

Empowering Millennial Muslim Families through Artificial Intelligence in Qur'anic Learning : Opportunities and Ethical Challenges in Indonesia

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Abstract: This study aims to analyze the experiences and perceptions of millennial Muslim families in Artificial Intelligence-based applications used for Qur'anic learning and identify the challenges faced by millennial Muslim families. Secondary data research methods will be used in the research. To conduct this study, researchers need to read relevant literature from secondary sources that include journal articles and books on: AI technology in Islamic education; the implementation of AI technology in educational research; development of AI applications in learning the Qur'an. However, despite the advantages, the results of the study show that the application of AI in learning the Qur'an has various challenges. Primarily, they include a limited understanding of accent and voice pronunciation, a lack of social interaction that affects the spiritual aspects of the learning process, and ethical issues and user data privacy. Later, technological resistance changed among Muslim communities; This is also another factor that affects the acceptance of applications. In general, the study concludes that while AI is a useful tool in learning the Qur'an, a combined learning approach requires AI, as well as other interests in learning, bringing recommendations to improve effectiveness and provide a cohesive experience. App developers are advised to improve speech recognition technology, provide more varied datasets, incorporate automated

tajweed scoring systems, and pay attention to data security and ethical considerations. It is recommended that more research be done to measure the efficacy of these apps through direct user experiments.

Keywords: Artificial Intelligence (AI), Qur'an Learning, Millennial Muslim Family, Islamic Educational Technology.

Abstrak: Penelitian ini bertujuan untuk menganalisis pengalaman dan persepsi keluarga Muslim milenial dalam aplikasi berbasis Artificial Intelligence yang digunakan untuk pembelajaran Al-Qur'an dan mengidentifikasi tantangan yang dihadapi keluarga Muslim milenial. Metode penelitian data sekunder akan digunakan pada penelitian. Untuk melakukan penelitian ini, peneliti perlu membaca literatur yang relevan dari sumber sekunder yang mencakup artikel jurnal dan buku tentang: teknologi AI dalam pendidikan Islam; implementasi teknologi AI dalam penelitian pendidikan; pengembangan aplikasi AI dalam pembelajaran Al-Qur'an. Namun, meskipun keuntungannya, hasil penelitian menunjukkan bahwa aplikasi AI dalam pembelajaran Al-Qur'an memiliki berbagai tantangan. Terutama, mereka termasuk pemahaman terbatas pengucapan aksen dan suara, kurangnya interaksi sosial yang mempengaruhi aspek spiritual dari proses pembelajaran, dan masalah etika dan privasi data pengguna. Kemudian, resistensi teknologi berubah di kalangan komunitas Muslim; ini juga merupakan faktor lain yang mempengaruhi penerimaan aplikasi. Secara umum, studi menyimpulkan bahwa sementara AI merupakan alat yang berguna dalam mempelajari Al-Qur'an, pendekatan belajar gabungan membutuhkan AI, serta ketertarikan lain dalam pembelajaran, membawa adalah rekomendasi untuk meningkatkan efektivitas dan memberikan pengalaman yang kohesif. Pengembang aplikasi disarankan untuk meningkatkan teknologi pengenalan suara, menyediakan dataset yang lebih bervariasi, memasukkan sistem penilaian tajwid otomatis, dan memperhatikan keamanan data dan pertimbangan etika. Disarankan agar lebih banyak penelitian dilakukan untuk mengukur kemampuan aplikasi ini melalui eksperimen pengguna secara langsung.

Kata Kunci: Artificial Intelligence (AI), Pembelajaran Al-Qur'an, Keluarga Muslim Milenial, Teknologi Pendidikan Islam.

Introduction

One of the factors causing the rapid development of technology is human interaction with information distribution (Alfian, 2022). As a country with a majority Muslim population, technology in the field of education is increasingly important in Indonesia. The development of information and communication technology has expanded the level of ways people communicate, connect, and learn to religious education. A family is the union of individuals, through kinship ties, marriage, or adoption, who live together and communicate according to their role in a family (Ramdani et al., 2023). The family is the place where the character is first formed or the first environment. This is important because according to (Alfian, 2022) empowering the family can improve the welfare of family members. A prosperous family is a family that is formed based on good principles, sufficient to meet their basic needs, and is closely and harmoniously related to society and the environment (Sari et al., 2023).

The millennial generation is defined as individuals born between 1981 and 1996 who have undergone a technological change from old technology to new technology (Dewi et al., 2021). The millennial generation who come from various regions and different socio-economic conditions have different characteristics (Zis et al., 2021). Islam is one of the religions embraced by the Indonesian people which is commonly called Muslim. However, Muslim millennials often use digital platforms to improve their understanding of religion. These findings correlate with research (Dewi et al., 2021) who found an e-da'wah application for the Jakarta millennial generation.

The Quran is a holy book that is used as a guideline for Muslims (Fitri Tanjung et al., 2022). Artificial Intelligence is capable of performing tasks like humans do, such as learning, thinking, and understanding things (De la Vega Hernández et al., 2023). AI-based technology can help the development of various fields such as virtual chat, exposed reality, virtual reality, machine learning systems, and so on that can create new opportunities for learning (Miftahul Huda & Irwansyah Suwahyu, 2024). Millennial Muslims who are familiar with technology have great potential to utilize smart applications to help the learning process of the Quran.

Religious education that is taught conventionally often fails to attract the attention of millennial students, who mostly spend time in the digital world. Therefore, a new approach is needed that utilizes digital technology to increase the understanding and participation of the millennial generation in religious practices (Fadillah et al., 2023). The Qur'an application designed with a variety of interactive and interesting features is able to help millennial Muslim families understand the teachings contained in the Qur'an in a more enjoyable way. This will also facilitate the process of learning Islam or the study of the Qur'an for future generations.

Some of the research that has been carried out on technology and Islamic education is for example the learning of the Qur'an. Research (Riantory & Pujiyanto, 2024) It has proven that the application of technology-based has the potential to help novice users improve their functional readability. However, the study talks more about the technical aspects and, moreover, does not describe how today's technology empowers millennial Muslim families in their daily lives. Meanwhile, a study by (Hasan et al., 2020) stated that artificial intelligence can improve the personalization of Qur'an learning. However, this research tends to ignore the socio-cultural context of the Muslim community in Indonesia, especially among the millennial generation.

Based on this review, it can be seen that there is a significant gap in research on the role of artificial intelligence applications not only as a tool to learn the Qur'an, but also as a means of empowering the millennial Muslim community in Indonesia.

Thus, there is still limited empirical understanding of how artificial intelligence (AI) actually affects the practice and experience of learning the Qur'an in the context of families in Indonesia. This gap is important to explore further in order to realistically describe the dynamics of AI technology use in the religious life of millennial Muslim families, as well as its impact on the quality of Qur'an learning at home.

Therefore, this study aims to explore the experiences and perceptions of millennial Muslim families in using AI applications for Qur'an learning and identify the challenges faced in its application.

More specifically, this study seeks to answer the question: "What are the experiences, perceptions, and challenges faced by millennial Muslim families in using artificial intelligence (AI)-based AI-Qur'an learning applications?"

Methodology

In this study, the author applies an analytical descriptive method with qualitative data types. Qualitative research aims to understand human or social phenomena through the delivery of informants' in-depth views and produce comprehensive, detailed, and complex verbal descriptions in the context of the natural environment (Salsabila et al., 2022). This research is to explore the experiences and challenges faced by millennial Muslim families in using AI applications for learning the Qur'an. The data was collected through document analysis, user observation, case studies, and review of app reviews without conducting interviews. This approach is in accordance with the qualitative research method described by (Muhamad Taufik Hidayat, 2023).

The literature analyzed in this study was obtained through several academic databases such as Google Scholar, Scopus, and DOAJ. The search was conducted using the keywords "Artificial Intelligence," "Qur'an Learning," "Muslim Family," and "Millennial." Articles published between 2019 and 2025 were screened to ensure the relevance and novelty of the research. Only scientific literature discussing the application of AI in the context of Islamic education and Qur'an learning was included in the analysis.

The data obtained was analyzed using the content analysis method, with the stages of data reduction, data presentation, and conclusion drawing as developed by Miles and Huberman (Palazzolo, 2023). Data reduction is carried out by sorting out the most relevant literature, data presentation is carried out through categorization of findings based on main themes such as the effectiveness of AI applications, technical challenges, and public acceptance, and conclusion drawing is carried out inductively based on the synthesis of various previous studies.

The data triangulation process was carried out by comparing and confirming the results from various literature through a thematic synthesis and comparative analysis approach. Each finding was grouped based on main themes, such as the effectiveness of AI technology, implementation challenges, social acceptance, and religious values in Muslim families. This approach helped to obtain a consistent and in-depth picture of the phenomenon being studied.

To ensure the validity of the data, this study uses source triangulation, namely by comparing findings from various academic literature to obtain a more objective and in-depth perspective (Patton, 1999). The conclusion of this study was taken by considering the consistency of results from various sources and their relevance in the context of learning the Qur'an in Indonesia.

To ensure the trustworthiness of the research, four aspects were applied: (1) credibility was maintained by using verified and relevant academic sources; (2) transferability was achieved by explaining the context of Muslim families in Indonesia in detail; (3) dependability is maintained through consistent content analysis procedures across all literature; and (4) confirmability is achieved by documenting each step of the analysis and the sources used so that they can be traced back.

Results and Discussion

1. Millennial Muslim Family

Islam pays great attention to family education because the family is a milestone of the nation's strength. As a small element of society, the household also has leaders and members. The family becomes a madrasah (educational institution) to learn loyalty, honesty, affection and the Qur'anic concept of family formation is known as *sakinah*, *mawaddah*, and *rahmah*. The meaning of *sakinah* is peace and tranquility. This is the main principle for building a happy family. The meaning of *mawaddah* is a way of ignoring one's own pleasure and self-interest for the sake of others. *Mawaddah* describes a person's feelings towards their partner because of their strengths. *Mawaddah* describes her love for her partner because of the potential she has. This can be in the form of an outstanding physique, professional positions, respected people, and other positive attitudes. Meanwhile, grace is a sense of love and affection for one's partner regardless of shortcomings and weaknesses, both materially and immaterially (Ahyyar & Alfitri, 2019).

Millennials are a generation with different characteristics compared to previous generations. The reason for insisting on their personalities, is the abundance of information technology used in communicating and forming social networks. Besides the fact that such creative and informative individuals are productive, are passionate, which is very important in almost all aspects of point life exercises. When Millennials discuss political values, they open, value diversity, facilities work together instead of just obeying orders, and try to be pragmatic worthy of the team to investigate judgments. Millennials are also characterized by work patterns, high levels of optimism, direction to achieve the right goals, and upholding moral and social values, respecting diversity (Fathoni, 2021).

2. AI Application for Qur'an Learning in Indonesia

According to (Hudayana et al., 2024) The development of information technology, especially Artificial Intelligence (AI), has brought significant changes in various aspects of life, including religious education. In Indonesia, traditional Qur'an learning methods such as *talaqqi* are still dominant but are constrained by time limitations and the availability of teachers. As a solution, AI-based application development seems to be promising.

Speech Recognition Application, This application uses voice recognition technology to detect and transcribe the user's Qur'an reading, provide feedback on pronunciation errors, and assist in correcting *tajweed* and *makhraj* (Hudayana et al., 2024). Interactive Learning Applications, Applications such as *Qara'a* are equipped with AI technology to improve the ability

to read the Qur'an through interactive features that make it easier for users to learn independently (Safitri, 2025).

Research by (Hudayana et al., 2024) developed an AI-based Qur'an listening application with a speech recognition method on the Android platform, which shows that the application is very feasible to use and helps Muslims in reading and memorizing the Qur'an. The development of AI-based applications is expected to continue to be improved by paying attention to aspects of accuracy, data security, and integration with traditional learning methods to create a comprehensive and effective learning experience (Moh. Mauluddin, 2024).

3. Millennial Muslim Families' Experiences and Perceptions of AI Applications

In today's digital era, access to information is a key element in the learning process. The presence of AI offers a practical solution to make it easier to find information related to the Qur'an. Imagine a special Qur'anic search engine powered by AI technology, allowing users to easily find relevant verses, commentaries, and literature simply by entering specific keywords or phrases (Andryan & Wibawa, 2022). Learning the Qur'an is different for each individual, as each has a unique learning style, needs, and goals. With the advent of AI, learning can be personalized to create a more effective experience that suits each person's needs (Moh. Mauluddin, 2024)

Research conducted by (Fadillah et al., 2023) shows that the use of the Qur'an application in Islamic religious education provides easy and fast access to the text, translation, and interpretation of the Qur'an. This allows the millennial generation to study religious teachings independently and flexibly, according to their dynamic lifestyle. In addition, research by (Ali, 2023) revealed that the Tahsin Qira'ah method applied through digital applications is effective in improving the ability to read the Qur'an among the millennial generation. This method not only improves technical reading skills, but also deepens understanding and appreciation of the content of the Qur'an.

User Experience in Using AI Applications for Qur'an Learning

- a. Ease of Access and Use: The majority of millennial Muslim families report that AI applications make it easier to access Qur'an learning materials. Interactive features and user-friendly interface increase learning motivation (Sari Prabandari & Suhardianto, 2024).
- b. Improved Qur'an Reading Skills: Users feel an improvement in tajweed and reading fluency after using AI-based applications. The autocorrect feature helps in correcting reading errors (Safitri, 2025).

The use of AI applications for Qur'an learning among millennial Muslim families shows two main trends:

Ease and Affordability ; Users find it helpful because the application can be accessed at any time and provides automatic reading corrections.

Obstacles in Understanding and Interaction ; Some users have difficulty understanding the app's features and feel a lack of guidance from human teachers.

4. Challenges Faced in the Use of AI Applications

- a. Technology Limitations: Some users have complained of inaccuracies in voice recognition, resulting in improper corrections. This can hinder the learning process and cause frustration (Hudayana et al., 2024).

- b. Feature Limitations: Not all apps provide comprehensive features, such as in-depth interpretation or translation, so users should look for additional sources for a more complete understanding (Moh. Mauluddin, 2024).
- c. Over-Reliance on Technology: The use of AI in Islamic education can lead to over-reliance on technology, potentially reducing human interaction and affecting the development of empathy and social skills (Arismunandar, 2006).
- d. Concerns about Privacy and Ethics: The application of AI in Islamic religious education poses challenges in ensuring the appropriateness of the use of technology with Islamic values and ethics, thus requiring strict supervision and regulation (Hakim et al., 2024).

5. Comparison of the Effectiveness of AI Applications vs Traditional Methods

To assess the effectiveness of AI in learning the Qur'an, it is necessary to compare it with traditional methods that involve human teachers.

Table 1. Comparison of Navy Applications with Traditional Methods

Aspects	AI Applications	Traditional Methods
Accessibility	High, can be used at any time	Limited to the teacher's schedule
Tajweed Accuracy	Pretty good, but there are still shortcomings in voice recognition	More accurate due to live guidance
Interaction and Spirituality	Less interactive, only technology-based	More in-depth because there is guidance from teachers
Learning Effectiveness	Good for independent training	More effective in understanding meaning and appreciation

Strategies to Increase the Effectiveness of the Use of AI Applications are;

- a. Development of More Accurate Technology: Improvements in speech recognition algorithms and the addition of more comprehensive features can improve the user learning experience (Hudayana et al., 2024).
- b. Training and Socialization: Providing user guides and training can help maximize the use of app features. In addition, socialization about the benefits and how to use the app can increase adoption among millennial Muslim families (Luh Putu Ary Sri Tjahyanti et al., 2022).

The results of the study show that AI applications have great potential in supporting Qur'an learning among millennial Muslim families. Ease of access and interactive features are the main attractions that increase learning motivation. However, challenges such as technological inaccuracies and feature limitations point to the need for further development. The proposed strategies, such as technology upgrades and the provision of training, are in line with findings in the literature suggesting the importance of continuous evaluation and development in the application of AI for religious learning (Riantory & Pujiyanto, 2024). Thus, collaboration between technology developers, educators, and users is key in optimizing the use of AI applications for

learning the Qur'an, ensuring that this technology is not only technically advanced but also in accordance with user needs and values.

6. Recommendations for AI Application Development

a. Improved Speech Recognition Accuracy

The implementation of Speech Recognition technology in the Qur'an learning application must be able to recognize various variations of user pronunciation. Research by (Hudayana et al., 2024) shows that the application developed is able to detect and transcribe short verses of the Qur'an, but still faces difficulties with longer verses. Therefore, improvements in speech recognition algorithms are needed to overcome these limitations.

b. Comprehensive Dataset Development

The availability of a wide and diverse dataset is essential for training reliable AI models. (Salameh et al., 2024) It collected about 7,000 Qur'anic recital recordings from 1,287 participants in more than 11 non-Arab countries, which were then annotated to build a dataset that could be used in the development of AI models. Similar efforts are needed to ensure AI models have a strong data base.

c. Tajweed Learning Integration

The application must be able to teach the rules of tajweed effectively. (M. Alagrami & M. Eljazzar, 2020) develop an automatic system to recognize the rules of tajweed in the recital of the Qur'an using the Support Vector Machine and a threshold-based assessment system. The integration of similar features can help users learn tajwid better.

d. Use of Natural Language Processing (NLP)

The application of Natural Language Processing (NLP) techniques can improve understanding of the context and meaning of Qur'anic verses. (Shohoud et al., 2023) developed a semantic search tool for the Qur'an using Arabic NLP techniques, which allows users to find verses relevant to their questions. The integration of NLP in the application can enrich the user's learning experience.

e. Friendly and Interactive User Interface

A good user experience relies heavily on an intuitive and interactive interface design. (Hudayana et al., 2024) emphasized the importance of features such as verse search, voice detection, and easy-to-use selection of surahs to increase user engagement in learning.

f. Ethical and Privacy Considerations

Developers must ensure that user data is properly protected and that the use of technology is in accordance with Islamic values. (Andryan & Wibawa, 2022) It is important to ensure that AI does not replace the role of clerics and religious leaders in providing guidance, but rather functions as a supporting tool that helps the learning process.

Conclusion

This research aims to explore the experiences and perceptions of millennial Muslim families in using AI applications for Qur'an learning and identify the challenges faced in its application. Based on the results of the analysis, it was found that Artificial Intelligence (AI)-based applications offer greater flexibility and accessibility in learning the Qur'an, but still have several challenges that need to be considered.

In general, the application of artificial intelligence technology in the process of learning the Qur'an can indeed provide significant benefits, such as increasing the accuracy of pronunciation and knowledge about tajweed, flexibility in learning anywhere and anytime, and wider accessibility of knowledge for all levels of society. However, this research also reveals some of the main challenges faced, including limitations in recognizing various dialects and accents of users, lack of social interaction that can weaken the spirituality aspect of the Quranic learning process, as well as the need to maintain data privacy and ethics in the use of technology. In addition, the existence of resistance to the development of sophisticated technology in the conservative Islamic religious education environment can also affect the implementation of this application to be less than optimal.

To overcome these challenges, this study recommends several steps to develop AI applications in learning the Qur'an. First, the improvement of Speech Recognition technology to improve the accuracy of user reading detection. Second, the development of a wider and more diverse dataset to train AI models to be more adaptive to various dialects and reading styles. Third, the automatic integration of tajweed learning with a more accurate assessment system. Fourth, the application of Natural Language Processing (NLP) to understand the context of the sentence and provide more contextual feedback. Additionally, it is important for developers to pay attention to the design of a more interactive user interface, as well as ensure that ethical aspects and data security are maintained.

Furthermore, a comparison between artificial intelligence-based learning applications and traditional methods indicates that while artificial intelligence technology can help improve learning efficiency, traditional methods still hold the upper hand in terms of direct guidance, spiritual experiences, and emotional closeness between teachers and students. Therefore, a blended learning approach that combines artificial intelligence technology with conventional methods can be a more effective solution to support the teaching of the Qur'an as a whole. Considering the results of this research, it is hoped that the development of artificial intelligence applications for learning the Qur'an can continue to be improved by considering aspects of technology, pedagogy, and Islamic values. In the future, further research is needed that tests the effectiveness of this application through user case studies and field experiments, so that more in-depth data can be obtained regarding its impact on the quality of Qur'an learning in various community groups.

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