ECSITE

Implementation of Goal-Directed Design in the Development of the Jogja Tourist Travel Planning Website Application

**Danny Sebastian[1*], Galen Riandito[2], I Kadek Dendy Senapartha[3]**

[1] Informatika, Universitas Kristen Duta Wacana, 55224, Indonesia
[2] Informatika, Universitas Kristen Duta Wacana, 55224, Indonesia
[3] Informatika, Universitas Kristen Duta Wacana, 55224, Indonesia

☞ danny.sebastian@staff.ukdw.ac.id

This article contributes to:

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SUSTAINABLE DEVELOPMENT GOALS

Time Based Efficiency
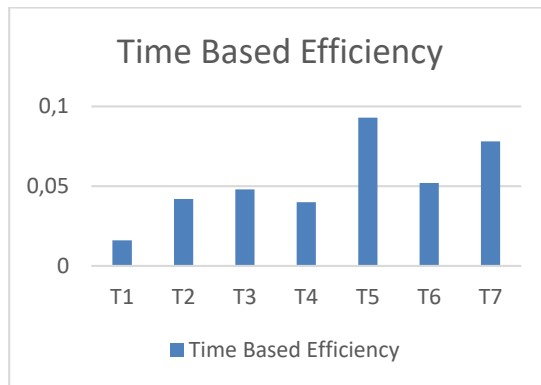
Highlights:
- 100% success rate for T1-T7.
- Average SUS value = 80,7. Adjective rating of Good, a grade scale with a C result, and an acceptability range with an acceptable value or can be accepted by users.

Abstract

Jogja is one of the most popular tourist destinations in Indonesia. Tourists who come to Jogja are mostly backpackers, family tourists, and tour groups. Jogja is indeed famous for its popular tourist attractions, such as Prambanan Temple, Malioboro, and Mount Merapi. However, tourists who do not know much about tourism in Jogja will find it difficult to design their travel plans. Therefore, the existence of Jogja travel planning website application will help tourists in planning their trip. This Jogja travel itinerary website application is designed using the Goal-directed design method because tourists have different types and characteristics so that their tourist interests will be different. This research will focus on the goals and needs of users with the stages of research, modeling, requirements, framework, design refinement, interface implementation, and usability testing. From the results of usability testing on the Jogja travel planning website application, we obtained an effectiveness value with a success rate of 100%, efficiency with the longest average time-based efficiency value T1, namely 0.016 goal/sec and the fastest time-based efficiency, namely T5 with a value of 0.093 goal/sec, as well as satisfaction with an average value of 80.7, which means it is acceptable with a good rating and a rating scale of C.

Keywords: Website application, Goal-directed design, usability testing

1. Introduction

Jogja is one of the tourist destinations that is always sought after by tourists and every year it experiences an increase. It is targeted that 6.6 million tourists will vacation in Jogja in 2023, this is around 430,000 higher than in 2022 [1]. According to Dama Adhyatma, the types of tourists are divided into: family tourists, hedonistic, backpackers, visiting friends and relatives, excursionists, educational tourists, religious tourists, snowbirds, ethnic minorities, disabled tourists, social tourists and short break markets [2]. Meanwhile, the types of tourists include: domestic tourists, foreign tourists, individual tourists, group tourists and bus tourists [3] [4]. In general, tourists who come on holiday to Jogja are backpackers, family tourists, and tour groups or groups. Jogja has long been famous for its popular tourist attractions that are known to tourists who travel to Jogja, such as Prambanan Temple, Mount Merapi, Parangtritis and Malioboro. However, as

tourists who don't know much about the tourist attractions in Jogja, they will find it difficult to plan their tourism activities, because they don't know which tourist attractions are suitable to visit. Apart from that, tourists also consider several aspects to make their travel plans, such as budget, effective tourist routes, length of time they will travel, accommodation, restaurants and other information related to their tourism needs. This problem is caused by the lack of information about tourist attractions in Jogja that tourists get. Even though Jogja has many other interesting tourist attractions, they are less popular due to the lack of information available.

From the problems obtained, the author is interested in designing a website-based application that can plan tourist trips for tourists where tourists can choose tourist trips that suit their needs. Based on the selected requirements, a tour itinerary will be displayed with tourist attractions and detailed information regarding these tourist attractions, accommodation and restaurants. With this travel planning, tourists can easily plan their tour without having to switch platforms to look for information to plan their tour because everything will be available on this website application, starting from tourist attractions, accommodation and restaurants.

In designing this website application, the Goal Directed Design method was chosen as the design method, because the Goal Directed Design method involves potential initial users taken from a sample of potential users used in the early stages of development. These potential users are backpackers, families and tour groups. These potential early users have different needs, characteristics and motivations in planning their travel trips, so they have different itineraries or travel plans. Therefore, the Goal Directed Design method will focus on the goals and needs of users which will be realized in the website application. The final result of this website application is a website application that has an interface and functionality that suits the user's goals and needs and has a usability value that is in accordance with good usability rules, so that users can use this website application effectively, efficiently and feel satisfied. In collecting data for the Goal Directed Design method used to design this website application was a questionnaire and usability testing.

2. Literature Review

Previous research regarding the application of designing web-based tourist itineraries was carried out by [5]. Designing an itinerary or travel itinerary is quite an important thing to do before heading to the desired destination. Indonesian tourists prefer to travel abroad because of the lack of information regarding tourist itineraries in Indonesia. Apart from that, the ease of creating an itinerary greatly influences the desire to travel to a destination. Based on these problems, researchers are interested in developing a website application to share travel experiences in the form of an itinerary. In this research, researchers used the User Experience (UX) lifecycle method and it was proven to be successfully implemented. Starting with interviews and online questionnaires with a total of 136 respondents to analyze user needs. The next stage is creating user personas, sketches, storyboards, scenarios and wireframes. Next, there is prototyping of the wireframe results in the form of a high-fidelity prototype which is then carried out with an evaluation which shows that this application has met the user's needs, but the application interface does not make it easy for users to find cost information.

Research using the Goal Directed Design method for designing user interfaces was carried out by [6]. Researchers conducted research on the MboisApp application. The MboisApp application is an Android-based application to provide tourism information so that it can make it easier for users to design tourist attractions in Malang. In conducting usability testing, 10 people were selected as respondents by dividing them into 2 groups of tourists based on geographical aspects. The usability testing metrics tested are effectiveness, efficiency and user satisfaction. Based on the test results, MboisApp experienced 13 usability problems which must be fixed immediately to make it easier for users to achieve their goal of using this application, namely searching for information. The Goal Directed Design method was chosen to improve the MboisApp application interface. After applying the Goal Direct Design method to improve this application, the usability value of this application became better. The original effectiveness value was 64.2% to 94.2%, the original efficiency value was 57.4% to 91.3% and the overall satisfaction value was 40.25 to 80.5. From this research it can be concluded that the GDD method can make the usability value of an application better so that it can be accepted by users.

Research using the Goal Directed Design method was also carried out by [7]. Researchers conducted research to design a website application that functions to connect adopters and animal shelters. The problem that occurs is that cats are animals that are often abandoned by their owners because they are sick or are no longer able to care for them. However, currently an adopter or person who wants to adopt a cat is less educated in caring for cats properly, such as the right time to

vaccinate cats. Another problem is that an adopter has to pay when he wants to adopt a cat from a trusted place. From this problem, researchers have a solution to create a website-based platform called "HelpMeong" which is useful for connecting adopters and shelters. In designing this platform, the Goal Directed Design method was used as a design method. From the results of implementing the GDD method, application design solution results were obtained which were evaluated using a combination of usability tools between MAZE and SUS. From the evaluation results, we obtained a MAUS result of 88.2 and a SUS value of 76.7 which is included in the ACCEPTABLE (acceptable) value with the adjective rating GOOD. So it can be concluded that the "HelpMeong" application is acceptable to users and can meet user needs.

The GDD method was carried out for other research by [8]. Researchers conducted research on the Funtech Plaza website, which is a tourist attraction with a technology theme which is part of the Jatim Park 3 tourist attraction. This website has problems with the interface design so that the content contained is less informative and the interface design seems ordinary. Due to these problems, the Funtech Plaza website felt the need to change its interface design and information structure. In this research, the researcher implemented the Goal Directed Design method because it focuses on the user's goals in using this website, as well as to support business goals. The research stage in this study was carried out by interviews to find out the problems on the website. Evaluation is carried out using SUS (System Usability Scale). The next step is designing content requirements, creating a website wireframe and finally creating a website prototype. The evaluation results with SUS at the initial stage showed an average value of 44. After improving the interface using the GDD method, it showed that the average value was 86.5. From this research it can be concluded that the GDD method can increase usability because the goals and needs of users can be met.

The Goal Directed Design method is also used by [9] to design a user interface that suits the user's goals and needs. Researchers conducted research with GDD to redesign the Jatim Park website, which is a tourist and learning place in East Java. The website requires improvements in terms of interface design, website information structure, and ticketing features. Researchers implemented the GDD method to produce interface designs that have good usability values. From the results of testing the prototype of the Jatim Park website that had been created, usability testing was carried out using the SUS questionnaire which showed a score of 82.75 in the acceptable category. From the research conducted, it can be concluded that the GDD method can produce an acceptable website interface because with the GDD method, the user's goals in using the website can be fulfilled.

3. Methods

Goal-directed design (GDD) is a method developed by Alan Cooper that focuses on interface design [10] [11]. This method is done by identifying the goals and behavior of users. Before designing a system, research will be done to create a model using the user persona also focusing on business goals [12] [10] [13]. According to [10] the goal is not the same as the task. A goal is an end result while a task is a process for a process to achieve a goal. There are 6 stages of GDD in general as shown in Figure 1 as follows:
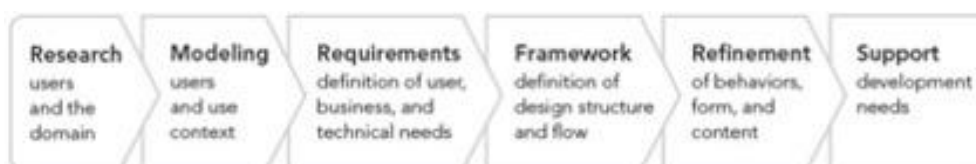

Figure 1.
Website user interface

The first stage is "Research". At this stage, a literature study is conducted and a research questionnaire or user needs is provided. The following is a list of questions used to describe the user profile [14].
1. What type of traveler are you?
2. How old are you?
3. Which city you came from?
4. What device are you using to access the website?
5. What website or application do you usually use to find tourist attractions or information about tourism in Jogja?

Here are the questions used to ask the user's needs.
1. What motivates ou to travel to Jogja?
2. What is the travel scenario to Jogja that you usually do? (Example: Buying a train ticket, looking for information about Jogja tourism on tour and travel sites such as booking.com, car rental, etc.)
3. What information do you need and what are you looking for as a tourist that is expected to be available in this website application?.

4. What kind of Yogyakarta tourist attractions interest you? (Example: nature, beach, culture, etc.)
5. How many days do you usually spend traveling in Jogja?
6. Are you interested in using a travel agency?
7. How many tourist places do you usually visit in one day?
8. What activities did you do while traveling in Jogja? (Example: enjoying culinary, outbound, exploring nature, studying cultural and historical sites, etc.)
9. How much budget range do you spend for traveling in Yogyakarta?
10. If there is an application to plan a Yogyakarta trip according to your interests, will it be useful?

After the next research stage is the modeling stage where user needs will be analyzed and user personas will be produced [15] [16]. Following in the Table 1, Table 2, and Table 3 is the persona of the user.

**Table 1.
Backpacker traveler persona**

Persona	
Demographics	Name: Budi Age: 24 Male gender Occupation: Student
Activity	Access social media to find information about Jogja tourism.
Exoertise	Using a smartphone to get information and other needs.
Motivation & Goal	1. Need a vacation. 2. Want to travel to enjoy the nature in Jogja and learn about the culture and culture of Jogja. 3. Travel in Jogja in a short time with a minimal budget.
Need	1. Recommendations for tourist attractions that are suitable to visit in a short time. 2. Complete information about tourist attractions including: opening and closing hours, ticket prices, and do's and don'ts.
Pain	1. Lack of information regarding access to tourist attractions. 2. Difficulty in finding suitable and popular tourist attractions that can be visited in a short time. 3. Look for a cheap hotel suitable for backpackers.

**Table 2.
Family traveler persona**

Persona	
Demographics	Name: Ardi Age: 35 Male gender Occupation: Civil servant
Activity	1. Carry out your work as usual. 2. When on leave or holiday, you usually plan a trip with your family by looking for information through Traveloka, or asking friends in Jogja.
Exoertise	Using a smartphone to get information and other needs.
Motivation & Goal	1. Study the culture and culture of Jogja. 2. Happy with the atmosphere of Jogja and the many tourist and culinary choices available. 3. Want to enjoy your favorite culinary delights in Jogja and explore Jogja's nature.
Need	1. Information about tourist attractions including pictures and tourist locations. 2. New tourist attractions, routes to tourist attractions and alternative public transportation available.
Pain	1. Difficulty finding tourist attractions that are friendly to children and the elderly. 2. Difficulty finding transportation when traveling. 3. Lack of information about Jogja tourist attractions. 4. Difficulty in budgeting or planning finances for traveling. 5. During tourist activities, energy is quickly drained or you feel tired.

Table 3.
Group traveler persona

Persona	
Demographics	Name: Adit Age: 30 Male gender Job: Head of Marketing Division
Activity	Carrying out work as usual.
Exoertise	Using a smartphone to get information and other needs.
Motivation & Goal	1. Want to travel with members of his division. 2. Enjoy the atmosphere of the city of Jogja and its tourist attractions.
Need	Retribution ticket prices, alternative restaurants for groups and comfortable hotels.
Pain	1. Difficulty finding a restaurant that is suitable for groups. 2. Difficulty with travel routes. 3. Difficulty finding transportation accommodation.

At requirement definition stage, an analysis of the user persona is performed and will produce a table of user needs. The following in Table 4 is a table of user needs.

Table 4.
Problems and user requirements

Problems	Requirements
Difficulty finding information about tourist spots in Jogja.	Need the most complete Jogja tourist information with tourist categories and suitable types of tourism as well as the location or route to the tourist place.
When in Jogja, difficulties in finding transportation.	Need information about transportation while in Jogja, including public transportation trans Jogja and vehicle rental.
Difficulty finding cheap hotels for backpackers.	Need recommendations for cheap hotels suitable for backpackers.
Difficulty in determining suitable tourist spots to visit in a short tourist time.	Provides a feature to search for the nearest tourist location and can make a tourist travel plan from the tourist you like.
It is difficult to determine tourist spots that are friendly to children and the elderly.	Need a tourist travel plan with tourist attractions that are friendly to children and the elderly.
In tourism activities, tourists feel that the energy needed during tourism is quickly depleted.	It requires a tourist travel plan with an effective but still effective travel route.
Difficulty in planning finances when traveling.	It requires a budget estimation feature that is needed in accordance with the tourist travel plan that will be made.
Difficulty finding a suitable restaurant to bring a group.	Need a restaurant alternative suitable for a group.

At the framework design stage, the interface is designed in rough form using a wireframe. Below, the design is carried out using a wireframe [17]. Several required pages are produced, namely the homepage, profile, travel plan form, tourist itinerary, travel category form, favorite tour form, and favorite tour page.

At the design rework stage, the results of the wireframe design will be given color, logo, content and user interaction to produce a prototype of the Jogja travel planning website application.

3.1. Evaluation Method

Testing is carried out using usability testing, the following is the success rate calculation formula to measure how easy it is for users to complete basic tasks [18]:

$$\text{Success rate} = \frac{\text{S+(PX0.5)}}{\text{Total Task}} \times 100\% \qquad (1)$$

The following is a time-based efficiency formula to measure how long it takes a user to complete a given basic task.

$$Time\ based\ efficiency = \frac{\sum_{j=1}^{R} \sum_{i=1}^{N} \frac{n_{ij}}{t_{ij}}}{NR} \qquad (2)$$
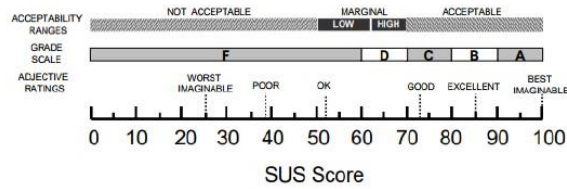
Figure 2.
SUS Score range

Figure 2 is the formula for measuring user satisfaction with SUS (System Usability Scale) [19] [20]. Next, the SUS score for each respondent is calculated. The average value of the SUS Score is calculated and grouped based on Figure 2.

4. Results and Discussion
4.1. Application User Interface

The interface produced from the prototype is implemented into program code and produces a website application that matches the design and functionality. The website was developed using bootstrap as the CSS framework and ReactJS as the frontend, and Laravel. The application interface can be seen on Figure 3.
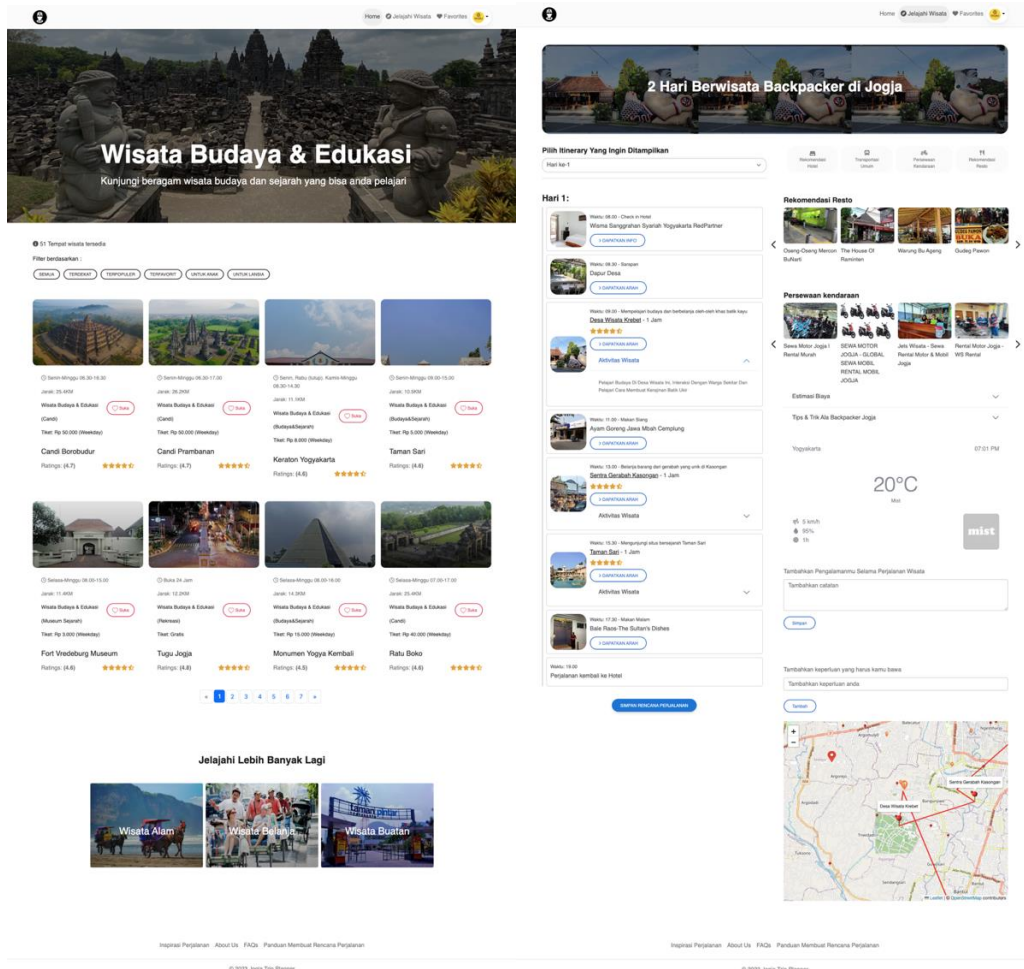

Figure 3.
Website user interface

4.2. Presenting the Results

Usability testing was carried out with 30 respondents by giving 7 task scenarios Table 5. Of all the tasks, T1 is the task with the longest average, which is 0.016 goals/sec. That is due to the complexity of task T1, which is a task for user account registration and login that requires user input as many as 8 inputs. While T5 has the highest value of time-based efficiency with 0.093 goals/sec, it is because the task performed is not as complex as other tasks. At T5, users are asked to use the 'like' feature or to like tourist attractions from the selected tourist category. While the second highest task is T7 with a value of 0.078 goal/sec, where the user is asked to save the results of the tourist travel plan made by filling in 2 inputs, namely the title of the travel plan and the description of the travel plan.

Table 5.
Success Rate & time-based
efficiency table

Success Rate	T1	T2	T3	T4	T5	T6	T7
Average	100%	100%	100%	100%	100%	100%	100%
Time-based Efficiency (goal/sec)	0.016	0.042	0.048	0.040	0.093	0.052	0.078

Of all the tasks, T1 is the task with the longest average, which is 0.016 goals/sec. That is due to the complexity of task T1, which is a task for user account registration and login that requires user input as many as 8 inputs. While T5 has the highest value of time-based efficiency with 0.093 goals/sec, it is because the task performed is not as complex as other tasks. At T5, users are asked to use the 'like' feature or to like tourist attractions from the selected tourist category. While the second highest task is T7 with a value of 0.078 goal/sec, where the user is asked to save the results of the tourist travel plan made by filling in 2 inputs, namely the title of the travel plan and the description of the travel plan.

Table 6.
SUS value

Respondent	SUS Value	Respondent	SUS Value	Respondent	SUS Value
R1	85	R11	80	R21	72,5
R2	80	R12	82,5	R22	90
R3	100	R13	95	R23	72,5
R4	80	R14	80	R24	70
R5	72,5	R15	90	R25	77,5
R6	65	R16	80	R26	77,5
R7	100	R17	87,5	R27	67,5
R8	77,5	R18	100	R28	75
R9	72,5	R19	87,5	R29	75
R10	72,5	R20	82,5	R30	72,5

Table 6 shown the SUS Score for each respondent. From the results above, the average value of SUS is obtained as follows: 2.420/30 = 80.7. From the results of the average value of SUS, it shows 80.7 with the adjective rating Good, grade scale with the result C, and acceptability range with the value acceptable or can be accepted by users.

5. Conclusion

From the research that has been carried out by analyzing to produce a Jogja travel planning website application using the Goal-directed design method, it can be concluded that this website application has been accepted by users and meets the needs required by users. This is proven by the results of usability testing which shows the effectiveness aspect with a success rate of 100%, efficiency with an average value of 0.052 goal/sec, which means users can complete tasks in an average of 19.23 seconds to carry out each task, as well as satisfaction with The average score is 80.7, which means it is acceptable with a good rating and a rating scale of C. From the interview results from user feedback, it also shows that users are quite satisfied and it is quite easy to use this website application to make travel plans for Jogja.

From the research carried out by the author, of course there are still many shortcomings as stated by users when giving feedback. There are also too many input requirements for users, such as registration and login tasks which still take a lot of time with an average of 62.5 seconds to complete this task. Therefore, the author gives advice to future researchers who will cover the same topic to consider providing the input needed for this website application so that it is not too much and makes the authentication process easier, so that it is even better in terms of features, user security and interface so that remains in accordance with user needs.

6. Authors' Declaration

Authors' contributions and responsibilities - The authors made substantial contributions to the conception and design of the study.The authors took responsibility for data analysis, interpretation, and discussion of results. The authors read and approved the final manuscript**.**

Funding - No funding information from the authors.

Availability of data and materials - All data are available from the authors.

Competing interests - The authors declare no competing interests.

Additional information - No additional information from the authors.

7. References

[1] B. Suryani, "6,6 Juta Wisatawan Ditargetkan Masuk ke Jogja Tahun Ini," Harian Jogja, 02 2023. [Online]. Available: https://jogjapolitan.harianjogja.com/read/2023/01/02/510/11219 juta-wisatawan-ditargetkan-masuk-ke-jogja-tahun-ini. [Accessed 27 November 2023].

[2] I. K. Suwena, I. G. N. Widyatmaja and M. J. Atmaja, "Pengetahuan dasar ilmu pariwisata," 2010

[3] R. George, Marketing tourism and hospitality: concepts and cases, Springer Nature, 2021.

[4] L. Wang, X.-k. Wang, J.-j. Peng and J.-q. Wang, "The differences in hotel selection among types of travellers: A comparative analysis with a useful bounded rationality behavioural d support model," *Tourism management,* vol. 76, 2020.

[5] A. C. Wardhana, N. Anggraini and N. F. Rozy, "Pengembangan aplikasi web perancangan perjalanan wisata menggunakan metode user experience lifecycle," *Jurnal Teknologi Inform Ilmu Komputer (JTIIK),* vol. 8, no. 2, 2021.

[6] R. L. P. Hati, R. I. Rokhmawati and L. Fanani, "Evaluasi Dan Perbaikan Rancangan Anta Pengguna Aplikasi MboisApp Menggunakan Metode Goal-Directed Design," *Jurnal Pengemb Teknologi Informasi dan Ilmu Komputer,* vol. 5, no. 6, pp. 2718-2726, 2021.

[7] T. U. Kulsum, F. M. Al Anshary and R. Fauzi, "PERANCANGAN DESAIN ANTARMUKA PENG PADA APLIKASI HELPMEONG BAGI ADOPTER MENGGUNAKAN METODE GOAL-DIRECTED DE *IIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika),* vol. 8, no. 1, pp. 27-39, 2023.

[8] P. Wicaksono, R. I. Rokhmawati and A. Rachmadi, "Evaluasi dan Desain Perbaikan Anta Pengguna Pada Situs Web Funtech Plaza Menggunakan Metode Goal-Directed Design (GDD)," *Pengembangan Teknologi Informasi dan Ilmu Komputer,* vol. 4, no. 3, pp. 883-890, 2020.

[9] Y. Maulana, R. I. Rokhmawati and H. M. Az-Zahra, "Maulana, Y., Rokhmawati, R., & Az-Za (2019). Evaluasi Dan Perbaikan Rancangan Antarmuka Pengguna Situs Web Jawa Timur Park Menggunakan Metode Goal-Directed Design (GDD). Jurnal Pengembangan Teknologi Inform Ilmu Komputer, 3374-3382.," *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer,* no. 4, pp. 3374-3382, 2019.

[10] A. Cooper, R. Reimann and D. Cronin, About face 3: the essentials of interaction design, John & Sons, 2007.

[11] A. Williams, "User-centered design, activity-centered design, and goal-directed design: a rev three methods for designing web applications," in *Proceedings of the 27th ACM intern conference on Design of communication*, 2009.

[12] Q. Zhang, Y. Cui and G. Qian, "Goal-directed design of metal--organic frameworks for liquid adsorption and separation," *Coordination Chemistry Reviews,* vol. 378, pp. 310-332, 2019.

[13] A. Williams, "User-centered design, activity-centered design, and goal-directed design: a rev three methods for designing web applications," in *Proceedings of the 27th ACM intern conference on Design of communication*, 2009.

[14] M. B. Syahroni and H. B. Santoso, "Designing social question-and-answering interaction usin directed design method," *International Journal on Advanced Science, Engineering and Infor Technology,* vol. 8, no. 4, 2018.

[15] S. J. Kerr, O. Tan and J. C. Chua, "Cooking personas: Goal-directed design requirements kitchen," *International Journal of Human-Computer Studies,* vol. 72, no. 2, pp. 255-274, 2014.

[16] I. Sukarsa, I. N. Piarsa, E. B. L. Sukarta and N. W. Wisswani, "Goal directed design method appl on UI/UX of dua mata mobile apps," *Scientific Journal of Informatics,* vol. 8, no. 2, pp. 183-193,

[17] V. Adhiazni, E. Nurmiati, S. Sumarsono and M. Irfan, "Redesigning user interface based o experience using goal-directed design method," *2020 8th International Conference on Cyber*

Service Management (CITSM), pp. 1-6, 2020.

[18] M. Rifqi, H. M. Az-Zahra and A. D. Herlambang, "Evaluasi Usability dan Rekomendasi Per Tampilan Aplikasi IBI Library menggunakan Metode Usability Testing," *Jurnal Pengemk Teknologi Informasi dan Ilmu Komputer,* vol. 3, no. 10, pp. 9832-9841, 2019.

[19] J. R. Lewis, "The system usability scale: past, present, and future," *International Journal of H Computer Interaction,* vol. 34, no. 7, pp. 577-590, 2018.

[20] P. Vlachogianni and N. Tselios, "Perceived usability evaluation of educational technology usi System Usability Scale (SUS): A systematic review," *Journal of Research on Technology in Edu vol. 54, no. 3, pp. 392-409, 2022.