groups will help refine the IVR educational tools and ensure they work well for people of different ages and cultural backgrounds. Next, developing and testing a complete

IVR prototype in real-world educational settings will provide practical insights into its effectiveness for teaching Islamic funeral management. Additionally, conducting long-term studies will help evaluate how well IVR-based education helps learners retain and understand Islamic funeral practices over time. Lastly, exploring how IVR can work with other technologies like augmented reality (AR) or artificial intelligence (AI) could create a more engaging and interactive learning experience. By addressing these areas, future research can advance educational tools and methods, improving the teaching of complex cultural and religious practices through new technologies.

## ACKNOWLEDGMENT

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## REFERENCES

Ariffin. (2009). *Conceptual Design of Reality Learning Media (RLM) Model Based on Entertaining and Fun Construct*. Univeristi Utara Malaysia.

Beck, D., Morgado, L., & O'Shea, P. (2024). Educational Practices and Strategies with Immersive Learning Environments: Mapping of Reviews for Using the Metaverse. *IEEE Transactions on Learning Technologies*, *17*, 319–341. https://doi.org/10.1109/TLT.2023.3243946

Castronovo, F., Nikolic, D., Liu, Y., & Messner, J. (2013). An Evaluation Of Immersive Virtual Reality Systems For Design Reviews. *Proceedings of the 13th International Conference on Construction Applications of Virtual Reality, 30-31*, *December 2015*, 30–31.

Conrad, M., Kablitz, D., & Schumann, S. (2024). Learning effectiveness of immersive virtual reality in education and training: A systematic review of findings. *Computers & Education: X Reality*, *4*, 100053. https://doi.org/10.1016/j.cexr.2024.100053

Dresch, A., Lacerda, D. P., & Antunes, J. A. V. (2015). Design science research: A method for science and technology advancement. In *Design Science Research: A Method for Science and Technology Advancement*. https://doi.org/10.1007/978-3-319-07374-3

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*(4), 1515–1529. https://doi.org/10.1007/s10639-017-9676-0

Mahfuzah, S. (2011). *Conceptual Design Model of Coputerized Personal-Decision AID (ComPDA)*. Universiti Utara Malaysia.

Marougkas, A., Troussas, C., Krouska, A., & Sgouropoulou, C. (2023). Virtual Reality in Education: A Review of Learning Theories, Approaches and Methodologies for the Last Decade. *Electronics (Switzerland)*, *12*(13). https://doi.org/10.3390/electronics12132832

McGovern, E., Moreira, G., & Luna-Nevarez, C. (2020). An application of virtual reality in education: Can this technology enhance the quality of students' learning experience? *Journal of Education for Business*, *95*(7), 490–496. https://doi.org/10.1080/08832323.2019.1703096

Mulders, M., Buchner, J., & Kerres, M. (2020). A Framework for the Use of Immersive Virtual Reality in Learning Environments. *International Journal of Emerging Technologies in Learning*, *15*(24), 208–224. https://doi.org/10.3991/ijet.v15i24.16615

Muntean, M., & Militaru, F. D. (2022). Design Science Research Framework for Performance Analysis Using Machine Learning Techniques. *Electronics (Switzerland)*, *11*(16). https://doi.org/10.3390/electronics11162504

Mystakidis, S., & Lympouridis, V. (2023). Immersive Learning. *Encyclopedia*, *3*(2), 396–405. https://doi.org/10.3390/encyclopedia3020026

Norshuhada, S., & Shahizan, H. (2010). *Design Research in Software Development* (First). UUM PRESS.

Nurulnadwan, A. (2015). *Conceptual Design and Developemnt Model of Assistive Courseware for Young Low Vision Learners*. Universiti Utara Malaysia.

Oculus. (2017). *Oculus Best Practices* (3rd ed.). Oculus VR LLC.

Parong, J., & Mayer, R. E. (2018). Learning science in immersive virtual reality. *Journal of Educational Psychology*, *110*(6), 785–797. https://doi.org/10.1037/edu0000241

Paszkiewicz, A., Salach, M., Dymora, P., Bolanowski, M., Budzik, G., & Kubiak, P. (2021). Methodology of implementing virtual reality in education for industry 4.0. *Sustainability (Switzerland)*, *13*(9), 1–25. https://doi.org/10.3390/su13095049

Parong, J., & Mayer, R. E. (2018). Learning science in immersive virtual reality. *Journal of Educational Psychology*, *110*(6), 785.

Piedrahita-Ospina, A., & Moreno-Cadavid, J. (2019). Design science research for development and validation of a pedagogical agent for STEM education. *Proceedings - 14th Latin American Conference on Learning Technologies, LACLO 2019*, 129–133. https://doi.org/10.1109/LACLO49268.2019.00031

Porcino, T. M., Clua, E., Trevisan, D., Vasconcelos, C. N., & Valente, L. (2016). Minimizing cybersickness in head mounted display system: Design guidelines and application. *2017 IEEE 5th International Conference on Serious Games and Applications for Health (SeGAH)*, 1–11. https://doi.org/10.1109/SeGAH.2017.7939283

Rebenitsch, B. L. (2015). *Cybersickness in Virtual Reality*. *22*(1), 46–51. https://doi.org/10.1145/2810054

Rebenitsch, L., & Owen, C. (2016). Review on cybersickness in applications and visual displays. *Virtual Reality*, *20*(2), 101–125. https://doi.org/10.1007/s10055-016-0285-9

Rojas-Sánchez, M. A., Palos-Sánchez, P. R., & Folgado-Fernández, J. A. (2023). Systematic literature review and bibliometric analysis on virtual reality and education. In *Education and Information Technologies* (Vol. 28, Issue 1). Springer US. https://doi.org/10.1007/s10639-022-11167-5

Saany, I., Jusoh, J. A., Zaki, A., Alwi, E., Nazari, A., & Rose, M. (2021). The Exploitation of Technology in an Islamic Funeral Arrangement. *PSYCHOLOGY AND EDUCATION*, *58*(1). www.psychologyandeducation.net

Sauri, N. (2023). *Design Model of Immersive Virtual Reality Aid System for Children Road Safety Education*. Universiti Utara Malaysia.

Schepers, P., Hagenzieker, M., Methorst, R., Van Wee, B., & Wegman, F. (2014). A conceptual framework for road safety and mobility applied to cycling safety. *Accident Analysis and Prevention*, *62*, 331–340. https://doi.org/10.1016/j.aap.2013.03.032

Sekaran, U., & Baugie, R. (2016). *Research Methods for Business : A Skill Building Approach* (5th ed.). John Wiley & Sons.

Stieglitz, S., Lattemann, C., & Kallischnigg, M. (2010). Experiential learning in virtual worlds - a case study for entrepreneurial training. *16th Americas Conference on Information Systems 2010, AMCIS 2010*, *7*(January 2010), 4816–4827.

Suhaimi, M., & Mirza, A. (2019). Funeral Management from Shafi'i School of Thought: Analysis on Cost Efficiency. *8th INTERNATIONAL ISLAMIC ECONOMIC SYSTEM CONFERENCE 2019* , 563–568.

Vaishnavi, V., Kuechler, W. (2015). *Design Science Research Methods and Patterns*. CRC Press. https://doi.org/10.1201/b18448

Wetzel, E. M., & Farrow, C. Ben. (2023). Active learning in construction management education: faculty perceptions of engagement and learning. *International Journal of Construction Management*, *23*(8), 1417–1425. https://doi.org/10.1080/15623599.2021.1974684

Yigitbas, E., Gorissen, S., Weidmann, N., & Engels, G. (2023). Design and evaluation of a collaborative UML modeling environment in virtual reality. *Software and Systems Modeling*, *22*(5), 1397–1425. https://doi.org/10.1007/s10270-022-01065-2

Zakaria, Z., & Abdullah, N. H. (2023). Strengthening The Management of Funeral Expenses System: Towards Digitalization And Sustainable Outcomes. *Journal Islamic Economic*, *14*(1).

Zhou, Y., Ji, S., Xu, T., & Wang, Z. (2018). Promoting Knowledge Construction: A Model for Using Virtual Reality Interaction to Enhance Learning. *Procedia Computer Science*, *130*, 239–246. https://doi.org/10.1016/j.procs.2018.04.035