Usability Evaluation of the Academic Information System at Universitas Battuta Using the System Usability Scale

Andika Syahdewa, Eko Hariyanto

Abstract

This study evaluated students' perceived usability of the Academic Information System (SIAKAD) at Universitas Battuta using the System Usability Scale (SUS). A quantitative descriptive survey was conducted through student SIAKAD accounts at the beginning of the 2025/2026 academic year. Participation was optional, resulting in a voluntary response sample of 300 active students. The questionnaire comprised the ten standard English SUS statements rated on a five-point agreement scale. All responses were complete and were analysed using standard SUS scoring, descriptive statistics, and Cronbach's alpha. The mean SUS score was 74.78, with a sample standard deviation of 6.38, a median of 75.00, and a range of 55.00–87.50. The mean falls within Grade B of the Sauro–Lewis Curved Grading Scale. However, Cronbach's alpha was 0.0041, indicating very low internal consistency and substantially limiting the interpretation of the aggregate score. Consequently, the numerical grade provides insufficient support for a firm conclusion about overall perceived usability. The findings indicate a need to examine questionnaire comprehension and verify response coding before the score informs institutional decisions. Further evaluation should combine questionnaire assessment with task-based observation or interviews, while addressing the limitations associated with voluntary participation.

Keywords*: academic information system; System Usability Scale; perceived usability; internal consistency; higher education.*

Andika Syahdewa
Department, Affiliation, Country
e-mail: andikasadewa0011@gmail.com

Eko Hariyanto
e-mail: eko.hariyanto@dosen.pancabudi.ac.id
3rd International Conference Epicentrum of Economic Global Framework (ICEEGLOF)
Theme: Cross-Sector and Cross-Disciplinary Strategies for Achieving the SDGS
https://proceeding.pancabudi.ac.id/index.php/ICEEGLOF

Introduction

Academic information systems provide digital infrastructure for managing academic information and supporting students' access to university services. Their evaluation should consider how students experience the systems during actual use. Research on the academic information system at Universitas PGRI Mahadewa Indonesia illustrates the relevance of incorporating students' assessments into the evaluation of academic services [1]. ISO 9241-11:2018 provides a conceptual framework that treats usability as an outcome of use, emphasizing the relationship between a system and its context of use [2]. This perspective establishes a basis for examining usability as an important consideration in the evaluation of university academic information systems.

Previous research has addressed the development of digital systems for administrative and educational purposes. Nasution et al. applied Design Thinking to develop a web-based electronic archiving system and examined its functionality through black-box testing [3]. In an educational setting, Ramadhan et al. developed an e-learning application supporting blended learning, incorporating needs analysis involving teachers and students [4]. Batubara et al. developed a massive open online course application to support skills development and the exchange of community skills information [5]. These studies illustrate the importance of aligning digital applications with their intended activities and users. They also provide a foundation for considering how the resulting systems should be evaluated.

Evaluation studies have examined digital educational platforms from several perspectives. Sitorus et al. employed COBIT 5 to assess the effectiveness of an online examination platform integrated with a learning management system, focusing on governance processes and capability assessment [6]. Tasril et al. examined interface usability in the context of children's digital literacy, considering interface clarity, navigation efficiency, and user engagement [7]. These different evaluation objectives highlight the need to specify the aspect of system use being investigated. For the present study, the central concern is students' overall perception of the usability of an academic information system.

The System Usability Scale (SUS) offers a standardized instrument for addressing this concern. Introduced by Brooke, SUS consists of ten statements assessed using a five-point response scale and produces an overall assessment of perceived system usability [8]. Lewis identifies SUS as a widely used questionnaire for measuring perceived usability and reviews the evidence supporting its application across different systems [9]. An empirical evaluation by Bangor et al., drawing on SUS data collected across numerous products, further supports its usefulness and versatility as an evaluation instrument [10]. These characteristics support the selection of SUS for a quantitative assessment based on students' experiences of using an academic information system.

Within the specific context of academic information systems, Adyanata et al. evaluated SIAkad at Universitas PGRI Mahadewa Indonesia using SUS with 30 student respondents and reported a mean score of 81 [1]. This study provides a methodological precedent for collecting students' usability assessments through a standardized questionnaire. Nevertheless, usability remains dependent on the users, activities, and environment associated with a particular system [8]. Consequently, evidence obtained at another university provides useful background while reinforcing the need for an assessment situated within the institutional context of Universitas Battuta.

The present study therefore focuses on the Academic Information System at Universitas Battuta, referred to as SIAKAD, with students as the respondents. The research problem concerns the extent to which students perceive SIAKAD as usable in supporting their academic activities. A structured assessment can provide an empirical basis for understanding these perceptions and informing subsequent evaluation and system improvement. Accordingly, this study adopts a quantitative approach using SUS to measure overall perceived usability and interpret the resulting assessment with reference to established SUS guidance. Its intended contribution is to provide quantitative evidence concerning students' perceptions of SIAKAD

at Universitas Battuta and establish a baseline for subsequent usability evaluations within the university.

Literature Review

2.1 Academic Information Systems in Higher Education

Academic information systems organize academic data and provide a channel through which students access information and undertake administrative activities. Their role connects institutional information management with the academic services experienced by students. The evaluation of SIAkad at Universitas PGRI Mahadewa Indonesia illustrates this relationship by examining an information system supporting academic activities from the perspective of undergraduate users [1]. Accordingly, evaluating an academic information system requires consideration of its functions and the experiences of the students who interact with those functions.

The application of digital systems within universities also encompasses the administration of student activities. Fahmi et al. developed an Android-based attendance application for the IMAKOM student organization at Universitas Pembangunan Panca Budi. The application used QR code-based identification cards to support attendance recording, database storage, and reporting [11]. This study provides a contextual example of how digital applications can support the management of student-related information within a university. Its relevance lies in the digitalization of student administration, with its specific application confined to organizational attendance. In the present study, the evaluation context is students' interaction with the Academic Information System at Universitas Battuta.

2.2 Usability and Perceived Usability

ISO 9241-11:2018 conceptualizes usability through the effectiveness, efficiency, and satisfaction associated with users achieving intended goals within a specified context. Effectiveness concerns the accuracy and completeness of goal attainment, whereas efficiency concerns the resources used in relation to the results achieved. Satisfaction addresses whether users' responses to system use meet their needs and expectations. The context of use includes users, goals, tasks, resources, and the surrounding environment [2]. Applied to an academic information system, this framework directs attention to the relationship between students, their academic activities, and the conditions under which they use the system.

Perceived usability concerns users' subjective judgments about their interaction with a system. Lewis distinguishes the assessment of perceived usability from performance-based evaluation, supporting the use of standardized questionnaires to capture users' assessments [9]. Measures such as task completion, completion time, and errors provide complementary evidence about observed performance. Consequently, a questionnaire-based evaluation can establish how students perceive the usability of SIAKAD, while conclusions about task speed or accuracy require corresponding performance measurements.

2.3 System Usability Scale

The System Usability Scale is a questionnaire developed to provide a concise, overall assessment of subjective system usability. Its standard form comprises ten statements with alternating positive and negative wording, answered using a five-point agreement scale. The statements address users' perceptions of system interaction, including complexity, ease of use, consistency, confidence, and learning requirements. Responses are adjusted according to item direction before being combined into an overall score. Brooke presents this score as a composite assessment of the system's usability [8].

The empirical basis for SUS extends across different products and development contexts. Bangor et al. examined data collected over approximately a decade and reported evidence supporting the instrument's robustness and versatility. Their study also considered approaches for relating numerical SUS scores to judgments about usability [10]. This evidence

provides a foundation for selecting SUS when the research objective is to obtain a standardized assessment of users' perceptions.

Interpretation should preserve the distinction between a raw SUS score and its position within an empirical reference distribution. Lewis discusses normative grading approaches and recommends treating SUS as an overall measure of perceived usability, rather than routinely dividing it into separate usability and learnability subscales [9]. Accordingly, interpretation requires an explicitly identified reference framework and consideration of the evaluation context. For the present study, SUS provides the conceptual basis for summarizing students' overall assessments of SIAKAD at Universitas Battuta.

2.4 Related Studies and Research Positioning

The reviewed studies address digital systems through development, governance, learning, and usability perspectives. Nasution et al. applied Design Thinking to a web-based electronic archiving system and used black-box testing to examine whether its functions operated according to the intended design [3]. Ramadhan et al. developed an e-learning application for blended learning, incorporating needs analysis involving teachers and students [4]. Batubara et al. developed a massive open online course application for community skills development and described evaluation using t-tests and gain analysis [5]. These studies contribute evidence concerning functional implementation, educational requirements, and learning-related evaluation. Their assessment objectives differ from the measurement of students' overall perceived usability.

Other studies demonstrate the importance of aligning evaluation methods with the construct and population being investigated. Sitorus et al. evaluated an online examination platform integrated with a learning management system using COBIT 5, involving 50 students and ten lecturers. Their assessment focused on governance processes and process capability [6]. Tasril et al. examined interface usability in the context of children's digital literacy, considering interface clarity, navigation efficiency, and engagement [7]. These contributions inform the broader evaluation of digital educational systems, although their evaluation constructs and participant contexts require careful consideration when relating them to university academic services.

A more direct methodological precedent is provided by Adyanata et al., who evaluated an academic information system using SUS with 30 student respondents and reported a mean score of 81 [1]. This study demonstrates the application of SUS within a university academic information system. Its reported findings concern the system and respondents investigated, providing contextual evidence for comparison rather than an expected result for Universitas Battuta. Taken together, the reviewed literature supports a distinction between assessing system functionality, educational outcomes, governance capability, and perceived usability. The present study addresses the last of these by examining students' overall perceptions of SIAKAD at Universitas Battuta through a quantitative SUS assessment. Its contribution is the provision of institution-specific evidence that can establish a baseline for subsequent usability evaluations and inform further investigation of academic service improvement.

Research Methodology

3.1 Research Design and Study Context

This study adopts a quantitative descriptive survey design to evaluate students' perceived usability of the Academic Information System at Universitas Battuta. The evaluation focuses on students' assessments of their interaction with SIAKAD, using the System Usability Scale as the measurement instrument. The unit of analysis is the individual student response. The principal outcome is the overall SUS score, which summarizes perceived usability among the students included in the analysis.

3.2 Population and Respondent Selection

The target population comprised all active students at Universitas Battuta who used SIAKAD. The questionnaire was made available through student SIAKAD accounts, and participation was optional. Consequently, the respondent group was formed through voluntary response sampling, a nonprobability approach in which individuals selected themselves for participation. The study initially targeted 300 respondents, and 300 students provided questionnaire responses. Because participation depended on students' willingness to respond, the characteristics and experiences of respondents may differ from those of nonrespondents. Self-selection is therefore considered when interpreting the findings, consistent with methodological concerns identified in web-based survey research [12]. The analysis describes the participating students' assessments, with the final analytical sample determined following response screening.

3.3 Research Instrument

The research instrument was the System Usability Scale (SUS), a standardized questionnaire developed by Brooke to assess perceived system usability [8]. The questionnaire comprised ten statements presented in their original English wording and sequence. In this study, the expression "this system" referred to the Academic Information System (SIAKAD) at Universitas Battuta. Table 1 presents the statements used in the questionnaire.

Table 1. SUS questionnaire statements

Item	Statement
Q1	I think that I would like to use this system frequently.
Q2	I found the system unnecessarily complex.
Q3	I thought the system was easy to use.
Q4	I think that I would need the support of a technical person to be able to use this system.
Q5	I found the various functions in this system were well integrated.
Q6	I thought there was too much inconsistency in this system.
Q7	I would imagine that most people would learn to use this system very quickly.
Q8	I found the system very cumbersome to use.
Q9	I felt very confident using the system.
Q10	I needed to learn a lot of things before I could get going with this system.

Each statement was rated using a five-point Likert scale, with strongly disagree assigned one, disagree assigned two, neutral assigned three, agree assigned four, and strongly agree assigned five. For compact presentation of questionnaire responses in the Results section, these categories were abbreviated as SD, D, N, A, and SA, respectively. The questionnaire contained five positively worded statements, comprising Q1, Q3, Q5, Q7, and Q9, and five negatively worded statements, comprising Q2, Q4, Q6, Q8, and Q10. Responses were scored according to their respective wording directions and combined to obtain an overall SUS score.

3.4 Data Collection Procedure

The questionnaire was disseminated through student SIAKAD accounts at the beginning of the 2025/2026 academic year. It was displayed to the student population, allowing students to decide whether to participate. Students who chose to participate completed the English-language SUS questionnaire through the account-based distribution channel. Data collection focused on students' self-reported assessments of the existing SIAKAD service. The optional nature of participation resulted in responses from students who voluntarily completed the questionnaire during the collection period.

3.5 Data Analysis

Data analysis followed the workflow presented in Figure 1. Questionnaire records were screened for completeness and conformity with the permitted five-point response scale. Complete responses were coded and processed using the original SUS scoring procedure [8]. For odd-numbered items, one was subtracted from the recorded response. For even-numbered items, the response was subtracted from five. The ten adjusted contributions were summed and multiplied by 2.5 to obtain each respondent's SUS score, as specified in Equation (1). The mean

score was subsequently calculated using Equation (2). The distribution of individual scores was summarized using the mean, sample standard deviation, median, minimum, and maximum.

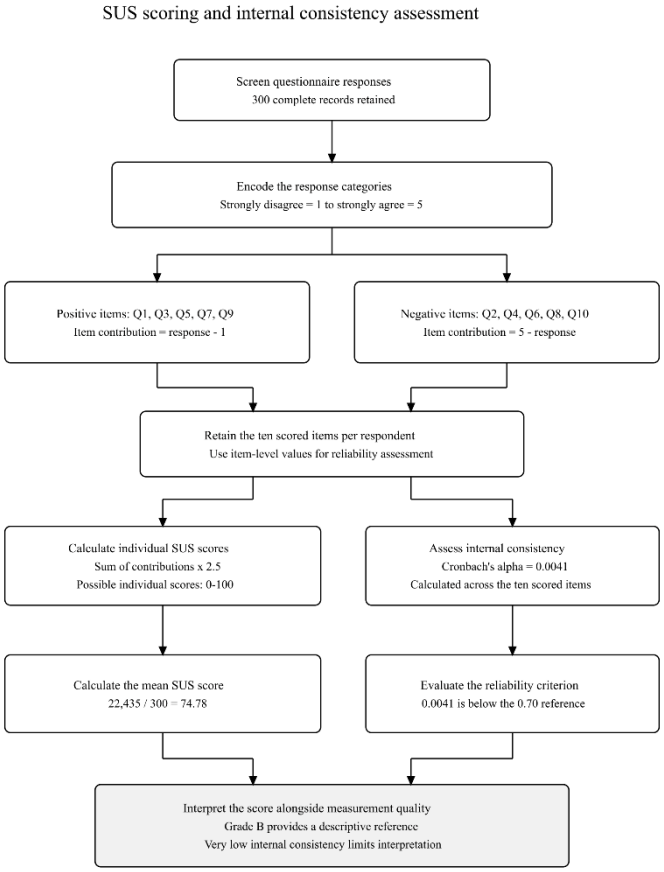


Figure 1. Workflow of SUS scoring

As illustrated by the parallel analytical branch in Figure 1, internal consistency was assessed using Cronbach's alpha calculated from the ten item responses after their scoring directions had been aligned. A coefficient of 0.70 served as the conventional minimum reference [9]. The mean SUS score was interpreted using the Sauro–Lewis Curved Grading Scale, which relates numerical scores to empirically derived grades and percentile ranges, with 68 representing its central normative reference [9]. The resulting grade was treated as a descriptive reference, and its substantive interpretation considered the observed internal consistency and the voluntary composition of the respondent group.

$$\mathrm{SUS}_i = 2.5\left[\sum_{j\in\{1,3,5,7,9\}}\left(x_{ij}-1\right)+\sum_{j\in\{2,4,6,8,10\}}\left(5-x_{ij}\right)\right] \tag{1}$$

$$\overline{\mathrm{SUS}} = \frac{1}{N}\sum_{i=1}^{N}\mathrm{SUS}_i \tag{2}$$

Where:

- x_{ij} denotes the response of participant *i* to item *j*, coded from one to five.
- SUS_i denotes the individual SUS score, ranging from zero to 100.
- N denotes the number of complete responses included in the analysis.
- $\overline{\mathrm{SUS}}$ denotes the mean SUS score across the analytical sample.

Results

4.1 Response and Score Adjustment

All 300 questionnaire records contained complete responses to the ten SUS statements and were retained for analysis. Table 2 presents an excerpt comprising the first ten respondent records and the final record in the dataset. The response categories are displayed using abbreviations to facilitate compact presentation. The omitted records were included in all subsequent calculations.

Table 2. SUS questionnaire results

ID_Responden	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
SIM001	A	SD	N	SD	A	N	SA	N	A	D
SIM002	N	N	A	D	A	N	SA	N	A	N
SIM003	SA	D	A	N	SA	D	SA	SD	N	D
SIM004	A	D	N	D	N	D	A	D	SA	SD
SIM005	N	D	SA	N	SA	SD	A	D	N	SD
SIM006	A	N	N	D	N	SD	N	N	SA	D
SIM007	A	N	A	SD	A	D	A	D	N	D
SIM008	A	N	N	SD	A	SD	A	SD	N	D
SIM009	N	N	N	SD	SA	SD	A	N	N	D
SIM010	SA	D	N	SD	A	N	A	N	A	N
…	…	…	…	…	…	…	…	…	…	…
SIM300	N	N	SA	D	SA	SD	SA	D	N	N

Note: SD = strongly disagree; D = disagree; N = neutral; A = agree; SA = strongly agree.

The response categories were initially assigned numerical values from one for strongly disagree to five for strongly agree. The numerical responses were then adjusted according to the original SUS scoring procedure [8]. For positively worded items Q1, Q3, Q5, Q7, and Q9, one was subtracted from the recorded response. For negatively worded items Q2, Q4, Q6, Q8, and Q10, the response was subtracted from five. Each adjusted item contribution consequently ranged from zero to four, with higher contributions indicating more favourable responses.

4.2 SUS Scores

The ten adjusted item contributions were summed for each respondent. For respondent SIM001, the contributions presented in Table 1 produced a total of 30. Applying the scaling factor specified in Equation (1) yielded an individual SUS score of 75.00. The same scoring procedure was applied consistently to all 300 respondents.

$$\mathrm{SUS}_{\mathrm{SIM001}} = (3 + 4 + 2 + 4 + 3 + 2 + 4 + 2 + 3 + 3) \times 2.5 = 30 \times 2.5 = 75.00$$

The individual SUS scores were subsequently aggregated to calculate the mean. Their combined total was 22,435. Dividing this total by the 300 respondents, following Equation (2), produced a mean score of 74.7833, reported as 74.78 after rounding to two decimal places. This value represents the descriptive average of the calculated SUS scores within the analytical sample.

$$\overline{\mathrm{SUS}} = \frac{\sum_{i=1}^{300} \mathrm{SUS}_i}{300} = \frac{22\,435}{300} = 74.7833 \ldots \approx 74.78$$

Table 3 presents the adjusted item contributions and resulting SUS scores for the respondent records shown in Table 1. The ten adjusted contributions were summed for each respondent, and the total was multiplied by 2.5, following Equation (1). For example, respondent SIM001 had a total adjusted contribution of 30, yielding an individual SUS score of 75.00. The same procedure was applied to all 300 respondents.

Table 3. SUS scores

ID_Responden	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	SUS
SIM001	3	4	2	4	3	2	4	2	3	3	30	75.00
SIM002	2	2	3	3	3	2	4	2	3	2	26	65.00
SIM003	4	3	3	2	4	3	4	4	2	3	32	80.00
SIM004	3	3	2	3	2	3	3	3	4	4	30	75.00
SIM005	2	3	4	2	4	4	3	3	2	4	31	77.50
SIM006	3	2	2	3	2	4	2	2	4	3	27	67.50
SIM007	3	2	3	4	3	3	3	3	2	3	29	72.50
SIM008	3	2	2	4	3	4	3	4	2	3	30	75.00
SIM009	2	2	2	4	4	4	3	2	2	3	28	70.00
SIM010	4	3	2	4	3	2	3	2	3	2	28	70.00
…	…	…	…	…	…	…	…	…	…	…	…	…
SIM300	2	2	4	3	4	4	4	3	2	2	30	75.00

The individual SUS scores obtained from all 300 respondents summed to 22,435. Following Equation (2), this aggregate was divided by the number of respondents, producing a mean SUS score of 74.7833, reported as 74.78. The excerpt in Table 2 illustrates the scoring procedure, whereas the reported mean was calculated using the complete dataset.

4.3 Descriptive Results

The calculated individual SUS scores had a mean of 74.78 and a sample standard deviation of 6.38. The median was 75.00, with scores ranging from 55.00 to 87.50. Table 4 summarizes these statistics and the internal consistency coefficient.

Table 4. Descriptive statistics

Statistic	Value
Number of respondents	300
Mean SUS score	74.78
Sample standard deviation	6.38
Median	75.00
Minimum	55.00
Maximum	87.50
Cronbach’s alpha	0.0041

Figure 2 presents the frequency distribution of individual SUS scores. The highest frequency occurred in the interval from 75 to below 80, which contained 90 respondents. The adjacent interval from 70 to below 75 contained 81 respondents. Together, these intervals accounted for 171 respondents, representing 57.00% of the analytical sample. Cronbach’s alpha was 0.0041 after the negatively worded items had been reverse-scored. This coefficient was substantially below the conventional minimum reference of 0.70 [9]. The responses therefore demonstrated very low internal consistency. Although all records satisfied the completeness and response-range criteria, the coherence of the item responses as a composite measure was weakly supported.

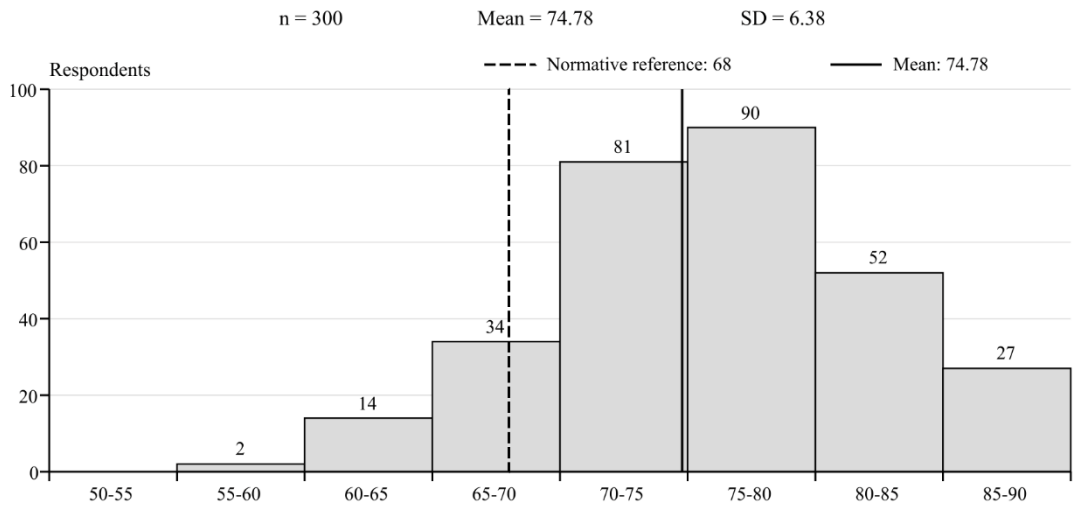


Figure 2. Distribution of calculated individual SUS scores

4.4 Discussion

The mean SUS score of 74.78 falls within Grade B on the Sauro–Lewis Curved Grading Scale, corresponding to the published interval of 74.1–77.1 [9]. This classification describes the numerical position of the calculated mean within the reference framework. Its substantive interpretation remains constrained by the very low internal consistency observed in this sample. Adyanata et al. reported a mean SUS score of 81 from 30 student respondents evaluating SIAkad at Universitas PGRI Mahadewa Indonesia [1]. The mean obtained in the present study was numerically 6.22 points lower. This difference provides a descriptive comparison, with differences in institutional settings, respondent groups, and measurement quality limiting conclusions about the relative usability of the two systems. The principal interpretive finding is the coexistence of a calculated mean within the Grade B interval and an internal consistency coefficient close to zero. Consequently, the numerical grade provides insufficient support for a firm conclusion that SIAKAD at Universitas Battuta demonstrates consistently favourable perceived usability. Interpretation requires consideration of both the aggregate score and the consistency of the responses underlying that score.

4.5 Implications and Limitations

The findings indicate a need to examine the measurement process before using the aggregate SUS score to guide institutional decisions. Further examination should review students' understanding of the questionnaire statements and verify the correspondence between item responses and respondent records in the original data. The present dataset does not establish the cause of the very low internal consistency. Voluntary participation also limits the generalization of the findings. Students who completed the questionnaire may differ from those who did not participate. Self-selection can influence the composition of web survey samples and the interpretation of their results [12]. The reported statistics therefore describe the responses of the participating students. The evaluation was conducted within one institution and relied on self-reported questionnaire responses. The analytical dataset provided no direct measurements of task completion time, task success, or interaction errors. It also contained no demographic or programme-level variables for examining differences across student groups. Future evaluations should combine questionnaire assessment with task-based observation or interviews to investigate specific interaction difficulties and strengthen the evidence supporting system improvement.

Conclusion

The conclusion provides an answer to the problem raised in the introduction. In scientific articles on research results, what is meant by conclusion is a formulation or answer to a research question based on the results of the research presented in a concise manner. The conclusion is

presented in the form of paragraphs. In the scientific article of the study results, the conclusions are formulated based on the results of the problem-solving analysis. The conclusion is presented in the form of paragraphs. At the end of the conclusion, it is necessary to write the implications and development of the findings.

References

[1] I. K. Adyanata, G. A. P. Nugraha, I. M. A. O. Gunawan, and G. Indrawan, "Evaluasi Sistem Informasi SIAkad UPMI Mengunakan Metode System Usability Scale," *JUPITER: Jurnal Penelitian Ilmu dan Teknologi Komputer*, vol. 16, no. 1, pp. 61–70, 2024, doi: 10.5281/zenodo.10567368.

[2] International Organization for Standardization, *Ergonomics of Human-System Interaction—Part 11: Usability: Definitions and Concepts*, ISO 9241-11:2018. Geneva, Switzerland: ISO, 2018.

[3] Z. H. Nasution, A. Lubis, and E. Hariyanto, "Rancang Bangun Sistem E-Arsip Berbasis Web Menggunakan Metode Design Thinking," *INTECOMS: Journal of Information Technology and Computer Science*, vol. 6, no. 1, pp. 60–65, 2023, doi: 10.31539/intecoms.v6i1.5349.

[4] D. Ramadhan, Z. Sitorus, and M. S. Penjaitan, "Design and development of an SDLC-based e-learning application as a learning medium using the blended learning model," *Bulletin of Information Technology*, vol. 5, no. 3, pp. 173–179, 2024, doi: 10.47065/bit.v5i3.1480.

[5] S. Batubara, T. Wahyono, A. Khaliq, and Y. E. Lubis, "Massive open online course (MOOC) based desa skill application," *Jurnal Mantik*, vol. 7, no. 1, pp. 50–59, 2023, doi: 10.35335/mantik.v7i1.3615.

[6] Z. Sitorus, H. Syahputra, B. Sugito, and Ibrahim, "Predicting the effectiveness of online exam platforms with LMS to improve online learning using the COBIT 5 method," *Journal of Information Technology, Computer Science and Electrical Engineering*, vol. 1, no. 2, pp. 1–9, 2024, doi: 10.61306/jitcse.v1i2.19.

[7] V. Tasril, M. Iqbal, A. S. Dewi, E. E. Syahputra, and A. Suhut, "Usability Testing Kualitas Desain UI Pemahaman Literasi Digital Anak-Anak," *Bulletin of Computer Science Research*, vol. 3, no. 6, pp. 427–434, 2023, doi: 10.47065/bulletincsr.v3i6.286.

[8] J. Brooke, "SUS: A 'quick and dirty' usability scale," in *Usability Evaluation in Industry*, P. W. Jordan, B. Thomas, B. A. Weerdmeester, and I. L. McClelland, Eds. London, U.K.: Taylor & Francis, 1996, pp. 189–194.

[9] J. R. Lewis, "The System Usability Scale: Past, present, and future," *International Journal of Human–Computer Interaction*, vol. 34, no. 7, pp. 577–590, 2018, doi: 10.1080/10447318.2018.1455307.

[10] A. Bangor, P. T. Kortum, and J. T. Miller, "An empirical evaluation of the System Usability Scale," *International Journal of Human–Computer Interaction*, vol. 24, no. 6, pp. 574–594, 2008, doi: 10.1080/10447310802205776.

[11] K. Fahmi, S. Wahyuni, M. Iqbal, and E. Hariyanto, "Implementation of the IMAKOM organization presence (Computer Student Association) Panca Budi Medan Development University using QR code-based ID cards," *Jurnal Mantik*, vol. 4, no. 2, pp. 1063–1069, 2020, doi: 10.35335/mantik.Vol4.2020.846.pp1063-1069.

[12] J. Bethlehem, "Selection bias in web surveys," *International Statistical Review*, vol. 78, no. 2, pp. 161–188, 2010, doi: 10.1111/j.1751-5823.2010.00112.x.