

User Interface Analysis on Open University Credit Transfer Applications Using User Experience Questionnaire (UEQ) and Heuristic Evaluation Methods

Ade Andika Kusuma¹, Aviarini Indrati²

¹Master in Information Systems Management, Business Information Systems, Gunadarma University, Indonesia

²Faculty of Technology and Engineering, Gunadarma University, Depok, West Java, Indonesia - 16424

Email Address: ¹adeandikak(at)gmail.com, ²avi(at)staff.gunadarma.ac.id

Abstract— *Open University is one of the universities that enforces a credit transfer system that can be done by new students, both UT and non-UT graduates. The credit transfer system that has been implemented by UT is the Past Learning Recognition system. Based on the results of observations, the credit transfer application used by UT is still so much lacking, especially in terms of design, difficult to understand by users, and the facilities contained in the application are still inadequate. This research aims to evaluate the user interface and user experience of credit transfer applications, as well as knowing the test results and providing the results of improvement recommendations on the application. The study combines UEQ and Heuristic Evaluation methods. The UEQ method is used to measure user experience as well as know the level of user experience of the design of the credit transfer application. The Heuristic Evaluation method is used to examine and assess interfaces based on heuristics, as well as create a list of heuristic problems found. Respondents who participated in this study were approximately 70 people. The results of the credit transfer application evaluation do not meet the usability criteria, because the results of the UEQ benchmark measurement show UX results are at a bad and below average value. The results of the heuristic evaluation showed the findings of a very serious usability problem from credit transfer applications. Furthermore, design improvements by making prototypes are carried out in accordance with the recommendations that have been suggested.*

Keywords— *Usability, UEQ, Heuristic Evaluation, User Interface, User Experience, Improvement Design.*

I. INTRODUCTION

The rapid development of technology today encourages massive integration in various aspects of life, including in the world of education. In the world of education, the application of Information and Communication Technology has given birth to the evolution of learning from traditionally done to online learning such as e-learning, computer-aided learning, Audio-Visual-based learning, and multimedia-based learning (Mustofa & Riyanti, 2019).

Distance learning methods continue to evolve using a variety of communication and information technologies including radio, television, satellite, and the internet. In Indonesia, Open University (UT) is one of the universities that implemented distance learning methods (PJJ) long before the Covid-19 pandemic hit. The term application of distance and open learning systems that have been applied by UT means that

learning is not done face-to-face, but using media, both print media (modules) and non-print (audio / video, computer / internet, radio broadcast, and television).

Furthermore, it can also be said that UT has academic and non-academic services. Academic services (face-to-face, and written tutorials) and non-academic services (administrative and information services) for students provided by UT are essential keys to UT students' student learning success.

As with other universities, UT implements a Semester Credit System (SKS) to set the burden of student study. In this case, the study load that must be completed in one study program is measured by semester credit units (credits). To reduce the burden of student study in credit units, UT provides a choice of credit transfer system that can be done by new students, both from UT graduates and non-UT.

The credit transfer system imposed by UT has been an RPL system that is a recognition of one's learning achievements obtained from formal or non-formal education, and/or work experience into formal education. (Peraturan Menteri Riset, Teknologi, dan Pendidikan Tinggi Nomor: 26 Tahun 2016).

According to Presman (2002) the quality of the application is an application designed to facilitate users by making attractive design models without any error constraints when used. However, credit transfer applications that have been used by UT for the credit transfer process still do not have a clear consistency in terms of usage. The application is still so much lacking, especially in terms of design, difficult to understand by users, and the facilities contained in the application are still inadequate. Therefore, there needs to be improvements and evaluations related to UI / UX to credit transfer applications to facilitate work, easy to use, and facilitate the credit transfer process that runs.

The study used the User Experience Questionnaire (UEQ) and Heuristic Evaluation methods. The main objective of the UEQ method is for fast and direct measurement of UX-related (Schrepp, Hinderks, & Thomaschewski, 2017). While the Heuristic Evaluation method is used to find usability problems in a UI by evaluators with a recognized usability principle (Nielsen, 1995).

The study combines both methods to gain user experience from users and to get ratings from experts, with web-based

credit transfer application objects. After obtaining quantitative results from UEQ testing related to UX, it can be retested with Heuristic Evaluation to provide recommendations for improvement.

II. LITERATURE STUDIES

A. Credit Transfer

The recognition of past learning (RPL) is a recognition of the achievement of a person's learning that has been taken from formal and non-formal education that has previously been taken and aims to provide equality with certain qualifications to the formal and non-formal education system needed by the state, such as lecturers, instructors, teachers or other specific professions. One type of RPL is credit transfer or commonly called credit transfer, and this RPL system has been implemented at the Open University with the aim to provide recognition to the graduation of subjects that have been taken in previous education.

B. User Interface (UI)

User Interface (UI) has a function that can connect or translate information between users and the system. UI can also be defined as the inter-relationship mechanism of hardware and software to form a computing experience. Lastiansah (2012) reveals that UI is a way for programs and users to interact.

C. User Experience (UX)

User Experience (UX) is the satisfaction and pleasure of using a product that is felt by the user. According to ISO 9241-210, UX is a reaction from users in response and perception of the use of a product, system or service. Broadly speaking, UX is an experience that results in attitudes, skills, habits, and personalities when using a product. A person's level of satisfaction and comfort with a product, system or service is also a UX assessment.

According to Frank Guo (2012) there are four elements in UX, including: Usability, Valueable, Adoptability, and Desirability. In addition, the elements contained in UX also have usability elements. Furthermore, it can be concluded that usability is part of UX and can be seen in Figure 1 (Maulani et al., 2021).

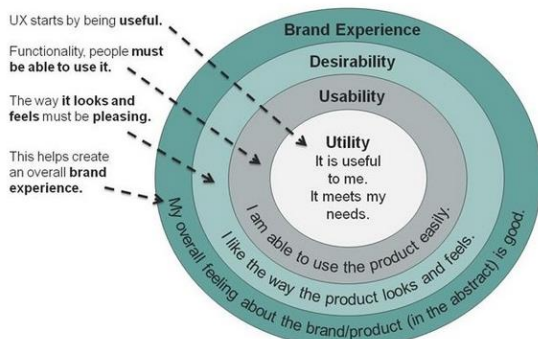


Fig. 1. Usability Part of UX

D. User Experience Questionnaire (UEQ)

The User Experience Questionnaire (UEQ) is a method used to measure user experience and is often used as part of usability

testing to collect quantitative data (Devy, Wibirama, & Santosa, 2017). According to Schrepp (2017) UEQ produced a questionnaire analysis with 26 items grouped into six scales, including: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty.

Of the six UEQ scales above, the scale is grouped into three groups, namely: attractiveness, pragmatic quality, and hedonic quality. All three groups can be seen in Figure 2.

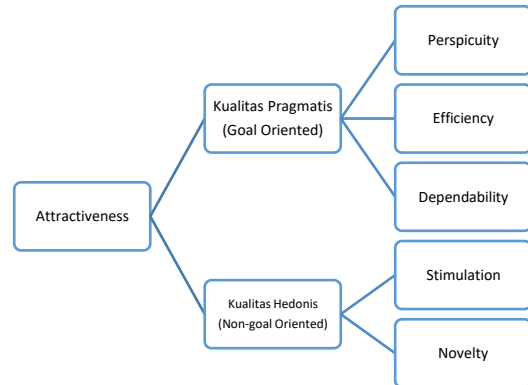


Fig. 2. UEQ Scale Grouping Structure (Kharis, Santosa, & Winamo, 2019)

E. Heuristic Evaluation

Heuristic is a usability engineering method used to find usability problems in a user interface design. Nielsen (1995) suggests that some evaluators are involved in heuristic evaluation with the aim of examining the interface of the system and assessing the degree of conformity to the principle of usability (Yolanovia & Indriyanti, 2021). Heuristic evaluation is also one of the most widely used methods to measure user comfort levels in terms of human and computer interaction.

According to Jacob Nielsen (1994) the Heuristic Evaluation method has 10 (ten) aspects of assessment, including: Visibility of System Status, Match between System and The Real World, User Control and Freedom, Consistency and Standard, Error Prevention, Recognition Rather than Recall, Flexibility and Efficiency of Use, Aesthetic and Minimalist Design, Help User Recognize, Diagnose and Recover from Errors, and Help and Documentation.

F. Usability

Usability is a user experience based on size or degree when interacting with a product or a system, application, technology or equipment that is operated effectively and efficiently within the scope of its users. In a context of use, usability refers to the level of a product that can be used by a particular user in achieving a specific goal effectively, efficiently, and satisfactorily.

According to Nielsen (1993), usability is a measure of the quality of user experience when interacting with products or systems operated by users. According to ISO 9241 (1999), usability is the level at which a product can be used by a particular user to achieve its goals more effectively, efficiently, and satisfactorily within the scope of its users.

III. RESEARCH METHODS

The stages in the research method are carried out so that in the work can be done systematically. In this section will also be explained the flow that will be done in the research contained in Figure 3 below.

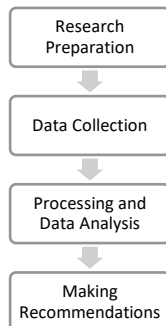


Fig. 3. Research Stage

A. Research Preparation

Research preparation is carried out with the aim to optimize each series of activities arranged in a plan. To help in the process of completing research, it is necessary to create a mature work guideline so that the time to complete the research report can be well planned. In addition, general guidelines need to be made so that the work gets optimal results but can answer all the problems that will be reviewed.

The population in the study was students applying for credit to UT. The sample used in this study was students enrolled at UT Jakarta who applied for credit transfer with the Management-S1 study program from PKN STAN numbering 267 students.

In this study researchers took a sample amount of 15% of the total population with the following sampling formula:
 SAMPLE = 15% x Total Population

From the results of the calculation above, the number of samples to be targeted in this study is as many as 40.05 respondents. Meanwhile, of the total respondents, the determination of respondents is determined by the theory of slovin and calculated using the following formula:

$$n = \frac{N}{1 + Ne^2}$$

Information:

n : Number of samples

N : Population numbers

e : Sampling errors that can be tolerated due to inaccuracy. (1%; 5%; 10%)

B. Data Collection

Data collection is the most important step in research, because the main purpose of research is to get the data and then processed. Based on the source and type of data collected, the data collection techniques in this study are with questionnaires and interviews.

C. Data Processing and Analysis

Data processing is the process of simplifying data into a form that is easier to read and interpret to get the conclusion of the evaluation results. This research uses quantitative analysis,

i.e. with average calculations with the microsoft Excel software base.

D. Make Recommendation Results

The creation of the improved interface design is done based on user experience (UX) improvement recommendations. The improved interface design is designed in the form of a prototype that displays an application design as the original based on menus with related pages.

IV. RESULTS AND DISCUSSIONS

A. Results of Research Preparation

Research preparation needs to be done so that the research can run smoothly and purposefully. Here is the realization and explanation of the results of preparation related to research.

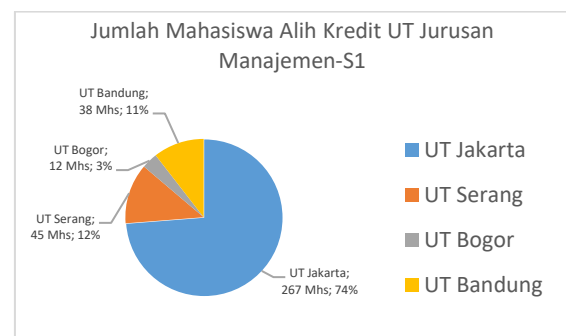


Fig. 4. Respondent Profile

Figure 4 explains that the most sample is in UT Jakarta students as much as 74%. From the total sample above, the determination of respondents selected with the largest number of students who have a major in Management-S1 with a total of 267 students and from the total of students has been calculated with the slovin formula and obtained a value of 72.75 (with an e value of 10%). Thus, the minimum sample size that can be used in this study is 72.75 which when rounded to 73 respondents.

B. Data Collection Results

The spread of questionnaires conducted online has been distributed with a total of approximately 70 respondents. After the questionnaire was distributed, respondents filled out questionnaires according to their respective opinions and experiences. In addition, the conduct of interviews has also been conducted by interviewing sources related to research.

C. Data Processing and Analysis Results

After conducting the dissemination and testing of questionnaires, the data that has been said to be valid and reliable is done data analysis. Here are the results of the data analysis from the spread of the questionnaire.

1. User Experience Questionnaire (UEQ)

The value gained from respondents' answers has been converted into a value weight for each UEQ scale. With the weight of the value can be done mean calculation. The mean value can be seen in Figure 5.

UEQ Scales (Mean and Variance)		
Daya tarik	↑ 0,910	1,34
Kejelasan	↑ 0,891	1,35
Efisiensi	→ 0,630	1,32
Ketepatan	→ 0,615	1,33
Stimulasi	↑ 0,802	1,17
Kebaruan	→ 0,260	1,25

Fig. 5. UEQ Scale (Mean and Variance)

Figure 5 shows the results of the six calculated scales, three show positive evaluation results (marked with green arrows upwards) with values 0.910, 0.891, and 0.802, and the other three show normal evaluation results (marked with yellow arrows to the side) with values of 0.630, 0.615, and 0.260, respectively.

After knowing the mean value, UX measurements can also be assessed by the available benchmark values. The benchmark on UEQ has five UX level categories that describe the level of the product being evaluated. Benchmark Datasets can be seen in Figure 6 and Figure 7.

Scale	Mean	Comparison to benchmark	Interpretation
Daya tarik	0,91	Below average	50% of results better, 25% of results worse
Kejelasan	0,89	Below Average	50% of results better, 25% of results worse
Efisiensi	0,63	Below Average	50% of results better, 25% of results worse
Ketepatan	0,61	Bad	In the range of the 25% worst results
Stimulasi	0,80	Below Average	50% of results better, 25% of results worse
Kebaruan	0,26	Below Average	50% of results better, 25% of results worse

Fig. 6. UEQ Benchmark

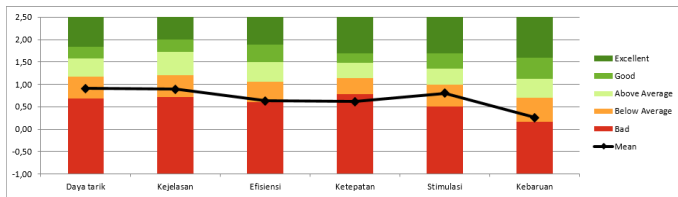


Fig. 7. UEQ Benchmark in chart form

Interpretation of the score obtained can be seen in both figures above. Of the six UEQ scales, namely Attractiveness, Clarity, Efficiency, Accuracy, Stimulation, and Novelty have below average results for the scale of Attractiveness, Clarity, Efficiency, Stimulation, and Novelty. While other results show Bad (bad) for the accuracy scale. This underlies that ux on credit transfer applications is still bad.

2. Heuristic Evaluation

Heuristic Evaluation in this study was conducted involving 5 evaluators. Of the five evaluators, evaluators were asked to examine and assess the extent to which the interface was judged favorably against the principles of usability. The evaluation process in this study was carried out based on 10 principles of Heuristic Evaluation which included 41 predefined evaluation points. Each of these evaluation points is given a scale ranging from 0 to 4 based on the category of problem level.

The average severity rating value is obtained from the results of the calculation of the overall aspect of usability, and from each of the average values severity rating is made rounding the values that can be seen in Table 1.

Based on Table 1 below, it is found that aspects H₂ and H₇ have aspects that need to be improved among other aspects of

usability. From the results of the calculation, 2 of the 10 aspects have a scale value of 4 which is an aspect of the category usability catastrophe, where this problem must be fixed before the product is launched.

TABLE 1. Severity rating average

Aspects of Usability	Severity Rating Average Score	Rounding Value
H ₁	3,44	3
H ₂	3,55	4
H ₃	3,25	3
H ₄	3,45	3
H ₅	3,08	3
H ₆	2,67	3
H ₇	3,9	4
H ₈	3,07	3
H ₉	3,47	3
H ₁₀	3	3

By looking at both aspects, it does not mean that the other 8 aspects do not require improvement. It's just that for the other 8 aspects have a scale value of 3 which is an aspect of the category usability problem, namely the repair of this problem also requires high priority. This shows that the interface designed still does not fit the criteria of usability and there are still many problems with the principle of Heuristic Evaluation and evaluation points using the Heuristic Evaluation method.

D. Recommendation Results

From the results of the analysis that has been spelled out, the next step is the creation of a prototype according to the recommendations that have been suggested. In the manufacture of prototypes also considered all heuristic principles in order to maintain consistency of usability improvement. Some of the design improvements that have been made can be seen in Figure 8.

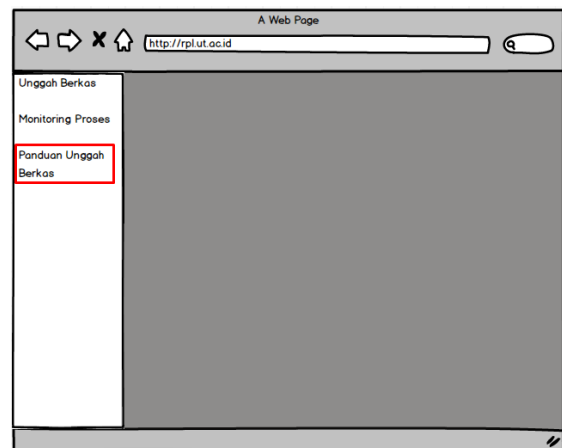


Fig. 8. Design Improvement Addition of File Upload Wizard

Figure 8 shows the problems that have been experienced by users when accessing credit transfer applications to make submissions. The absence of guidance for uploading files makes it slightly difficult for users when an error occurs. The design of improvements by adding a file upload guide to the credit transfer application is expected to make it easier for users to access and apply for credit transfer through the application.

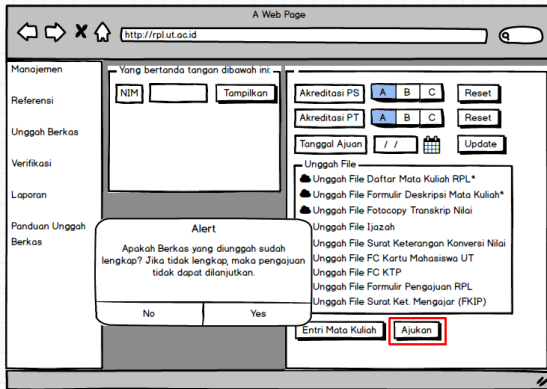


Fig. 9. Design Improvement Addition of File Completeness Warning Feature

Figure 9 shows the problem with applying for student credit. The previously available application button does not have an alert and if the Submit button has been clicked, automatically the student credit transfer application has been submitted. The design of improvements by adding a file completeness Warning feature is expected to minimize user errors when applying for credit transfer.

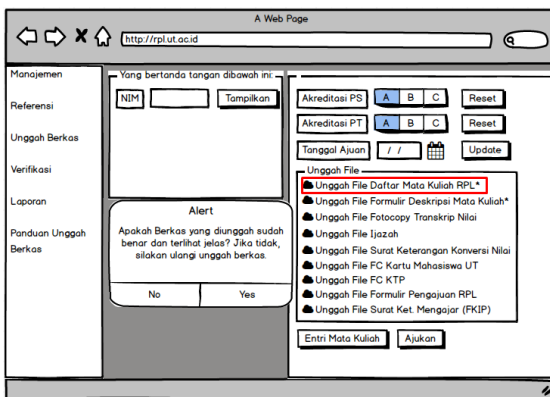


Fig. 10. Design Improvements Addition of File Clarity Warning Feature

Figure 10 shows the problem with the file uploaded by the student. During this time the files uploaded by students sometimes look less clear and will hamper the process of switching student credit. The design of improvements by adding a file upload Warning feature is expected to minimize user errors when uploading credit transfer files.

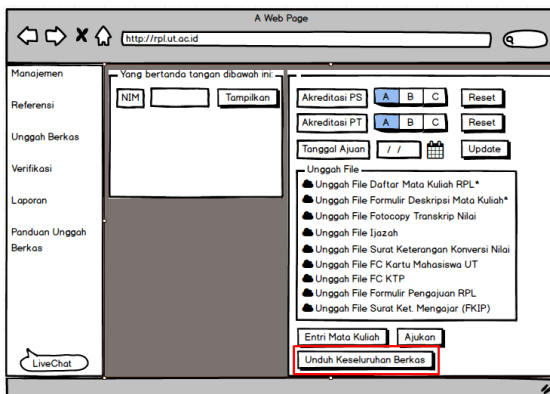


Fig. 11. Design Improvement Addition Feature Download Overall File

Figure 11 shows the problem with the file the validator wants to download. Previously downloaded files can only be done one by one. The design of the improvement with the addition of the overall download feature of the file is expected to speed up the credit transfer validation process.

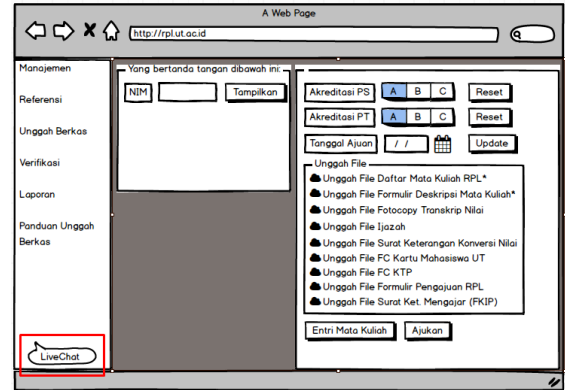


Fig. 12. Design Improvements to LiveChat Feature Additions

Figure 12 shows the problems that have been experienced by users when accessing credit transfer applications to make submissions. If there is something that the user wants to ask about the use of the application, the user must contact ut by phone or email. The design of improvements by adding LiveChat features to the credit transfer application is expected to make it easier for users if there are questions that want to be asked directly without having to contact ut.

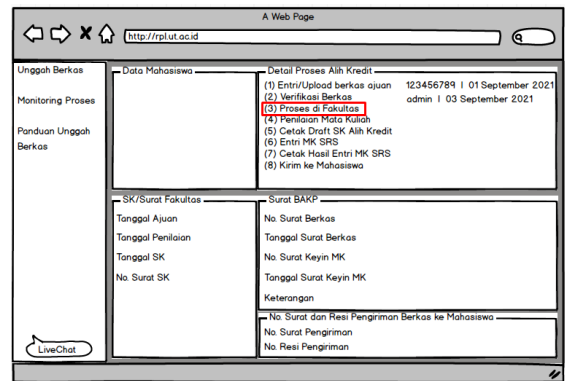


Fig. 13. Process Detail Change Improvement Design

Figure 13 shows the problems that have been experienced by users and validators. The description "In the Process of Study Program" often confuses users regarding the process of applying for credit transfer. The design of improvements by changing the information to "Process in the Faculty" is expected to clarify the user or validator regarding the credit transfer process.

Figure 14 shows the problem with sending files to students. The design of improvements by adding shipping information is expected to make it easier for students to track the delivery of files over credit.

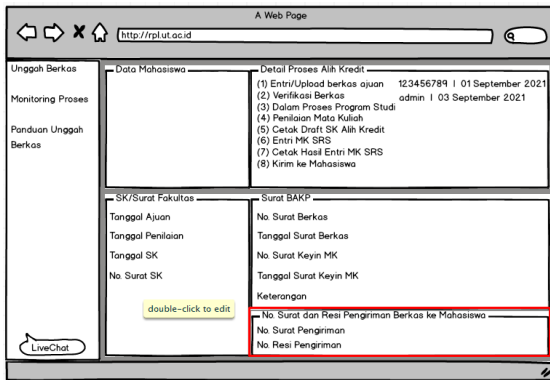


Fig. 14. Design Improvement Addition of Shipping Info

V. CONCLUSION

Based on the results of evaluation and analysis of research data conducted, it can be concluded that the results of evaluation of credit transfer applications do not meet the criteria of usability, because from the results of quantitative testing with the User Experience Questionnaire (UEQ) method shows that user experience results are at a bad value and below average. The results of poor judgment are on the accuracy scale with an average value of 0.61. As for the below average assessment results are on the scale of attractiveness, clarity, efficiency, stimulation, and novelty with average values of 0.91, 0.89, 0.63, 0.80 and 0.26. From the results that have been obtained, it can be concluded that respondents provide poor user experience value to credit transfer applications.

As for the results of quantitative testing with the Heuristic Evaluation method resulted in findings of very serious usability problems from credit transfer applications. Heuristic assessment results show that 2 out of 10 usability principles have the greatest value compared to the other 8 principles, namely with a scale value of 4 with aspects of Match Between System and The Real World (H₂) and Flexibility and Efficiency of Use (H₇) which has the category of us catastropheability, which is the problem must be fixed before the product is launched. From the results that have been obtained, it can be concluded that credit transfer applications have a very high usability problem. Furthermore, the improvement design is done by making a prototype according to the recommendations that have been suggested and using the 10 principles of usability to maintain the consistency of usability improvements.

VI. SUGGESTION

Improvement design recommendations obtained from the results of usability evaluation can be used as input to develop credit transfer applications on an ongoing basis so that the application becomes better and has better application quality. In addition, researchers also recommend further research by applying other evaluation methods in order to get different results against credit transfer applications.

REFERENCES

- [1]. Devy, N. P. I. R., Wibirama, S., & Santosa, P. I. (2017). Evaluating user experience of english learning interface using User Experience Questionnaire and System Usability Scale. *Proceedings - 2017 1st International Conference on Informatics and Computational Sciences, ICICoS 2017, 2018-January*, 101–105. <https://doi.org/10.1109/ICICOS.2017.8276345>
- [2]. Faticha, R., Aziza, A., & Hidayat, Y. T. (2019). *Analisa Usability Desain User Interface Pada Website*. 13(1), 7–11.
- [3]. Hadion Wijoyo, D. (2021). *Sistem Informasi Manajemen*. ICM Publisher.
- [4]. Intanny, V., Widiyastuti, I., Dolorosa, M., & Perdani, K. (2018). Pengukuran Kebergunaan dan Pengalaman Pengguna Marketplace Jobjaplaza .id dengan Metode UEQ dan USE Questionnaire. *Pekommas*, 3(2), 117–126.
- [5]. Kharis, Santosa, P. I., & Winarno, W. W. (2019). Evaluasi User Experience pada Sistem Informasi Pasar Kerja Menggunakan User Experience Questionnaire (UEQ). *The 10th National Conference on Information Technology and Electrical Engineering*, 24–25.
- [6]. Kurniawan, R. D. B. (2019). Evaluasi Usability Aplikasi MY JNE Dengan Metode User Experience Questionnaire (UEQ) Dan Heuristic Evaluation. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, 3(6), 5583–5591.
- [7]. Lestari, I., Widodo, J., & Wahyuni, S. (2016). *Jurnal Ilmiah Ilmu Pendidikan, Ilmu Ekonomi, dan Ilmu Sosial. Jurnal EKSIS*, 12(1), 3295–3298. <https://doi.org/10.19184/jpe.v14i2.16255>
- [8]. Maulani, T. J., Perdanakusuma, A. R., Studi, P., Informasi, S., Komputer, F. I., & Brawijaya, U. (2021). *Evaluasi User Experience Menggunakan Metode Usability Testing dan User Experience Questionnaire (UEQ) (Studi Kasus : Website Superprof . co . id dan Zonaprivat . com)*. 5(6), 2639–2645.
- [9]. Mustofa, R. H., & Riyanti, H. (2019). Perkembangan E-Learning Sebagai Inovasi Pembelajaran Di Era Digital. *Wahana Didaktika : Jurnal Ilmu Kependidikan*, 17(3), 379. <https://doi.org/10.31851/wahanadidaktika.v17i3.4343>
- [10]. Schrepp, M., Hinderks, A., & Thomaschewski, J. (2017). Construction of a Benchmark for the User Experience Questionnaire (UEQ). *International Journal of Interactive Multimedia and Artificial Intelligence*, 4(4), 40. <https://doi.org/10.9781/ijimai.2017.445>
- [11]. Schrepp, M., Version, T., Ueq, T., Ueq, T., Ueq, T., Ueq, T., & Ueq, T. (2019). *Handbook for the modular extension of the User Experience Questionnaire*. 1–16.
- [12]. Yolanovia, D., & Indriyanti, A. D. (2021). *Evaluasi User Experience Aplikasi TIX ID Menggunakan Metode Heuristic Evaluation*. 02(03), 8–13.