

Design And Evaluation of UI/UX Using the Heuristic Evaluation Method: The Case of Universitas Papua Website

Natasya Yusinta Subay^{1✉}, Dedi I. Inan², Ratna Juita³, Marlinda Sanglise⁴,
Devid Riswandy Podajow⁵

^{1, 2, 3, 4, 5} Informatics Engineering Study Program, Faculty of Engineering, Papua University,
Manokwari, West Papua, Indonesia

Article Information

Article History

Received : March 18, 2024

Revised : March 22, 2024

Accepted : March 25, 2024

Keywords:

Heuristic evaluation; User experience; User interface; Website

Kata Kunci:

Antarmuka pengguna; Evaluasi heuristik; Pengalaman pengguna; Situs web.

ABSTRACT

This research focuses on designing and evaluating user interface (UI/UX) of the Informatics engineering website profile of Universitas Papua using Heuristic Evaluation, a qualitative method used to assess UI quality. One crucial aspect of website design's the UI, which serves as the tool for user interaction and determines user experience. Research process involves problem identification, literature review, UI design using prototype method, questionnaire testing, user experience evaluation using the 10 Heuristic Principles method, and evaluation results. The questionnaire, as an evaluation tool, gathered data from 21 respondents, including 4 lecturers of Informatics Engineering experiencing in this field. The evaluation results concluded an average severity level of 2, indicating minor issues in the website's UI design. Areas needing improvement include Error Prevention, System Recovery, Help, and Documentation. However, these aspects can be enhanced to improve the website design quality. Suggestions for further development include incorporating three aspects to enhance user experience.

ABSTRAK

Penelitian ini berfokus pada merancang dan mengevaluasi antarmuka pengguna (UI/UX) dari profil website Teknik Informatika Universitas Papua menggunakan Evaluasi Heuristik, metode kualitatif yang digunakan untuk menilai kualitas UI. Salah satu aspek penting desain website adalah UI yang berfungsi sebagai alat interaksi pengguna dan website itu sendiri yang menentukan pengalaman pengguna. Alur penelitian ini meliputi identifikasi masalah, tinjauan pustaka, desain UI dengan menggunakan metode prototype, pengujian kuesioner, evaluasi pengalaman pengguna menggunakan metode 10 prinsip Heuristik, serta hasil evaluasi. Kuesioner sebagai alat evaluasi memperoleh data dari 21 responden, termasuk 4 dosen Teknik Informatika yang berpengalaman pada bidang ini. Hasil evaluasi menyimpulkan bahwa terdapat tingkat keparahan rata-rata sebesar 2, menunjukkan isu-isu kecil dalam desain UI website. Aspek yang membutuhkan perbaikan yaitu Sistem Pencegahan Kesalahan, Pemulihan Sistem, Bantuan dan Dokumentasi. Namun, aspek-aspek ini dapat diperbaiki untuk meningkatkan kualitas desain website. Saran untuk pengembangan lebih lanjut termasuk menambahkan tiga aspek tersebut untuk meningkatkan pengalaman pengguna.

Corresponding Author :

Natasya Yusinta Subay

Informatics Engineering Study Program, Faculty of Engineering, Universitas Papua, Manokwari, West Papua, Indonesia

Jl. Gunung Salju, Amban, Manokwari, West Papua, Indonesia

E-mail: 202065044@student.unipa.ac.id

INTRODUCTION

The advancement of technology in the current era of globalization has significant impacts on various aspects of human life, particularly in supporting academic activities in higher education institutions. Many universities now adopt mobile platforms and websites as tools to support students' academic activities. Therefore, the design of websites supporting academic activities needs to consider the website's interface design, aiming to benefit from technological advancements in the field of education (Tristiyanto et al., 2020).

The UI of a website plays a crucial role as the tool for interaction between users and the website itself. Thus, the quality of the website's user interface design is essential to ensure users experience ease and comfort in using the website. Neglecting the website's user interface design can lead to discomfort and difficulties for its users. Therefore, a website with a good user interface design can encourage users, particularly students, to access academic information easily through the academic website. In this regard, the perception of user experience, commonly known as UX, becomes a crucial factor influencing the ease of using an application and its suitability to users' needs. User experience perception is one of the reasons users evaluate whether an application can be used easily and appropriately (Tristiyanto et al., 2020).

The Informatics Engineering program at the Universitas Papua is still facing challenges regarding academic information, causing difficulties for students to obtain information about class schedules, academic announcements, and other related information. The impact of these challenges is a disruption in student productivity, as students often rely on academic information provided by the program. With the absence of an academic information website, students face limitations in accessing other academic information related to the Informatics Engineering program because there is no website providing access to such information. This is a problem that needs attention and resolution. Therefore, the creation of a website design for the Informatics Engineering program aims to provide a solution to this issue. However, further evaluation of user experience regarding the UI design of the website is necessary to determine whether the website design is adequate or requires improvement. This evaluation also aims to provide an optimal UI design that facilitates students' interaction with the website.

The objective of this research is to leverage technological advancements to create solutions that can assist students in overcoming challenges within the Informatics Engineering program. The goal is to improve academic quality and efficiency for students. The design of the Informatics Engineering profile website for Universitas Papua is a conceptual web-based application aimed at assisting and facilitating students in accessing information related to their studies in the Informatics Engineering department at Universitas Papua. The emphasis is on optimal UI/UX design, and evaluation is conducted to ensure the quality and usability of the resulting website design. This website design is created to be interactive and minimalist, providing ease of access to academic information for students while also offering comfort through a well-designed user interface both functionally and aesthetically. The prototype method is chosen for the website design process because it is suitable for designing a system that will be developed further. Additionally, this method is selected because of its ability to provide a comprehensive overview of the final system, which can be redesigned until the desired outcome is achieved. Subsequently, in the website evaluation phase, the Heuristic Evaluation method is utilized. Heuristic Evaluation is a testing technique used to solve user problems based on the user interface, allowing for effective and efficient decision-making. This method was developed by Jacob Nielsen and consists of ten principles, including help and documentation, helping users recognize and recover from errors, aesthetic and minimalist design, flexibility and efficiency of use, recognition rather than recall, error prevention, consistency and standards, user control and freedom, match between the system and the real world, and visibility of system status (Dandi & Linda, 2022).

LITERATURE REVIEW

Previous Research

Previous research serves as a foundation for this study, providing explanations related to the discussions of research conducted by previous researchers. For instance, Muhamad Dandi and Linda Atika (2022) analyzed data and evaluated questionnaires regarding the Visibility of System Status indicator in the academic website system of the Palembang Health Polytechnic. The findings revealed that the indicator reached the highest score, 380. Based on this discovery, the academic system at the Palembang Health Polytechnic was considered to have an intuitive and reliable user interface, expected not to disappoint students (Dandi & Linda, 2022).

According to Ovila Victoria et al. (2022), their research evaluated the user interface (UI) design's impact on user experience (UX) in the PeduliLindungi application. They conducted the evaluation using Jakob Nielsen's Heuristic Evaluation method consisting of 10 points. Subsequently, they calculated the Severity Rate to determine the priority scale for improving the application's interface design. The evaluation results and Severity Rate calculation showed an average rate of 1.298, indicating that the identified problems were still in the Cosmetic Problem category. This implies that the usability issues could be addressed with additional time or may not be the top priority in the application development process (Victoria et al., 2022).

Furthermore, Andi Muhammad Ihsan (2023) conducted Usability Analysis of the Government of Jambi Province's website through Heuristic Evaluation. He highlighted several implications to consider in the development of the website. Firstly, issues such as navigation complexity, lack of clear guidance, and complicated online forms were identified. Secondly, improvements in text readability and website responsiveness were suggested. Thirdly, recommendations for improvement from the Heuristic Evaluation results should be implemented carefully, focusing on addressing poorly rated aspects while maximizing those rated positively (Ihsan, 2023).

Furthermore, according to Aswidani (2023), the Heuristic Evaluation method assessed the usability of the SIMAK (Academic Information System) website of Khairun University, achieving an average suitability score of 3.9. This indicates that the SIMAK website of Khairun University has met and complied with good usability standards (Aswidani, A., 2023).

In the study by Rasmila et al. (2023), several recommendations were provided for future research. Firstly, the application prototype could be further developed by converting it into a website, allowing access not only through Android smartphones but also other devices. Additionally, the findings from this research could serve as a guide for developing similar sales applications based on Android, with adjustments made to the interface for a fresher look. Despite the shortcomings in the UI/UX design of the Jhon Store Sales application, it is hoped that future research will utilize alternative testing methods as comparisons to obtain more comprehensive testing results (Rasmila et al., 2023).

Profile of the Informatics Engineering Program at Universitas Papua

The Informatics Engineering program is a higher education program focused on the fields of information technology, computers, and software development. Subjects in the Informatics Engineering program typically include programming, computer networks, databases, computer security, and related fields.

At Universitas Papua, the Informatics Engineering Program was established on January 22, 2013, at the undergraduate level (S1). The program has achieved accreditation B. The goal of the Informatics Engineering Program at Universitas Papua is to produce graduates who can compete globally and possess entrepreneurial insights. Additionally, the program aims to enhance the quality of research conducted by faculty and students in the fields of intelligent systems, information management, and computer networks, which can be widely disseminated through national and international publications.

User Interface

According to Schlatter, there are components that influence the development of application design, including consistency, hierarchy, personality, layout, type, color, imagery, and control and affordances (Adhi et al., 2022).

User Experience

According to Don Norman, the overall user experience in using a product encompasses aspects such as interaction, usability, and emotional impression (Muqoddas et al., 2020).

Website

As the creator of the World Wide Web, Tim Berners-Lee defines a website as a collection of web pages that are interrelated, typically owned by one domain and accessible via the Internet (Wirawan et al., 2021).

Prototype

A prototype is the process of constructing a tangible design solution that originates from and meets the needs of users. It represents the model of the product to be built, simulating the functionality or operation of the system (Nurahmi & Pinem, 2024).

In the field of design, a Prototype, also known as a purwarupa or archetype, is an initial form serving as an example or standard size of an entity. A Prototype is created prior to development or specifically for development purposes before being produced on a larger scale or mass-produced (Muhyidin et al., 2020).

RESEARCH METHODS

This section will outline the research flow applied in evaluating the user experience in designing the user interface for the Informatics Engineering profile website. Due to the research approach being based on evaluation using data obtained from expert evaluators, several steps in this research include problem identification, literature review, research object, research variables, implementation of user interface design using the prototype method, screenshots of the UI website interface, and the user experience evaluation stage of the Informatics Engineering profile website interface design using the 10 principles of the Heuristic Evaluation method. Subsequently, there will be a discussion of the evaluation results, followed by concluding remarks and recommendations. (Romansya et al., 2019). The research flow diagram can be seen in Figure 1.

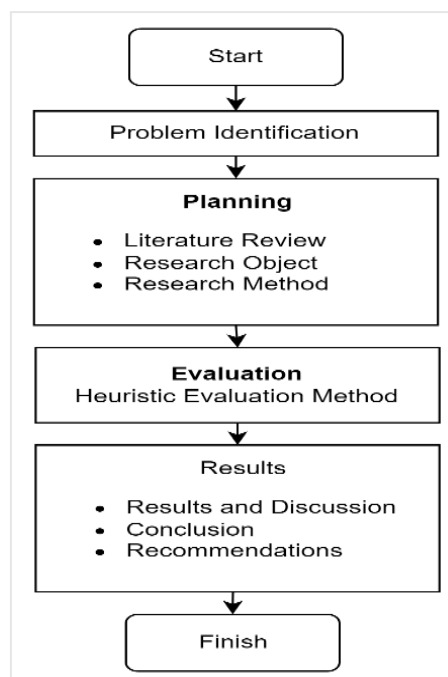


Figure 1. Research Flow Diagram of Evaluating User Experience using Heuristic Methods

This research commences with the identification of issues, conducted during the researcher's practical work at the Department of Informatics Engineering, Papua University, through observations of academic activities related to the department.

In the initial planning phase, a literature review is conducted to study and understand similar research. Subsequently, the research object is defined, which is the design of the user interface for the Informatics Engineering Department website profile. The third step involves selecting the research method appropriate for the predetermined research object.

Following this is the evaluation stage, which employs the Heuristic Evaluation method comprising 10 principles. The first step in this phase is data collection, utilized to evaluate the user interface design of the website profile.

The Informatics Engineering Department at Papua University distributes an online questionnaire using Google Forms to gather responses from respondents, including students and faculty members who are experts in the field of design and evaluation. After distributing the questionnaire, the responses will undergo testing to ensure the validity and reliability of the data. Once validated, the data will be ready for evaluation using the Heuristic Evaluation method to assess whether the website design is adequate or requires improvements.

Following the evaluation using the Heuristic Evaluation method and obtaining the results, conclusions and recommendations will be drawn based on the evaluation findings.

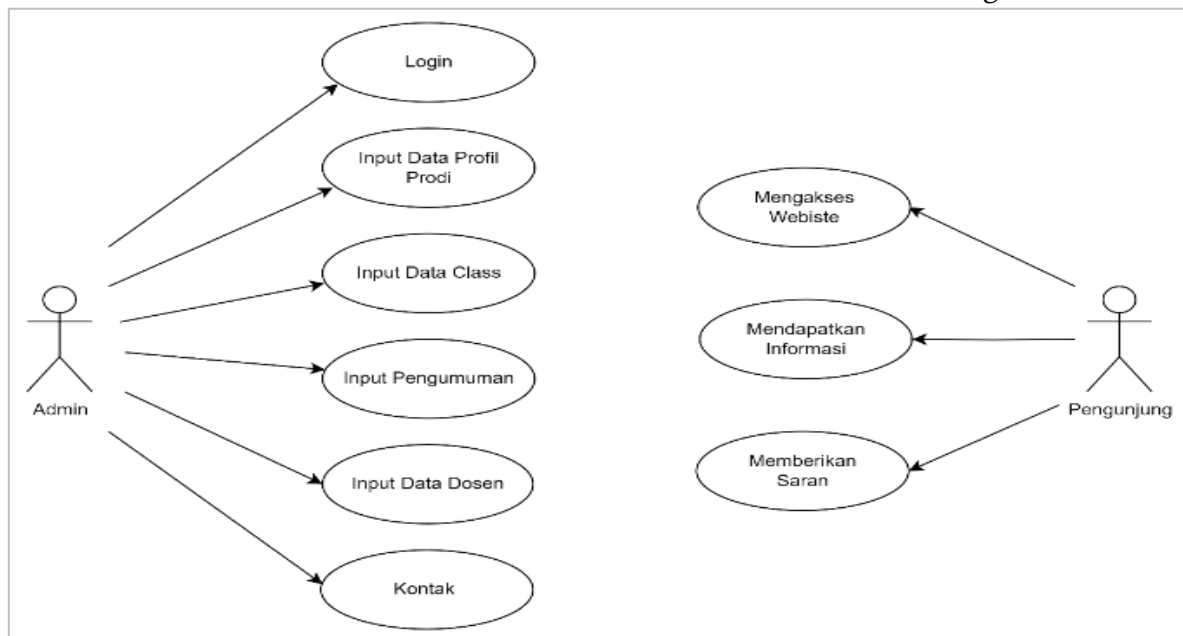


Figure 2. Use Case Diagram of website administrator and visitors

As shown in Figure 2, it explains the features accessible to both administrators and visitors involved in the system, playing a crucial role in the interaction between users and the system. Administrators have special access rights that allow them to perform a variety of administrative tasks. These include managing program profile data, inputting class data, managing announcements, inputting faculty data, as well as contact and other details related to the program. On the other hand, visitors have access to obtain information available within the system. Additionally, visitors can also provide feedback or suggestions to the system. With these features in place, the system can function efficiently and provide a better user experience for all parties involved.

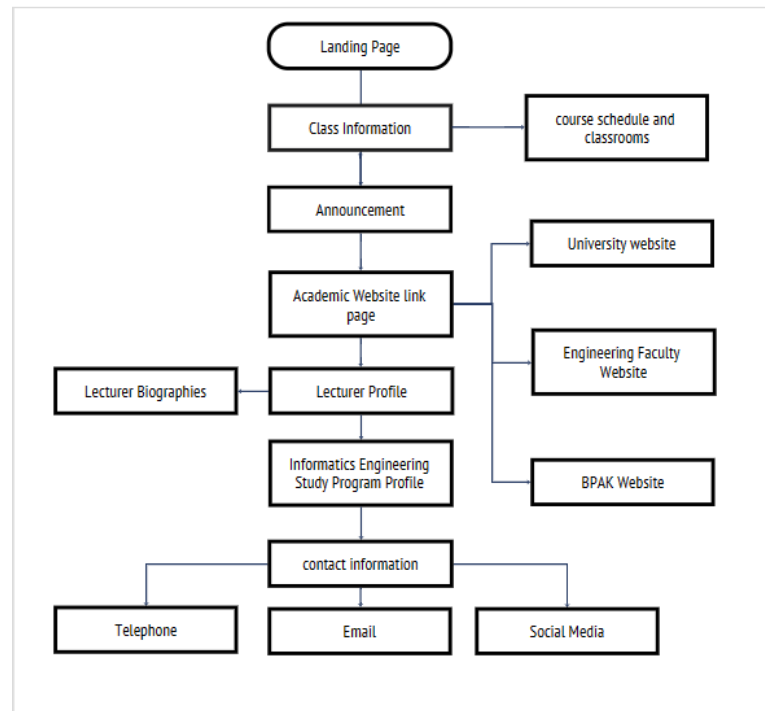


Figure 3. User Flow Diagram of Informatics Engineering Website

In figure 3, the user flow on the website starts from the Landing Page. From there, users can scroll down to access class information, view schedules and classroom details by selecting available courses on the class information page. Next, users can scroll down from the class information page to the announcement page, where they can read announcements made by the informatics engineering administrator. From the announcement page, users can further scroll down to access academic websites such as the university website, faculty website, and BPAK website. Users can also view lecturer information on the lecturer profile page, which displays the names of lecturer members, their biographies, and their academic achievements. Furthermore, users can access the informatics engineering program profile page, which contains information about its history, mission, and goals. Finally, users will find contact information to reach out to the program, including telephone, email, and social media channels like Instagram.

Validity

Validity originates from the word validity, which means the truthfulness or accuracy. Validity refers to the extent to which the precision and accuracy of a measuring instrument can perform its measuring function. According to Sugiyono (2005), Validity is an index that indicates whether the measuring instrument truly measures what it intends to measure. In addition to validity, a good measuring instrument should also be reliable. Reliability is translated from the word reliability, which means something that can be trusted (resistant to testing) (Ono, 2020).

Reliability

Reliability testing of a research instrument is a test employed to determine whether a questionnaire used in data collection for the research can be considered reliable or not. In this research, reliability testing is conducted using Cronbach's Alpha analysis (Dewi & Sudaryanto, 2020).

Heuristic Evaluation

According to Jakob Nielsen, heuristic evaluation is a usability engineering method used to identify usability problems in user interfaces.

Heuristic evaluation involves a small number of evaluators reviewing the user interface and evaluating it based on usability principles.

The advantages of this method include relatively easy usability, low cost, efficient user time, and the ability to identify a large number of problems. However, the main disadvantage is that evaluators must have good expertise in user interfaces to evaluate a website (Murdiaty et al., 2019).

In Table 1, we present the evaluation instrument comprising the 10 Heuristic Evaluation principles:

Table 1. instrument of 10 principles Heuristic Evaluation

Variable	Instrument
Visibility of systems	The clarity and consistency of information on the website are already good.
Match Between System and The Real World	The terminology used in the menu for communication on the website is already good. The use of communicative images on the website is already good. The color selection on the website interface is good. The use of language grammar on the website is good.
User Control and Freedom	The website's navigation is already good. The cancellation of an operation on the website is already good.
Consistency and Standard	The consistency of writing standards on the website is already good. The consistency of data on the website is already good.
Recognition Rather Than Recall	Having labels on each button is already good. The clarity of language, symbols, and images on the website is already good. The presence of error message notifications on the website when an operation fails is already good.
Prevention Error System	Notification of input information when negligence occurs. Notification of preventive messages to avoid making mistakes.
Flexibility and Efficiency of Use	A suitable system for screen reading.
Design	The interactive design on the website interface is already good. The choice of colors, fonts, and backgrounds on the website interface is already good. The font size on the website is already good. The grouping of information on the website is already good.
Recovery and System	Notifications when there are errors on the website. Feedback system on the website.
Help and Documentation	Assistance when there are error messages on the website. Design documentation on the website. The presence of user guidance for website users.

Source : (Agarina et al., 2019)

Severity Rating

Severity rating is a scale used to assess the priority of fixing identified issues. Typically, severity ratings are represented by numbers or categories that describe the severity level of the problem. The common severity rating scale used is from 0 to 4, with each number or category representing different meanings and levels of impact (Victoria et al., 2022).

Here is an explanation for each value on this scale:

Table2. Severity Rating Scale for The 10 Principles of Heuristic Evaluation

Severity Rate	Explanation
0	None: No issues were found.
1	Cosmetic: These are minor issues that affect the appearance or aesthetics, but do not affect functionality.
2	Minor: These are minor issues that slightly inconvenience users but do not hinder the basic functionality of the product.
3	Moderate: These are issues that significantly affect the functionality of the product or user experience but still allow users to complete their tasks.
4	Major: These are issues that seriously hinder the functionality of the product or user experience, making it difficult for users to complete their tasks.

RESULTS AND DISCUSSION

Distribution of Questionnaire

The next step is to discuss the results of the evaluation conducted through the distribution of online questionnaires using Google Forms. The participants focused on in this study are the lecturers and students of Informatics Engineering. With a total of 21 respondents, here is a summary of the collected respondent data:

Table 3. Respondent Data

Variable		Total
Gender	Women	11 (52,38%)
	Men	10 (47,62%)
Profession	Lecturers	4 (19,05%)
	Students	17 (80,95)

Design Implementation



Figure 3. Admin User Interface

Figure 3 displays the admin dashboard design page. Here, the admin logs in and manages input data for programs, class input data, announcement input, input data for lecturers, and contact input.



Figure 4. Landing Page User Interface

Figure 4 depicts the main page of the Informatics Engineering program website design, featuring a landing page, class information, program vision and mission, and a brief history of the program



Figure 5. Attendance User Interface

Figure 5 shows the website page of the Informatics Engineering program containing information about classrooms and student attendance.



Figure 6Lecturer Data User Interface

Figure 6 depicts the page of the Informatics Engineering program website containing data of lecturers within the Informatics Engineering program environment.

User Testing

At this stage, the goal is to evaluate the completed prototype by gathering feedback from respondents on the designed website. Testing is conducted with respondents to ensure they can use the prototype design without difficulty and to validate the effectiveness of the testing. Usability

testing is performed using the prototype section in the Figma application to evaluate user experience with the user interface design.

Below is the URL for the prototype design results of the Informatics Engineering program website, admin: (<https://shorturl.at/kmvGM>), visitors: (<https://shorturl.at/acz56>).

Questionnaire Testing

Questionnaire validity and reliability testing is an important step in evaluating the quality and reliability of measurement instruments. This questionnaire testing utilizes the SPSS software, with a sample size of 21 respondents. The Likert scale used for assessment includes options such as strongly disagree, disagree, neutral, agree, and strongly agree. Below is the questionnaire validity and reliability testing:

1. Validity Testing

In Table 4 of the SPSS output, the validity test results indicate that all questions are considered valid because the Pearson Correlation values for all questionnaire items exceed the critical value determined in the r-table.

Table 4. Validity Testing Result

Questions	R Calculated	R Table	Description
Q1	0.577	0.433	Valid
Q2.1	0.818	0.433	Valid
Q2.2	0.688	0.433	Valid
Q2.3	0.494	0.433	Valid
Q2.4	0.789	0.433	Valid
Q3.1	0.756	0.433	Valid
Q3.2	0.796	0.433	Valid
Q4.1	0.569	0.433	Valid
Q4.2	0.688	0.433	Valid
Q5.1	0.703	0.433	Valid
Q5.2	0.503	0.433	Valid
Q5.3	0.818	0.433	Valid
Q6.1	0.799	0.433	Valid
Q6.2	0.841	0.433	Valid
Q7	0.717	0.433	Valid
Q8.1	0.763	0.433	Valid
Q8.2	0.607	0.433	Valid
Q8.3	0.636	0.433	Valid
Q8.4	0.789	0.433	Valid
Q9.1	0.801	0.433	Valid
Q9.2	0.793	0.433	Valid

Questions	R Calculated	R Table	Description
Q10.1	0.753	0.433	Valid
Q10.2	0.549	0.433	Valid
Q10.3	0.763	0.433	Valid

2. Reliability Testing

Reliability is explored using Cronbach's Alpha, considered reliable if its value exceeds 0.7. The results of reliability evaluation conducted using the SPSS program are presented in the table below. These findings indicate that the Cronbach's Alpha coefficient for the 24 questionnaire items is 0.957, exceeding the threshold value of 0.7, affirming the questionnaire's reliability.

Table 5. Reliability Testing Result

Reliability Statistics		
Cronbach's Alpha	N of Items	Description
0.957	24	Reliable

Heuristic Evaluation Result

Out of 21 respondents, 5 of them served as Heuristic evaluation evaluators, comprising 4 lecturers and 1 Informatics Engineering student tasked with evaluating the design of the created website. Then, from the evaluation results conducted by the evaluators, the severity rate results were obtained for each variable of the 10 Heuristic Evaluation principles, as shown in the following table:

Table 6. Evaluation Result

No	Variable	Original Values	Rounded Values
1	Visibility of System Status	1	1
2	Match between System and the Real World	1	1
3	User Control and Freedom	2	2
4	Consistency and Standard	1	1
5	Recognition rather than Recall	1,66	2
6	Prevention Error System	3	3
7	Flexibility and Efficiency of Use	1	1
8	Aesthetic and Minimalist Design	1,25	1
9	Recovery and System	4	4
10	Help and Documentation	3,5	4

In Table 6, the average severity rate results of each variable are presented, calculated based on the assessments from the experts. There are three aspects that have severity levels exceeding 2

(Minor), indicating minor issues that slightly inconvenience users but do not hinder the basic functionality of the product. The following are the three aspects with high severity rate values that require further improvement compared to other aspects:

1. Prevention Error System

The error prevention aspect shows a severity level of 3 (Moderate), indicating issues that significantly affect the product's functionality or user experience but still allow users to complete their tasks. According to the respondents' feedback, the application still lacks a feature for notifying users of preventive messages to avoid errors.

2. Recovery and System

The Recovery and System aspect shows a severity level of 4 (Major), indicating issues that seriously impede the product's functionality or user experience, making it difficult for users to complete their tasks. According to respondents' feedback, the application still lacks notifications when errors occur on the website and also lacks feedback features.

3. Help and Documentation

The Help and Documentation aspect has a severity level of 4 (Major), indicating serious issues that hinder the product's functionality or user experience, making it difficult for users to complete their tasks. According to respondents' feedback, the application still lacks help features when error messages appear on the website and also lacks design documentation on the website.

CONCLUSION

In this research, an evaluation was conducted using Jakob Nielsen's 10-point Heuristic Evaluation, followed by calculating the Severity Rate to determine the priority scale for improving the User Interface design of the website profile of the Informatics Engineering Program at Universitas Papua. The evaluation results and Severity Rate calculation for the 10 Heuristic Evaluation principles yielded an average severity rate value of 2. This indicates that the issues fall within the Minor Problem category, where usability problems are minor and do not significantly hinder the user experience.

RECOMMENDATION

To enhance the user experience when using the application, developers can focus on improving the three Heuristic Evaluation variables with the highest Severity Rate. The Prevention Error System, Recovery and System, and Help and Documentation aspects can be enhanced by adding features such as error message notifications, feedback mechanisms, and design documentation. Through the analysis and conclusion drawn from this research, developers can evaluate usability issues in the User Interface Design of the Informatics Engineering Program website at Universitas Papua. This evaluation helps identify necessary improvements according to their priority scale to enhance the application's quality.

REFERENCES

- Adhi, T. R., Wijoyo, S. H., & Prakoso, B. S. (2022). Perancangan User Interface Website Profil Perusahaan dengan menggunakan Metode Human Centered Design (HCD) dan Heuristic Evaluation (Studi Kasus: PT Mahitala Bramanta Digital). *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, 6(10), 4867–4876. <http://j-ptiik.ub.ac.id>
- Agarina, M., Sutedi, & Suryadi Karim, A. (2019). Seminar Nasional Hasil Penelitian dan Pengabdian 2019 IBI DARMAJAYA Bandar Lampung. *In Prosiding Seminar Nasional Hasil Penelitian Dan Pengabdian*, 1, 192–200.
- Dandi, M., & Linda, A. (2022). Analisis User Interface Dengan Menggunakan Metode Heuristic Evaluation Terhadap Academic Management System Poltekkes Kemenkes Palembang. *Jurnal Mantik*, 6(3), 3216–3225. <https://www.iocscience.org/ejournal/index.php/mantik/article/view/2858>

- Dewi, S. K., & Sudaryanto, A. (2020). Validitas dan Reliabilitas Kuesioner Pengetahuan , Sikap dan Perilaku Pencegahan Demam Berdarah. *Seminar Nasional Keperawatan Universitas Muhammadiyah Surakarta (SEMNASKEP) 2020*, 73–79.
- Ihsan, A. M. (2023). *Analisis Usabilitas Website Pemerintah Provinsi Jambi melalui*. 1(September), 1–7.
- Muhyidin, M. A., Sulhan, M. A., & Sevtiana, A. (2020). Perancangan Ui/Ux Aplikasi My Cic Layanan Informasi Akademik Mahasiswa Menggunakan Aplikasi Figma. *Jurnal Digit*, 10(2), 208. <https://doi.org/10.51920/jd.v10i2.171>
- Muqoddas, A., Yogananti, A. F., & Bastian, H. (2020). Usability User Interface Desain pada Aplikasi Ecommerce (Studi Komparasi Terhadap Pengalaman Pengguna Shopee, Lazada, dan Tokopedia). *ANDHARUPA: Jurnal Desain Komunikasi Visual & Multimedia*, 6(1), 73–82. <https://doi.org/10.33633/andharupa.v6i1.3194>
- Murdiaty, M., Angela, A., & Sylvia, C. (2019). Evaluasi Desain Antarmuka Portal Akademik Menggunakan Metode Heuristic Evaluation. *Jurnal Media Informatika Budidarma*, 3(4), 391. <https://doi.org/10.30865/mib.v3i4.1547>
- Nurahmi, H., & Pinem, S. (2024). *UI / UX Textbook Development Using ADDIE and E-learning in the Multimedia Study*. 2024, 221–230. <https://doi.org/10.18502/keg.v6i1.15370>
- Ono, S. (2020). Uji Validitas dan Reliabilitas Alat Ukur SG Posture Evaluation. *Jurnal Keterampilan Fisik*, 5(1), 55–61. <https://doi.org/10.37341/jkf.v5i1.167>
- Rasmila, R., Mardiyansya, Y., Udariyansyah, D., & Sauda, S. (2023). Analisis Pendekatan Ui/Ux Perancangan Aplikasi Android Pada Toko Jhon. *Jurnal Komputer Dan Informatika*, 11(2), 254–261. <https://doi.org/10.35508/jicon.v11i2.12597>
- Romansya, C. B., Az-Zahra, H. M., & Rokhmawati, R. I. (2019). Evaluasi User Experience Aplikasi Perangkat Bergerak Ruang Guru dengan Metode Heuristic Evaluation. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer E-ISSN*, 2548(9), 964X.
- Tristiyanto, T., Irawati, A. R., Kurniawan, D., & Arba, R. A. (2020). Evaluasi Heuristik Pada Aplikasi Terampil Untuk Optimalisasi User Interface Dan User Experience. *Jurnal Pepadun*, 1(1), 109–119. <https://doi.org/10.23960/pepadun.v1i1.18>
- Victoria, O., Kaunang, F. J., & Wagiu, E. B. (2022). Analisis Komponen Desain Layout, Warna, dan Kontrol User Interface terhadap User Experience pada Aplikasi PeduliLindungi. *TeIKa*, 12(02), 97–106. <https://doi.org/10.36342/teika.v12i02.2912>
- Wirawan, R., Aisyah, N., Rahman, A., Bilgah, B., Rahmawati, S., Medikano, A., Sebayang, A., & Putra, A. S. (2021). Perancangan Aplikasi Website Menggunakan Macromedia Dreamweaver Mx Untuk Budi Daya Anggrek (Studi Kasus Toko Anggrek Berseri). *Tekinfo: Jurnal Bidang Teknik Industri Dan Teknik Informatika*, 22(2), 77–86. <https://doi.org/10.37817/tekinfo.v22i2.1765>