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Revolutionizing Quranic Education for 4th Grade Student Through Customized Open-Source Operating System

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***Abstract*— This study aims to develop an open-source and legal operating system for Quranic education that can be used for teaching the Quran to 4th-grade students using a computer. The operating system display is customized using code commands and Gnome Tweak Tool, and includes themes, shells, icons, fonts, OS logos, backgrounds, booting screens, and multimedia. The IQROS Linux distribution was designed to assist teachers in teaching Quranic lessons to elementary school students, and was evaluated using a questionnaire at a particular elementary school in Indonesia. The study found that the majority of respondents agreed that the color and background design were appropriate, and the use of IQROS Linux was suitable for facilitating religious learning. The software was found to help teachers with their work and increase student interest in learning the Quran, demonstrating the potential of IQROS Linux to enhance religious education in elementary schools. The relevant future resreach is to conduct a longitudinal study to assess the long-term impact of using IQROS Linux on students' Quranic learning outcomes. This could involve tracking students' progress over several years to measure their retention of Quranic knowledge and their ability to apply it in their daily lives.**

***Index Terms*—4th grade student, open-source, operating system, quranic education**

I. Introduction

THE commitment of Indonesian society towards religious values remains high, as seen from their awareness and the efforts of parents to educate their children in religious knowledge to become pious individuals. Islam is one of the religions that provide guidance and direction to humans towards the right path, and the Quran is its holy book, which serves as the primary source of Islamic teachings. Reading the Quran is a noble act and not only an act of worship but also serves as a protection for individuals who have troubled hearts. Parents aspire to raise their children as pious individuals who use the Quran as a guide to lead a righteous life and avoid any negative aspects of life.

However, the reality does not always align with the parents' plans. As children grow older, they tend to become lazy or find it challenging to read the Quran, despite the presence of Quranic education institutions such as *Taman Pendidikan Al-Quran* (TPA, School for learning Quran). Additionally, the limited time available for learning makes the process less effective. Furthermore, many people have forgotten the tradition of studying the Quran after the Maghrib prayer, and children nowadays prefer to stream movies or play with gadgets instead of learning the Quran. Some people view understanding Islam as less crucial than understanding the world. Therefore, there is a need for effective and efficient learning methods to increase interest in Quranic education and make it easy and enjoyable to learn.

Information and communication technologies (ICT) have been rapidly developing, and the majority of primary schools in Indonesia have incorporated computer technology into their educational system. For instance, the 4th grade at a particular elementary school uses a laptop as input and an LCD projector as output during teaching. However, the implementation of such technology is not yet optimal. The introduction of a Linux distribution can enhance the effectiveness of the educational system in school.

The lifestyle of teachers also relies heavily on computer technology, in the form of either Personal Computers (PCs) or portable computers. Even children as young as seven years old are familiar with computer technology and can operate it. However, a computer cannot function without an installed operating system (OS). An operating system is software that serves as a bridge between a user and computer hardware and manages the computer's resources. One example of an operating system is Linux, which allows users to modify and customize the system to meet their specific needs.

One way to increase interest in learning the Quran among children is through the use of information and communication technologies (ICTs). ICTs can provide a more engaging and interactive learning experience, making it easier for children to learn and retain information. This is particularly important in the context of Indonesia, where the use of ICTs in education is still relatively low. One example of the use of ICTs in Quranic education is the development of digital Quranic learning apps. These apps can provide a fun and interactive way for children to learn the Quran, with features such as gamification, interactive quizzes, and audio recitations. Studies have shown that the use of digital learning tools can have a positive impact on children's learning outcomes, particularly in the areas of

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motivation and engagement [1],[2].

Another way to increase interest in learning the Quran is to make the learning process more accessible and convenient. One way to do this is through online Quranic learning platforms, which can provide flexible learning options for children who may not have access to traditional Quranic schools. These platforms can also provide personalized learning experiences tailored to each child's individual learning needs.

In addition to the use of ICTs, it is also important to address the underlying factors that may be contributing to the decline in interest in learning the Quran, such as social and cultural changes. For example, there has been a shift away from traditional Quranic schools in some parts of Indonesia, as parents prioritize secular education for their children [3]. Addressing these factors will require a multifaceted approach that involves collaboration between religious leaders, educators, parents, and policymakers.

Given the widespread use of computers, even among children, and the incorporation of IT in the educational system, it is necessary to conduct research on the use of computer technology in Quranic education. This study aims to introduce an open-source and legal operating system for Quranic education for 4th-grade students and develop a system that can be used for teaching the Quran using a computer.

The novelty of this study is focus on enhancing religious education in elementary schools. The study specifically targets elementary school students, aiming to enhance religious education at an early stage of their learning journey. This novel approach recognizes the importance of incorporating technology in Quranic education for young learners to foster their interest, engagement, and understanding of religious teachings from an early age. The study highlights the potential benefits of using IQROS Linux for teachers, including assisting them in their work and increasing student interest in learning the Quran. Moreover, it suggests that the software has the potential to enhance students' religious learning experiences, which can contribute to the field of Quranic education research and practice.

II. METHOD

A. Remastered Display Design

In the process of designing this operating system, one of the stages that will be carried out is to customize or change the display of the Linux Ubuntu 18.04 operating system to a design that can meet the needs of this research on learning the Quran in elementary schools. The design of the operating system display to be designed includes themes, shells, icons, fonts, OS logos, backgrounds, booting screens, and multimedia. In carrying out all the processes of designing the operating system display, the method used is by inputting code commands into the terminal on the Linux Ubuntu operating system that is already available. To easily change and manage themes, shells, icons, extensions, and fonts on the Linux Ubuntu operating system, a software program called Gnome Tweak Tool is needed. Install the software program first. The Activities Configurator in Linux Ubuntu is an indicator panel located at the top left of the desktop display. To change its appearance and text, it can be done in the extension program on the Gnome Tweak Tool. However, to be able to change it according to your wishes, you must download the program first at https://extensions.gnome.org/extension/358/activities-configurator/.

B. Software Package Installation

In designing this operating system, the educational theme is about learning the Quran in elementary schools. Therefore, in choosing software packages that can support this learning, the following are selected as Table I.

C. Build to Flashdisk

In designing this operating system, the installation concept is dual boot, meaning that to operate this system, there is no need to install the system into a device (laptop or personal computer) first. Instead, just insert the flash drive containing the remastered operating system file into the USB port of the device, and when finished operating the system, shut down the system in the desktop menu and then remove the flash drive from the USB port of the device. Therefore, to build the data that has been designed and saved from the hard disk to the flash drive, a software program called "Pinguy Builder" is needed. The first step is to download the software program and then root it through the terminal by entering the command code. Next, set the remastering backup file that you want to build in the Pinguy Builder software menu, and finally build the remastered file to the available flash drive.

TABLE I
REMASTERED SOFTWARE PACKAGE

No.	Name	Function	Notes
1	Zekr	Digital Quran with audio	Successfully installed
2	Elforkane	Digital Quran with Hidden Ayat and audio features	Successfully installed
3	Qioo	Extension on LibreOffice Writer to write Ayat Successfully installed	
4	LibreOffice	Writer Used to create questions with Quranic verses using the Qioo extension	Successfully installed

D. Operating System Remaster Testing

Software testing is an investigation carried out to obtain information about the quality of the product being tested. Testing is the development of software aimed at adjusting the required needs with the software design. The testing of this remastered operating system was carried out at a particular school. The fourth-grade at this school is one of the many elementary schools in Indonesia that already use information and communication technology in their learning system. This means that teachers use laptops as inputs and projectors as outputs. Therefore, the IQROS Linux distribution can be used

to support learning activities, especially in religion in elementary school classes.

III. Results and Discussion

To operate the IQROS operating system, the first step is to insert the flash drive containing the design files into the USB device port. Don't forget to configure the Basic Input Output System (BIOS) of the system first to be able to read the design files on the flash drive so that it can perform its booting process. This Linux design result is a Live USB Linux distribution, so this Linux distribution can be booted and run directly from the flash drive media with its software packages without having to install it into its hard disk device first.

The boot screen is a display that will appear when the operating system enters the login screen. When the boot screen appears, a process will also run to prepare the login screen. And the shutdown screen is a display that will appear when the operating system is turned off. The login screen is a display that will appear when the operating system is requested to verify access or user login to input the previously created password so that the operating system can be used. The Home screen is a display that will appear when the operating system is being loaded on the system. When the Home screen appears, a process will also run behind it to load all the available drivers. And also during the Home screen process, the login sound will be active.

Here, users can directly run all the available software without having to install them first because it is in the form of a Live USB that can be used directly. And it also makes it easier for users to use it because there are several education software shortcuts on the main desktop. In addition, in the user media window, users can also open Windows partitions, whether it is Quran software or other software located in the bottom toolbar.

After the remastering process of the Linux distro, many changes have been made to tailor it to the needs of religious education in the 4th grade students. The distro now includes several software packages that have been removed and added.

The following Table II shows the list of software that has been removed.

TABLE II
REMOVED SOFTWARE

No.	Name	Description
1	Rhythm Box	Software for playing music
2	Solitaire	Game software
3	Amazon	Online shopping software
4	Mahjong	Game software
5	Cheese Webcam Booth	Webcam software

Meanwhile, the following Table III shows the list of software that has been added.

TABLE III
ADDED SOFTWARE

No.	Name	Description
1	Zekr 1.1.0	Digital Quran software
2	Elforkane 1.2	Digital Quran software
3	Libre Office Writer 6.3.5	Typing software
4	Qioo 0.303b	Quran extension for Libre Office Writer
5	Gnome Tweak Tool 3.27	Linux configuration software
6	Pinguy Builder 5.1-8	Remastering software to create an iso file

These changes were made to remove unnecessary software and add more relevant ones for religious education purposes. The addition of digital Quran software, Zekr and Elforkane, allows for easy access to Quranic resources, while the removal of game and online shopping software eliminates distractions during learning.

The addition of Libre Office Writer and Qioo extension provide a platform for students to practice their typing skills while referencing the Quran. Lastly, the inclusion of Gnome Tweak Tool and Pinguy Builder makes it easier to customize and remaster the Linux distro for future use.

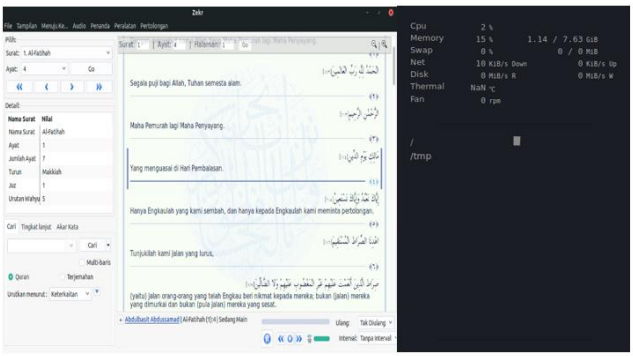

Fig. 1. Zekr's performance when the audio reciter is running

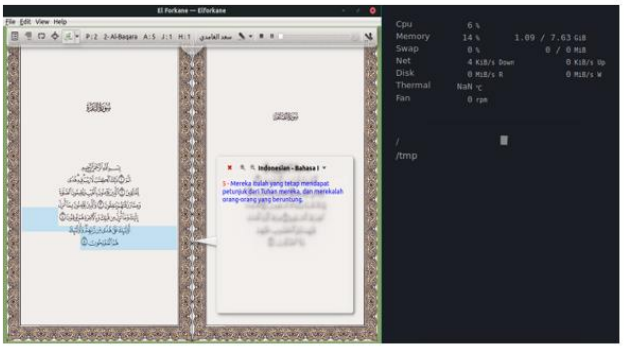

Fig. 2. Elforkane's performance when the audio reciter is running

The questionnaire was distributed to several teachers and fourth-grade students. The purpose of the test was to evaluate the operating system and software as well as to see how users respond. Thirteen respondents were selected for the sample. The data obtained from the respondents were used to determine if the system was sufficient and if it met users' needs. The data obtained from the questionnaire were analyzed, and the majority of respondents agreed that the use of color and background design was appropriate. Additionally, the majority of respondents also found that the use of Linux IQROS was suitable for helping teachers with their work and facilitating students' learning of religion.

Fig. 3(a) and 3(b) show the evaluation of the suitability of

color use and background design, and text color to background, respectively. These charts describe the effectiveness of certain design choices in enhancing the readability and usability of written content.

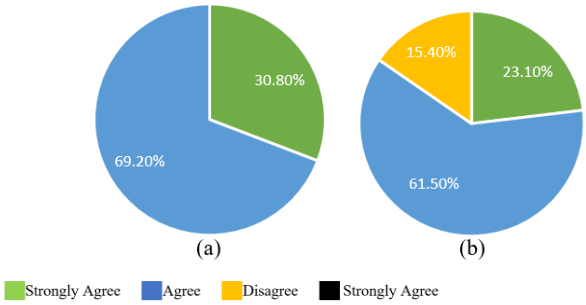

Fig. 3. (a) Suitability of Color Use and Background Design, (b) Suitability of text color to background

Fig. 4 shows the suitability of using IQROS Linux Distro in facilitating the performance of religious teachers investigating the benefits of using this particular software in religious education, or how it compares to other similar software or tools.

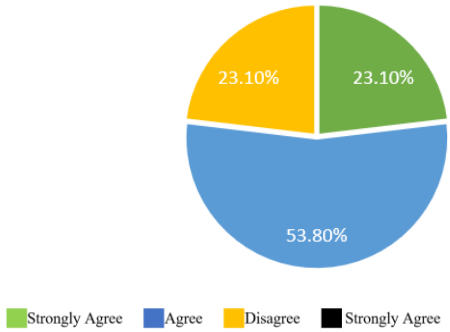

Fig. 4. The suitability of using IQROS Linux Distro in helping & facilitating the performance of religious teachers

Fig. 5 assesses the ease of operation of IQROS Linux Distro. It shows the user experience study or survey that aims to evaluate how easy or difficult it is to use this particular software.

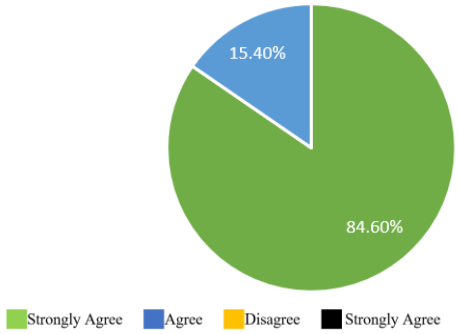

Fig. 5. Ease of Operation of IQROS Linux Distro

One way to increase interest in learning the Quran among children is through the use of information and communication technologies (ICTs). ICTs can provide a more engaging and interactive learning experience, making it easier for children to learn and retain information. This is particularly important in the context of Indonesia, where the use of ICTs in education is still relatively low. One example of the use of ICTs in Quranic education is the development of digital Quranic learning apps. These apps can provide a fun and interactive way for children to learn the Quran, with features such as gamification, interactive quizzes, and audio recitations. Studies have shown that the use of digital learning tools can have a positive impact on children's learning outcomes, particularly in the areas of motivation and engagement [1]. In the era of digital technology, educational apps have become increasingly popular and are transforming the way students learn. These apps offer a wide range of benefits to students, such as convenience, flexibility, and interactivity. In my opinion, educational apps are important for students and have a significant impact on their academic performance and overall development.

One of the most significant benefits of educational apps is the flexibility they offer. Students can access learning materials and resources anytime, anywhere, making it easier for them to keep up with their coursework. Additionally, many educational apps are designed to be interactive, engaging, and fun, which can help students stay motivated and interested in learning. Educational apps also provide students with personalized learning experiences. Many apps use algorithms to track a student's progress and adapt the content to their needs and learning style. This approach ensures that students receive tailored learning experiences that can improve their comprehension and retention of the material.

Furthermore, educational apps can help students develop critical skills such as problem-solving, critical thinking, and decision-making. These skills are essential for success in today's fast-paced and rapidly changing world. By using educational apps that incorporate gamification and other interactive features, students can develop these skills in a fun and engaging way. Another advantage of educational apps is that they can make learning more accessible and inclusive for students with different learning abilities. Many apps offer features such as text-to-speech and audio descriptions that can help students with visual or hearing impairments. Additionally, apps that use adaptive technology can provide support for students with learning disabilities such as dyslexia or ADHD.

The use of technology in teaching and learning has become increasingly prevalent in recent years. Ref. [5] provides valuable insight into how to effectively use technology in education. The NMC Horizon Report [6] further highlights the importance of technology in higher education, stating that institutions must be proactive in integrating new technologies in order to remain competitive. Ref. [7] outline design principles for mobile learning, which can be particularly useful in today's world where many students use mobile devices for learning. Ref. [8] propose a theory of learning for the mobile age, emphasizing the importance of context and collaboration in mobile learning environments. The technological pedagogical content knowledge (TPACK) framework, introduced by Ref. [9] offers a useful lens for understanding the intersection of technology, pedagogy, and content knowledge

in teaching and learning. Overall, these sources demonstrate the importance of technology in education and provide valuable guidance for effectively integrating it into teaching and learning practices.

Educational apps are a valuable tool for students, and their impact on education is undeniable. By providing students with personalized, engaging, and accessible learning experiences, these apps can help improve academic performance, increase motivation, and develop critical skills. It is crucial that educators and policymakers continue to invest in the development and implementation of educational apps to ensure that all students have access to the benefits they offer. The use of educational apps has been shown to have a positive impact on students' academic performance, motivation, and skill development [10]-[13]. As a result, it is important for educators and policymakers to continue investing in the development and implementation of these apps to ensure that all students can benefit from them [14].

Studies have shown that the use of educational apps and games can have a positive impact on students' attitudes and achievements towards mathematics. Ref. [15] found that students who used educational applications had significantly higher attitudes towards mathematics and improved achievement scores compared to those who did not use such apps. Similarly, Ref. [16] reported that the use of educational games and applications positively influenced students' attitudes towards mathematics. These findings suggest that the use of technology-based resources can contribute to more positive learning experiences and outcomes in mathematics education.

For the recommendation, this app can improve the accessibility and inclusivity. The next study can investigate the accessibility and inclusivity of IQROS Linux for students with diverse needs, such as students with disabilities or special educational needs. This could involve assessing the usability and effectiveness of the operating system for students with different abilities, and identifying potential barriers and solutions to ensure equitable access and participation in Quranic education.

IV. Conclusion

In conclusion, the IQROS Linux distribution has been designed to assist teachers in teaching Quranic lessons to elementary school students. The open-source software contains various educational packages that focus on Quranic education, such as helping with memorization and teaching proper recitation. The study conducted at a paricular elementary school in Indonesia used a questionnaire to evaluate the system's effectiveness and user response. The majority of respondents agreed that the color and background design were appropriate and found the use of IQROS Linux to be suitable for facilitating religious learning. Additionally, the respondents found that the software helped teachers with their work and increased student interest in learning the Quran. Overall, the study demonstrated that IQROS Linux has the potential to enhance religious education in elementary schools, and it is well-received by both teachers and students.

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