Quran Mobile Application: A Structured Review

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ARTICLE INFO	ABSTRACT
	Mobile applications are growing rapidly and can be employed for various purposes. Presently, they have been applied widely in education. The pace of technological advancement is incredibly fast, impacting all segments of society. One noteworthy area is the facilitation of learning to read and write the Quran, where recent technological developments have significantly simplified the process. However, these applications have certain limitations as they solely concentrate on utilizing technology without incorporating more inventive approaches to aid Quran readers in interacting with, memorizing, comprehending, and establishing connections with the topics covered in the Quran. This paper aims to systematically review and analyze current research on the Quran mobile application. The study reviewed relevant literature indexed in Scopus, Web of Science (WOS), and Directory of Open Access Journals (DOAJ) databases. Consequently, three key study themes have been identified after thoroughly analyzing the "Quran mobile application": learning and memorization, text analysis and information retrieval, and user experience and engagement. As Quran mobile applications have increased accessibility to learning the Qur'an, they frequently concentrate only on the use of technology meanwhile innovative approaches to improve engagement, memorization, comprehension, and topic connections for Quran readers remain lacking. The outcomes of this study can serve as inspiration for other researchers, providing a solid groundwork for the development and improvements in understanding the Quran.

1. Introduction

In today's digital age, mobile devices have transformed how people access and engage with information [1]. As the central text of Islam, the Quran has not been exempt from this trend. Furthermore, the advent of Quran mobile applications has made Quranic learning more accessible and convenient than ever, providing a wealth of resources and tools for Muslims seeking to deepen their knowledge and understanding of the Quran [2].

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Quran mobile applications offer a range of features, including digital copies of the Quran, audio recitations [3], interpretations, interactive learning methods [4], multimedia tools [5], and speech recognition [6][7] enhancing users' Quranic experiences and promote more frequent and meaningful Quranic studies [8]. As a result, these applications have the potential to revolutionize how Muslims engage with their faith, fostering a sense of community and connectedness among users [9] and enabling access to Islamic content and resources that were previously unavailable or inaccessible [10].

The previous study addresses the challenge of authenticating Quranic verses in the context of mobile applications and websites, emphasizing the importance of accurate classification. In addition, it proposes a novel algorithm based on hashed values, achieving efficient and accurate classification with 100% accuracy on a dataset of 300 verses, contributing to Quran authentication [11]. Moreover, the study develops the Android application Same Verses Detection, aiding Quran memorization by assisting students in finding similar verses. Conducted in three Islamic boarding schools in Indonesia, the resulting Quran for *Tahfidz* application features verse search, *juz* information, letter classification, and identification of similar verses prone to memorization mistakes [12].

Much work on Quran memorization by mobile application has been reported. The study delves into the traditional methods of memorizing the Quran, specifically focusing on the *Takrar* and *Tasmi'* approaches that involve utilizing the *mushaf* book. Additionally, with the advancements in smartphone technology and networking, various mobile applications have been developed to facilitate learning. Table 1 shows comparison between conventional and modern methods highlights the superior performance of modern technology in memorizing the Quran [13].

Table 1
Comparison of The Methods According to the Motivation in Completing the Quran Memorization Process Category [13]

Method	Category
Traditional Method	Motivation in completing the Quran memorization
Takrar	x
Tasmi'	x
Modern Technology	
E-Hafiz	x
Mobile Quran Memorization System using RFID Technology	/
Quran Companion	/

The development and evaluation of the "EzHifz" mobile application for Quran memorization, based on the Visual, Aural, Read/write, and Kinesthetic (VARK) learning style, provides positive feedback, indicating the application's effectiveness in supporting independent memorization through preferred learning styles and sensory elements. This contribution enhances the design and evaluation of the Quran memorization applications [14]. Mobile learning as a supporting method is also explored in response to the need for alternative solutions to Quran memorization for young Muslims. Emphasizing the significance of specific design guidelines and pedagogy, the study proposes a unifying framework that combines interactive multimedia methods and learning theories for effective mobile learning in Quran memorization [15]. TeBook is an Android application that enables self-evaluation of the Quran recitation employing speech recognition and an online search engine. It allows learners to practice and memorize Quranic verses anytime and anywhere without needing a third-party evaluator [16].

Preserving and comprehending the Quran encompasses memorization, writing, and diacritical points. The study assesses Quranic symbol knowledge among teachers and the correlation between modern learning methods and Quranic symbols. The findings indicate a high level of knowledge among teachers, with no notable variances based on race, gender, or age [17]. Additionally, the research exposes the limited understanding of Muslim students regarding the Quran's messages and warns about the risks of relying on Internet interpretations alone. To improve comprehension, the study integrates the *Tafsir Ibn Katsir* mobile application and suggests six critical steps, including reinforcing *tafsir* studies and incorporating information and communication technology (ICT) media [18].

The emergence of mobile applications has provided a convenient and interactive medium for individuals to learn Qiraat, the esteemed practice of reciting the Quran, unrestricted by time and location. Hence, two innovative mobile applications for Quranic studies have been proposed. The first application, *"Qiraat Sab'ah",* underwent a summative evaluation, utilizing Rapid Application Development (RAD) and user experience methodologies. Feedback from students, lecturers, and the public contributed to its improvement, with positive feedback received regarding usability. Although considered a valuable supplementary tool for learning Qiraat, enhancements such as including all Quran chapters and *tajweed* indicators are necessary before real-world implementation [19]. The second application, the Quranic Verse Finder, provides a comprehensive tool for preachers to search and identify Quranic verses for reference. In addition, it offers bilingual translation, bookmarking, social media sharing, and detailed verse information, distinguishing it from other Quran search applications [20]. Other research focuses on developing and evaluating the design of a *Qiraat* mobile application through RAD and user experience methodologies to promote ubiquitous *Qiraat* teaching and learning through mobile devices. Here, the study presents the progress and evaluation of the MyQiraat design, highlighting participants' recognition of the application's potential benefits for enhancing *Qiraat* learning [21-23].

An interactive mobile serious game for children with severe autism is being examined, measuring its effectiveness and comparing it to the traditional approach. The results demonstrate increased engagement levels and a significant relationship between involvement and engagement as in Figure 1 [24].
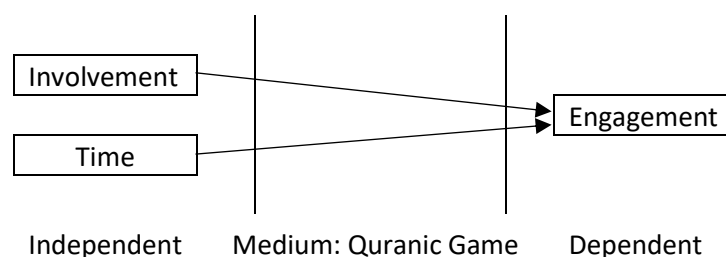

Fig. 1. Framework for Conducting Effectiveness Evaluation for Quranic Game [24]

With the rise of the Internet and algorithmic control over digital content, Arabic Quranic content has yet to benefit from computational linguistics and Artificial Intelligence (AI) algorithms fully. To address this, the study aims to enhance the utilization of computer linguistics and AI algorithms in Arabic Quranic content employing Word Embeddings and Deep Learning techniques. Note that it achieves a high accuracy of 98.33% in distinguishing Quranic verses, improving the resourcefulness and censorship of digital Quranic content [25]. A study analyzed Quranic Arabic vocabulary learning applications on the Google Play Store, finding most application textual interfaces, with some

including multimedia elements. Many applications offer exercises, but only a few provide assessments. Hence, the study highlights the current state of these applications and calls for further development to meet the needs of Muslim adults seeking to enhance their devotional practices [26].

Another study employed a mobile application to evaluate diary designs for collecting spiritual experience data from older adults. The daily diary captures detailed activities, while the Expressing Experiences and Emotions (3E) diary records rich data on emotions and experiences, including reading Quran. Therefore, the 3E diary design is suggested as the most suitable for capturing spiritual experiences data among older adults through mobile spiritual applications [27]. Moreover, a study focuses on designing and developing the "Say Quran" mobile application for recognizing spoken Quranic verses. The application utilizes speech recognition technology and has been positively received by students for its usability and effectiveness in learning Quranic verses [28]. As a result, research examining the impact of the "Say Quran" mobile application on students' perceived performance, satisfaction, and behavior in the Quran study proposes a positive relationship between the application and factors as shown in Figure 2 [29].
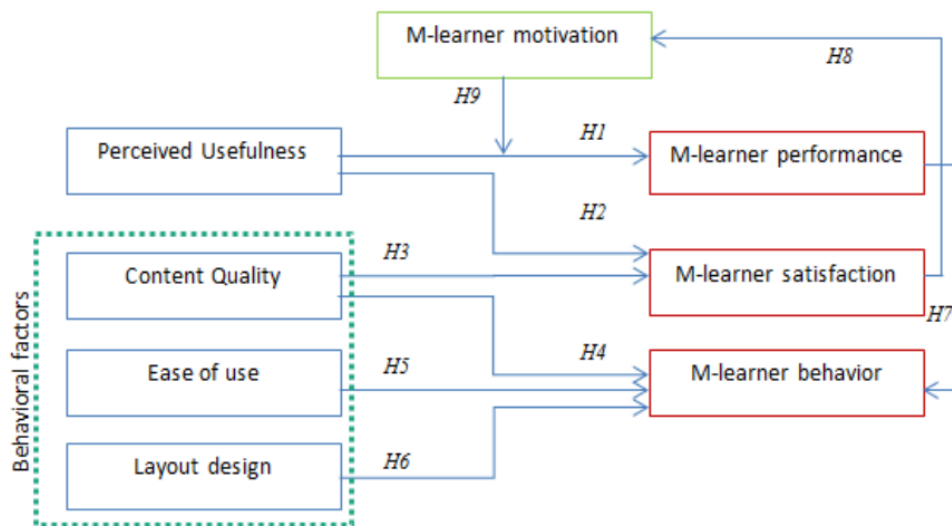

Fig. 2. Research Model [29]

Tajweed, or the understanding of flawless Quranic recitation, has developed over time. The study explores the integration of technology in teaching and learning *tajweed*, examining its impact on students' ability to learn and its compatibility with contemporary technology. Other than that, the study highlights the use of technology in Islamic education, including a startup's struggles with a Quran Tajwid app, the evaluation of its business model, and the development of an innovative Quranic application [30]. Additionally, a system is developed to recognize the *Qalqalah* rule in Quranic recitation, achieving high accuracy with professional readers' audio samples [31].

Speech recognition enhances Quranic learning, improving recitation and understanding [32]. A system called *Samee'a* is introduced that utilizes automated speech recognition for text memorization, including poems, speeches, and the Holy Quran. The system employs the Google Cloud Speech Recognition Application Programming Interface (API) and the Jaro Winkler Distance algorithm to convert Arabic speech to text and measure similarity. Consequently, the testing indicated an average similarity of 83.33% for collected files and 69% for selected Quranic chapters, which improved to 91.33% and 95.66% after preprocessing. Comparison studies validated the system's performance, and user testing demonstrated its efficiency [33].

Another paper examines the acceptance and interest of users in employing mobile speech recognition for learning the Quran. A questionnaire-based survey was conducted to gather user

feedback on the proposed usage. Correspondingly, mobile speech recognition and mobile learning factors are discussed to support the survey results [34]. Mispronunciation detection in Quranic recitation gains popularity as a complement to manual teaching. The system utilizes Relative Spectral Transform-Perceptual Linear Prediction (RASTA-PLP) and Hidden Markov Model for accurate training and recognition. Promising results suggest an improved understanding of *Tajweed* rules and high recognition rates, supporting the successful implementation of the research [35]. Another study presents a sound-matching application for children to learn Quran verses independently using speech recognition scheme as shown in Figure 3. The application utilizes the Fast Fourier Transform (FFT) algorithm and Divide Conquer (DC) for voice matching and text conversion. As a result, testing indicates 61.1% accuracy for appropriate reading and 38.9% for inappropriate reading [36].
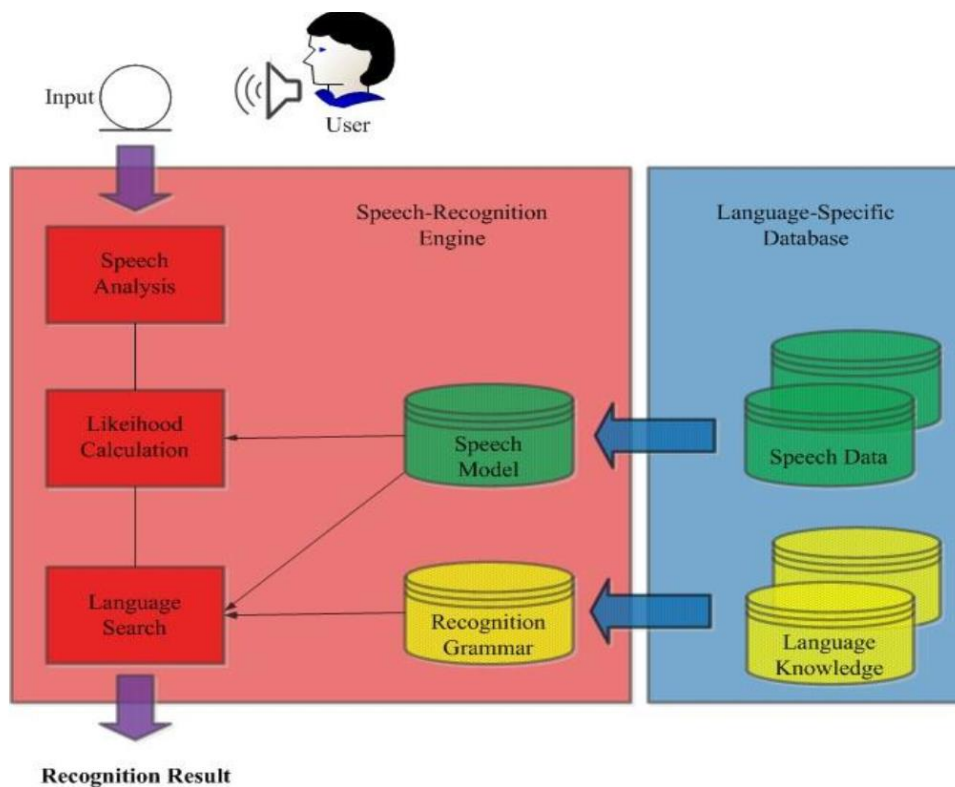

Fig. 3. Speech Recognition Scheme [36]

With the advent of Quran applications, learners now have the opportunity to delve into the art of *tarannum* through interactive platforms. The Tarannum-SLA, a Quran application, is discussed in the article, aiming to facilitate *tarannum* learning and raise awareness about the Quran's importance. According to usability analysis, it offers multiple language options and *tarannum* styles, with high user satisfaction [37]. Additionally, a new application for *tarannum* is introduced, capturing and analyzing melodies to provide feedback to users. With the assistance of pitch sequences and the k-Nearest Neighbor (KNN) classifier, the application trains melody patterns and allows users to compare their recitations for feedback on similarity and accuracy [37]. Consequently, results suggest the application's potential in aiding *tarannum* learning, with a 66% shape-based weighted score, motivating users to improve their recitations for better scores.

The utilization of applications for Quranic learning has witnessed a significant rise, offering new avenues for individuals to engage with and enhance their understanding of the Quran. A comprehensive review of Quran learning applications from Google Play Store and iOS Apple Store highlights the predominance of applications targeting adult Arabic-speaking users. Note that real-

time feedback and authentication concerns are important factors. Therefore, the design implications for Quranic teaching applications are discussed [38]. Another study examining iPads' impact on language learning, particularly for Quranic learning among Saudi children, established that younger children benefit more from using Quranic and Arabic Alphabet learning applications. Besides, iPads aid kindergarten children with alphabets, numbers, animals, colors, and more [39]. Reading the Quran and preserving the Malay identity requires the *Jawi* script. *Jawi* is the language of many Islamic educational resources. However, according to research, 56% of students lacked linking character abilities. To address this, the Jawi-AR application employs Augmented Reality (AR) to strengthen the connections between knowledge and skills. Moreover, it offers students early exposure and chances for independent learning [40].

Mental disorders are prevalent in Arab countries, yet there is a lack of quality mental health applications for Arabic speakers. A systematic assessment of depression and anxiety applications for Arabic speakers revealed only 23 applications, with most providing general information. Some applications focus on spirituality, referencing the Islamic faith and the Quran. Consequently, more empirical studies and the involvement of healthcare professionals are needed to ensure application quality and efficacy in addressing mental health needs [41]. Note that the NOOR eMashaf application is designed for Android-based tablets, offering a comprehensive range of features for Quran readers and reciters, including accessibility options. The application includes Quran text, images, *Tafsir, Ahkam, Qiraat*, and translations, presented through user-friendly interfaces and tools for efficient navigation, search, and customization. Furthermore, advanced features enable voice and motion control for individuals with special needs, facilitating their engagement with the application [42].

The current research gap is caused by the lack of thorough and user-friendly mobile applications for the Quran that can successfully meet the demands of people looking to learn, understand, and interact with the Quran. Although there are many Quran mobile applications available, these apps notably lack a variety of features, interesting learning opportunities, and reliable content. Users are unable to fully profit from their Quranic engagement and study as a result of this restriction. The importance of this study comes in its potential to provide insight into how Quranic mobile applications are currently being used globally. This research can help to create more useful tools for Quranic learning and engagement by addressing the shortcomings in current platforms. Additionally, it can be a useful tool for academics and developers who want to employ technology to improve Quranic studies' user experience and educational outcomes.

The purpose of the current systemic analysis is to respond to the fundamental research issue, which is: How advanced is the Quranic mobile application globally? Even if there are many Quran mobile applications available, there are limited comprehensive and user-friendly platforms that can effectively suit the needs of those who wish to learn, understand, and interact with the Quran. Due to the dearth of diversified features, interesting learning opportunities, and reliable content in current applications, users usually struggle to obtain the most out of their Quranic study and engagement. Hence, a thorough analysis of the Quran mobile application is addressed. The method employed to discuss the report's research question is contrasted in the following part. Subsequently, the third component employs a methical review and synthesis of the scientific literature to pinpoint, determine, and evaluate the required research. The section discusses the necessary measures, highlighting potential researchers' awareness of the issues raised.

2. Material and methods

2.1 Identification

The systematic review process involved three main phases in selecting appropriate papers for this report. The first phase focused on keyword recognition and identifying related and similar terms through thesauri, dictionaries, encyclopedias, and prior studies. Once relevant keywords were identified, search strings were created for the Scopus, WoS, and DOAJ databases (Table 2). During the first phase of the systematic review process, 155 papers were retrieved from the three databases for the present research work.

Table 2
The search string

Scopus	TITLE-ABS-KEY (quran AND mobile AND app*) AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015)) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j"))
WoS	quran AND mobile and app* (Topic) and 2015 or 2016 or 2017 or 2018 or 2019 or 2020 or 2022 or 2021 (Publication Years) and Article (Document Types) and English (Languages)
DOAJ	quran AND mobile AND app*

2.2 Screening

The screening phase involves examining a collection of potentially relevant research materials to identify content that is aligned with the predetermined research questions. This phase typically employs content-based criteria, such as machine learning to classify Quran mobile applications and involves removing duplicate papers from the list of searched papers. In the first screening stage, 98 publications were excluded, while 57 papers were assessed in the second stage based on various inclusion and exclusion criteria (see Table 3). Note that the primary criterion for inclusion was literature, encompassing research papers, reviews, meta-syntheses, meta-analyses, books, book series, chapters, and conference proceedings not covered in the most recent study. Moreover, only publications in English from the past eight years (2015-2022) were considered. Consequently, twelve publications were rejected due to duplication criteria. Notably, literature was selected as the primary source of practical recommendations.

2.3 Eligibility

At the eligibility stage (the third level), 31 articles were considered. This stage involves meticulously evaluating the article titles and essential text to ascertain compliance with the inclusion criteria and appropriateness for the study's research objectives. After analyzing the empirical data, 11 papers were excluded due to the out-of-field, their titles and abstracts not being significantly relevant to the study's objective. This led to the selection of 20 articles, which were deemed appropriate for review (Table 3).

Table 3
The selection criterion is searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2015 – 2022	< 2015
Literature type	Journal (Article)	Conference, Book, Review
Publication Stage	Final	In Press

2.4 Data Abstraction and Analysis

This study conducted an integrative analysis as one of the assessment approaches used to examine and synthesize several research designs (qualitative, quantitative, and mixed methodologies). Developing acceptable subjects and sub-topics was the focus of expert research, and data collection was the first stage in the theme's development. The authors thoroughly reviewed 20 papers for assertions or details addressing issues from the present study (see Figure 4). Correspondingly, the authors and experts evaluate every Quran mobile application, conclude, and create themes. As a result, learning, memory, text analysis, and engagement with Quran mobile applications are the key topics that emerged from the approach.

From then on, the authors resumed each theme they had previously established, along with any associated themes, notions, or ideas. The corresponding author and other co-authors worked to develop themes based on the data within the context of this study. In this case, a log was kept along the data analysis process to record any analyses, viewpoints, conundrums, or other concepts related to the data interpretation. In order to clarify any inconsistencies in the theme design process, the authors carefully compared the results. To be clear, the authors discuss any discrepancies between their topics if they occur.

Consequently, the developed concepts were adjusted to make sure they were cohesive. Two experts, one with expertise in Computer Science (Wan Azani Mustafa) and the other in Quranic Studies (Mohd Nizho Abd Rahman), conducted the examinations to guarantee the legitimacy of the problems. The expert review phase ensured each sub-themes clarity, significance, and appropriateness by establishing domain validity. Subsequently, the authors have made modifications at their discretion in response to reader feedback and professional comments.
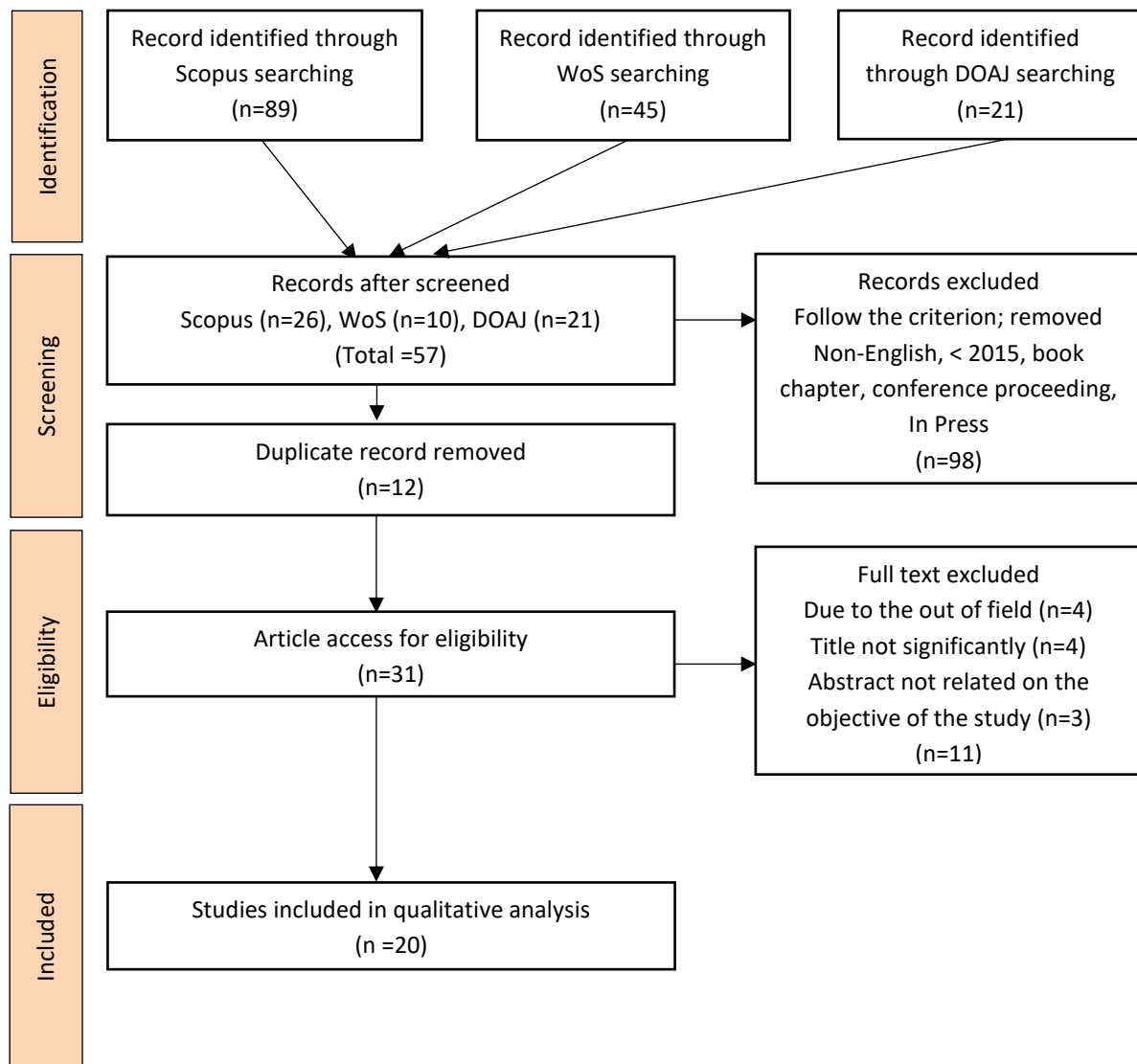
Fig. 4. Flow diagram of the proposed search study [43]

3. Results and Finding

The popularity of Quran mobile applications has grown significantly among Muslims worldwide as they provide an easy and convenient way to read, learn, and memorize the Quran. With the increasing usage of these apps, it has become crucial to evaluate their effectiveness, quality, and impact on users' attitudes and behaviors. Thus, 20 articles were extracted and analyzed employing the search technique. All papers were classified into three categories: learning and memorization, text analysis and information retrieval, and user experience and engagement in Quran mobile applications.

3.1 Learning and Memorization

In this theme, articles regarding Quran learning and memorization will be explored and summarized below.

Table 4
Learning and Memorization

Authors	Title	Year	Finding
Brata, Nugraha, and Brata [44]	An alternative m-learning scoring approach to automatically evaluate *Iqro*'s pronunciation based on pitch, volume, and rhythm features	2022	Experimental results with ten respondents suggest that the sample correlation coefficient through Pearson between a manual assessment by *Ustaz* and the application result for *Iqro'* level 1 is 0.51, which means this approach is acceptable for future implementation.
Mustafa *et al.,* [14]	Development and Alpha Testing of EzHifz Application: Al-Quran Memorization Tool	2021	The application supports the teaching and learning of Quran memorization, allowing students to select their preferred VARK learning style with the technique of memorizing the Quran. This mobile application learning approach based on VARK's learning style has the potential to be implemented in the process of memorizing the Quran as well as retaining memory through the use of memory senses in support of the learning materials developed.
Laila *et al.,* [12]	Same verses detection application: An innovative media for memorizing Quran in *Tahfidz pesantren*	2020	The research result indicated that 89.5% of the students of the Jepara Darut Ta'lim Islamic Boarding School, 49.3% of Pesantren Yanbu'ul Quran Menawan Kudus, 63.8% of the students of Yanbu'ul Quran Boarding School 1 Pati. Quran application media was developed based on Android with Quran for *Tahfidz*.
Supriyadi *et al.,* [18]	Digital technology era and al-Quran understanding problem: Critical reflection of al-Quran learning through action research	2020	The result disclosed that there were six steps taken as a critical reflection in the learning process utilizing action research design, namely (1) strengthening the study of *tafsir* (interpretation); (2) choosing ICT media in understanding the Quran; (3) understanding Quran through IT with language approach; (4) understanding Quran through IT with a historical approach; (5) understanding Quran through ICT with *mufassir* explanation; and (6) evaluating the learning. Those steps were combined with the integration of the *Tafsir Ibn Katsir* application as the learning media made those steps a series of reflective and soluble measures in increasing students' understanding of the Quran.
M. M. Aziz *et al.,* [13]	Comparison between the conventional method and modern technology in Al-Quran memorization	2019	This paper compared the performance between the conventional and modern methods. Based on the comparison, it is proven that modern technology performs better than conventional methods.
Wan Khairuldin *et al.,* [17]	The knowledge of mobile learning and quranic symbols (*Dabt* Al-Quran) in *Mushaf Uthmani* and mobile learning among Al-Quran teachers in IMTIAZ, Terengganu	2019	The t-test analysis also found no significant differences in min knowledge of the Quranic symbols in *Mushaf Uthmani* based on race and gender among teachers of *tasmi'* Quran in Imtiaz, Yayasan Terengganu. The t-test analysis also found no significant differences in min knowledge of the symbols marking (*dabt*) *Uthmani Mushaf* based on age and gender among Quran teachers in IMTIAZ.
Hamzah *et al.,* [45]	Android application for children to learn basic *solat*	2019	An android learning application was developed through the Waterfall methodology, which consists of five phases: idea, analysis, design, development, evaluation, and final product. Adobe Flash Professional CS6 was chosen as a development platform. The application

			consists of four modules: "Let's Pray," "Five Times Prayer," "Doa' After a Prayer," and "Mind Test". The result concludes that the application is suitable for new learners to learn about performing a *solat*, specifically in Quran recitation.
Nisa [46]	Social media and the birth of an Islamic social movement: ODOJ (One Day One Juz) in Contemporary Indonesia	2018	Demonstrates technology's capacity in generating and crafting this new semi-virtual socio-religious movement. ODOJ has painted new color onto the contemporary Islamic public, and its presence is imperative to understanding the transformation of the religious mediascape in Indonesia.
Alkhatib *et al.,* [47]	Building an assistant mobile application for teaching Arabic pronunciation through a new approach to Arabic speech recognition	2017	Proposes the application of Mel-frequency cepstral coefficient (MFCC) features to extract features from the speech signal. It also demonstrates the use of a modified version of the Dynamic time warping (DTW) algorithm to compare the features of the user and the teacher.
Shamsuddin *et al.,* [15]	A framework for designing mobile quranic memorization tool using multimedia interactive learning method for children	2016	Providing a unifying framework for developing Quran memorizer applications through interactive multimedia methods and learning theories for mobile learning.

3.2 Text Analysis and Information Retrieval

This theme focuses on text analysis and information retrieval of the Quran. The table below summarizes the articles' findings related to the selected theme.

Table 5
Text Analysis and Information Retrieval

Authors	Title	Year	Finding
Aziz *et al.,* [20]	Quranic verse finder: A tool for speech preparation using Quranic verses	2020	The user can identify the *juz* number, the name of the *Surah*, which number of verses in the *Surah,* and the meaning of the verses of a specific verse. The Quranic Verse Finder differs from other existing Quran Search applications due to its bilanguage feature. This application provides Malay and English translation. It also has other special features, such as Bookmark, that allow specific Quran verses to be saved for later reference. Moreover, due to current trends, the Quranic Verse Finder allows users to share it through popular social media sites like Facebook and Twitter.
Tayyeh, Mahdi, and Al-Jumaili [48]	Novel steganography scheme using Arabic text features in Holy Quran	2019	The algorithms hide secret messages elements within Arabic letters benefiting from the existence of sun letters (Arabic: *urūf shamsīyah*) and moon letters (*urūf qamarīyah*). Other than that, we consider the existence of some Arabic language characteristics represented as small vowel letters (Arabic Diacritics). The experiments employing the proposed two algorithms demonstrate a high capacity for text files. Moreover, the proposed algorithms are robust against attack since the changes in the cover text are imperceptible. Hence, our contribution offers a more secure algorithm that provides good capacity.

Ridzuan *et al.,* [11]	Classification for Quran authentication using characters and diacritics hashed values	2017	Contributes to the creation of a new classification based on hashed values of characters and diacritics as its features and further extends the knowledge in the Quran authentication field.
Alqahtani and Fayyoumi [28]	Mobile application development for Quran verse recognition and interpretations	2015	Presents the results of a preliminary study to gather feedback from students regarding the developed application.
Aljaloud, Dahab, and Kamal [49]	Stemmer Impact on Quranic Mobile Information Retrieval Performance	2016	Implementing the two stemming approaches and assessing their accuracy by calculating the precision, recall, Mean Average Precision (MAP), and f measure produced results that suggest that the Light10 stemmer outperforms the dictionary lookup stemmer in precision and MAP. Furthermore, the mobile performance of the Light10 stemmer exceeds that of the dictionary-based stemmer.

3.3 User Experience and Engagement

This theme explored the user experience and engagement with Quran and is summarized in Table 6.

Table 6
User Experience and Engagement

Authors	Title	Year	Finding
Mohd Zaki, Ishak and Mohamad [19]	User Interface Designs of an Educational Mobile Application: A Study of *Qiraat* Teaching and Learning	2021	The application can be a supplementary teaching and learning tool for people who wish to learn *Qiraat* anytime and anywhere. However, further expansion areas are needed, such as including all chapters (*surahs*) in the Quran and *tajweed* indicators to the verses before they can be applied for real.
Abdullah and Hamid [50]	Interface design features of a mobile application for senior citizens	2019	The application is satisfactory and usable for the users. In the future, the same research interest researcher can explore the audio and navigate the interface by audio commands. The prototype could be extended to meet the needs of senior citizens with problems such as Parkinson's and Alzheimer's.
Kamaruzaman *et al.,* [24]	Engaging children with severe autism in learning Al-Quran through the serious game	2016	The involvement of children in playing games affects the level of engagement, as the analysis indicates a significant relationship between involvement and engagement level. The engagement level of children with severe autism in learning increased after applying the serious game compared to the traditional approach.
Ahmad *et al.,* [27]	A pilot study of using diaries method for collecting spiritual experiences data among older adults	2015	A daily diary appears to be a good tool for describing older adults' daily activities in detail, while a structured diary fails to achieve any target, especially in reading Quran. 3E diary records rich data about older adults' feelings, emotions, and experiences in terms of facial expressions from the drawing and written text.
Alqahtani and Mohammad [29]	Mobile applications' impact on student performance and satisfaction	2015	Provide evidence of a positive relationship between the mobile application "Say Quran" and students' perceived performance, satisfaction, and behavior while studying the Holy Quran.

4. Discussion and Conclusions

Various innovative approaches are presented to support Quranic learning and memorization through mobile applications. These applications offer new opportunities for learners of different ages, abilities, and backgrounds to engage with the Quran and enhance their understanding and retention of its content. Moreover, the studies highlight the importance of interactive and multimedia elements to increase user engagement and motivation. In addition, the findings also emphasize the potential of mobile Quranic applications to support language learning, speech preparation, and spiritual experiences among users. However, more research is needed to evaluate the effectiveness of these applications and address their limitations and challenges.

Quranic text analysis and information retrieval have vast potential in several areas, such as speech preparation, verse recognition, authentication, and recitation verification. Therefore, using mobile applications can foster a deeper understanding of the Quran and encourage engagement. Hence, utilizing advanced technologies, such as stemmers and intelligent recitation recognition, can further increase the precision and efficacy of Quranic text analysis. Nevertheless, there are still unresolved research gaps and challenges, like character and diacritic recognition, and more dependable algorithms for Quranic text analysis and verification are required.

Furthermore, user experience and engagement are essential for effective Quranic mobile applications. The research highlights the importance of designing user-friendly interfaces, particularly for specific user groups such as senior citizens, children with autism, and students. Mobile applications can enhance student performance and satisfaction with Quranic learning. Consequently, the study reveals the potential of mobile applications in collecting data about spiritual experiences through diary methods. As a result, these findings proposed the need for continuous improvement and innovation in user experience and engagement in Quranic mobile applications.

Acknowledgment

Conflicts of Interest
The authors declare that they have no conflicts of interest to report regarding the present study.

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