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Development of UI/UX E-Learning Javanese Android Apps Using User Centered Design (UCD) Method

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Abstract−Indonesia is a country with an area of 1.9 million km2 that is rich in diversity, including different languages in each region. This language diversity gives each region its own characteristics. However, in the 21st century, we witness the phenomenon of losing polite values in speaking using local languages. This is due to the influence of western culture that has penetrated Indonesia, especially through technological advances and television broadcasts that often show city and foreign cultures. One of the threatened cultures is the use of Javanese language which is increasingly rarely used. Javanese language is unique with unggah-ungguh as a differentiator from other regional languages. The rapid development of technology, especially in the world of education, requires that we make the best use of it, but still maintain and preserve ancestral heritage, such as Javanese. This research aims to design an optimal UI/UX design for Javanese E-Learning platform on Android device, focusing on UCD approach. Then after successfully designed, SUS calculation was done and obtained an average SUS value of 77.5 which means this design is good to continue to the application development stage. The target in this research is early childhood, researchers took the object of one of the MI in Banjarnegara Regency, namely MI Muhamadiyah Kalilandak.

Keywords: E-Learning; User Centered Design; System Usability Scale; Technology; Javanese Language

1. INTRODUCTION

Indonesia is a country with an area of 1.9 million km2 which is rich in diversity, including language differences in each region. This diversity of languages gives its own characteristics to each region. However, in the 21st century, we are witnessing the phenomenon of losing polite values in speaking using regional languages [1]. This is due to the influence of western culture that penetrated into Indonesia, especially through technological advances and television broadcasts that often featured city and foreign cultures [2]. As a result, many young people tend to forget the values of politeness in communicating, influenced by the style of slang they see and listen to. One of the threatened cultures is the use of Javanese language which is increasingly rarely used.

Javanese language is unique with upload-ungguh as a differentiator from other regional languages. Language uploads include rules in speech and behavior, paying attention to speakers, interlocutors, and situations as a form of maintaining polite values, manners, and mutual respect [3]. Javanese language also has a stratum of language use known as grammatical arrangement, namely Krama and Ngoko which are divided into Krama Alus, Krama Lugu, Ngoko Alus, and Ngoko Lugu. The rapid development of technology, especially in the world of education, demands that we make the best use of it, but still maintain and preserve ancestral heritage, such as Javanese[4]. This is a big challenge, especially for parents and teachers in preserving Javanese, especially in early childhood, which is the main target of conservation efforts. The rapid growth of information technology and mobility has changed the learning landscape, such as introducing E-Learning platforms as modern solutions to expand access and effectiveness of learning[5].

In this digital era, E-Learning platforms can be an effective means to teach and introduce Javanese to the younger generation, while still maintaining traditional values. This research aims to design an optimal UI/UX design for Javanese E-Learning platforms on Android devices, focusing on the UCD approach [6]. UCD (User Centered Design) is a widely used method and is considered an innovative approach in system development. UCD can be used to describe a model, then the core of the UCD concept is to prioritize user experience in the system development process, with the aim that the entire system environment is based on user experience [7]. UCD is implemented as an interactive process, where the planning and evaluation stage is carried out from the beginning of the project to the implementation stage. The UCD approach adopts existing methods and techniques for analyzing and evaluating hardware and software interfaces. In the context of UCD, user participation is considered a key element in the entire development process . The use of the UCD method in this research will help gain an in-depth understanding of user needs and preferences, as well as capture changes and adjustments needed during the development process .

This is expected to produce a UI / UX design design that is responsive, intuitive, and in accordance with the wishes and level of understanding of users, increasing the attractiveness of Javanese E-Learning applications on the Android platform [8]. After finishing designing the application, the next stage is to conduct testing to evaluate the usability of the application. Tests were conducted using the System Usability Scale (SUS), a questionnaire used to measure user perceptions of the usability of software after it has been installed, built, and

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developed. This measurement method involves 10 questions graded on a scale of 1-5, where a value of 1 indicates very high disapproval, and a value of 5 indicates very high approval [9].

After the data is collected from the respondents, calculations are carried out to analyze the results. In previous studies, there were also discussions about UCD, which researchers used as literature review material and added knowledge before conducting this research. The first research was conducted by Kurniawan dkk which is titled Designing the User Interface for the Student Credit System at STMIK "AMIKBANDUNG" Based on a Website Using the User-Centered Design (UCD) Method. The results of this research indicate that the evaluation using usability testing yielded an average score on the usability variable greater than 126, suggesting no significant issues. Furthermore, a total score exceeding 102 implies that substantial improvements are not necessary. Consequently, it is concluded that implementing the User-Centered Design (UCD) approach before the development of an application is crucial to ensure that the created application aligns well with user expectations and needs [10].

The second study was conducted by Ramadhhan dkk which is titled Designing the User Experience for the E-KTP Application Submission Using the UCD Method in Tanah Baru Subdistrict. The study yielded results by implementing the user-centered design method in the electronic ID card (E-KTP) application system. The advantage of the UCD method is to construct an efficient and user-friendly E-KTP application submission system because the UCD method involves users throughout the entire design process[11].

The third study was conducted by Mahfud dkk which is titled Designing the User Interface User Experience for the Android-Based E-Ngaji Application Using the User-Centered Design (UCD) Method at TPQ. The research yielded UI/UX results for the E-Ngaji application designed using the User-Centered Design (UCD) method. The application's prototype was crafted to comprehend user preferences, placing them at the core of the application design. To achieve usability, usability testing was conducted on the prototype using the cognitive walkthrough method. The testing time for each session did not exceed 30 seconds, and the issues encountered by participants while using the design were minor, with an error percentage of no more than 50%. This was done to ensure that the application has an engaging and consistent interface that aligns with user satisfaction [12].

The fourth study was conducted by Khairil dkk which is titled Analysis of The Usability Of An Online News Website Using The User-Centered Method. In this study, an analysis of the usability of the bertuahpos.com website was conducted, and a prototype was developed. The method employed was User-Centered Design, encompassing six principles: perspective, compliance, feedback, linkages, restriction, assistance, and usability. Based on the analysis results, three identified as problematic: Perspective, Compliance, and Feedback. For the Perspective principle, it is recommended to enhance the website by adding comment features from various social media accounts such as Facebook, Twitter, and Gmail. Regarding Compliance, the suggestion is to add content for each district in the Riau province. As for the Feedback principle, the website should provide clear error messages to users in the search feature. These improvements were implemented into a proposed design prototype without altering other aspects of the design. The prototype serves as a reference for the company to enhance the website design related to usability [13]. After conducting a literature study, this research is different from previous research, this research focuses on the design of making Javanese language applications for elementary school children.

2. RESEARCH METHODOLOGY

In this study, researchers used the UCD, or User-Centered Design, represents a novel approach to system development and is widely acknowledged as a language for articulating design concepts. The fundamental principle of UCD revolves around placing the user at the core of the system development process, where the objectives and context of the system are entirely shaped by user experiences [14]. UCD is an interactive and iterative process that encompasses planning and evaluation phases from the project's initiation to its implementation stage. The application of UCD involves adhering to established methods and techniques for scrutinizing both hardware and software interfaces [15]. Of paramount importance in UCD is the active participation of users throughout the entire process. Users not only contribute to the formulation of design concepts but are also deeply engaged in all facets, including the implementation phase, which directly impacts their interactions [16]. Users are integral to the initial testing, evaluation, and iterative design phases. However, the approach may exhibit variations depending on the complexity of the system under construction. A visual representation of these processes is illustrated in Figure 1.

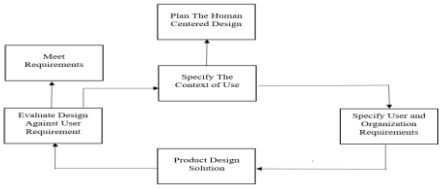

Figure 1. User Centered Design Processes

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Then after Figure 1 as for a more detailed explanation for each stage of the UCD software development method is described as follows:

1. Planning the Human Centered Design
   In this initial stage, a comprehensive literature survey is conducted to understand the theoretical background supporting the study and to identify research needs. This involves reading and comprehending reference materials such as books and journals, utilizing data processing tools to reinforce existing theories, ensuring that UCD designs align with user expectations.
2. Specify the Context of Use
   During this stage, the needs analysis phase takes place, determining which users will serve as respondents for the analysis. The aim is to establish a clear understanding of the context in which the software will be used.
3. Specify User & Organization Requirements
   In this phase, a detailed identification of user needs is undertaken to collect information about the system's design requirements. This step focuses on gathering essential data to inform the design process.
4. Product Design Solution
   After progressing through the preceding stages, this phase involves the actual design of the system. The proposed system is developed in the form of a flowchart, and the user interface design is crafted to meet the specified requirements.
5. Evaluate Design Against User Requirement
   Evaluation takes place by actively involving users throughout the entire process, from the initial stages to the finalization. The primary goal of the evaluation is to verify whether the application, designed and constructed, aligns with user preferences and needs.

3. RESULT AND DISCUSSION

The findings of this research will be elucidated step by step in accordance with the phases of the User-Centered Design (UCD) process. The explanation is as follows:

3.1 Planning the Human-Centered Design

The primary theories employed in this study are Garrett's UCD theory and previous research on the implementation of UCD in mobile phone system development.

3.2 Specify the Context of Use

The initial step in this UCD method involves determining the user context (understanding the user context). During this stage, user identification is conducted through observation, interviews, and the distribution of questionnaires. This identification aims to ascertain who the system users are and what their needs are.

a. Observation
   The survey's objective is to acquire student data and user requirements. Observations were made by the author at the school from November 2023. Initial observations involved interviewing teachers regarding user needs in designing online learning applications.
b. Questionnaire
   From the survey results, issues related to the use of e-learning application prototypes were identified, along with understanding what users require to facilitate the use of e-learning application prototype.

3.3 Specify User & Organization Requirements

At this stage, five respondents, including Javanese language teachers and staff of MI Muhamadiyah Kalilandak, were interviewed. In addition to interviews, direct observation of the application design needs was conducted at MI Muhamadiyah Kalilandak. Not only that, when filling out the questionnaire there were several students involved but in this study only five data were taken because this is only a design so that five respondents already represent considering the number of students is not too large.

a. Empathy Map
   Based on interview results, an empathy map was created to chart the responses of various individuals. This empathy map is designed to recognize user needs. Below is an empathy map based on interview findings. Empathy Map can be seen in the figure 2.

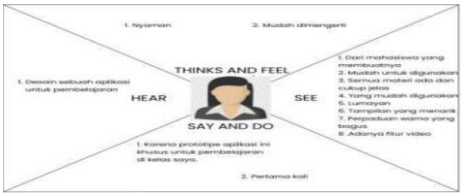

Figure 2. Empathy Map

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b. User Persona
A user persona is employed to depict the intended users of a prototype application, encompassing their profiles, challenges, aspirations, and usage scenarios [17]. This information will subsequently serve as a benchmark for understanding the requirements of users utilizing the prototype application. The data gathered to establish the user's identity is acquired through previously conducted interviews.

3.4 Product Design Solution

Following the identification of user requirements, the subsequent phase involves crafting a design that fulfills those needs. This involves implementing the solution design developed in prior stages, encompassing wireframe creation, user interface design, and prototyping.

a. Wireframe
Wireframes are employed to illustrate the visual representation of the planned user interface and are commonly known as detailed designs[18]. These wireframes are intentionally basic to avoid revealing the original design of the application prototype. Wireframe can be seen in the figure 3 and figure 4.

Figure 3. Wireframe Home Page

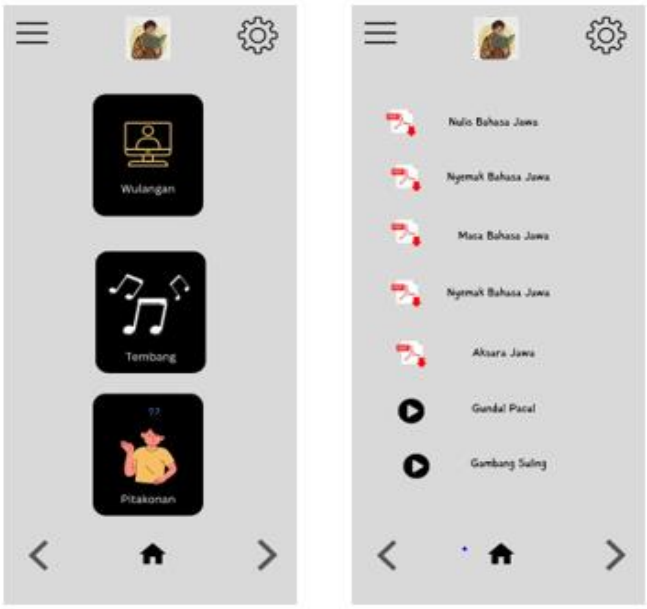

Figure 4. Wireframe Menu

b. Mockup
A mockup is the ultimate outcome of a design, encompassing intricate details such as detailed images, typography, colors, and shapes [19]. This phase yields a user interface design that resembles a completed application. Mockup can be seen in the figure 5 and figure 6.

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Figure 5. Mockup Home Page

Figure 6. Mockup Menu Page

c. Prototype

A prototype functions as a tangible instance of an API in the developmental phase, constituting an extension of the model [20]. This stage involves establishing connections between frameworks to facilitate interactive engagement with users. It serves as a dynamic representation that goes beyond the conceptual model, providing a hands-on experience of the API's functionality and its integration within a broader system. [21] The prototype essentially acts as an intermediary, showcasing the evolving features and interactions within the API and allowing for iterative testing and refinement before the final implementation is realized. In this study the prototype is presented in the figure 7 and 8.

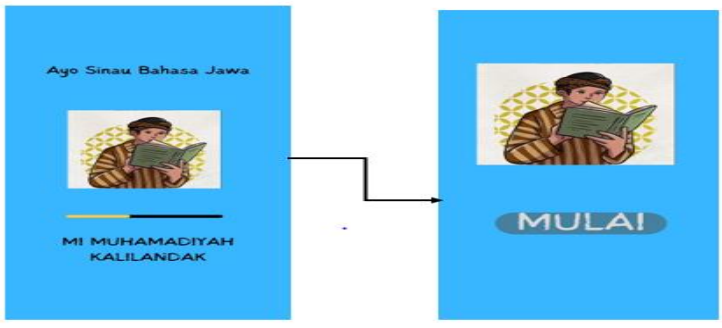

Figure 7. Prototype Home Page

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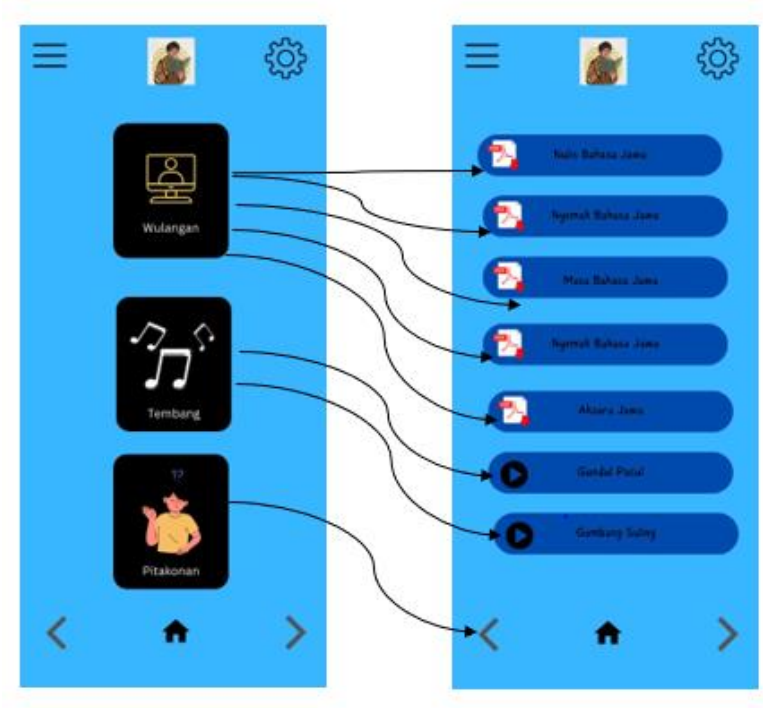

Figure 8. Prototype Menu Page

3.5 Dicussion

3.5.1 Evaluate Design Against User Requirement

During this stage, the prototype developed in the preceding phase undergoes scrutiny through usability testing. Potential users are provided with questionnaires and prototype links to gauge its usability. A System Usability Test (SUS) is conducted, comprising 10 questions that users assess on a scale of 1-5 to express their agreement with statements regarding the prototype under evaluation.

a. Testing

To ascertain the utility value of 5 respondents, the SUS data was computed using the following calculation guidelines:

1. In the case of an odd number of statements, subtract 1 from the rater's response.
2. If the statement numbers are even, deduct 5 from the rater's response.
3. Responses range from 0 to 4, with 4 indicating the highest rating.
4. The total of all rater responses is multiplied by 2.5.
5. Calculate the average score based on all rater responses.

Table 1. Question System Usability Scale

No.	Question
1.	I think I will use this system again.
2.	I find the system complicated to use.
3.	I find the system easy to use.
4.	I need help from others or the latest in using this system.
5.	I feel that the features of this system work properly.
6.	I feel there are many inconsistencies in the system.
7.	I feel others will understand how to use this system quickly.
8.	I feel the system is confusing
9.	I feel that there is no obstacle in using this system
10.	I need to get used to it before using this stem.

Table 2. Original Score of respondet's answer

Respondent	Question									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
R1	5	4	5	2	5	4	4	5	5	2
R2	5	3	5	3	5	5	5	5	5	4
R3	5	4	5	4	5	4	5	5	5	5
R4	5	3	5	3	5	4	5	4	5	3

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Respondent	Question									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
R5	5	4	5	4	5	5	5	3	5	5

In this study only used 5 respondents, because this study was only a design and there were research limitations. Then for those who filled in these respondents were teachers at MI Muhamadiyah Kalilandak. In the future, SUS applications and calculations can be made with many respondents. After data collection is carried out then calculated using the SUS method, the results are contained in Table 3.

Table 3. Calculation SUS

Responden	Question										Raw SUS	SUS Score	Grade
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10			
R1	4	3	4	1`	4	3	3	4	4	1	31	77.5	B
R2	4	2	4	2	4	1	4	4	4	3	32	80	A
R3	4	2	4	3	4	3	3	1	4	1	29	72.5	B
R4	4	2	4	2	4	2	4	3	4	2	31	77.5	B
R5	4	3	4	3	4	2	4	2	4	2	32	80	A
Nilai Rata – Rata SUS												77.5	B

In table 3 above are the answers to the SUS questions and the final assessment results using the SUS formula with an average result of 77.5. If the average SUS score is more than 70 then the application prototype is acceptable and for a value of 77.5 is included in grade B. This can be seen in figure 9 for SUS scale or SUS grade from Range 0 to 100.

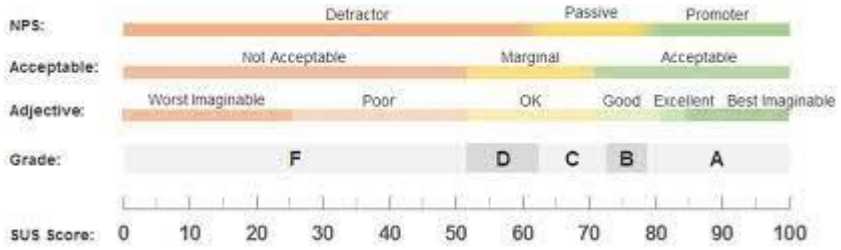

Figure 9. SUS Scale

4. CONCLUSION

The user-centered design method of application design can be used to create a user interface design that meets the needs of the user. When designing the user interface and user experience of the javanese language Mobile E-learning app, using the user-centered design method, the application, using the user-centered design method, the E-learning application produces a prototype design that provides convenience for students. Produced a prototype design that provides convenience for students. Using multiple several functions in one application. The result of this research produces a prototype of learning application, namely. After conducting the System Usability Scale (SUS) test. The average score obtained is 77.5. It can be It can be concluded that the structure of the E-learning application of Javanese language based on android can be accepted because it in accordance with the acceptable category. Then for future research can make the application according to the design and then re-conduct SUS testing, whether the application is successfully made or not.

REFERENCES

[1] T. Sunaryo, “Indonesia Sebagai Negara Kepulauan,” Jurnal Kajian Stratejik Ketahanan Nasional, vol. 2, no. 2, 2019.
[2] P. Bisnis Berbasis E-Commerce, B. Huda, and B. Priyatna, “Penggunaan Aplikasi Content Manajement System (CMS) Untuk,” 2019.
[3] W. P. Bhakti and I. Pekalongan, “PERGESERAN PENGGUNAAN BAHASA JAWA KE BAHASA INDONESIA DALAM KOMUNIKASI KELUARGA DI SLEMAN,” PBSI UPY, 2020.
[4] E. Noviyanti, A. Christian, and K. Wijaya, “Implementasi Metode UCD (User Centered Design) Pada Rancang Bangun Sistem Informasi Perpustakaan: Studi Kasus : SMK Negeri 1 Gelumbang,” 2021.
[5] Y. S. Novitasari, Q. J. Adrian, and W. Kurnia, “RANCANG BANGUN SISTEM INFORMASI MEDIA PEMBELAJARAN BERBASIS WEBSITE (STUDI KASUS: BIMBINGAN BELAJAR DE POTLOOD),” Jurnal Teknologi dan Sistem Informasi (JTSI), vol. 2, no. 3, pp. 136–147, 2021, [Online]. Available: http://jim.teknokrat.ac.id/index.php/JTSI
[6] D. R. Alamsyah, M. G. Resmi, and I. Jaelani, “DESIGN UI/UX E-LEARNING ENGLISH MOBILE USING USER CENTERED DESIGN (UCD) METHOD,” sinkron, vol. 8, no. 4, pp. 2434–2443, Oct. 2023, doi: 10.33395/sinkron.v8i4.12727.

Journal of Information System Research (JOSH)
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ISSN 2686-228X (media online)
https://ejurnal.seminar-id.com/index.php/josh/
DOI 10.47065/josh.v5i2.4740

[7] R. Saepul Rohman, Y. Wahyudin, R. Oktapiani, and D. Arief Firmansah, "RANCANG BANGUN WEBSITE DESAIN SERTIFIKAT ELEKTRONIK MENGGUNAKAN METODE USER CENTERED DESIGN," JURNAL RESPONSIF, vol. 5, no. 1, pp. 70–79, 2023, [Online]. Available: https://ejurnal.ars.ac.id/index.php/jti

[8] N. Nurtsani and E. Sarvia, "Perancangan dan Analisis User Interface/User Experience Online Store dengan Menggunakan Pendekatan Ergonomi (Studi Kasus: Wods)," Journal of Integrated System, vol. 5, no. 1, pp. 27–48, Jun. 2022, doi: 10.28932/jis.v5i1.4476.

[9] H. T. Yasmine and W. T. Atmojo, "UI/UX Design for Tourism Village Website Using the User Centered Design Method," TIERS Information Technology Journal, vol. 3, no. 2, pp. 100–114, Dec. 2022, doi: 10.38043/tiers.v3i2.3871.

[10] B. K. Dewi, M. Defriani, and M. A. Sunandar, "Design Of Health Service Mobile Application Interface Using User Centered Design Method," Sinkron, vol. 8, no. 1, pp. 231–240, Jan. 2023, doi: 10.33395/sinkron.v8i1.11931.

[11] R. D. Cahyani1 and A. Dwi, "Penerapan Metode User Centered Design dalam Perancangan Ulang Desain Website MAN 1 Pasuruan," JEISBI, vol. 03, p. 2022, [Online]. Available: https://mansatupasuruan.sch.id.

[12] A. A. Mahfudh and W. R. Saputra, "Perancangan User Interface User Experience Aplikasi E-Ngaji Berbasis Android Menggunakan Metode User Centered Design (UCD) Pada TPQ," Jurnal Ilmiah Intech : Information Technology Journal of UMUS, vol. 4, no. 2, pp. 255–262, 2022.

[13] T. Khairil Ahsyar, A. Jakawendra, P. Studi Sistem Informasi, F. H. Sains dan Teknologi Universitas Islam Negeri Sultan Syarif Kasim Riau Jl Soebrantas KM, and P. Pekanbaru-Riau, "ANALISA USABILITY WEBSITE BERITA ONLINE MENGGUNAKAN METODE USER CENTERED DESIGN," Jurnal Ilmiah Rekayasa dan Manajemen Sistem Informasi, vol. 6, no. 2, pp. 165–172, 2020.

[14] Y. Meisella Kristania, "Sistem Informasi Pelayanan Administasi Kependudukan Desa (M-Desa) Dengan Metode User Centered Design," 2021. [Online]. Available: http://ejournal.bsi.ac.id/ejurnal/index.php/ijse

[15] F. N. Khasanah, S. Rofiah, and D. Setiyadi, "Metode User Centered Design dalam Merancang Tampilan Antarmuka Ecommerce Penjualan Pupuk Berbasis Website Menggunakan Aplikasi Balsamiq Mockups," JAST : Jurnal Aplikasi Sains dan Teknologi, vol. 3, no. 2, pp. 14–23, 2019, [Online]. Available: https://jurnal.unitri.ac.id/index.php/jast/article/view/1443

[16] P. Kurnia Wardani, M. Bobbi Kurniawan, W. Azhar Ritonga, B. Ulya, and K. Kunci, "E-Commerce Penjualan Bibit Ikan Air Tawar Pada UD. Agung Sumber Sari Sigambal Menggunakan Metode User Centered Design (UCD)," vol. 05, no. 02, pp. 76–84, 2021, doi: 10.52332/u-net.v5i2.

[17] F. Febrianto and W. Andhika, "Penggunaan Metode User Persona dalam Upaya Penambahan Kebutuhan Fitur Learning Management System," Jurnal Syntax Admiration, vol. 2, no. 7, pp. 1245–1256, Jul. 2021, doi: 10.46799/jsa.v2i7.274.

[18] U. U. Sufandi, D. A. Aprijani, and P. Pandiangan, "Evaluasi dan Hasil Review Desain User Interface Prototype Aplikasi Mobile Sitta Universitas Terbuka," Jurnal Nasional Pendidikan Teknik Informatika (JANAPATI), vol. 10, no. 3, p. 147, Dec. 2021, doi: 10.23887/janapati.v10i3.40281.

[19] D. A. Fatah, A. Mufarroha, and M. A. Husnah, "PERANCANGAN ANTARMUKA PENGGUNA SISTEM INFORMASI AKADEMIK BERBASIS WIREFRAMING WIREFRAMING-BASED ACADEMIC INFORMATION SYSTEM USER INTERFACE DESIGN," vol. 11, no. 1, 2022.

[20] M. A. Wicaksono, C. Rudianto, and P. F. Tanaem, "Rancang Bangun Sistem Informasi Arsip Surat Menggunakan Metode Prototype," Jurnal Teknik Informatika dan Sistem Informasi, vol. 7, no. 2, Aug. 2021, doi: 10.28932/jutisi.v7i2.3664.

[21] D. Solehudin, T. Priatna, and Q. Y. Zaqiyah, "Konsep Implementasi Kurikulum Prototype," Jurnal Basicedu, vol. 6, no. 4, pp. 7486–7495, Jun. 2022, doi: 10.31004/basicedu.v6i4.3510.