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

Isma Fajriati¹, Iis Siti Nurhasanah¹, Nurhidayati Harun¹*, Nia Kurniasih¹, Susan Sintia Ramdani¹

¹Diploma Pharmacy, STIKes Muhammadiyah Ciamis
*Email Corresponding: harunnurhidayati@gmail.com

Submitted: October 20, 2023 Revised: February 26, 2024 Accepted: March 15, 2024

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.
Design of The Mu Diabetes Application as an Educational Method Of Type I

(IsmaFajriati et al.)

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>
<thead>
<tr>
<th>R&lt;sub&gt;count&lt;/sub&gt;</th>
<th>R&lt;sub&gt;table&lt;/sub&gt;</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1 0.633</td>
<td>0.361</td>
<td>Valid</td>
</tr>
<tr>
<td>R2 0.432</td>
<td>0.361</td>
<td>Valid</td>
</tr>
<tr>
<td>R3 0.454</td>
<td>0.361</td>
<td>Valid</td>
</tr>
<tr>
<td>R4 0.642</td>
<td>0.361</td>
<td>Valid</td>
</tr>
<tr>
<td>R5 0.592</td>
<td>0.361</td>
<td>Valid</td>
</tr>
<tr>
<td>R6 0.455</td>
<td>0.361</td>
<td>Valid</td>
</tr>
<tr>
<td>R7 0.533</td>
<td>0.361</td>
<td>Valid</td>
</tr>
<tr>
<td>R8 0.495</td>
<td>0.361</td>
<td>Valid</td>
</tr>
<tr>
<td>R9 0.526</td>
<td>0.361</td>
<td>Valid</td>
</tr>
<tr>
<td>R10 0.528</td>
<td>0.361</td>
<td>Valid</td>
</tr>
</tbody>
</table>

The validity test used Pearson (2 tail) with a significance level of 5%. The results are considered valid if R<sub>count</sub> > R<sub>table</sub>, with an R<sub>table</sub> of 0.361. Table I shows that R<sub>count</sub> on the 10 questionnaires was greater than R<sub>table</sub>, 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>
<thead>
<tr>
<th>Alfa Cronbach</th>
<th>Number of Items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.721</td>
<td>10</td>
<td>Reliable</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Range of values</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 – 79</td>
<td>12</td>
<td>40%</td>
</tr>
<tr>
<td>80 – 100</td>
<td>18</td>
<td>60%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Average value: 80

---

**SUS Score Analysis**

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

![Figure 2. Sauro Chart Interpretation](image)

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.

![Figure 3. Percentile Value of SUS Score Results](image)
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.

ACKNOWLEDGMENT
   Thank you to STIKes Muhammadiyah Ciamis, who has helped provide research
   facilities, and colleagues who have helped to complete this research.

REFERENCES
   User Experience on ShopeePay Digital Wallet Using System Usability Scale (SUS) and
   User Experience Questionnaire (UEQ) Methods. 2023 3rd International Conference on
   Emerging Smart Technologies and Applications (ESmarTA), 01–06. https://doi.org/10.1109/eSmarTA59349.2023.10293705
   (Ed.), Agile Systems Engineering (pp. 313–365). Morgan Kaufmann.
   Ilham, I. (2024). Needs Analysis of Project-Based Learning Model in Writing Paragraphs
   from EFL Students’ Perspectives. Journal of Languages and Language Teaching,
   12(1), 282. https://doi.org/10.33394/jollt.v12i1.9215
   Pasien Diabetes Melitus Tipe 2 Disertai Hipertensi Dengan Menggunakan Metode
   Moller, A. C., Merchant, G., Conroy, D. E., West, R., Hekler, E., Kugler, K. C., & Michie,
   S. (2017). Applying and advancing behavior change theories and techniques in the
   context of a digital health revolution: proposals for more effectively realizing untapped