

# Usability Analysis of Educational Assistance Information Systems Using the Heuristic Evaluation and End User Computing Satisfaction (EUCS) Methods

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## ABSTRACT

User interface and user satisfaction are crucial components of a system that can significantly impact its usability. SIBADIK, as a web-based application used by many students as a scholarship platform, should have a high level of usability. However, there has been no specific research analyzing the usability of the SIBADIK website. Usability analysis is necessary to determine whether the website is acceptable to users or if there are issues that need to be addressed. The method used is heuristic evaluation combined with End-User Computing Satisfaction (EUCS) to measure user satisfaction levels before and after improvements. The sample was obtained using purposive sampling technique with Slovin formula at 10% margin of error, resulting in 95 samples. The research findings indicate that the SIBADIK website received a user satisfaction score of 2.92 (in the "fairly satisfied" category). The heuristic evaluation by three evaluators revealed a severity point of 3.0195 (rounded to 3), indicating a major usability problem that requires improvements. Twelve issues were identified on the SIBADIK website: 2 issues with Match Between System and Real World, 1 issue with User Control and Freedom, 2 issues with Consistency and Standards, 1 issue with Error Prevention, 2 issues with Recognition Rather Than Recall, 2 issues with Flexibility and Efficiency of Use, and 2 issues with Aesthetic and Minimalist Design. These identified problems serve as recommendations for improving the SIBADIK user interface.

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Satisfaction (EUCS);  
User Satisfaction

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## 1. INTRODUCTION

The rapid development of Information Technology (IT) has ushered in the digital era, transforming various aspects of human life and increasing dependence on information systems (Danuri, 2019). The internet has become a key technology in connecting humans with the digital world, providing access to various activities and information. Information Systems (IS) have become important components in modern organizations, enabling efficient data management that can be accessed anytime (Ladjamudin, 2005). One innovation in this field is the Educational Aid Information System (SIBADIK) managed by the Pelalawan Regency Government, Riau.

SIBADIK is a platform that facilitates the provision of educational assistance to students from Pelalawan Regency who are pursuing education in higher education institutions. This system can be accessed via the internet and functions as software for information management and reporting. To ensure the effectiveness of systems like SIBADIK, it is important to design information systems that meet optimal usability standards. Usability includes the ease with which users can understand and use the system, as well as their level of satisfaction with the system (Paramitha, 2017). Website quality involves various factors, including features that operate well according to their purpose, ease of use by users, and easy accessibility from various locations and times. This study aims to analyze the usability of the SIBADIK website using the Heuristic Evaluation (HE) method and End-User Computing Satisfaction (EUCS). HE involves experts identifying potential problems in the system based on ten heuristic principles (Halabi, 2007).

The HE method is used as an initial step to make improvements to existing designs before proceeding to user testing on the system. Since this system has never been evaluated before, HE is an appropriate choice to assess the usability of this system. Recommendations given by evaluators based on evaluation results can be used to improve the SIBADIK interface design and enhance user experience. In addition to HE, the EUCS method is also used in this study. EUCS is an information system evaluation method that measures the level of user satisfaction. The EUCS model, developed by Doll & Torkzadeh in 1998, emphasizes end-user satisfaction with various aspects of technology. Measurements in EUCS include five aspects: content, accuracy, format, timeliness, and ease of use (Arthur et al., 2007).

Research conducted by Nielsen (1994) and Dix (2003) emphasizes the importance of measuring user satisfaction as part of usability parameters. This is also affirmed by Dewa et al. (2016) who emphasize the importance of achieving efficiency in user satisfaction with information systems, especially in terms of usage satisfaction and system feasibility. EUCS was chosen because this model is known as

one of the most famous and frequently used to assess the level of user satisfaction with a system (Pratama et al., 2012). User satisfaction is an important indicator of success in information system development, because a good system is assessed not only by its sophistication, but also by the extent to which users accept and understand the system, and feel satisfied with the information it produces (Rakhmadian et al., 2017). The combination of HE and EUCS methods is expected to provide a more complete picture of usability problems on the SIBADIK web and provide better recommendations to improve the usability of the application.

Previous research has shown the effectiveness of combining HE and EUCS methods in system usability analysis. Jordan et al. (2022) compared these two methods and found a high level of user satisfaction, with a final presentation of 73.26% for HE and 72.04% for EUCS. Recommendations for improving interface display were found in EUCS3, HE8, and HE10 in the help information feature. Rahmadina et al. (2019) used HE to identify problems and provide improvement recommendations. Their research found that principles H1, H2, H3 already met heuristic principles, but the other seven principles still had some problems. H4 had the highest number of problems (7 problems), while H9 had the highest accumulated value (3). There were 21 improvement recommendations, including 10 changes in page design and 6 changes in pop-up or notification design. Muhammad et al. (2023) combined five HE principles with five EUCS variables, resulting in a very high level of user satisfaction, with scores of 9.118 for HE and 9,292 for EUCS.

The results of this study are expected to provide recommendations to improve SIBADIK usability and serve as a reference for the Pelalawan Regency Government in improving the user interface of the system. By using a combination of HE and EUCS methods, this study aims to provide a comprehensive analysis of the usability of the SIBADIK website, identify areas that need improvement, and provide recommendations that can be implemented to enhance user experience. This will help ensure that SIBADIK can fulfill its purpose in facilitating the provision of educational assistance effectively and efficiently, while providing a satisfying user experience for students from Pelalawan Regency who use this system.

## **2. RESEARCH FRAMEWORK**

This study adopts a comprehensive usability analysis framework, combining two main methods: Heuristic Evaluation (HE) and End-User Computing Satisfaction (EUCS). The theoretical foundation of HE is based on 10 heuristic principles developed by Nielsen (1995), which cover critical aspects of user interface design such as visibility of system status, match between system and the real world, user control and freedom, consistency and standards, error prevention, recognition rather than recall, flexibility and efficiency of use, aesthetic and minimalist design,

help users recognize, diagnose, and recover from errors, and help and documentation.

EUCS, on the other hand, adopts a model originally developed by Doll and Torkzadeh (1998) and later expanded by Chin and Lee (2000). This model measures user satisfaction through six key variables: content, accuracy, format, ease of use, timeliness, and system speed. The use of the EUCS model is based on research by Seddon and Yip (1992) which showed that EUCS is more effective in measuring user satisfaction compared to the User Information System (UIS) model.

The research methodology applies the Likert scale, as explained by Setyawan and Atapukan (2018), to measure users' perceptions and attitudes towards the system. The interpretation of satisfaction levels refers to the model defined by Kaplan and Norton (2004), which provides a framework for categorizing user satisfaction levels from "Very Dissatisfied" to "Very Satisfied" based on certain value ranges.

Usability evaluation is carried out by a small group of expert evaluators, in accordance with Nielsen's (1995) recommendation which suggests using 3-5 evaluators to produce optimal results. These evaluators use severity ratings to identify and classify usability problems, ranging from cosmetic issues to usability catastrophes that require immediate improvement before the system can be used.

This research framework is applied to the Educational Aid System (SIBADIK), an information system managed by the People's Welfare Government of Pelalawan Regency, Riau. SIBADIK, which has been operating since 2020, aims to distribute educational assistance to students from Pelalawan Regency who are pursuing education in higher education institutions both inside and outside Riau Province. The usability analysis conducted aims to provide a comprehensive evaluation of the effectiveness, efficiency, and level of user satisfaction with SIBADIK. This is in line with the definition of usability proposed by Paramitha (2017) and Utami et al. (2020), which emphasizes the importance of optimizing interaction between users and the system to ensure functions run well and failures can be minimized.

The results of this analysis are expected to produce a series of improvement recommendations that can be implemented to enhance SIBADIK's usability. To visualize and implement the proposed improvements, this research utilizes Figma, a web-based design tool that allows for efficient and collaborative UI/UX prototyping, as explained by Muhyidin et al. (2020) and Puspita (2020). The use of Figma allows researchers to translate analytical findings into concrete and implementable design solutions, thus bridging the gap between theoretical analysis and practical application in improving system usability.

### 3. RESEARCH METHODS

#### 3.1 Sampling

Based on an in-depth review, this research sampling uses a non-probability sampling method, namely purposive sampling, which is a sampling technique based on certain criteria (Sugiyono, 2013). Data collection took place for approximately three weeks from January 4 to January 25, 2024. During the data collection period, the target minimum number of respondents was 95 samples, with predetermined criteria, namely respondents in this study were SIBADIK aid recipient students who had completed the registration process from beginning to end so that students had tested the SIBADIK web as a whole. After distributing the questionnaire, 105 respondents were collected. The total number of respondents who filled out the questionnaire was 105 respondents. However, this study only analyzes 95 respondents with the criteria of the first 95 respondents according to the purposive sampling technique.

#### 3.2 Research Instrument

The research instrument consists of two parts written in Indonesian. The first part contains demographic profile information of respondents such as name, gender, university of origin and domicile of origin. The second part contains questions that are in accordance with the indicators of the EUCS variables, namely Content (C), Accuracy (A), Format (F), Easy Of Use (EOU), Timeliness (T) and System Speed (SS). Meanwhile, in this study, measurements were made using a 5 (five) point Likert scale, which offers five choices to respondents for each question. These choices include strongly disagree with a set value of 1, disagree with a value of 2, neutral with a value of 3, agree with a value of 4, and strongly agree with a value of 5.

#### 3.3 Data Analysis

This research begins by giving a heuristic questionnaire to experts, which consists of 38 questions based on 10 heuristic evaluation principles from Nielsen (1995). After that, severity rating calculations are carried out from the results of the questionnaire and expert interviews to obtain improvement suggestions, which form the basis for improving the SIBADIK user interface. Furthermore, this study measures the level of SIBADIK user satisfaction with the EUCS method using 20 questions and then analyzes the satisfaction level using the model defined by Kaplan and Norton (2004).

### 4. RESULTS AND DISCUSSION

#### 4.1 Demographic Analysis

The outer model test is also called the measurement model. The first test is convergent validity. Convergent Validity in this study was evaluated through the

correlation between indicator scores and construct scores. According to (Husnawati et al., 2019) the PLS-SEM model is considered to have adequate convergent validity if the outer loading value exceeds 0.7 and the AVE value is greater than 0.5. Table 1 shows that the outer loadings value of each indicator exceeds 0.7, so no indicators are deleted. This conclusion is in accordance with the general rule that applies, where outer loading should be  $> 0.7$  (Santosa & Raharjo, 2021).

## 4.2 Measurement Model Test Results (Outer Model)

The following is an evaluation of each questionnaire based on relevant dimensions, using the End-User Computing Satisfaction (EUCS) method. Table 1 displays the results of the questionnaire assessment from each dimension analyzed in EUCS using the Average Satisfaction (RK) formula.

$$RK = \frac{JSK}{JK}$$

Keterangan:

RK = Rata-rata kepuasan

JSK = Jumlah skor kuesioner

JK = Jumlah kuesioner

**Table 1.** The total value of each dimension

Variabel	SS	S	N	TS	STS	RK
<i>Content</i>	7	122	158	67	26	3,04
<i>Accuracy</i>	1	97	127	52	8	3,11
<i>Format</i>	3	96	166	97	18	2,92
<i>Easy of Use</i>	4	99	158	99	20	2,92
<i>Timeliness</i>	0	35	88	57	10	2,78
<i>System Speed</i>	1	49	130	84	21	2,74

## 4.3 Results of Heuristic Evaluation Method Testing

### 4.3.1 Result of Heuristic Evaluation Method Calculation

**Table 2.** Severity Rating Aspects and Values

Aspect	Severity rating value
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<i>Visibility of Systems Status (HE1)</i>	4,25
<i>Match Between System and the real world (HE2)</i>	4
<i>User Control and Freedom (HE3)</i>	1,25
<i>Consistency and Standard (HE4)</i>	4,25
<i>Error Prevention (HE5)</i>	4,25
<i>Recognition rather than recall (HE6)</i>	2,66
<i>Flexibility and efficient of use (HE7)</i>	3
<i>Aesthetic and minimalistic design (HE8)</i>	1
<i>Help user recognize dialog, and recover from errors (HE9)</i>	4,33
<i>Help dan Documentation (HE10)</i>	2,33

Table 2 is the result of usability testing using the heuristic evaluation method from three evaluators with 38 question indicators, and gets an overall average result from the severity rating assessment of all usability aspects of 3.132 which is rounded to 3 or major usability problem, meaning the system must undergo an improvement because it affects the process in the system.

4.3.2 **Usability Problem Findings and Improvement Plans**

**Table 3.** Problem Findings and Improvement Plans

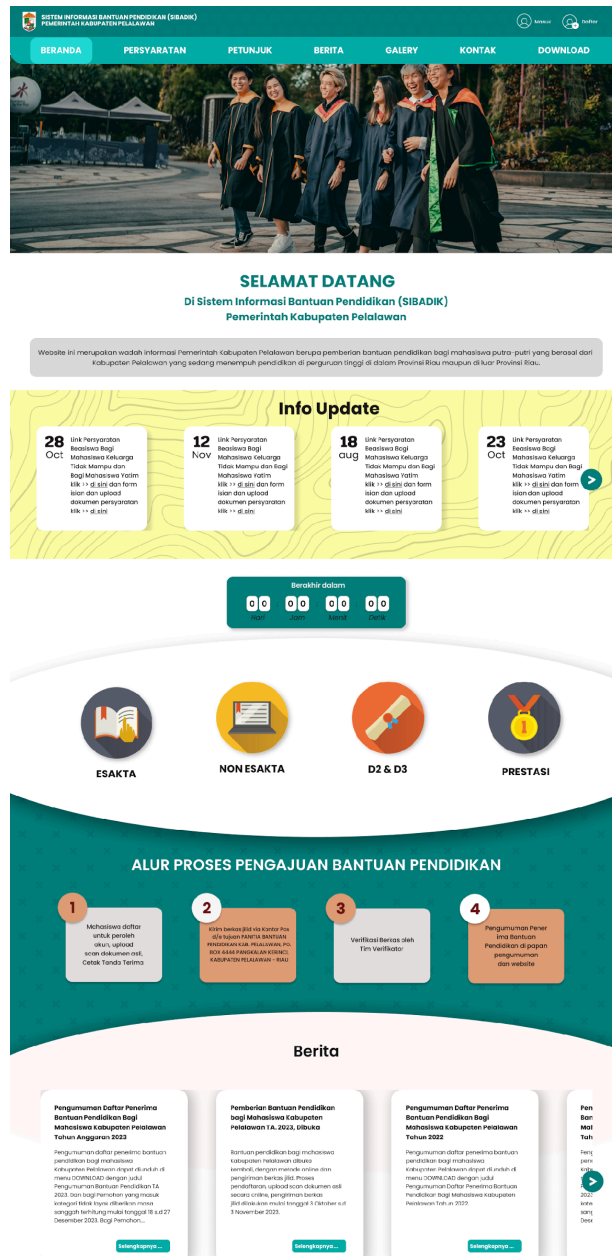
Problem Code	Problem Finding	Remediation Plan
M1	"The typography can adjust the font type used, and pay attention to details such as reducing the use of words in full capitals and not using too many bold words or sentences."	Improve typography issues by adjusting font types, reducing the use of capital letters and bold sentences.
M2	"The arrangement of elements or layout needs to be considered; ensure that the design elements to be prioritized are within the user's reach."	Arrange elements or layout by prioritizing design elements within the user's reach.

M3	"Don't provide too much information at once to the user, especially in the registration form section. Information about documents and personal data can be separated into different sections."	Separate the "Apply for scholarship" section into 4 sections: personal information, university information, bank information, and document upload.
M4	"Pay more attention to small details such as labels and placeholders, as well as important information like help or information related to things that might confuse users."	Create labels and placeholders for each input to assist users in entering data. For example, provide a placeholder "Enter your name" for the "Name" input.
M5	"Color selection needs to be considered and adjusted. Don't use too many colors, and choose colors that match the identity of the website or brand in question."	Reduce excessive use of colors. Align colors with the character of the SIBADIK website.
M6	"In the password input field during login, there is no 'View' password feature, so users are prone to entering incorrect passwords."	Add a "View" feature to the password input field during login.
M7	<i>"The save application icon on the Apply for Request page should be replaced with a more familiar icon."</i>	Replace the "Save Application" icon with something more structured and familiar to users.
M8	"After logging in, some input fields have placeholders with information that is the same as their title (redundant). The placeholder should instead show the user how to fill in that input field. The layout of file/document uploads on the application page is not neat."	Improve the layout of file/document uploads on the application page.



### 4.3.3 ***Recommendation Results***

Based on suggestions and input from the three evaluators in accordance with the heuristic evaluation method, improvements to the SIBADIK user interface have been made in the form of wireframe displays using Figma. Based on problems M1 and M2, there are typography and layout problems, such as inconsistent use of capital letters on the front page, especially the "Dashboard" and "Exit" features, as well as bold sentences that need to be fixed. Messy layouts and too much information on one page cause user confusion. To overcome this, the first step is to change the word "Front" to "Home" and fix the capitalization on the "Login" and "Register" icons. The "Dashboard" design was updated to present information more firmly, involving rearrangement and icon replacement to improve readability and overall appearance. These improvements can be seen in Figure 1.



**Figure 1.** Front page improvements

Based on problems M4 and M6, there were issues with placeholders for each input provided, which function to assist users in entering data. The resulting improvement was to add placeholders to each input field. For example, for the "Name" input, a label "Enter Your Name" was added, and for password input, a "View" feature was provided to facilitate easier entry and avoid fatal errors. Figure 4.5 shows the Registration Page After Improvements.

**Figure 2.** List page improvements

**Figure 3.** Login page improvements

Regarding problem M9, there was a duplication of dashboard information in both the top navigation bar and the sidebar. The solution implemented was to remove the dashboard information from the top navigation bar, allowing users to access information more efficiently without confusion. The result of the dashboard page improvement can be seen in Figure 4.

**Figure 4.** Improvements to the dashboard page

Regarding problems M3, M7, M8, and M12, the "Apply for Scholarship" page had a hierarchy issue as it contained four categories of information simultaneously: personal data information, campus information, bank information, and document upload, which made it difficult for users. The solution was to divide the page into four separate sections for each category and add a draft feature to each section. This makes it easier for users to input data and avoid repetition when continuing the registration process at a later time. The results of these improvements can be seen in Figures 5 through 8.

**SISTEM INFORMASI BANTUAN PENDIDIKAN (SIBAPD)**  
PEMERINTAH KABUPATEN PELALAWAN

BERANDA PERSYARATAN PETUNJUK BERITA GALERY KONTAK DOWNLOAD

Informasi Data Diri

Nama Lengkap (sesuai KTP/KK)\*  
Masukkan nama lengkap Anda

Nomor Induk Kependudukan (NIK)\*  
Masukkan NIK Anda

Tempat/Tanggal Lahir (sesuai KTP)\*  
Masukkan tempat lahir Anda

Alamat sesuai KTP/KK\*  
Masukkan alamat Anda

Alamat kuliah saat ini\*  
Masukkan alamat kuliah anda

Kecamatan/Kota sesuai KTP/KK\*  
Masukkan kecamatan/kota Anda

Nomor Handphone (aktif)\*  
Masukkan no hp Anda

Jadikan Draft Selanjutnya

SISTEM INFORMASI BANTUAN PENDIDIKAN (SIBAPD) PEMERINTAH KABUPATEN PELALAWAN

**Figure 5.** Improvement of personal data information page

**SISTEM INFORMASI BANTUAN PENDIDIKAN (SIBAPD)**  
PEMERINTAH KABUPATEN PELALAWAN

BERANDA PERSYARATAN PETUNJUK BERITA GALERY KONTAK DOWNLOAD

Informasi Kampus

Nomor Induk Mahasiswa (NIM)\*  
Masukkan NIM Anda

Perguruan Tinggi\*  
Pilih perguruan tinggi

Lokasi Perguruan Tinggi\*  
Kab./kota\*  
Pilih kota

Fakultas\*  
Pilih fakultas

Jurusan\*  
Masukkan jurusan Anda

Semester saat ini\*  
Pilih semester

Kategori Pendidikan\*  
Pilih kategori pendidikan

Indeks Prestasi Kumulatif (IPK)\*  
Isikan dengan 0,00

Jadikan Draft Selanjutnya

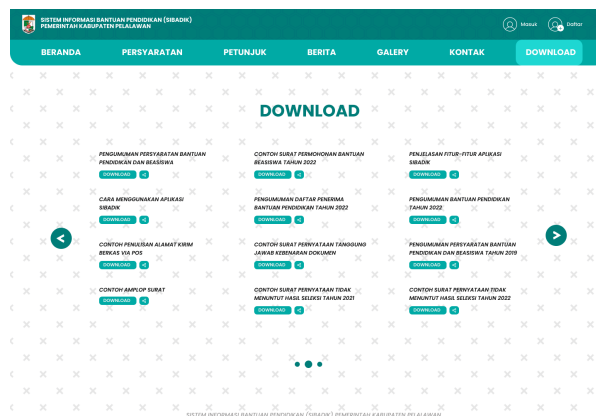
SISTEM INFORMASI BANTUAN PENDIDIKAN (SIBAPD) PEMERINTAH KABUPATEN PELALAWAN

**Figure 6.** Improvements to the campus information page

**Figure 7.** Improvements to the bank information page

**Figure 8.** Improvements to the document upload page

Regarding problem M11, the "Download" information appeared repeatedly on every page of the SIBADIK website, such as the homepage and user guide, causing confusion. The solution was to create a separate "Download" page in the top navigation bar and remove the "Download" information from all other pages.



**Figure 9.** Download page improvements



Figure 10. Improved user manual page

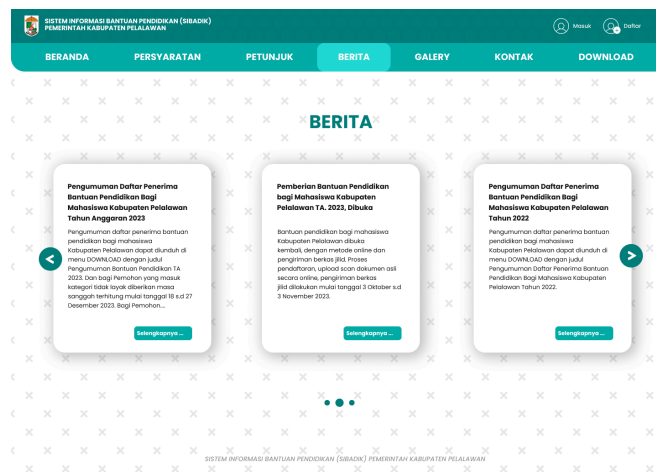


Figure 11. News page improvements

Based on the results of research using the heuristic evaluation method using Nielsen's ten usability principles, this study identified 12 heuristic problems from three evaluators, namely two problems in Match Between System and the Real World (HE2), one problem in User Control and Freedom (HE3), two problems in Consistency and Standards (HE4), one problem in Error Prevention (HE5), two problems in Recognition Rather Than Recall (HE6), two problems in Flexibility and Efficiency of Use (HE7), two problems in Aesthetic and Minimalistic Design (HE8) and as for the current SIBADIK satisfaction results by measuring using the EUCS method, it has a fairly good UI/UX in providing satisfaction to users with a score of 2.92 with the Quite Satisfied category.

## 5. CONCLUSION

Research on the SIBADIK website using Jakob Nielsen's heuristic evaluation method based on 10 heuristic principles, which resulted in 38 questions from 10 heuristic aspects. Three evaluators assessed the severity rating of each aspect. Evaluation of



usability levels using EUCS began with initial testing using a Likert scale, followed by heuristic evaluation to obtain values and improvement recommendations from experts. The average result of the severity rating of all usability aspects is 3 (major usability problem), indicating the need for improvement. Of the 12 main problems that have been validated by users, solutions were designed in the form of wireframes as recommendations. The SIBADIK website was tested for satisfaction level using the EUCS method and received a score of 2.92 with the Quite Satisfied category.

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