



Enhancing Learning Accessibility through Digital Libraries: A Study on User Orientation, Resources, and Pedagogical Aspects

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ABSTRAK

Perkembangan teknologi digital telah mendorong transformasi perpustakaan tradisional ke dalam format digital untuk mempermudah akses terhadap sumber belajar melalui jaringan internet. Namun, efektivitas perpustakaan digital dalam mendukung kebutuhan pengguna masih memerlukan evaluasi yang komprehensif. Penelitian ini bertujuan untuk mengevaluasi efektivitas platform perpustakaan digital berbasis Android yang digunakan oleh mahasiswa Program Studi Teknologi Pendidikan. Metode penelitian yang digunakan adalah deskriptif kuantitatif dengan teknik pengumpulan data melalui angket dan wawancara. Instrumen penelitian berfokus pada tiga aspek utama, yaitu orientasi pengguna, sumber belajar digital, dan aspek pedagogis. Data dianalisis menggunakan statistik deskriptif untuk mengukur tingkat efektivitas platform berdasarkan ketiga aspek tersebut. Hasil penelitian menunjukkan bahwa platform perpustakaan digital mendapatkan respons positif dari mahasiswa dengan rincian: antarmuka yang intuitif (90%), koleksi sumber belajar yang relevan (95%), interaktivitas yang baik (85%), dan dukungan terhadap pembelajaran kolaboratif (85%). Temuan ini mengindikasikan bahwa platform perpustakaan digital berbasis Android telah efektif dalam menyediakan layanan akses sumber belajar serta mendukung proses pembelajaran mahasiswa. Simpulan dari penelitian ini adalah bahwa perpustakaan digital dapat menjadi solusi inovatif untuk memperluas jangkauan akses sumber belajar, meningkatkan keterlibatan pengguna, dan mendukung efektivitas proses pendidikan di lingkungan perguruan tinggi.

ABSTRAK

The development of digital technology has driven the transformation of traditional libraries into digital formats to facilitate access to learning resources through internet networks. However, the effectiveness of digital libraries in meeting users' needs still requires comprehensive evaluation. This study aims to evaluate the effectiveness of an Android-based digital library platform used by students of the Educational Technology Study Program. The research employed a quantitative descriptive method with data collection techniques including questionnaires and interviews. The research instruments focused on three main aspects: user orientation, digital learning resources, and pedagogical aspects. The collected data were analyzed using descriptive statistics to measure the platform's effectiveness across these aspects. The findings revealed that the digital library platform received positive responses from students, with detailed results indicating an intuitive interface (90%), relevant learning resource collections (95%), good interactivity (85%), and support for collaborative learning (85%). These findings suggest that the Android-based digital library platform has been effective in providing access to learning resources and supporting students' learning processes. The conclusion of this study is that digital libraries can serve as an innovative solution to expand access to learning resources, enhance user engagement, and improve the effectiveness of educational processes in higher education settings.

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1. INTRODUCTION

Libraries are an essential part of the university environment, and their important role in supporting the implementation of the Tri Dharma of Higher Education makes effective library management very necessary. This aims to provide academic members in accessing various sources of information they need (Deodhar, M. and Powdwal, 2017; Johnston, 2020). Furthermore, libraries also play an important role in meeting knowledge and information needs which are the main support in the learning process. In the past, the dissemination of information through libraries was done manually, but with advances in digital technology, libraries have undergone a significant transformation, becoming what we now know as digital libraries (Deodhar, M. and Powdwal, 2017; Johnston, 2020; Mannheimer et al., 2019). Therefore, a system is needed that is able to manage library information from manual management to more efficient digital management. Therefore, with the dynamic development of information institutions and the existence of legislation regarding libraries, libraries in higher education are required to innovate in the provision, management, preservation, utilization and dissemination of information in an efficient and affordable way through information technology that continues to develop. One form of this development is the establishment of a digital library through the process of digitizing and collecting digital collections that already exist at the institution (Hendra et al., 2018; Ummah et al., 2020). A digital library is an information institution based on Information and Communication Technology (ICT) that provides services and collections in digital form, accessible via the internet network. Digital library is an organization that provides information sources, complete with staff who have special expertise in selecting, organizing, interpreting, providing intellectual access, distributing, preserving and ensuring the continuity of collections of digital works (Aggleton, 2019; Gegenfurtner et al., 2020).

The use of information technology in library management can be illustrated through library automation and the development of digital libraries. In the current era, when people are increasingly accustomed to mobile devices such as smartphones, libraries are starting to develop mobile applications. In Indonesia, many libraries are starting to develop mobile versions of OPAC (Online Public Access Catalog) which allows users to access the library catalog via their smartphones. The development of this mobile version of OPAC aims to accommodate the preferences of users who are accustomed to accessing information via smartphone (Ardiani, 2020; Permata et al., 2022). By utilizing smartphone technology, libraries can improve their services in higher education. One example of a library service application that combines the sophistication of a smartphone and an internet connection is a mobile library. Some examples of digital libraries currently that have been developed by many educational institutions are in the form of website-based digital library systems using SLiMS (Senayan Library Management System) software as in the research of (Robinson Situmorang, 2013; Sutamrin et al., 2022). SLiMS provides various important features for managing and administering libraries, including collection management, catalogue, borrowing and returning books, member management, and other administrative functions. Along with the increasing use of smartphones to access various daily needs which are considered more practical than access to computer devices, digital libraries require development innovation, one of which is the development of an Android-based digital library application (Alfawareh & Jusoh, 2014; O'Donnell & Epstein, 2019; Qodr et al., 2021; Synnott, 2018).

Digital library development aims to ensure that existing library collections can be accessed easily and economically by the public (Aggleton, 2019; Meiza et al., 2020). The library can be considered as a learning resource because it is able to provide a variety of reading sources that can be used to support the learning process. Learning sources can come from various aspects, including humans (individuals), materials, events, environments, and technology that form conditions that support learning and facilitate the acquisition of knowledge, skills, and attitudes by students (Aggleton, 2019; Nurlaili, 2018). Learning resources are seen from a digital aspect, emphasizing the use of digital devices such as smartphones, notebooks, laptops, etc, as well as the use of the internet. Using the internet as a learning resource gives students the opportunity to study independently and access learning resources online, such as searching for information through search engines such as Google and Yahoo, as well as accessing digital libraries online (Farida et al., 2020; Sasmita, 2020). Digital learning resources provide flexibility for users to access information anytime and anywhere according to their needs, thereby facilitating distance learning, independent learning, and technology-based learning (Celik & Karadeniz, 2018; Mathrani et al., 2022; Perdana et al., 2021). Digital libraries, on the other hand, contain collections of reading materials and information sources presented in digital format and accessed via technological devices such as computers, tablets, or smartphones. Digital libraries often provide access to various types of digital learning resources, including e-books, electronic journals, databases, and other digital resources that support the learning process, research, and scientific development.

Collections in digital format are considered practical in terms of storage and allow users to access them via smartphone devices without being limited by distance and time. The main goal of a digital library

is to provide users with broad access to information, with a focus on delivering and disseminating information that is fast, accurate and reliable (Farida et al., 2020; Herawati et al., 2019; Sasmita, 2020). Libraries, as providers of relevant information for users, are expected to be able to complete and maintain their collections. Apart from these core objectives, digital libraries also offer various benefits, as mentioned by Mac Kellar, including: (1) easier catalog browsing, (2) the ability for users to search library catalogs from outside the library, (3) improvements in service information, (4) ease in editing and updating bibliographic information, (5) creating more physical space in the library, and (6) increasing the profile of the library (Fahrizandi, 2020).

Based on initial data collection carried out by researchers through interviews with the head of the Education Technology Department, Faculty of Education, Makassar State University, it was confirmed that there is already a digital library information management system, such as an Android-based digital library application, which has been implemented in the Education Technology Department, Faculty of Education, University Makassar State. The reason for choosing the Android operating system in library development is because Android is open source, which means it can be used, distributed and modified freely by developers and creators (Ramadhani & Saputro, 2021). Android-based digital libraries provide new media for users in providing information services, including book collections and online book lending (Aprizal & Hasriani, 2019; Herawati et al., 2019). Uses Android smartphone technology, the result of an analysis of library needs (Aprizal & Hasriani, 2019). The characteristics of Android-based digital libraries identified by Chowdury include the ability to contain various digital information sources such as text, images, audio and video; reducing dependence on physical space; allows simultaneous use of information sources; supporting the role of librarians as online customer service; provide information search and retrieval facilities; as well as eliminating space, time and language barriers (Aprizal & Hasriani, 2019; Kristyanto, 2019). Other research also added other characteristics, such as large collection sizes, various formats, general and special collection development policies, attention to copyright, level of accessibility and interoperability (Widiyawati, 2019).

The creation of a digital library system aims to ensure that information is stored and can be accessed in the future (Farida et al., 2020; Sasmita, 2020; Sumarni & Rahmi, 2018). Implementing an appropriate digitization system is the main key to ensuring the sustainability of digital collections, in line with the aim of making these collections easily accessible to students. The Android-based library that has been implemented in the Educational Technology study program should have an effectiveness study that can provide an overview of how the existence of the library supports the lecture process. Evaluation of the quality of digital libraries needs to be carried out, especially from users. Several important aspects relate to aspects of library users (students), namely aspects of usability, collection quality, service quality, system performance efficiency, and user opinion solicitation. It is very necessary to measure the effectiveness of digital libraries to determine the extent of the quality of digital libraries as learning resources that are suitable for use by students to support learning. Based on this context, this research aims to investigate the effectiveness of using an Android-based digital library platform in the Educational Technology Study Program, Faculty of Education, Makassar State University based on aspects of user orientation, digital learning resources, and pedagogical aspects.

2. METHOD

This research uses a quantitative descriptive approach. This approach has the ability to provide a comprehensive picture of the effectiveness of the Android-based Digital Library as a Learning Resource Center for students of the FIP UNM Educational Technology Study Program. This research population includes all students enrolled in the UNM Educational Technology Study Program. The research sample was taken using a random sampling method with a total of 70 students. The application whose effectiveness is measured is an Android-based digital library application which has been developed by the FIP UNM Educational Technology study program in 2022. The ePusTP application has been developed through a series of development models with feasibility test results by content experts (96%), media experts (88%) and librarians (98%) indicated the product was "very worthy." Data collection methods involve the use of questionnaires and interviews. The questionnaire consists of aspects: (1) user orientation; (2) digital learning resources; and (3) pedagogical aspects. The assessment aspects in the quality evaluation questionnaire were adapted from digital library components according to the Federation of Library Associations and Institutions (IFLA) and research by (Natalea & Christiani, 2020). The interview method was carried out to complete information regarding suggestions and criticism of digital library applications. Digital Library Quality Evaluation Questionnaire Instrument Grid showed in Table 1.

Table 1. Digital Library Quality Evaluation Questionnaire Instrument Grid

No.	Aspect	Indicator
1	User Orientation	a. Intuitive interface b. Individual differentiation c. Collection of learning resources d. Inclusive design e. Ability to understand material
2	Digital Learning Resource	a. Interaction with students b. Latest learning content c. Inspirational learning content d. Access via various devices
3	Pedagogical	a. Collection of relevant books b. Collaborative learning support c. Usage & support guide

3. RESULT AND DISCUSSION

Results

This section will discuss the findings related to aspects of user orientation assessment, aspects of digital learning resources, and pedagogical aspects based on the responses and perceptions of users (students of the Educational Technology Study Program) who have used them. Android-based digital library application developed by students of the Education Technology study program in 2022 and can be downloaded on the Play Store via the link https://play.google.com/store/apps/details?id=id.my.akbarcahaya.android61e6ce8047b7a&pcampaignid=web_share. The ePusTP application has several services including: (a) guest book; (b) catalog; (c) favorite book; (d) thesis; (e) librarian; (f) discussion room; and (g) account. Meanwhile, the menus available in this digital library are: (a) homepage; (b) catalog; (c) discussion; (d) notification; and (e) others (consisting of my menu, thesis, collections, librarian, guest book, and about). The ePusTP application can only be installed on the Android operating system. At the start (opening) each user or student needs to create an account, followed by logging in to the application. Each user has the authority to access all the menus in the application. ePusTP main menu display and Main homepage of ePusTP showed in Figure 1. Ebook List Display in ePusTP and Reference Book Catalog Menu showd in Figure 2.

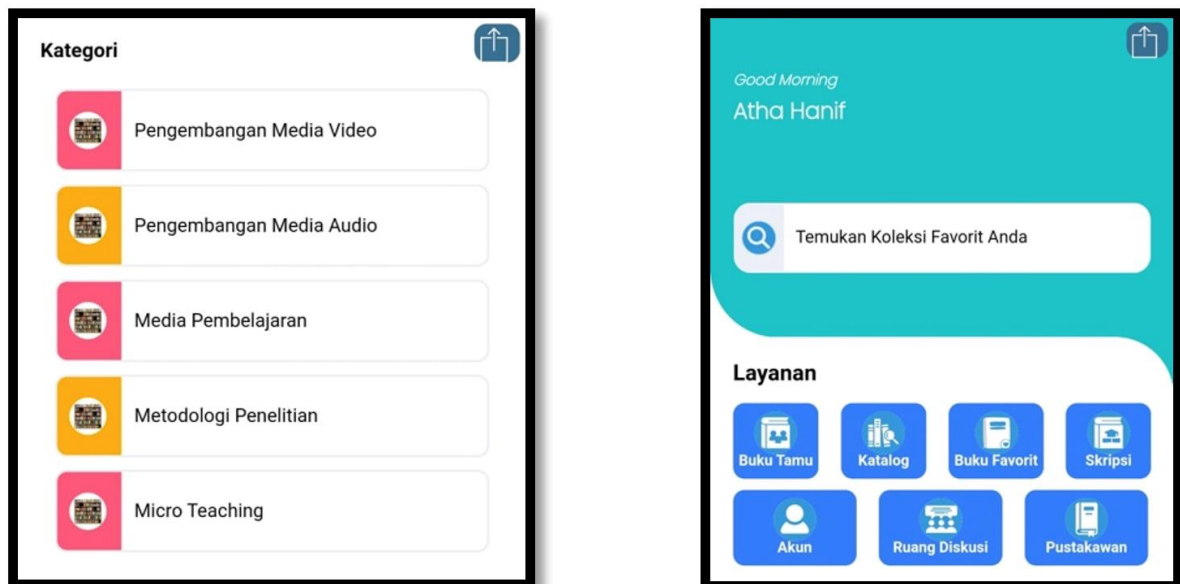


Figure 1. ePusTP Main Menu Display and Main Homepage of ePusTP

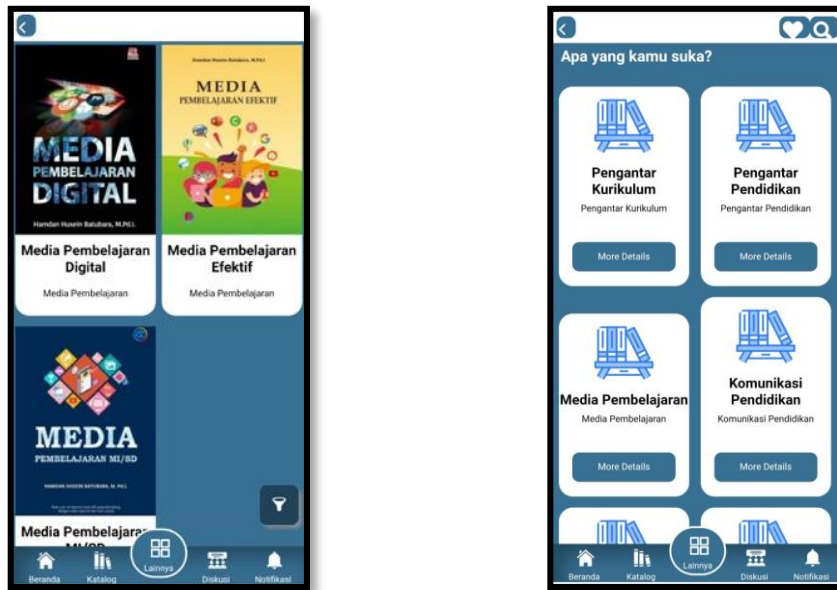


Figure 2. Ebook List Display in ePusTP and Reference Book Catalog Menu

On the homepage, the ePusTP application provides a search menu to find the desired collection of learning resources and generally has a main menu that is grouped into service categories, categories, book recommendations, and ePusTP user testimonials. In the service menu, users can access the book and thesis collections. In the category menu in the ePusTP application, reference books are presented which are grouped based on their relevance to the courses in the Educational Technology study program. This application menu is also equipped with a Book Recommendations menu, which contains selected books that are recommended for users to read online. To be able to read books and other reading sources in the ePusTP application, an access code is required which will be provided by the admin or librarian.

Apart from textbooks and reference books, the ePusTP application also provides references for thesis titles of Educational Technology students who have graduated from 2017 to 2022. Thesis title data can be filtered based on year of graduation, type of research, research method, and research subject. This thesis menu feature aims to enable students to analyze trends and opportunities for thesis topics in the Educational Technology study program. Thesis Menu Display in the FIP UNM ePusTP Application in Figure 3.

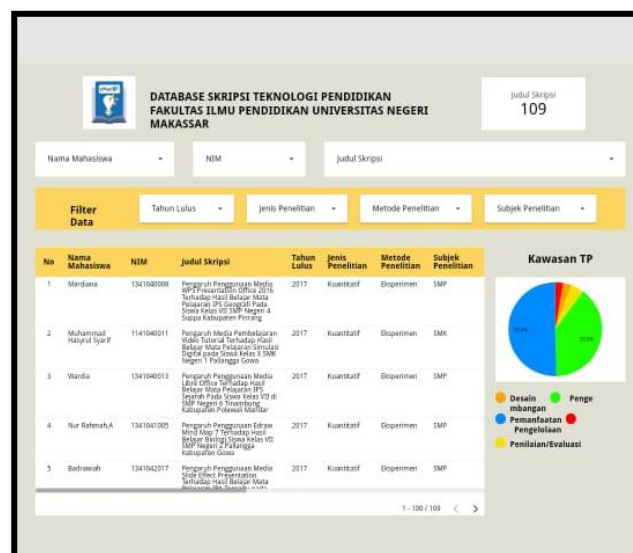


Figure 3. Thesis Menu Display in the FIP UNM ePusTP Application

The research results show that the majority of users find the Educational Technology Digital Library (ePus TP) interface to be very intuitive, with a percentage of 55%. This indicates that users feel comfortable and familiar with how to use the platform. In addition, around 45% of respondents stated that

the platform is able to provide good individual differentiation, which means the platform can adapt to user preferences and needs effectively. Other findings show that as many as 50% of respondents felt that the collection of learning resources provided by the platform met their needs, while 45% of respondents felt that the platform design was inclusive, able to reach diverse user groups. Furthermore, as many as 50% of respondents also stated that the platform allows them to understand the material independently, indicating that the platform supports and encourages independent learning among users. Overall, these findings indicate that the TP Digital Library Platform has succeeded in providing a friendly and relevant user experience, and supports the diversity of user needs, while facilitating the independent learning process among students. Assessment of User Orientation Aspects showed in Table 2. Percentage of Effectiveness Assessment of User Orientation Aspects showed in Figure 4.

Table 2. Assessment of User Orientation Aspects

User Orientation Aspects	Strongly Disagree	Disagree	Agree	Strongly agree
Intuitive interface	-	10%	35%	55%
Individual differentiation	-	5%	50%	45%
Collection of learning resources	-	5%	45%	50%
Inclusive design	-	10%	45%	45%
Ability to understand material	5%	10%	50%	35%

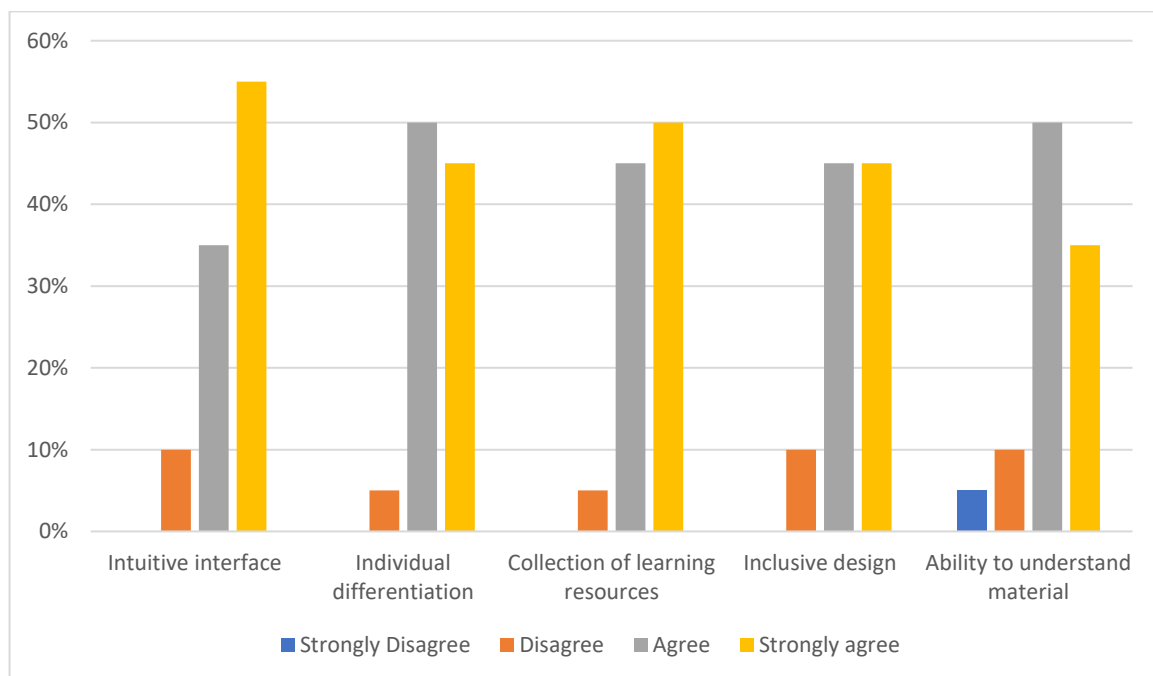


Figure 4. Percentage of Effectiveness Assessment of User Orientation Aspects

In the aspect of digital learning resources, the majority of users expressed satisfaction with the interaction provided by the ePus TP Digital Library application with 60% of respondents agreeing. This shows that the application is successful in creating an interactive learning environment and facilitating active involvement from students. Around 55% of respondents also agreed that this digital library application was able to provide the latest learning content and users felt that they had access to relevant and up-to-date information and knowledge. Furthermore, as many as 55% of respondents also strongly agreed that the learning content presented by this digital library application was inspiring and able to motivate and encourage users to study with high enthusiasm. In addition, 65% of respondents strongly agreed that this digital library application provides access flexibility via various devices, indicating that users can easily access this platform via various devices, such as laptops, tablets and smartphones. From this data, it provides a positive picture of how the TP digital library application (ePusTP) is able to provide adequate interaction, up-to-date, inspiring learning content, and access flexibility that allows users to learn effectively and efficiently. Assessment of Digital Learning Resources Aspects in Table 3. Percentage of Effectiveness Assessment of Digital Learning Resources Aspects in Figure 5.

Table 3. Assessment of Digital Learning Resources Aspects

Aspects of Digital Learning Resources	Strongly Disagree	Disagree	Agree	Strongly agree
Interaction with students	-	15%	60%	25%
Latest learning content	-	5%	55%	40%
Inspirational learning content	-	10%	35%	55%
Access via various devices	-	10%	25%	65%

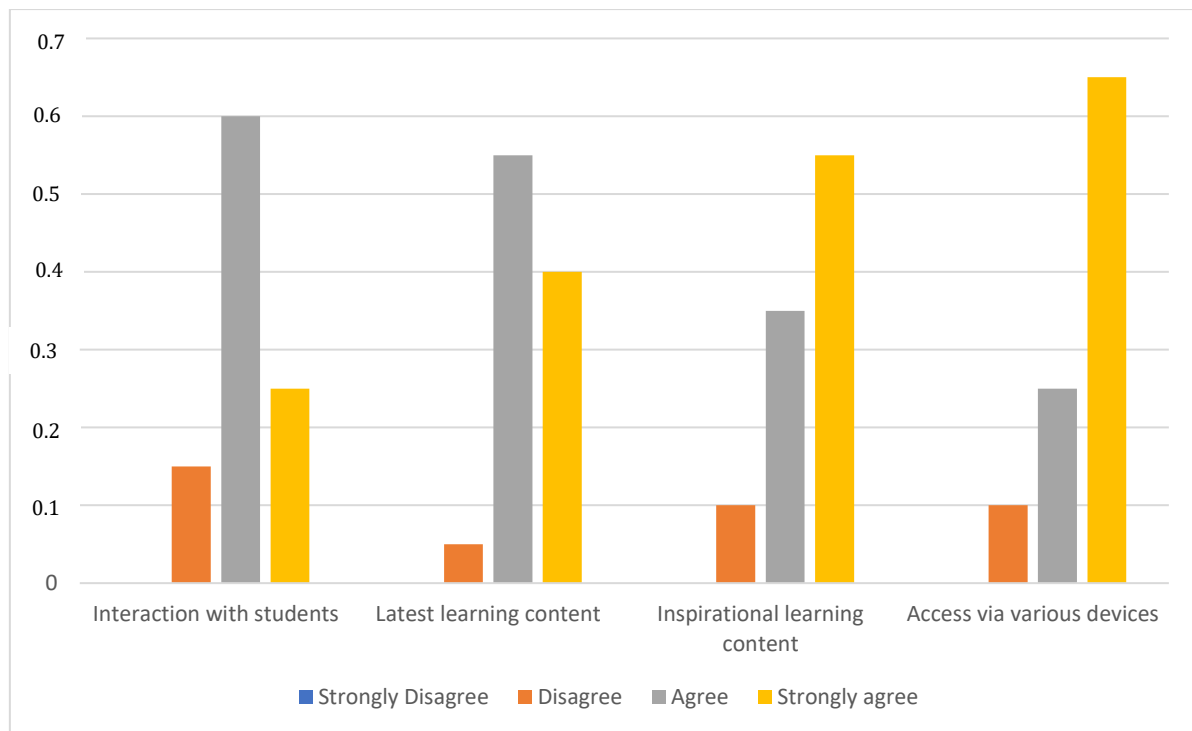


Figure 5. Percentage of Effectiveness Assessment of Digital Learning Resources Aspects

In the pedagogical aspect, research shows that the majority of users feel that the TP Digital Library Application provides a collection of books that are relevant to the curriculum of the Makassar State University Educational Technology Study Program, with 45% of respondents agreeing and 45% of respondents strongly agreeing. These findings show that this application is able to meet learning needs in accordance with the applicable curriculum. In addition, around 50% of respondents strongly agreed and 35% of respondents agreed that this application supports collaborative learning, indicating that this application encourages interaction between users to learn together, facilitating discussion and exchange of ideas between fellow students. Furthermore, around 45% of respondents strongly agree and 50% of respondents agree that this application is equipped with a usage guide and adequate technical support for users. This shows that this application provides the necessary assistance for users in understanding and making good use of the application features. These findings as a whole confirm that the TP Digital Library Application not only provides collections that are relevant to the curriculum, but also encourages collaborative learning and provides sufficient guidance and support for users, so as to facilitate an effective and efficient learning process among Study Program students Education technology. Discussion Forum Menu in ePusTP and Discussion Display in ePusTP in Figure 6. Assessment of Pedagogical Assessment Aspects in Figure 7.

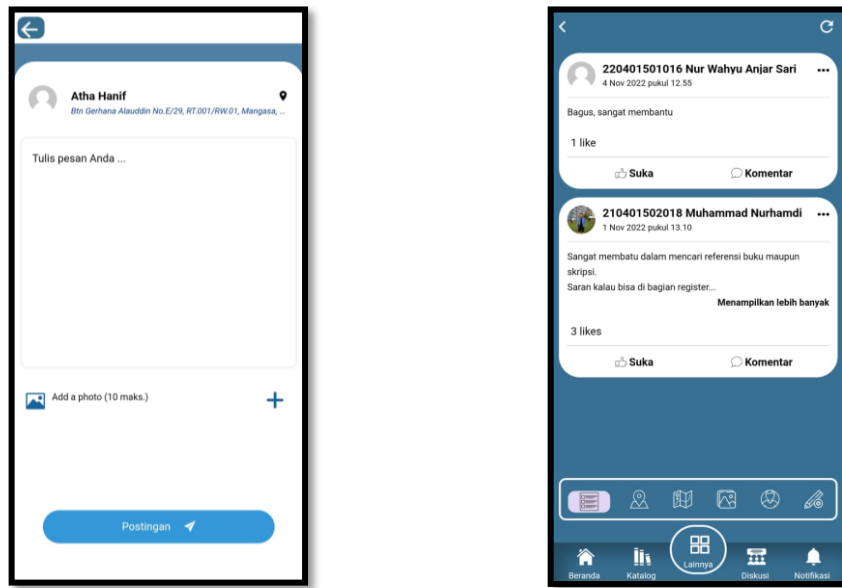


Figure 6. Discussion Forum Menu in ePusTP and Dicussion Display in ePusTP

Table 4. Assessment of Pedagogical Assessment Aspects

Pedagogical Aspect	Strongly Disagree	Disagree	Agree	Strongly agree
Collection of relevant books	-	10%	45%	45%
Collaborative learning support	5%	10%	35%	50%
Usage & support guide	-	5%	50%	45%

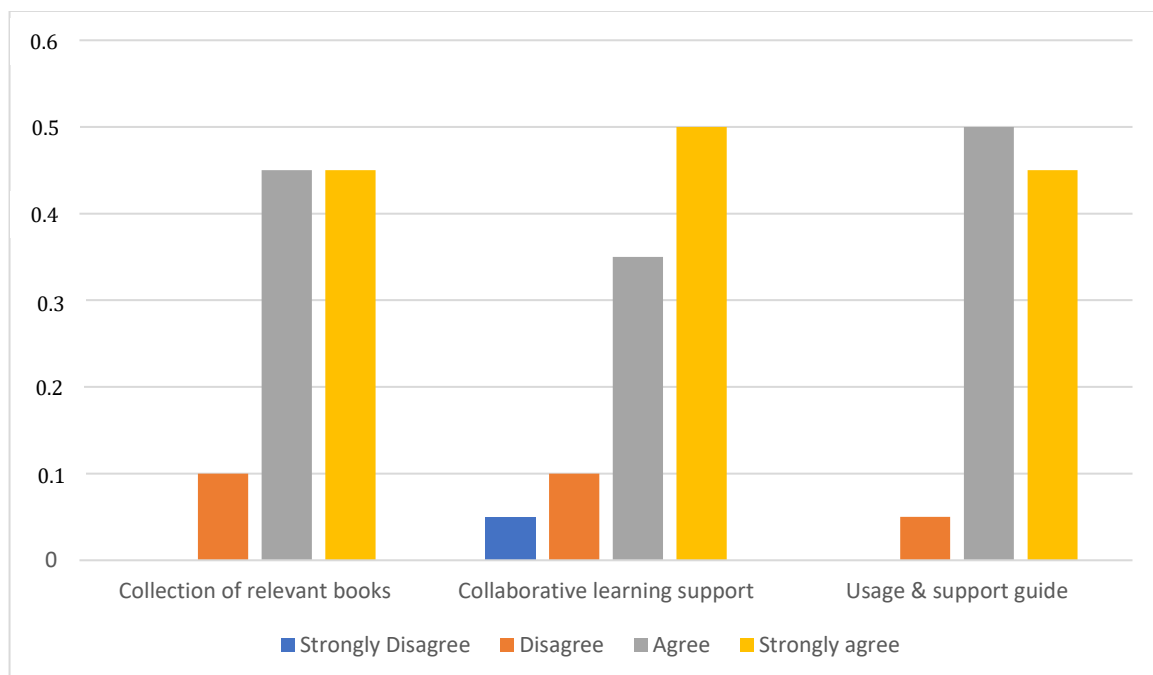


Figure 7. Percentage of Effectiveness Assessment from Pedagogical Aspects

The TP Digital Library application (ePusTP) is able to provide a learning experience, support the diversity of user needs, as well as facilitate the independent learning process among students through access to a variety of reading books. The intuitive interface of the ePusTP digital library application is able to provide effective individual differentiation and accommodate user needs well. In terms of digital learning resources, this application is considered successful in providing the latest and inspiring learning content, motivating users to learn with high enthusiasm, and providing flexibility of access via various devices. This allows users to learn effectively and efficiently anywhere and anytime. From a pedagogical perspective, this

application is proven to be able to provide a collection of books that are relevant to the curriculum, support collaborative learning, and provide adequate guidance and technical support for users, thereby encouraging an interactive and effective learning process among students of the Educational Technology Study Program. Thus, the TP digital library application (ePusTP) is an effective and efficient learning resource in facilitating learning and knowledge development among students.

Discussion

Digital libraries are a transformation of libraries according to the demands of the times. The transition from analog society's habits to the digital native era is also a challenge for policy makers to be able to align library functions with current community needs (Aggleton, 2019; Meiza et al., 2020). Digital libraries are expected to not only transfer book collections into digital format, but also need to have user-friendly services and systems. Digital libraries as a digital learning resource must be able to improve student performance; increasing the number, quality and completeness of internet-based learning resources; make learning resources easy to find by students, teachers, & parents; and ensuring that learning resources are available at all times (Akviansah, 2020; Doni & Zain, 2019). The Education Technology Digital Library (ePusTP) application features a clear and intuitive interface, making it very easy for students and users to access without experiencing any difficulties. The interface design of this digital library application is well managed, displays a simple appearance and presents all the features that can be accessed by users easily. Apart from that, the light size of the ePusTP application, only around 26 MB, makes it easier for users to install on their Android smartphone. This provides comfort for students in operating this application, without having to worry about overloading their devices. Apart from having a user-friendly interface, ePusTP also pays good attention to aspects of individual differentiation. This application is able to provide a user experience that is tailored to the user's preferences and needs effectively (Aggleton, 2019; Meiza et al., 2020). This is reflected in the various types and forms of reading references available in digital library applications. Students or users can easily choose reading books, such as reference books and theses, according to the catalog category they want. More than that, ePusTP even provides book recommendations according to readers' interests, creating a personalized learning experience that suits each individual's needs.

The development of learning resources must be based on learning objectives, the character of the material content, learner characteristics, and the learning and learning environment (Rahmadi et al., 2018). The ePusTP digital library application as a learning resource platform not only meets standards as a user-friendly platform, but is also able to accommodate various individual learning needs. With a focus on simple and intuitive design, as well as the ability to provide appropriate book recommendations, ePusTP provides an effective solution for students to access relevant and useful learning resources according to their preferences. The reference books provided are also adapted to the study program curriculum so that they can become the main learning resource when students need access to lecture reference books (Robinson Situmorang, 2013; Sutamrin et al., 2022). Based on the research results, users are satisfied with the interaction provided by the ePusTP Digital Library application. Digital library applications succeed in creating an interactive learning environment, facilitating active involvement from students, and encouraging more participatory learning. On the ePusTP main menu, a Discussion Room menu is available to conduct virtual conversations between application users. Through the discussion room, users can conduct discussions directly like using the messenger application.

Digital library application users say that this application provides the latest and inspiring learning content, as well as providing flexibility of access via various devices. The collection of books and reading resources in the digital library application provides the latest references until 2022. Through the use of ICT in the digital library, it is hoped that it will be able to increase students' motivation and interest in searching for sources and lecture materials (Aggleton, 2019; Meiza et al., 2020; Robinson Situmorang, 2013). From a pedagogical perspective, the Educational Technology Digital Library provides a collection of books that are relevant to the Educational Technology Study Program curriculum. Books and reading sources are categorized into course topics in the Educational Technology study program. This can make it easier for students who want to find learning resources related to certain subjects. The learning resources available in the digital library application are relevant to the courses in the educational technology study program. Apart from that, this application is also supported by collaborative learning support features and usage guides as well as adequate technical support. The existence of an Android-based digital library can be an application that provides reference sources, but also supports the implementation of active and efficient learning for Educational Technology students.

4. CONCLUSION

The Android-based Digital Library Platform developed for the Educational Technology Study Program, Faculty of Education, Makassar State University, has great potential to support and enrich student learning experiences. Based on the user orientation aspect, the digital library platform is considered to be very intuitive and able to meet the needs of a variety of student learning resources. Based on research results, Android-based digital libraries have advantages, namely in the aspects of comfort, convenience and efficiency in their use. On the other hand, the weakness of this type of digital library lies in that access is disrupted when the server has problems or if there is a power outage because of its dependence on internet network access. Android-based digital libraries also have other advantages such as saving space, providing access to non-stop reading sources without space and time limitations, multimedia collections, and more affordable costs (even free). The results of the effectiveness assessment from various aspects show that this platform has succeeded in meeting user needs well. Intuitive interfaces, appropriate collections of learning resources, interactivity, and support for collaborative learning are important elements in ensuring the success of a digital library platform.

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