Original Article

User Acceptance and Usability for Early Detection of Hearing Loss Using The LittlEars Application: A Validity Study

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Abstract

Introduction: *This study aims to evaluate the acceptance among Posyandu cadres of the Littlears application, which is designed to identify hearing impairments in children early on.*
Method: *The LittlEars Questionnaire, designed to identify hearing impairment in children, has evolved into the LittlEars application with the objective of early detection of hearing loss. The evaluation of system usability within the framework of the USE Questionnaire involves four key elements: usability, user-friendliness, learnability, and user satisfaction, and is assessed through 35 specific questions.*
Result: *The usability assessment of the LittlEars application through the USE questionnaire revealed that its usefulness stands at 95.4%, its ease of use at 93.5%, its ease of learning at 92.8%, and satisfaction levels at 94.6%. The average for all dimensions combined is 9.07%.*
Conclusion: *The LittlEars application can be accepted by users, especially Posyandu cadres, and is an application that is easy to use in detecting hearing loss in children.*

Keywords: *Hearing loss, LittlEars, User acceptance, USE questionnaire.*

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Penerimaan dan Kegunaan Pengguna untuk Deteksi Dini Gangguan Pendengaran Menggunakan Aplikasi LittlEars: Sebuah Studi Validitas

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Abstrak

Pendahuluan: *Penelitian ini bertujuan untuk mengukur penerimaan pengguna khususnya kader Posyandu terhadap aplikasi LittlEars dalam deteksi dini gangguan pendengaran pada anak.*
Metode: *LittlEars Questionnaire digunakan untuk mendeteksi gangguan pendengaran pada anak. Saat ini kuesioner tersebut telah dikembangkan menjadi aplikasi LittlEars yang bertujuan untuk mendeteksi gangguan pendengaran sejak dini. Pengukuran usability pada system aplikasi LittlEars menggunakan empat faktor dalam kerangka USE Questionnaire yang terdiri dari 35 pertanyaan, yaitu faktor usability, kemudahan penggunaan, kemudahan belajar, dan faktor kepuasan.*
Hasil: *Hasil pengukuran usability kuesioner USE aplikasi LittlEars menunjukkan nilai usability sebesar 95,4%, kemudahan penggunaan sebesar 93,5%, kemudahan belajar sebesar 92,8% dan kepuasan sebesar 94,6%. Rata-rata dimensi keseluruhan adalah 9,07%.*
Kesimpulan: *Aplikasi LittlEars dapat diterima oleh pengguna khususnya kader Posyandu dan merupakan aplikasi yang mudah digunakan dalam mendeteksi gangguan pendengaran pada anak.*

Kata kunci: *Gangguan pendengaran, LittlEars, Penerimaan pengguna, USE kuesioner.*

Introduction

Hearing plays a crucial role in human sensory perception. Early childhood hearing impairments can hinder a child's developmental trajectory, leading to language impairments, alterations in personality and attitude, diminished communication abilities, reduced environmental awareness, and compromised cognitive and emotional capacities. The World Health Organization (WHO) reports that over 5% of the global population, amounting to 430 million individuals, require interventions for hearing loss, with children making up 34 millions of this number. The WHO projections suggest that by 2050, hearing loss will affect 1 in 10 individuals worldwide. Furthermore, the Basic Health Research conducted by the Indonesian Ministry of Health in 2013 revealed a 2.6 prevalence rate of hearing loss among individuals aged five and above across various regions in Indonesia.[1] Research carried out across seven Indonesian provinces revealed that deafness had a prevalence of 0.4%, while hearing impairment was observed in 16.8% of cases. Specifically, the ability to hear is crucial

for enabling communication and nurturing social connections. It is the primary mechanism for acquiring spoken language and plays a significant role in children's cognitive development.[2] With appropriate measures, hearing loss increases educational attainment and social inclusion. The Joint Committee on Infant Hearing advises that interventions for all children experiencing hearing loss be administered no later than six months of age.[3]

Early detection of hearing loss in children is crucial due to the significant impact of auditory function on speech development. The LittlEars Auditory Questionnaire (LEAQ) is a validated tool used in various countries. In Indonesia, an adaptation of the LittlEars questionnaire was validated in 2013 and has since been transformed into an application. This development aims to enable widespread use by the public, enhancing the efficiency and speed of detection, given the critical importance of hearing functionality in speech development.[1]

Therefore, tools are also needed to detect the sense of hearing early. In 2013, the LittlEars Questionnaire was used to detect hearing loss in children. This questionnaire has been developed for the LittlEars application, which aims to detect early hearing loss. This research aims to measure user acceptance, especially Posyandu cadres, of the LittlEars application in the early detection of hearing loss in children.

Material and Method

Subjects

This research included 29 samples of Posyandu cadres. It was conducted at several Posyandu cadres in the Kota Baru sub-district of Depok.

User Acceptance

In these interviews, participants alternated in completing a single questionnaire, specifically the USE Questionnaire, employed for this research. The USE Questionnaire serves as a tool for subjectively evaluating the usability of products and services through 25 questions organized into four key dimensions: usability, ease of use, ease of learning, and user satisfaction.[4]

Data Processing

Posyandu cadres will be given information about the LittlEars application, and then they will try it using their respective cell phones. Cadres will first be trained to fill out the LittlEars application, and then the cadres will be removed from the application. After the cadres practice filling out the LittlEars application, they then fill out a questionnaire in the form of a USE Questionnaire to assess the usefulness of the LittlEars application in detecting hearing loss.

Data Analysis

The study population and outcomes were summarized using descriptive statistics. Microsoft Excel 365 spreadsheet software was utilized for data analysis.

Statistical Analysis

The analysis of data was performed utilizing SPSS version 26.0. Following the completion of the questionnaire by respondents, a preliminary assessment of the questionnaire's outcomes is executed to ascertain its feasibility before processing for usability. The evaluation involves a validity test, which employs Pearson product-moment correlation analysis to evaluate whether the responses to the questionnaire items are validly correlated. Furthermore, a Reliability Test is conducted to ascertain the consistency of the measurement tool derived from the questionnaire outcomes, with the results being determined by Cronbach's Alpha coefficient value. Should the findings prove dependable, the process advances to the subsequent phase. Once the validation test indicates that the results are valid and reliable, the usability measurement compares the observed scores against the expected scores.

Ethical Clearance

The Ethics Committee of Rumah Sakit Universitas Indonesia approved the study protocol (Reference: S-005/KETLIT/RSUI/11/2022).

Result

The population of this study was Posyandu cadres in the Tanah Baru sub-district Depok, where the total number of cadres who took part in this study was 29 samples. Respondent profiles were grouped based on age and education. The profile of respondents based on age classification is 6.8% aged 35-40 years, 41.2% aged 41-46 years, 37.8% aged 47-52 years and 13.7% aged 52 years. The following details of the distribution of respondents based on age can be seen in Table 1.

Table 1. Respondent Profile Based on Age

No	Age Range	Total	Percent (%)
1	35-40	2	6.8
2	41-46	12	41.2
3	47-52	11	37.8
4	>52	4	13.7
Total		29	100

The profile of respondents based on education classification is 3.4% SD, 10.3% SMP, 65.5% SMA, 6.9% Diploma, 10.3% S1 and 3.4% S2. The following details of the distribution of respondents based on education can be seen in Table 2.

Table 2. Respondent Profile Based on Education

	Frequency	Percent (%)
SD	1	3.4
SMP	3	10.3
SMA	19	65.5
Diploma	2	6.9
S1	3	10.3
S2	1	3.4
Total	29	100

Validity Result

Results from the questionnaire were subsequently analyzed to find the Pearson product-moment correlation value for each item on the questionnaire. IBM SPSS Statistics' Analyze Correlate function was the calculation tool for these questionnaire outcomes. The correlation value determined for each item will then be juxtaposed against the coefficient value in the r-table.

For a respondent count of 29 and a significance level of 5%, the r-table yields a coefficient of 0.355. Table 3 illustrates that questionnaire items with a correlation exceeding 0.355 are considered valid, whereas those falling below this threshold are deemed invalid.

Table 3 displays the outcomes of the Pearson product-moment correlation value computation, revealing 25 valid items and no invalid items in the questionnaire. This indicates that every question item anticipated can be incorporated into the reliability test's calculation, as all items are deemed valid.

Following the completion of validity tests, the focus shifts to reliability tests, which are performed using solely the valid items from the questionnaire. This reliability analysis uses the IBM SPSS Statistics software to determine Cronbach's Alpha value. Table 4 summarizes the case processing outcomes, indicating that all 29 pieces of data are entirely valid.

The questionnaire's reliability was assessed using Cronbach's alpha, which, as indicated in Table 5, yielded a value of 0.9858 for the data analysis questionnaire.

Table 3. Correlation Value

No	Correlation	Status
Usefulness		
1	0.450	Valid
2	0.783	Valid
3	0.104	Valid
4	0.694	Valid
5	0.833	Valid
6	0.663	Valid
Ease of Use		
7	0.887	Valid
8	0.862	Valid
9	0.869	Valid
10	0.820	Valid
11	0.797	Valid
12	0.777	Valid
13	0.884	Valid
14	0.583	Valid
15	0.741	Valid
Ease of Learning		
16	0.877	Valid
17	0.887	Valid
18	0.725	Valid
19	0.559	Valid
Satisfaction		
20	0.598	Valid
21	0.255	Valid
22	0.800	Valid
23	0.606	Valid
24	0.662	Valid
25	0.600	Valid

Table 4. Case Processing Summary

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded	0	.0
	Total	29	100.0

The LittlEars application system demonstrates significant utility and efficiency in the early identification of hearing loss among children, offering a user-friendly experience. Moreover, the favourable usability outcomes indicate high user satisfaction and operational effectiveness with the software. The application is well-received by Posyandu cadres to detect hearing loss and highlight its acceptance and applicability.

Table 5. Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
0.958	25

Discussion

Notably, the ability to hear significantly enhances communication and promotes social engagement. It is crucial for acquiring spoken language and is vital to children's cognitive growth. With appropriate measures, hearing impairment can allow educational achievement and social inclusion.[5] Childhood hearing loss primarily affects language development, but its consequences extend to literacy, self-esteem, and social interaction. If left untreated, it can result in academic underperformance and subsequently diminish career prospects in adulthood.[6]

Communication difficulties can result in enduring emotional and psychological effects, fostering a sense of isolation, loneliness, and depression. The repercussions on the family unit are also significant. Parents with children who are deaf or hard of hearing face unique obstacles, frequently encountering increased stress levels, higher personal expenses, and a more substantial loss of work days in comparison to other parents.[7] This research aimed to determine the impact of the LittlEars application on usability, focusing on its positive or negative effects, particularly among primary health service workers known as posyandu cadres.

The original USE questionnaire, crafted in English by Lund and utilizing a Likert scale from 1 to 6, from strongly disagree to strongly agree, was modified to Indonesian for better comprehension. This research includes 25 queries divided into four categories: usefulness, ease of use, ease of learning, and satisfaction.[8]

The USE questionnaire is employed in this research to assess the LittlEars application's usability for identifying hearing loss in children. The reliability of the USE questionnaire matched that of other usability surveys. Moreover, the USE demonstrated sensitivity by distinguishing user-friendliness, learnability, and user satisfaction variations across various products.[9]

The total score of respondents in measuring the usability variable was 3600, while the maximum score was 3436, so the percentage obtained was 95.4%. The criteria for the usability variable are very feasible, so the LittlEars application is handy. The total score of respondents in measuring the ease of use variable was 5050, while the maximum score was 5400, so the percentage obtained was 93.5%. The criteria for the convenience variable are very feasible, so the LittlEars application makes it easy for users.

Furthermore, the total score of respondents in measuring the ease of learning variable was 2228, while the maximum score was 2400, so the percentage obtained was 92.8%. The ease of learning variable criteria is very feasible, so the LittlEars application is straightforward.[10]

Table 6. USE Questionnaire Usability Measurement Results

No	Usability Dimension	Number of Valid Items	Max Score	Observation Score	%	Average
1	Usefulness	6	3600	3436	95.4	5.72
2	Ease of use	9	5400	5050	93.5	5.61
3	Ease of learning	4	2400	2228	92.8	5.57
4	Satisfaction	6	3600	3407	94.6	2.04
		25	15.000	14.121		
				Average	94.07	4.73

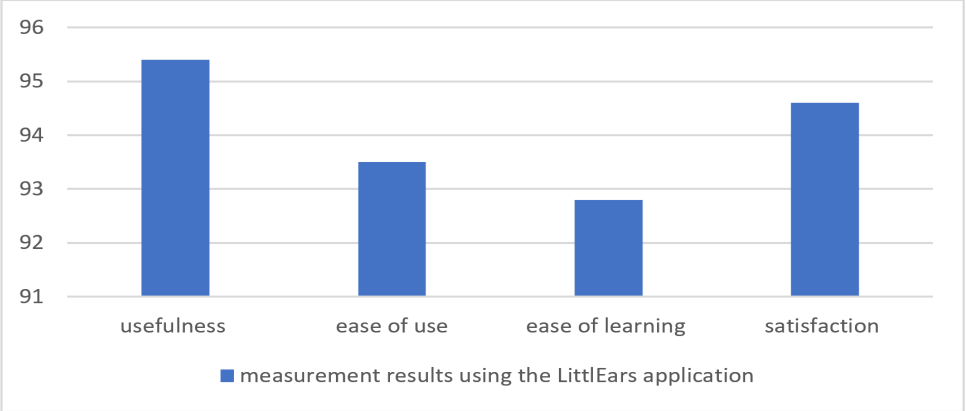

Figure 1. Graph of Measurement Results for Using the LittlEars Application

The total score of respondents in measuring the satisfaction variable was 3407, while the maximum score was 3600, so the percentage obtained was 894.6%. The criteria for the satisfaction variable are very feasible, so it can be concluded that the LittlEars application satisfies users, in this case, Posyandu cadres.

Conclusion

The presentation of the above calculation results leads to the conclusion that users, particularly Posyandu cadres, find The LittlEars application user-friendly and effective for detecting hearing loss in children, with a notable acceptance rate among its users.

Conflict of Interest

The authors declare no conflict of interest associated with this study.

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