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Design and usability evaluation of eLOK mobile using a user-centered design

Indonesian title: Perancangan dan evaluasi usabilitas pada elok mobile dengan pendekatan user-centered design

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ABSTRAK

eLOK merupakan platform e-learning berbasis Learning Management System (LMS) yang digunakan di Universitas Gadjah Mada. Saat ini, eLOK belum memiliki versi mobile yang dapat mendukung fleksibilitas pengguna dalam mengakses pembelajaran kapan pun dan di mana pun. Penelitian ini bertujuan untuk merancang UI/UX eLOK versi mobile menggunakan pendekatan User-Centered Design serta menguji tingkat usability aplikasi menggunakan System Usability Scale (SUS). Subjek pada penelitian ini terdiri dari 9 mahasiswa aktif Universitas Gadjah Mada yang menggunakan eLOK versi website. Hasil penelitian menunjukkan adanya beberapa perubahan pada rancangan antarmuka, meliputi perbaikan desain pada halaman login disertai penambahan fitur login menggunakan sidik jari, perubahan tata letak menu, penambahan ikon visual pada menu pencarian kursus, penambahan ikon tugas, materi, dan video pada halaman kursus, penambahan fitur download materi dan video, serta fitur chat yang sebelumnya belum tersedia pada eLOK versi website. Pengujian usability menggunakan System Usability Scale menghasilkan skor rata-rata sebesar 94,4 yang termasuk dalam kategori "Best Imagine," sehingga menunjukkan bahwa aplikasi memiliki tingkat kemudahan penggunaan yang sangat baik dan sesuai dengan harapan pengguna. Temuan ini menunjukkan bahwa eLOK Mobile memiliki potensi dalam mendukung pembelajaran yang lebih interaktif, simulatif, dan berbasis praktik. Fitur seperti login sidik jari dan chat juga memberikan dukungan terhadap keterlibatan pengguna serta pembelajaran mandiri. Pengembangan selanjutnya disarankan untuk mengintegrasikan konten multimedia dan alat komunikasi real-time guna meningkatkan efektivitas, aksesibilitas, dan performa pengguna dalam pembelajaran berbasis praktik.

Kata kunci: *eLOK mobile; desain UI/UX; desain berpusat pada pengguna; kegunaan; Skala Kegunaan Sistem.*

ABSTRACT

eLOK is an e-learning platform based on a Learning Management System (LMS) used at Universitas Gadjah Mada. Currently, eLOK does not yet provide a mobile version that supports flexible access to learning anytime and anywhere. This study aims to design the UI/UX of the eLOK mobile version using a user-centered design approach and to evaluate its usability through the System Usability Scale (SUS). The participants involved in this study were 9 active students of Universitas Gadjah Mada who regularly use the eLOK website. The study identified several interface improvements, including redesigning the login page with the addition of a fingerprint login feature, modifying the menu layout, adding visual icons to the course search menu, introducing icons for assignments, materials, and videos on the course page, adding features for downloading materials and videos, and implementing a previously unavailable chat feature in the eLOK website version. Usability testing using the System Usability Scale produced an average score of 94.4, which falls into the "Best Imagine" category, indicating

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that the application demonstrates an excellent level of usability and aligns well with user expectations. These findings suggest that eLOK Mobile has strong potential to support more interactive, simulation-based, and practice-oriented learning. Features such as fingerprint login and chat also support user engagement and independent learning. Future development is recommended to integrate multimedia content and real-time communication tools in order to improve effectiveness, accessibility, and user performance in practice-based learning.

Keywords: *eLOK mobile; UI/UX design; user-centered design; usability; System Usability Scale.*

INTRODUCTION

Recently, the education sector has undergone significant changes due to rapid advances in digital technology. E-learning has emerged as one of the key solutions to address the evolving demands of education. The primary focus of e-learning is on learners, who are expected to be independent and responsible in the learning process, encouraging them to be more actively engaged in their educational activities. (Dey *et al.*, 2025). Universitas Gadjah Mada is one of the largest universities in Indonesia, with an e-learning platform based on a Learning Management System (LMS) called eLOK (E-Learning: Open for Knowledge Sharing). This platform implements the concept of Massive Open Online Courses (MOOCs), which can be accessed by students, lecturers, and the public.

A Learning Management System (LMS) is defined as a software platform designed to comprehensively administer, document, track, report, and deliver learning materials. Although an LMS is closely associated with e-learning and distance education, its effectiveness depends heavily on the institution's strategy for optimizing existing resources and facilities. An LMS provides a suite of support features and communication tools-such as assignment management, announcements, quizzes, discussion forums, chat functionalities, and a learning resource repository—to facilitate the teaching and learning process. (Nizham *et al.*, 2024).

Until now, eLOK is only available in a website version. However, in the current digital era, mobile learning offers opportunities to provide a more authentic learning and evaluation process. It provides a more flexible online learning experience, as it can be accessed anytime, anywhere (Nadzeri et al., 2023). Therefore, the development of the first mobile version of eLOK is a crucial step in enhancing accessibility and improving the overall user experience.

Numerous studies have investigated e-learning UI/UX design and its usability evaluation, encompassing both Learning Management Systems (LMS) and website platforms. For instance, research by Nizham et al (2024) evaluated the User Experience (UX) of the JayJay Digital Career School Learning Management System website. This study used the design thinking method to conduct a UI/UX redesign and to evaluate the website-based LMS. Similarly, Ristiasa et al (2021) conducted research to design the UI/UX for a mobile e-learning application named Digilearn, also employing the design thinking method. The objective was to assist students at UPN Veteran Jawa Timur in utilizing learning resources more effectively.

While both studies provide valuable insights, the present research adopts a distinct position. Whereas Nizham et al. (2024) focused on a website, this study specifically addresses challenges on the mobile platform. Furthermore, unlike Ristiasa et al. (2021), which involved building a new system from scratch, the uniqueness of this study lies in its context. This research centers on the adaptation and redesign of an established, complex legacy system (the eLOK web version) into a mobile interface. The primary challenge involves transforming existing functionalities and resolving specific usability issues currently experienced by eLOK UGM users. The objective is to produce a solution specifically tailored to this existing ecosystem.

The development of the first eLOK mobile version aims to enhance the user experience by providing a user-friendly interface

that can be easily accessed through mobile devices. Therefore, this study adopts a User-Centered Design (UCD) approach, involving users at every stage of the design process to ensure the developed mobile application meets their needs and expectations. Additionally, to assess user satisfaction with the application design, this study employs the System Usability Scale (SUS), a proven method for measuring ease and comfort of system use.

This study aims to design and evaluate the usability of the first mobile version of eLOK using a User-Centered Design approach. The results of this research can serve as a reference for the future development of eLOK mobile and similar e-learning platforms to enhance user experience.

METHOD

The UI/UX design of the first mobile version of eLOK was developed using the user-centered design approach, which involves users in the design process to ensure the application interface meets their expectations. The User-Centered Design (UCD) method outlines the phases of the design and development lifecycle, with a focus on gaining a thorough understanding of the intended users. When a product team creates digital products, they consider the users' requirements, objectives, and feedback. Meeting user needs and desires becomes a priority, and every design decision is assessed based on its value to the users. User-centered design enables products to incorporate an emotional component (Sugosha et al., 2021).

The User-Centered Design approach consists of four stages: Understand Context of Use, Specify User Requirements, Design Solution, and Evaluate Against Requirements. The first stage in the User-Centered Design (UCD) process is to Understand Context of Use, which involves identifying the target users, the product's purpose, and the conditions or environments in which it will be used. The next step is to Specify User Requirements, determining the business criteria or user goals the product must meet to ensure its effectiveness. Following this, Design Solutions are developed progressively, beginning with an initial concept and culminating in a fully realized design. Finally, Evaluate Against Requirements is a crucial phase, ideally carried out through usability testing with actual users, ensuring that the design meets quality standards and aligns with users' needs, making it as essential as other quality assurance processes in software development (Josephine et al., 2022).

The subjects of this study are students of Universitas Gadjah Mada who actively use the eLOK website in their academic activities. The number of respondents in this study is 9, which is the recommended sample size for usability testing of a mobile app. According to research conducted by Zhao and Lal (2020), utilizing 9 respondents is considered more cost-effective. Utilizing 9 respondents is considered more cost-effective. Their study indicated that both 9 and 12 respondents successfully identified 64% of usability issues; consequently, adding participants beyond 9 did not yield significantly more findings. The sampling technique employed was purposive sampling. Participants were selected based on specific criteria established by the researchers, namely: (1) being active UGM students, (2) being aged between 19 and 35 years, and (3) being familiar with or having previously used the eLOK website. These criteria were established to ensure that the participants represented the actual target users (end users) of the eLOK system.

In the usability evaluation stage, the System Usability Scale (SUS) method was used. The System Usability Scale (SUS) is a method for evaluating user satisfaction with a computer-based product or system. This method is widely used in User Experience (UX) assessments to determine how easy a system or product is to use. SUS consists of a series of questions designed to assess various aspects of usability, such as ease of use, clarity, and overall user satisfaction. The results of the SUS evaluation provide a score that can be

used to measure the level of satisfaction and usability of the product or system (Kuncoro & Subarkah, 2024).

The SUS calculation uses a 5-point Likert scale, with the following ratings: "Strongly Disagree = 1," "Disagree = 2," "Neutral = 3," "Agree = 4," and "Strongly Agree = 5." Respondents are asked to provide their assessment on 10 items, which serve as subjective evaluations (Burhan & Gea, 2023). The SUS questionnaire items are presented in Table 1.

Table 1.
System Usability Scale Question

No	Question
1	I think that I would like to use this system frequently
2	I found the system unnecessarily complex
3	I thought the system was easy to use
4	I think that I would need the support of a technical person to be able to use this system
5	I found the various functions in this system were well integrated
6	I thought there was too much inconsistency in this system
7	I would imagine that most people would learn to use this system very quickly
8	I found the system very cumbersome to use
9	I felt very confident using the system
10	I needed to learn a lot of things before i could get going with this system

Source: Burhan & Gea, 2023

To calculate the satisfaction score using the SUS questionnaire, a specific formula is applied to each statement provided by respondents. For statements with odd numbers (1, 3, 5, 7, and 9), the score is calculated using the formula (x-1). In contrast, for even-numbered statements (2, 4, 6, 8, and 10), the formula (5-x) is used, where x is the scale value given by the respondent for each question. After calculating the score for each statement, the total SUS score from all 10 questions is summed and multiplied by 2.5 to obtain the final score for each respondent. The average score is then calculated from all respondents to determine the overall satisfaction level of the users who completed the questionnaire (Fachrizal, Paramitha Fadillah, and Budiarto, 2023).

Once the average SUS score is obtained, it is categorized according to the SUS scale shown in Figure 1.

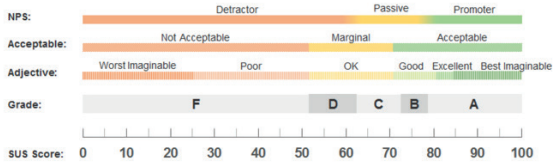


Figure 1.
System Usability Scale Score
Source: Anshari et al., 2024

RESULTS AND DISCUSSION

Understand Context of Use

In the Understand Context of Use stage, interviews were conducted with active students of Universitas Gadjah Mada who use the eLOK website to understand their needs, frustrations, experiences, expectations, and the goals they aim to achieve through a mobile e-learning application. Structured interviews were conducted by preparing questions in advance to ensure consistent information gathering. The data from these interviews is expected to serve as a basis for designing a persona for eLOK mobile users.

Specify User Requirements

The next stage, Specify User Requirements, involves analyzing the interview data and organizing it into a persona, which serves as a reference for understanding user behavior patterns with the product. From this process, a persona named Anggun Purnama was developed, as shown in Figure 2.



Figure 2.
Persona result
Source: Author Analysis (2025)

Based on the user persona designed, Anggun Purnama is a 24-year-old master's Degree student from Yogyakarta who identifies as an extrovert. As a user, Anggun tends to avoid using the eLOK academic information system due to its complicated navigation and unattractive interface. However, she hopes to have easier, faster, and more efficient access through a mobile application. Her primary goal is to be able to submit assignments, access class materials, and interact with the platform anytime and anywhere. Her biggest motivation is an intuitive interface and a streamlined process, so she does not have to waste time understanding how the system works. Thus, Anggun's main frustrations lie in the confusing navigation and unappealing interface, which often hinder her academic activities.

Based on the developed persona, a scenario is created to illustrate how the persona interacts with the system. The scenario is as follows: Anggun, a master's student in Industrial Engineering at UGM, wants to enroll in a newly available elective course. As a practical user, she expects a simple and quick process. After logging in with her UGM SSO account, Anggun navigates through the application to search for the course via the faculty menu. Fortunately, the course does not require a registration code, allowing Anggun to add the class and begin learning immediately.

Next, based on the scenario created, the following stage is to formulate design ideas as the foundation for developing the interface design. The *Design Ideas* stage involves both the researcher and users, aiming to generate as many ideas as possible to develop design recommendations that meet users' needs and preferences. The results of the design ideas are summarized in Table 2.

Table 2.
The result of the Design Ideas process

Idea	Recommendation
Simple and user-friendly interface	• Choose colors that are not overly bright or distracting. • Use clear and visually appealing menu icons. • Simple menu layout for better navigation.
Login Page	• Implement fingerprint login for enhanced convenience. • Design a flexible and user-friendly interface for the login screen.
Course search feature	• Include images for each Faculty and Department for better identification. • Utilize icons for a more intuitive menu layout.
Course menu display	• Incorporate icons for Materials, Assignments, and Videos to enhance user experience. • Add a feature for downloading materials and videos for offline use. • Enlarge the display of enrolled courses for better visibility.
Chat feature	• Add a chat feature that allows communication between eLOK users, including both instructors and peers. • Simplify the chat interface, making it like popular messaging apps (e.g., WhatsApp, Line). • Use minimalistic colors to maintain clarity and focus.

Source: Author Analysis, 2025

Based on the summary, users require a simple, user-friendly eLOK Mobile design with an intuitive layout and navigation. They also desire new features, such as fingerprint login, to facilitate access and speed up the login process. Additionally, users expect ease of searching for courses they wish to enroll in, with images or icons that represent each faculty and department. With these icons, users no longer need to search for courses in each faculty man-

ually. Users also want a fresher interface in the My Courses menu, along with added icons for tasks, materials, and videos to enhance accessibility. Furthermore, they require the ability to download materials and videos for offline access. Finally, a Chat feature is needed to enable direct communication with other registered eLOK users, including lecturers.

Design Solution

Design Solution is the stage where the eLOK mobile interface design is developed based on the ideas generated in the Design Ideas stage. The collected ideas are translated into interface designs (Rafif, Effendy, and Gandhi, 2022). The first design stage is the wireframe, which focuses on determining the layout of menus, the navigation flow, and the arrangement of key features, without considering aesthetics or visual appeal.

The first section of the design is the Login Section, which consists of four screens: the welcome page, the login options page, the UGM SSO login page, and the homepage. This section serves as the initial step for users to access the application. The design introduces significant changes from the previous eLOK website, including an updated interface, a fingerprint login feature, and refreshed menu layouts and icons, as shown in Figure 3.

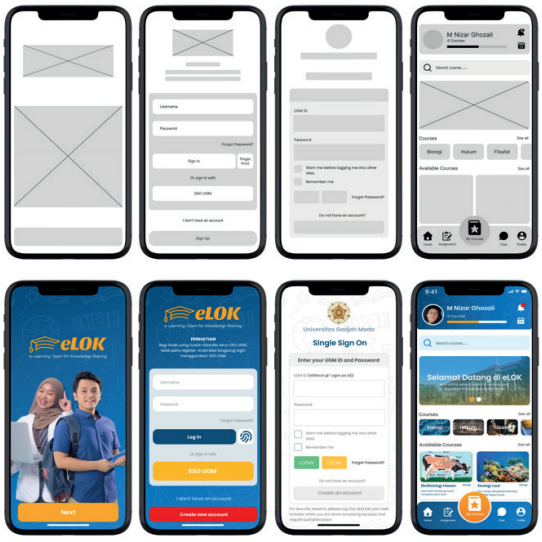


Figure 3.
Wireframe and Mockup Login Section
Source: Author Analysis, 2025

The second section is the Course Search Section, where users can search for the courses, they wish to enroll in. This section consists of four screens: the "Faculty" menu, the "Department" menu, the "Program" menu, and the "Course" menu. The design introduces significant changes, including the addition of image icons for each faculty and department that represent their unique characteristics and facilitate easier searching. Additionally, the interface has been updated, differing from the previous eLOK website design. The Enroll Course button is also designed with a rectangular bottom to make it easily visible to users and to facilitate enrollment.



Figure 4.
Wireframe and Mockup Course Search Section
Source: Author Analysis, 2025

The third section is the My Courses Section, where users engage in learning activities for the courses, they have enrolled in. The page designs include sections for reading materials, instructional videos, and assignments. The design differs from the eLOK website in its updated interface and the addition of icons for the tasks, materials, and video menus, which are designed to appear fresher and facili-

tate easier access. A new feature allows users to download materials and videos, enabling offline access. This feature is particularly useful for users who wish to study anywhere, including in areas with poor internet connectivity. This design is shown in Figure 5.

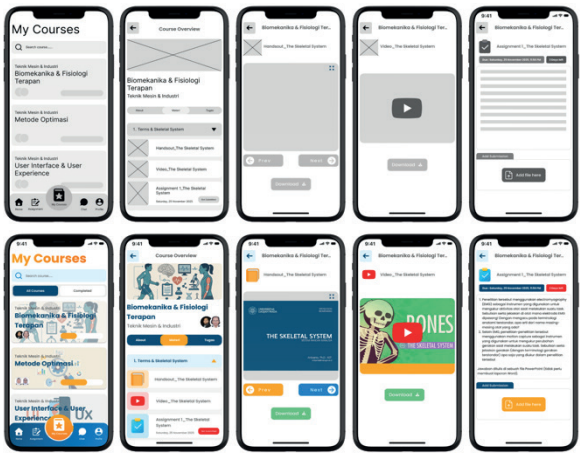


Figure 5.
Wireframe dan Mockup Section My Courses
Source: Author Analysis, 2025

The fourth section, the *Chat Section*, allows users to interact with other eLOK users, including students and lecturers. This chat feature is a new addition to this study, as the previous eLOK website did not have one. The chat interface is designed to be simple, like other instant messaging applications, making it easy for users to access and use the feature. This design is shown in Figure 6.

After all designs, including the wireframes and mockups, have been created, the next crucial step is to connect the mockup frames to function as a realistic, interactive application. This is achieved by utilizing the Prototype feature within Figma. Designers link the various frames together by defining user flows and interactions.

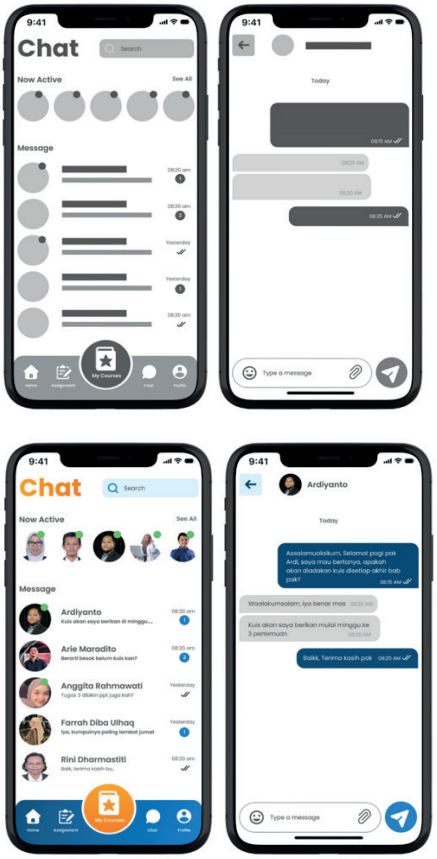


Figure 6.
Wireframe and Mockup Chat Section
Source: Author Analysis, 2025

For example, a "login" button links to the home frame, while an "enroll" button links to the course frame. This process involves creating transitions and animations to simulate a smooth user experience, such as "push," "slide," or "dissolve" effects between screens. Once this interactive prototype is complete, it will be shared with respondents for testing. The goal is to evaluate the usability of the eLOK mobile application and gather valuable feedback on how intuitive and efficient the user journey is, before moving into the final development phase.

Evaluate Against Requirements

The final stage is prototype testing, conducted through usability testing with the respondents using the System Usability Scale (SUS). Respondents will be provided with the SUS questionnaire to assess their experience while using the designed application prototype. They will be asked to rate the extent to which they agree with the statements provided for each item in the questionnaire.

Based on the obtained SUS scores, respondents provided highly positive evaluations of the eLOK mobile application prototype, with an average SUS score of 94.4. This score indicates that the system being tested possesses a very high level of usability. Based on the standard grading scale, this score falls into the "Excellent" or "Best Imaginable" categories, meaning the system is highly intuitive, efficient, and user-friendly. Furthermore, in a letter-grade system, this score earns an "A" and positions the system as a "Promoter" on the Net Promoter Score (NPS) scale. This indicates that users are not only satisfied but also highly likely to recommend the system to others. Overall, a score of 94.4 indicates that the system's design and functionality have successfully met user needs and expectations. The scores for each SUS question are presented in the bar chart in Figure 7.

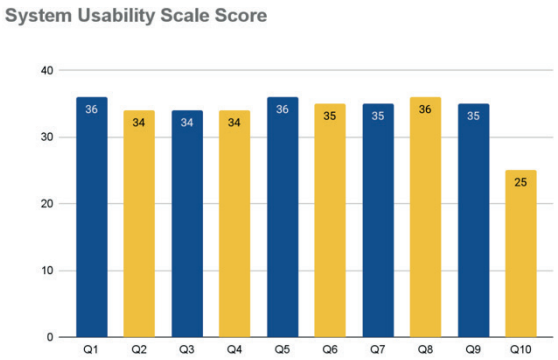


Figure 7.
Bar Chart SUS Score
Source: Author Analysis, 2025

Based on the bar chart above, the results of the System Usability Scale (SUS) indicate that most respondents gave high scores to questions Q1-Q9, reflecting a positive perception of the overall ease of use of the eLOK Mobile application. Respondents felt the application had an intuitive design, easy navigation, and clear functionality, enabling them to complete tasks effortlessly. The high scores on these questions suggest that the application is well-designed, with clear design elements, ease of task completion, and high user satisfaction, leading users to perceive it as easy to use.

However, despite most questions receiving high scores, Q10 ("I needed to learn a lot of things before I could get going with this system") received significantly lower scores from most respondents. The low score on Q10 suggests that some respondents felt they needed considerable time to adapt to the application before they could use it smoothly. This indicates a gap in terms of ease-of-use or interface clarity, suggesting that new users may not fully comprehend or master the application without additional time or training.

The low score on Q10 may be attributed to several factors. First, although the application is generally well-designed, some features or interactive elements may not be immediately clear to first-time users. This could lead to difficulties in finding specific features, particularly for users who are new to the application or unfamiliar with e-learning application designs. Additionally, the lack of explicit guidance or tooltips can lead to confusion or uncertainty when new users use the application for the first time. This also suggests that some features may not be fully intuitive, prompting users to feel the need to "learn more" before they can use the application efficiently.

Although the eLOK Mobile application has an effective design that meets the expectations of most users, improvements in user guidance and navigation simplification could help reduce the time required for adaptation. Enhancing design elements that may confuse new users, such as menus or icons that are

not immediately clear, could reduce reliance on learning and expedite application use. As a recommendation, the application could be optimized by adding interactive tutorials, improving the visibility of key elements, and using clearer color contrasts to make it easier for users to understand the application from the first use.

Overall, the high SUS score indicates that the interface design is good and user-friendly, and that users are satisfied with their experience using the application. This reflects the success of applying the User-Centered Design (UCD) principles throughout the design process. This study focused on the design and usability evaluation of a high-fidelity prototype. It did not encompass the technical constraints and challenges of the actual implementation phase. This includes aspects such as backend integration with the existing eLOK legacy system, potential database complexities, and data security protocols.

CONCLUSION

This study developed the eLOK Mobile design, featuring a new interface and additional features not previously available on the eLOK website. On the login page, the interface was updated and equipped with a fingerprint login feature. The course search menu was redesigned with an updated interface and layout, including the addition of images and icons representing the identity of each faculty and department. The My Courses page was also updated with icons for tasks, materials, and videos. Furthermore, a new Chat feature was introduced that was not available on the previous eLOK website. Usability testing using the System Usability Scale (SUS) yielded an average score of 94.4 in the "Best Imagine" category, indicating that eLOK Mobile is highly usable, well-received by users, meets their expectations, and provides a smooth user experience.

The findings suggest that eLOK Mobile applications have the potential to enhance interactive learning, simulations, and practice-based training. Features such as fingerprint login and chat support user engagement and independent learning. It is recommended that future developments integrate multimedia content and real-time communication tools to improve effectiveness, accessibility, and user performance in practice-based learning.

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