DESIGN OF THE MU DIABETES APPLICATION AS AN EDUCATIONAL METHOD OF TYPE II DIABETES MELLITUS BASED ON ANDROID SOFTWARE

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ABSTRACT

Diabetes mellitus is a chronic condition prevalent among individuals. The cornerstone of effective diabetes management is strict adherence to daily medication intake. Deviation from the prescribed medication regimen poses a substantial risk of exacerbating disease and precipitating complications. Recognizing the necessity for educational interventions to bolster medication adherence among individuals with diabetes mellitus, the Mu Diabetes application was developed using the Android software. This research endeavors to devise an application encompassing comprehensive education on type II diabetes mellitus treatment with the primary aim of enhancing medication adherence. Employing a research and development approach, the study entailed designing, coding, and testing the application using the waterfall method and System Usability Scale questionnaire methodology, respectively. The resultant Android-based Mu Diabetes application, as evidenced by the trial outcomes using a Likert scale, yielded an average score of 80. In summary, the findings affirm the feasibility and utility of the Mu Diabetes application as a viable tool for managing type II diabetes mellitus and promoting medication adherence.

Keywords: DM Type II, Drugs, android, application, alarm

INTRODUCTION

The utilization of digital-based health services is deemed highly advantageous because of their capability to enhance access and availability of services while also affording digital platforms the opportunity to advance healthcare provisions (Moller *et al.*, 2017). Diabetes mellitus represents a significant public health concern, with its prevalence steadily increasing each year. Type 2 diabetes mellitus accounts for 90-95% of all cases globally (Mokolomban *et al.*, 2018).

Patient adherence to medication regimens plays a pivotal role in the efficacy of therapies aimed at maintaining blood glucose levels within the optimal range (Mokolomban *et al.*, 2018). Non-compliance with medication intake, often stemming from factors such as forgetfulness or lack of understanding about the importance of medication, is a major contributing factor to treatment failure among patients with diabetes mellitus.

Hence, the development of the Mu Diabetes application was conceived as a platform for diabetes mellitus education utilizing Android software. This solution aims to assist in educating patients with diabetes about maintaining a healthy lifestyle, providing reminders for medication schedules, disseminating educational materials such as posters, offering information on herbal remedies, and enabling consultations with pharmacists regarding medications.

RESEARCH METHODS

The instrument utilized in this study was a usability scale questionnaire administered to both students and the general public to evaluate the usability of the application. Samples

were selected using a purposive sampling method targeting individuals who were willing to participate in the evaluation process. Respondents were recruited from educational institutions and various public settings (Alisya *et al.*, 2023).

Research Procedure

1. Preparation for Application Development
   a. Input Needs Analysis.
      The input requirements for the application were identified through a needs analysis process outlined by Ilham (2024). These requirements encompassed user identification, educational materials, medication reminders, herbal treatment suggestions, and pharmacist consultation.
   b. Process Requirements Analysis
      The system is designed to receive user input and process it accordingly.
   c. Output Requirements
      The outputs of the Mu Diabetes application include the dissemination of information on medication schedules, exercise routines, and dietary plans, which are inputted and processed by administrators via the application (Ilham, 2024).
2. System Design.
   The system design phase aims to provide an overview of the design requirements.
   a. Use Case Diagrams
      Use case diagrams were used to depict the system's behavior from the user's perspective, illustrating how the system responds to user requests through a sequence of steps (Verhoef *et al.*, 2021).
   b. Activity Diagrams
      Activity diagrams were employed to outline various activities within the system (Douglass, 2016).
3. Application Testing
      The usability of the application was assessed using the System Usability Scale (SUS) method questionnaire. The testing process involved the questionnaire design, selection of respondents, and distribution of the application via WhatsApp for installation and usage. Questionnaire responses were collected electronically through the application and manually on paper (Manurung *et al.*, 2024).

Data Analysis

The data presented in this study were derived from calculations performed using the System Usability Scale (SUS) method to assess respondent satisfaction with the application. The methodology for calculating the SUS questionnaire, as outlined by Brooke (2013), involved several steps. Respondents rated their agreement with a series of statements on a scale ranging from strongly disagree to strongly agree, with values assigned from 1 to 5. For odd-numbered statements, 1 was subtracted from the score (X-1), while for even-numbered statements, 5 was subtracted from the score (5-X). The resulting scores range from 0 to 4, representing the four most positive responses. Subsequently, the scores for odd- and even-numbered statements are summed, and the sum is multiplied by 2.5, to calculate the average score. The interpretation of the score results was conducted using scales, as proposed by Bangor (Bangor *et al.*, 2009) and graphical representations, as suggested by Brooke (2013).

RESULTS AND DISCUSSION

1. Results of implementing the Mu Diabetes application
      Participants of the monitoring program can register through the application, after which they are prompted to log in upon successful registration. Within the main menu, users can access various options including educational materials, diet menus, exercise routines, reminder schedules, a feature for consulting with experts who will guide and address participants' inquiries, as well as an option to exit the application.The results of implementing the application can be shown in **Figure 1**.

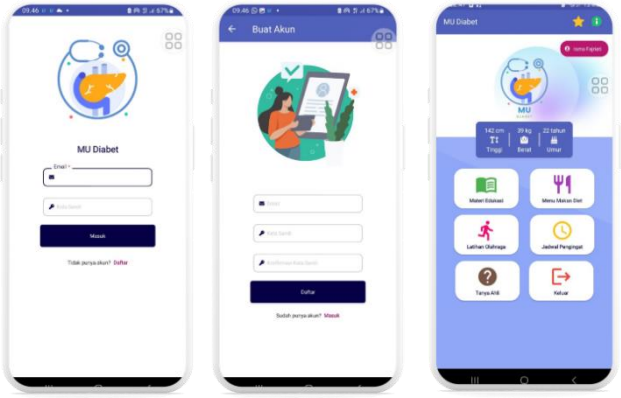

Figure 1. Implementing the application

2. Validity Test

Validity testing was performed using SPSS for the questionnaire results from the 30 respondents. The results of the validity test are shown in **Table I**.

Table I. Validity Test Results

	R_{count}	R_{table}	Description
R1	0.633	0.361	Valid
R2	0.432	0.361	Valid
R3	0.454	0.361	Valid
R4	0.642	0.361	Valid
R5	0.592	0.361	Valid
R6	0.455	0.361	Valid
R7	0.533	0.361	Valid
R8	0.495	0.361	Valid
R9	0.526	0.361	Valid
R10	0.528	0.361	Valid

The validity test used Pearson (2 tail) with a significance level of 5%. The results are considered valid if $R_{count}>R_{table}$, with an R_{table} of 0.361. **Table I** shows that R_{count} on the 10 questionnaires was greater than R_{table}, so the 10 questionnaires were valid.

3. Reliability Test

The reliability test used Cronbach's alpha, which is considered reliable if the value is greater than 0.6. The reliability test results from SPSS are presented in Table II.

Table II. Validity Test Results

Alfa Cronbach	Number of Items	Description
.721	10	Reliable

The results show that the Cronbach's Alpha value for the 10 questionnaire items is 0.721, greater than 0.7 so this questionnaire is considered reliable

4. Test the Mu Diabetes App

Table III. Validity Test Results

Range of values	Amount	Percentage
60 – 79	12	40%
80 – 100	18	60%
Total	30	100%
Average value	**80**	

SUS Score Analysis

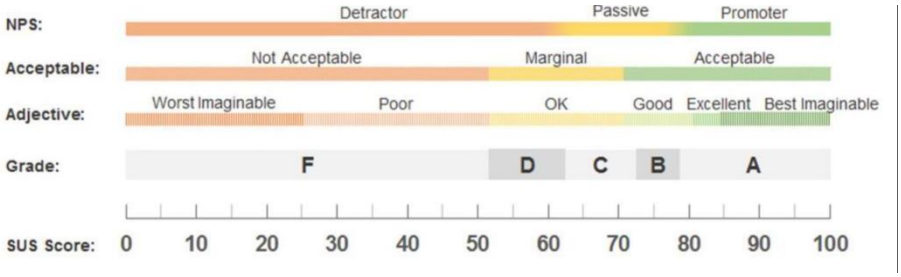

Figure 2. Sauro Chart Interpretation

Using the Sauro curve graph, the percentile ranking for the Mu Diabetes application SUS results was 90%, as shown in **Figure 2**.

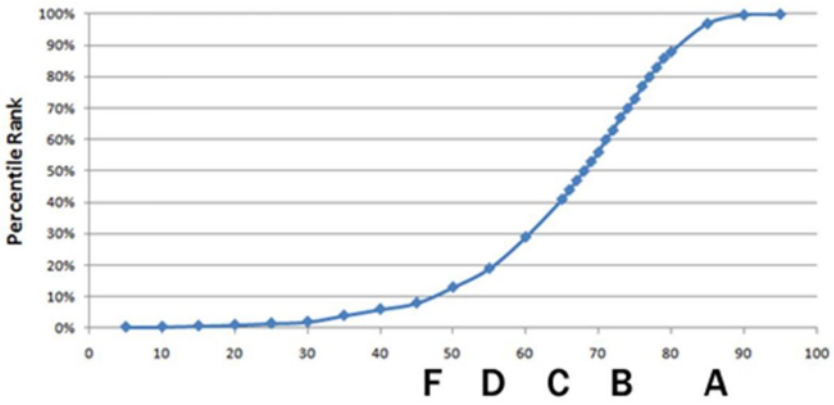

Figure 3. Percentile Value of SUS Score Results

A more complete interpretation of the results is presented in **Figure 3**. It is known that if the Mu Diabetes application is viewed from the usability aspect, the service received grade A because the SUS score is 80, with a percentile ranking in the range of 89%, which is above average because the results are different from the standard SUS score, which is 68. For the results of the interpretation of the approach based on traits (Adjective), the Mu Diabetes application is included in the Good category and the level of acceptance is in the Acceptable category, which means that this service can be generally accepted by students and the public. For the interpretation approach based on NPS, the result is a promoter, which means that users of the Mu Diabetes application really like the Mu Diabetes application. The perceptions of the students and the public who were respondents in this research were at a good level.

5. System Maintenance
   The stages of system maintenance are defined as follows:
   a. Adherence to prescribed functionalities within the application is imperative to ensure the dissemination of information pertaining to the utilization of local medicinal plants as an alternative treatment for specific ailments to the public.
   b. System maintenance entails users judiciously employing the application in line with its intended purpose of information dissemination, thereby facilitating its seamless operation.
   c. The rectification of system errors involves users promptly reporting operational discrepancies (bugs) or undetected weaknesses encountered post-system testing to the application's developer for resolution.
   d. System upgrades necessitate users liaising with the application developer to modify or enhance the system in response to identified areas for potential improvement in functionality.

CONCLUSION

In conclusion, the usability of the application was assessed through the implementation of the questionnaire method, specifically the System Usability Scale. The results, calculated using a Likert scale, yielded an average score of 80, indicating a grade A rating for usability. This outcome suggests that the application is user friendly and operates effectively.

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