

Applying the Fuzzy Delphi Method in the Development of a Hadith Terminology Dictionary Application (IS-HADIS)

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DOI Link: <http://dx.doi.org/10.6007/IJARPED/v14-i3/25795>

Published Online: 06 August 2025

Abstract

The advancement of technology in today's educational landscape has witnessed the growing use of Artificial Intelligence (AI) across various learning platforms. This technological integration enhances the learning process by making it more interactive, responsive, and flexible, thereby complementing existing traditional methods. In this context, the Hadith Terminology Dictionary Application (IS-HADIS) was developed to facilitate students in accessing information quickly and effectively without the need to consult bulky printed dictionaries. Students simply type the desired term, and the relevant information is displayed almost instantly. This study was conducted to obtain expert consensus on the essential elements required for the design and development of this application. The Fuzzy Delphi Method was employed using a seven-point Likert scale, involving ten experts from the fields of educational technology, multimedia, and information technology. Data were collected through questionnaires distributed to all participating experts. The findings revealed a high level of agreement among the experts regarding the elements examined, with threshold (d) values less than 0.2, agreement percentages exceeding 75%, and defuzzification values above 0.5—except for one element, namely the application introduction element. Overall, this study successfully designed the Hadith Terminology Dictionary Application (IS-HADIS), which can be effectively utilized by educators in higher learning institutions, mosque and surau instructors, as well as students, as a valuable learning support tool.

Keywords: Application, Dictionary, Fuzzy Delphi, Hadith, Terminology, IS-HADIS.

Introduction

In today's digital era, the integration of technology into various aspects of life is not only inevitable but essential. Particularly in the field of education, the use of technology has

expanded significantly and has had a profound impact on teaching and learning methods (Ghosh et al., 2021). With the advancement of digital technology, educators now have access to a wide range of multimedia teaching materials such as videos, animations, and interactive applications, which not only enhance student engagement but also facilitate their understanding of various topics.

Global curriculum developers increasingly integrate technology into learning, as it is believed to enhance students' academic abilities through student-centred learning experiences and by catering to individual learning needs (Nur Faizahton et al., 2023). Teaching and learning methods have evolved in tandem with the changing times. While traditional methods are still practiced, online learning has gained wide acceptance and is now extensively utilized. E-learning methods are conducted via personal computers and internet networks, allowing for seamless access to information without geographical boundaries. According to Rader and Wilhelm (2001), this approach facilitates a more systematic and interactive teaching and learning process.

In addition, mobile learning (M-Learning) has emerged as a flexible approach that is not constrained by time or location, as it can be conducted anywhere and at any time (Kukulka-Hulme & Traxler, 2005). M-Learning offers several advantages, such as flexibility in terms of time and location, improved access to information, and increased student engagement through digital interaction. However, it also presents challenges, including reliance on mobile devices and stable internet connections, as well as difficulties in keeping students focused due to potential distractions from other applications (Siraj, 2005).

A more recent advancement in education is the integration of Artificial Intelligence (AI), which is increasingly dominating various learning platforms. AI helps optimize students' learning experiences and facilitates teaching processes for educators. According to Bhat and Muduli (2023), AI-based and robotic technologies can significantly enhance the efficiency of the learning process. AI enables faster, more accurate, cost-effective, flexible, and accessible learning experiences, even for large numbers of students simultaneously. The integration of technology also makes learning more interactive and responsive, complementing traditional methods while offering a flexible alternative for modern education. Teaching and learning processes become more engaging and can be conducted at any time without temporal limitations (Siti Zahrah et al., 2018).

Interestingly, the field of Islamic studies has also embraced technology-based learning. Technology functions as a medium that facilitates the delivery of religious knowledge to students in a more dynamic and interactive manner. For instance, numerous mobile applications and websites now provide easy access to digital Qur'an content, hadith collections, supplications, and worship guides, which are available anytime and anywhere. Similarly, online classes allow students to learn religious knowledge virtually with the guidance of lecturers or religious teachers, without the limitations of time and place (Kamarul Azmi et al., 2012). The integration of technology in religious education not only enriches the learning process but also offers opportunities to enhance understanding and appreciation of religious teachings among the younger generation.

Hadith studies have become the second most important discipline after Qur'anic studies, as both constitute the primary sources of Islamic law. In the era of modern technology, Hadith studies have increasingly intertwined with multimedia, aiding Muslims in fulfilling their daily religious obligations while contributing scholarly expertise at the international level. Therefore, the integration of Hadith studies and multimedia must progress forward and become a strategic focus. This direction should be regularly evaluated to produce suitable products for both national and international use (Nur Saadah et al., 2019; Ummah, 2019).

According to Chowdury et al. (2017), innovative technologies have become vital instruments for teaching and learning. This development has made the study of Hadith more accessible and engaging. A study involving undergraduate students from the Department of Qur'an and Sunnah at a public university in Malaysia found that 68% of participants believed that software and websites could enhance the study of Hadith and its related knowledge. Similarly, Kawaid et al. (2018) reported that most Hadith lecturers at Malaysian public universities welcomed and adopted the use of ICT applications in the teaching and learning of Hadith-related courses.

The use of technology in Islamic studies is no longer supplementary. It is becoming central to how knowledge is accessed, understood, and applied. This transition is not merely a matter of convenience but a strategic necessity to ensure that Islamic knowledge remains vibrant and relevant in the 21st century. By focusing on the Hadith as one of the important fields of Islamic study, it requires a deep understanding of specific terminologies and textual contexts. However, students often face challenges in navigating traditional references, which can be time-consuming and discouraging. To address this, electronic dictionaries (e-dictionaries) have emerged as valuable tools to simplify the learning of Hadith by offering fast, user-friendly, and interactive access to understand each term in the right context.

According to Noor Azean and Yakub (2010), e-dictionaries simplify information retrieval through keyword input, reducing students' reliance on lecturers. They also have the potential to serve as primary or supplementary references in the learning process and help improve academic performance through self-directed learning. Therefore, the existence of e-dictionaries not only accelerates the search for definitions but also improves students' accessibility and understanding of Hadith terminology through a faster, more interactive, and efficient alternative that can be accessed at any times.

Despite their growing availability, the actual impact and effectiveness of e-dictionaries in Hadith education remain underexplored. There is a critical need to assess their practical benefits, identify areas for improvement, and understand how they contribute to better learning outcomes. By focusing on the development and use of e-dictionaries in Hadith studies, this research aims to fill that gap and contribute to the modernization of Islamic pedagogy.

This study is particularly significant for educators, curriculum designers, and students in Islamic studies. It offers insights into how digital tools can enhance the teaching and learning process, promote autonomous learning, and support educational equity by making resources more accessible. Moreover, this research contributes to the broader goal of

fostering an IT-literate and knowledge-seeking Muslim society equipped for the challenges of the digital age.

In sum, this study emphasizes the need to integrate modern educational technologies in the teaching and learning of Islamic studies. It highlights the utility and effectiveness of e-dictionary which is not just used as a practical tool, but valuable asset that support contemporary learning needs while remaining faithful to the richness and authenticity of Hadith scholarship. By bridging tradition with innovation, such tool offers a meaningful way forward for Islamic education in a digitally connected world.

Research Objectives

The objective of this study is to apply the Fuzzy Delphi Method in the systematic development of a Hadith Terminology Dictionary Application (IS-HADIS) aimed at enhancing the teaching and learning process of Hadith studies. This research seeks to identify and validate key terminologies which related to Hadith that are essential for student comprehension, and to incorporate them into a user-friendly, interactive electronic dictionary. By integrating expert consensus through the Fuzzy Delphi Method, the study aims to ensure the relevance, accuracy, and usability of the terminology included. Therefore, the Hadith Terminology Dictionary Application (IS-HADIS) is intended to facilitate faster and more effective access to Hadith terms, support self-directed learning, reduce students' dependence on lecturers, and contribute to the advancement of digital tools in Islamic education.

Research Scope and Limitation

This study involves a total of 10 experts who were purposively selected as the expert panel in accordance with the recommended range of 10–20 experts for the Fuzzy Delphi Method (Adler & Ziglio, 1996). The panel consists of lecturers specializing in educational technology, multimedia, and information technology. The research instrument used is a questionnaire comprising three constructs, which was distributed to the experts. The items in the questionnaire were developed based on content analysis, needs analysis findings, and a comprehensive literature review to ensure the relevance and validity of the constructs assessed.

Methodology

This study adopts a modified version of the Fuzzy Delphi Method originally introduced by Murry et al. (1985) and further developed by Kaufmann and Gupta (1998), which combines fuzzy set theory with the traditional Delphi technique. This indicates that the Fuzzy Delphi Method is not a new technique per se, but rather an enhanced instrument that improves upon the conventional Delphi method (Mohd Ridhuan et al., 2013).

Data collection involved 10 purposively selected experts comprising lecturers in the fields of educational technology, multimedia, and information technology. The research instrument used in this study was a questionnaire consisting of three constructs, which was distributed to a panel of experts. After rating their level of consensus on each item, the experts were also invited to share their views. This approach allowed for a more comprehensive evaluation of the questionnaire items through both structured responses and open-ended feedback.

Subsequent to the completion of all Likert scale responses, the data collection and analysis process was carried out using the Fuzzy Delphi Method. The responses were processed and analysed with the aid of Microsoft Excel, where the numerical data were systematically converted into Triangular Fuzzy Numbers (TFNs) to facilitate further interpretation. This transformation enabled the application of fuzzy logic principles in assessing the level of expert consensus. A seven-point Fuzzy scale was applied in this study, where higher scale values indicated greater accuracy and consensus among experts, as shown in Table 1 and supported by the applied formulas.

Table 1
Fuzzy Scale Consensus Level

Consensus Level	Fuzzy Scale			Likert Scale
Extremely Agree	0.9	1.0	1.0	7
Strongly Agree	0.7	0.9	1.0	6
Agree	0.5	0.7	0.9	5
Moderately Agree	0.3	0.5	0.7	4
Disagree	0.1	0.3	0.5	3
Strongly Disagree	0.0	0.1	0.3	2
Extremely Disagree	0.0	0.0	0.1	1

Source: Siraj et al. (2020)

Referring to Table 1, when an expert selects a specific scale value, for example, scale 7, this response can be translated into a corresponding Fuzzy scale using the values: m_1 (0.9 = approximately 90% likelihood of consensus), m_2 (1.0 = approximately 100% likelihood of consensus), and m_3 (1.0 = approximately 100% likelihood of consensus). This indicates that the higher the Fuzzy scale value selected, the stronger the level of expert consensus and the greater the precision of the data obtained (Mohd Khairul et al., 2018).

In accordance with the procedures of the Fuzzy Delphi Method (FDM), the questionnaire was designed to evaluate expert consensus on the core constructs and components of the developed Dictionary Application. A total of 11 elements from the Interface Layout Component, 6 elements from the Dictionary Component, and 12 elements from the Gamification Component of the Hadith Terminology Dictionary Application (IS-HADIS). These components were examined as part of the model development process guided by the Design and Development Research (DDR) approach. The identified elements were derived through an extensive literature review, expert input during the needs analysis phase, and feedback from ten domain experts engaged during the preliminary design phase.

Findings

This section presented expert consensus on three main components which were developed to construct the Hadith Terminology Dictionary Application (IS-HADIS). These components are: (i) the Interface Layout Component – comprising 14 elements, (ii) the Dictionary Component – comprising 6 elements, and (iii) the Gamification Component – comprising 12 elements. The findings related to each of these components will be discussed to provide a foundation for the development of an application design that is both conceptually sound and aligned with user needs.

Expert Consensus on the Interface Layout Component of IS-HADIS

Following the analysis process, this section presents the findings related to the first component, which focuses on evaluating the interface layout of the Hadith Terminology Dictionary Application (IS-HADIS). The evaluation was carried out using the Fuzzy Delphi Method to obtain expert consensus on the suitability and effectiveness of the layout design.

Table 2 presents the findings for the Interface Layout Component of the IS-HADIS, as analysed using the Fuzzy Delphi Method (FDM). The analysis aimed to determine the level of expert consensus regarding the relevance and appropriateness of each element within the interface layout.

Table 2

Interface Layout Component of the IS-HADIS based on Expert Consensus Analysis

No	Element	Triangular Fuzzy Numbers Requirement		Defuzzification Requirement			Process	Expert Consensus
		Threshold Value, d	Expert Group Consensus Percentage, %	m1	m2	m3	Fuzzy Score (A)	
1	The application introduction is clear (<i>Pengenalan Aplikasi jelas</i>)	0.217	80.0%	0.660	0.830	0.930	0.807	REJECTED
2	Navigation is easy (<i>Navigasi mudah</i>)	0.157	100.0%	0.680	0.850	0.960	0.830	ACCEPTED
3	Icons are easy to understand (<i>Ikon yang mudah difahami</i>)	0.128	100.0%	0.760	0.910	0.980	0.883	ACCEPTED
4	Interface display is clear (<i>Paparan antara muka yang jelas</i>)	0.094	100.00%	0.760	0.920	0.990	0.890	ACCEPTED
5	The application is interactive (<i>Aplikasi yang interaktif</i>)	0.157	100.00%	0.680	0.850	0.960	0.830	ACCEPTED
7	Content delivery attracts users' attention (<i>Penyampaian kandungan menarik perhatian pengguna</i>)	0.145	100.00%	0.660	0.840	0.960	0.820	ACCEPTED
8	Interface layout is appropriate (<i>Susun atur paparan</i>)	0.125	100.00%	0.680	0.860	0.970	0.837	ACCEPTED

	<i>antara muka yang sesuai</i>)							
9	Use of attractive icons (<i>Penggunaan ikon yang menarik</i>)	0.145	100.00%	0.660	0.840	0.960	0.820	ACCEPTED
10	User-friendly interface (<i>Antara muka yang mesra pengguna</i>)	0.145	100.00%	0.660	0.840	0.960	0.820	ACCEPTED
11	Response time matches user needs (<i>Masa tindak balas sesuai dengan keperluan pengguna</i>)	0.155	100.00%	0.640	0.820	0.950	0.803	ACCEPTED
13	Graphics or images used are attractive (<i>Grafik atau imej yang digunakan menarik</i>)	0.145	100.00%	0.660	0.840	0.960	0.820	ACCEPTED
14	Text colour matches screen background colour (<i>Penggunaan warna teks sesuai dengan warna latar skrin</i>)	0.169	90.00%	0.620	0.810	0.940	0.790	ACCEPTED
15	Button functions are easily understood (<i>Fungsi butang dapat difahami dengan mudah</i>)	0.135	100.00%	0.700	0.870	0.970	0.847	ACCEPTED
16	Buttons are consistently placed on each page (<i>Kedudukan butang yang seragam pada setiap halaman</i>)	0.135	100.00%	0.700	0.870	0.970	0.847	ACCEPTED

Based on the results, one element recorded a threshold value (d) greater than 0.2, which indicates a lack of consensus among experts and non-compliance with the acceptance criteria established under the FDM. In response to this, expert panel members recommended several improvements. The suggestions included enhancing the introductory element by incorporating a user guide, clearly stated objectives, an information architecture map, and a concise explanation of the application. Experts also advised that the content can be rewritten in simpler, more accessible language. These revisions were subsequently implemented by the researchers and validated by the expert panel.

The remaining elements demonstrated strong expert agreement, with threshold values below 0.2 and consensus percentages exceeding 75%. As such, these elements were

accepted without further modification. Overall, the results indicate that the majority of the interface layout components for the IS-HADIS meet the criteria set out by the Fuzzy Delphi Method and are considered appropriate based on expert consensus.

Expert Consensus on the Dictionary Component of IS-HADIS

For the second component, the Fuzzy Delphi Method (FDM) was employed to evaluate the Dictionary Component of the Hadith Terminology Dictionary Application (IS-HADIS). This method allows for the identification of consensus among a panel of experts regarding the relevance, clarity, and functionality of the elements within the dictionary component. Through this process, the study aimed to ensure that the content and structure of the dictionary as digital application align with user needs and expert expectations. The analysis produced the following findings.

Table 3

Dictionary Component of the IS-HADIS Based on Expert Consensus Analysis

No	Element	Triangular Fuzzy		Defuzzification			Process	Expert Consensus
		Numbers Requirement	Expert Group Consensus Percentage, %	m1	m2	m3	Fuzzy Score (A)	
1	The development of the dictionary in the IS-HADIS application is relevant to current developments (<i>Pembangunan Kamus dalam Aplikasi IS-HADIS relevan dengan perkembangan terkini</i>)	0.166	90.0%	0.660	0.840	0.950	0.817	ACCEPTED
2	The language style used is appropriate (<i>Penggunaan laras bahasa adalah bersesuaian</i>)	0.151	90.0%	0.700	0.870	0.960	0.843	ACCEPTED
4	The audio used in the IS-HADIS application is appropriate (<i>Audio yang digunakan didalam Aplikasi IS-HADIS adalah bersesuaian</i>)	0.170	90.00%	0.600	0.790	0.930	0.773	ACCEPTED

5	The pronunciation audio produced is clear (Audio sebutan perkataan yang dihasilkan adalah jelas)	0.170	90.00%	0.600	0.790	0.930	0.773	ACCEPTED
6	Uses appropriate font type (Menggunakan tulisan (font) yang bersesuaian)	0.140	100.00%	0.620	0.810	0.950	0.793	ACCEPTED

Table 3 presents the elements of the Dictionary Component of the IS-HADIS which were analysed using the Fuzzy Delphi Method (FDM). The findings indicate that all items were accepted by the expert panel, having met all three key FDM criteria. Specifically, the threshold value (d) did not exceed 0.2 (recorded at 0.068), the expert consensus percentage met or exceeded 75% (recorded at 100%), and the defuzzification value (alpha-cut) was equal to or greater than 0.5 (recorded at 0.900). These results confirm that all elements within the Dictionary Component were validated and accepted based on expert consensus.

Expert Consensus on the Gamification Component of IS-HADIS

The third component of the study involves the evaluation of the game feature integrated into the Hadith Terminology Dictionary Application (IS-HADIS). This component was assessed to determine its effectiveness, relevance, and alignment with the application's overall educational objectives. The following section presents the findings obtained from the expert consensus analysis conducted using the Fuzzy Delphi Method.

Table 4

Game Component of the IS-HADIS Based on Expert Consensus Analysis

No	Element	Triangular Fuzzy		Defuzzification			Process	Expert Consensus
		Numbers Requirement	Requirement	Requirement	Requirement	Requirement	Requirement	
		Threshold Value, d	Expert Group Consensus Percentage, %	m1	m2	m3	Fuzzy Score (A)	
1	The games developed in the IS-HADIS application are appropriate (<i>Permainan yang dibangun dalam aplikasi IS-HADIS adalah sesuai</i>)	0.193	90.0%	0.720	0.870	0.950	0.847	ACCEPTED
2	The games in the IS-HADIS application serve as support in learning (<i>Permainan dalam aplikasi IS-HADIS bertindak sebagai sokongan dalam pembelajaran</i>)	0.185	90.0%	0.700	0.860	0.950	0.837	ACCEPTED
3	The games in the IS-HADIS application motivate users (<i>Permainan dalam aplikasi IS-HADIS memberi motivasi kepada pengguna</i>)	0.199	90.0%	0.640	0.810	0.930	0.793	ACCEPTED
4	The game content in the IS-HADIS application attracts users' attention (<i>Kandungan permainan dalam aplikasi IS-HADIS menarik perhatian pengguna</i>)	0.157	100.00%	0.680	0.850	0.960	0.830	ACCEPTED
5	The instructions for the games in the IS-HADIS application are	0.185	90.00%	0.700	0.860	0.950	0.837	ACCEPTED

	easy to understand (Arahan pada permainan dalam aplikasi IS-HADIS mudah difahami)							
6	The IS-HADIS application provides various types of games (Aplikasi IS-HADIS menyediakan pelbagai jenis permainan)	0.145	100.00%	0.720	0.880	0.970	0.857	ACCEPTED
7	The audio in the games within the IS-HADIS application is appropriate (Audio pada permainan dalam aplikasi IS-HADIS adalah sesuai)	0.168	100.00%	0.700	0.860	0.960	0.840	ACCEPTED
8	The animations in the IS-HADIS games are attractive (Animasi pada permainan dalam aplikasi IS-HADIS adalah menarik)	0.188	100.00%	0.740	0.880	0.960	0.860	ACCEPTED
9	The colours used in the IS-HADIS games are attractive (Warna pada permainan dalam aplikasi IS-HADIS adalah menarik)	0.155	100.00%	0.740	0.890	0.970	0.867	ACCEPTED
10	The fonts used in the IS-HADIS application are appealing (Tulisan pada aplikasi IS-HADIS adalah menarik)	0.145	100.00%	0.660	0.840	0.960	0.820	ACCEPTED
11	The games in the IS-HADIS application can be used for self-directed learning	0.145	100.00%	0.720	0.880	0.970	0.857	ACCEPTED

	<i>(Permainan dalam aplikasi IS-HADIS latihan boleh dijalankan secara pembelajaran sendiri)</i>							
12	Users are free to exit the IS-HADIS game at any time <i>(Pengguna bebas untuk keluar daripada permainan aplikasi IS-HADIS pada bila-bila masa sahaja)</i>	0.191	90.00%	0.660	0.840	0.940	0.813	ACCEPTED

As presented in Table 4, all elements under the Game Component of the IS-HADIS Dictionary Application were validated by the expert panel. Each item recorded a threshold value (d) of less than 0.2, with the percentage of expert consensus exceeding 75%, thereby satisfying the acceptance criteria outlined by the Fuzzy Delphi Method. These findings reflect a high level of consensus among experts concerning the relevance and suitability of the game elements, affirming their appropriateness for integration into the application.

Discussion

This study was conducted to obtain expert consensus from a panel of 10 experts on the elements associated with the constructs of the Hadith Terminology Dictionary Application (IS-HADIS). Based on the findings, the expert panel agreed that all elements related to the interface layout, dictionary, and game components were appropriate and acceptable for the development of the IS-HADIS. Although the introductory element initially recorded a threshold (d) value exceeding 0.2—indicating non-compliance with the acceptance criteria—revisions were made accordingly and subsequently validated by the experts.

One of the essential constructs in any application is the user interface. An intuitive and accessible user interface design is a critical aspect in the development of educational applications. A user-friendly interface ensures that individuals with varying levels of technological proficiency can navigate the application with ease, thereby enhancing user satisfaction and overall experience (Ahmad & Hassan, 2024; Mohd Najib et al., 2022). In e-learning applications, the interface design plays a significant role in organizing content and components to maintain clarity and ease of use. An aesthetically appealing interface—such as through the use of well-designed backgrounds—can further stimulate user interest and engagement, particularly among students (Zhao, 2017). Additionally, an efficient search function is vital for improving application navigation, enabling users to locate entries quickly and thereby enhancing the overall usability and effectiveness of the application (Hamdan, 2017).

The findings of this study highlight that effective learning applications should integrate audio elements. Harun and Tasir (2003), as well as Nik Yusoff and Ghani (2012), found that

the use of multimedia ICT tools, including audio recordings, can stimulate students' auditory senses and significantly contribute to the development of Arabic listening skills. Similarly, Fakhri (2024) discovered that the use of audio media has the potential to enhance students' ability to memorise the Qur'an and Hadith. The integration of multimedia elements such as text, graphics, audio, and images aims to improve the effectiveness of information delivery by leveraging engaging computer-based technologies.

The incorporation of gamification and game-based elements into exercises and quizzes has also been proven to enhance student performance, bridge the achievement gap between high- and low-performing learners, and improve the overall learning experience (Barata et al., 2013; Mekler et al., 2013; Kozub et al., 2025). These studies underscore the importance of embedding game-based mechanisms within educational settings to increase the effectiveness of the learning process.

Gamification offers a range of benefits, including boosting student motivation, strengthening learning outcomes, and supporting long-term knowledge acquisition and retention. Structured exercises and interactive quizzes allow learners to review and reinforce previously acquired information, thereby facilitating the transfer of knowledge from short-term to long-term memory (Roediger & Karpicke, 2006). In addition to enhancing memory retention, quizzes also improve student motivation and engagement through elements of challenge and reward (Nicol & Macfarlane-Dick, 2006). Furthermore, quizzes serve as effective formative assessment tools that help both educators and learners identify areas that require further mastery, allowing instructional strategies to be tailored accordingly (Black & Wiliam, 1998).

Therefore, all elements across the three evaluated constructs collectively form the foundation of the IS-HADIS that has been developed. The creation of this e-Dictionary for Hadith Terminology represents a form of mobile learning that has become increasingly essential in today's digital era. The existence of such an application is expected to provide a broader and more accessible network of information for the digital generation. The integration of technology in education offers opportunities to create a more dynamic, interactive, and expansive learning environment (Sarrab et al., 2015).

Conclusion

This study applied the Fuzzy Delphi Method (FDM) to systematically evaluate and validate the components of the Hadith Terminology Dictionary Application (IS-HADIS), encompassing its interface layout, dictionary content, and game-based learning features. A panel of ten experts participated in the validation process, confirming that all elements met the FDM acceptance criteria—threshold (d) values below 0.2, expert agreement above 75%, and defuzzification scores exceeding 0.5. Although the introductory component initially did not meet the threshold, necessary revisions were made and subsequently approved by the panel. With all components validated, the IS-HADIS application is ready to be used as a comprehensive educational tool for learning Hadith terminology.

The IS-HADIS application enhances learning through the integration of multimedia elements, interactive quizzes, and gamified features that increase engagement and retention across diverse learner groups, from students to adult users. While the current version has

been positively evaluated, continuous improvements are encouraged, including expanding the database of Hadith terms, incorporating voice recognition, personalising learning paths, and boosting interactivity. The application not only fulfils pedagogical and usability standards but also contributes significantly to the development of digital Islamic education. Besides, this study highlights the value of using technology to make religious learning more engaging, accessible, and aligned with the needs of modern learners, while also enriching the academic discourse on Islamic educational innovation.

Acknowledgements

This study is the result of the Selangor State Research Grant (GPNS) titled: “Developing an E-Dictionary Application of Hadith Terms for Hadith Learning in Selangor” (SUK/GPNS/2023/PKS/06). Appreciation is also extended to Universiti Islam Selangor.

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