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Feasibility study of the growth and development of child information system (SI-GoChild) in daycare

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Abstract

The process of child growth and development is a process that is important in the next life. The role of adults around children in paying attention to and stimulating growth and development can optimize children's growth and development, including caregivers and educators in daycare. This research aims to examine the need and feasibility of developing the Growth and Development of Child Information System (SI-GoChild) in daycares. The system development method was developed using the Waterfall method. Gradual testing was carried out starting from black box testing, white box testing and usability testing. Database development uses the Entity Relationship Diagram (ERD) method and the database is tested for feasibility using Normalization testing. The results of the study revealed that the most expected feature is growth monitoring and child development reports. As many as 85% of respondents stated that SI-GoChild can help improve the quality of services in childcare centers. Database testing shows that the table design is quite good and meets the Normal Form. Testing of the system on a computer laboratory scale showed that SI-GoChild was functioning properly and meeting the needs of users. The conclusion that SI-GoChild has great potential to be an effective tool in monitoring children's growth and development in Child Care.

Keywords

Growth, Development, Information system

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Introduction

The growth and development of children in accordance with their age is the expectation of all parents [1]. At this time, many parents are working so that they cannot directly monitor the growth and development of children. Many working parents choose alternatives to leave their children in daycare parks [2]. The task of monitoring and stimulating child development is becoming increasingly complex and requires collaboration between daycare centers and parents. Monitoring of children's growth and development is carried out on an ongoing basis in basic health care facilities and in kindergartens [3]. Monitoring children's growth and development is not solely the

responsibility of parents. When the child is in the landfill while the parents work outside the home. The participation and participation of Child Care Parks is very important in monitoring children's growth and development [4]. Growth and development screening does not have to be carried out in health care settings, but can be carried out at Daycare. According to Law of republic ministry of health No. 20 of 2003, Daycare is a non-formal education path for early childhood education (Pre-School). Early childhood education is a coaching effort aimed at children from birth to the age of six years which is carried out through the provision of educational stimulation to help physical and spiritual growth and development so that children have readiness to enter further education. Not all daycare implements the Pre School program and use trained personnel. Especially considering the ratio of students to caregivers in daycare centers that is more than 1:10 [5].

The American Academy of Pediatrics (AAP) recommends routine screening using valid and reliable instruments [6]. Studies in the US found that only 23% of pediatricians do developmental screening and the most use Denver II. Denver II screening examination is also used at the Growth and Development polyclinic of hospitals and clinics in Indonesia. Growth monitoring is also an integral part of health services. By monitoring growth regularly, early intervention can be carried out if growth disorders are obtained. However, sometimes parents experience obstacles, namely the absence of accurate records about children's growth and development, so that it will hinder parents in observing their children's development. The rapid development of technology with the use of many web-based devices has made an open opportunity to develop an application that is able to make it easier for parents to observe the growth and development of their children [7]. Therefore, researchers design and create a child development information system that aims to support and make it easier for parents to observe the process of child growth and development and make it easier for parents to gain knowledge about health in children.

Research Methods

This study uses a research and development design with stages as shown in Figure 1. At this stage, the research has completed stage 4 (Completion of the preparation of the information system) and continues stages 5 and 6. So that there is a stage of this research, the researcher will carry out a feasibility test of the growth and development information system which is named by the researcher of the child growth and development information system with the abbreviation SI-GoChild.

Stage 5 is the stage of testing information systems on a laboratory scale. The trial consists of 2 stages, namely the black box and white box trials. The Black Box trial aims to test the functionality of each button in the application. This trial involves three information system channels. The white box trial aims to see the suitability of the thinking flow in the algorithm that has been made by the previous team. This trial involved three experts in the field of child growth and development.

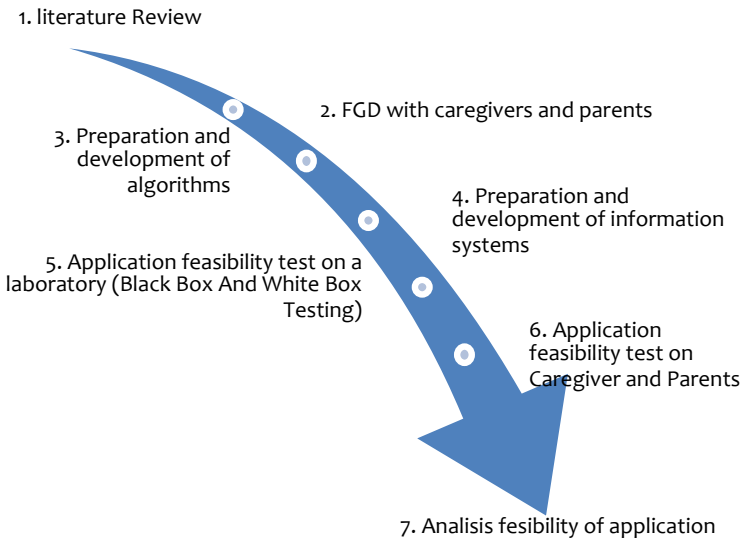

Figure 1. Research flow chart

After a stage 5 analysis was carried out and improvements were made to the design of the information system. So, the next stage, namely stage 6 of trials to limited-scale users, is carried out. This test was carried out to see the feasibility of the information system being used in the actual environment. The population in this study were all caregivers and parents at the Daycares in the Kedungwuni District Working Area, Pekalongan Regency. There are currently 63 early childhood education schools, and 11 of them are daycare in the Kedungwuni District Working Area, Pekalongan Regency. At this stage, the researcher establishes several criteria to maintain the homogeneity of the research site and the research respondents. The criteria are as follows: 1) Daycare that have implemented a child growth monitoring system with z-score, 2) Daycare that have implemented a child development monitoring system with Denver II, 3) Daycare that are willing to be used as research sites, 4) Caregivers and parents who are willing to be interviewed in collecting data for information system feasibility studies. Based on these criteria, there were only 2 daycares that were sampled in this study with the number of educators and parents of 120 people.

The instruments used in this study consisted of three instruments, the first data collection instrument was used for the black box test, the second instrument was used for the white box test and the third instrument was used for caregivers and parents in the test in a limited environment. The third checklist for testing to limited users asks about user satisfaction in using the application that has been designed. The instrument uses a Likert scale containing a series of statements that meet five aspects of user satisfaction, namely reliability, responsiveness, Empty, Guarantee, Tangible Material [8]. To determine the quality of the data collection instrument, a validity test was conducted on the data collection instrument and the application usage satisfaction instrument. The validity of the interview instrument for data collection at the service location will be tested in Peka longan Regency by taking 10 respondents. The questionnaire indicator is said to be valid if the calculated r value is > r table. The analysis carried out is univariate,

bivariate to multivariate analysis with the purpose of each test. analysis which was carried out with univariate analysis.

Results and Discussion

Black Box Testing

Black box trials have been carried out on The Growth and Development of Child Information System (SI-GoChild) to identify functional defects. Trials are carried out by entering various input data and observing the results produced by the system. Test results are as follows in Table 1. The test results have been improved and continued to the next stage.

Table 1. Table of Black Box Testing Defect Severity

No.	*Defect*	Severity Level
1	The system does not display a clear error message when input data is incomplete.	Minor
2	The format of the report on stunting diagnosis results does not comply with established standards	Minor
3	The user interface (UI) display on several system pages is less intuitive.	Minor
4	The system cannot produce recommendations for appropriate stunting management in several cases.	Major
5	The system cannot store patient data correctly	Major
6	The system does not have features for patient monitoring and evaluation.	Major

White box trials

White box trials have been carried out on the child growth and development Information System to identify structural and implementation defects. Testing is carried out by analyzing the system source code and tracking the program execution flow. Test results are as in Table 2. The test results have been improved and continued to the next stage.

Table 2. Table of Defect Severity Levels (Defect) White Box Testing

No.	*Defect*	Severity Level
1	There is unused code (dead code) in several parts of the program	Minor
2	The program code structure is inconsistent and difficult to understand	Minor
3	There are inconsistencies in the naming of variables and functions	Minor
4	The recommendation algorithm for stunting management has several weaknesses that can cause inaccurate recommendation results.	Major
5	The system does not validate data input correctly, thereby allowing invalid data to enter the system.	Major
6	The system does not have adequate error handling mechanisms, which can cause crashes in some situations.	Major

Feasibility test

Of the 120 samples determined, 12 of them were not willing to be respondents because there was no contact with the researcher and 8 others were not willing to be research respondents. So that in the test only 100 respondents took part in the research.

1. Respondent characteristics (Table 3)

The total number of respondents involved in the feasibility test for the child growth and development information system was 100 respondents, consisting of educators and caregivers at daycare. The largest distribution is in the 30-39year age range. High school educational background and 3-5years work experience. This shows that respondents who took part in the information system feasibility test knew the importance of children's growth and development.

Table 3. Table of Respondent Characteristics

Variable	n	%
Respondent's age		
20-29 years	30	30%
30-39 years	40	40%
40-49 years	25	25%
More Than 50 years	5	5%
Respondents' Education Level		
Elementary School	5	5 %
Junior High School	10	10%
Senior High School	50	50 %
Diploma Degree	25	25%
Bachelor Degree	10	10%
Length of Work		
Less than 1 year	20	20%
1-2 years	30	30%
3-5 years	35	35%
More than 5 years	15	15%

2. Usability Testing

The first test carried out on respondents is to ensure that the product meets user needs by assessing the respondent's perception of the product being developed to meet the needs and expectations of end users, as well as providing effective solutions to the problems they face. The results of usability testing of the growth and development information system are as follows in Figure 2.

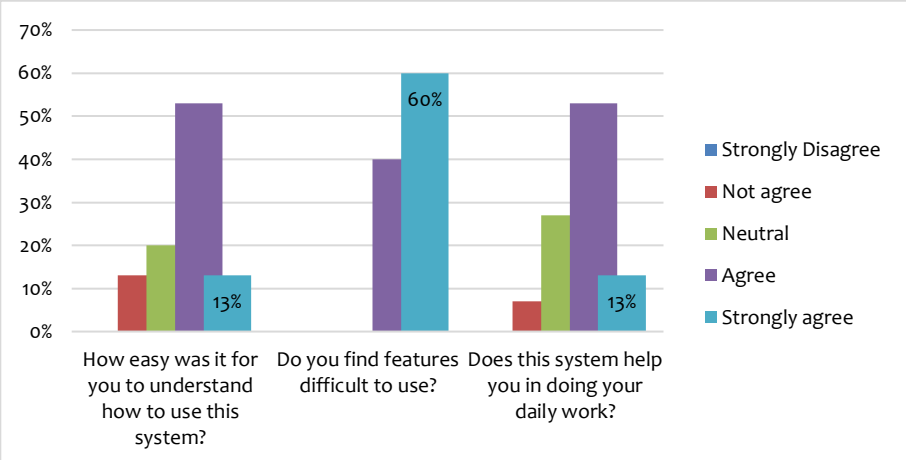

Figure 2. Usability Study Analysis

The results of the trial on the usability of the information system, respondents stated that the information system was quite easy to understand and they did not experience any difficulties when operating the child development information system.

3. Controlled Beta Trial

In addition to assessing user perceptions of the usefulness and function of the tool, researchers asked respondents to carry out a number of assessments with a controlled beta instrument. This pilot aims to get feedback from a small, selected group of users in a more structured and focused way. The results of the controlled beta trial are as shown in the graph in Figure 3.

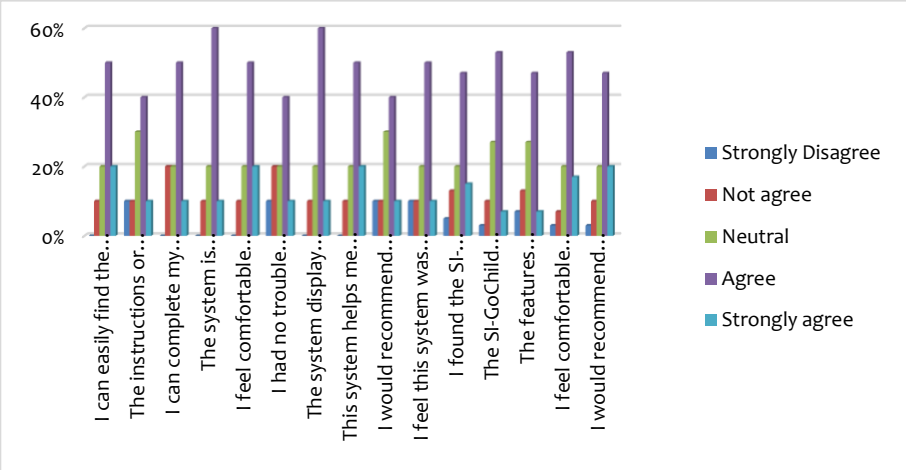

Figure 3. Controlled Beta Analysis

The results of the analysis show that more than half of the respondents stated that the child growth and development information system is easy, comfortable to use and meets user needs. The system helps to reduce errors in user works, the interface is comfortable to use and recommended for use.

4. User Acceptance Test (UAT) testing

This UAT testing is the final test by a sample of users which aims to ensure that the software being developed not only meets technical requirements but is also suitable for use in a real business context. This process is critical to reducing potential problems after launch and to ensuring that end users are satisfied and productive using the system. Table 4 shows the UAT results.

Controlled beta testing results show this system is accurate in generating reports and supports my team's work so recommend this system to coworkers

The results of the feasibility of the child growth and development information system which was evaluated after being used for one month showed that the system's accuracy was 85% from the opinions and input of educators which stated that it was appropriate to diagnose children's growth and development and the results of children's learning development in accordance with the conventional stages carried out. The system is also considered 90% relevant to the needs of caregivers and educators in daycare so that it can make the work of caregivers and educators easier, including optimizing care that can be monitored by parents but does not burden educators. Users can use the data for communication with parents, thus helping deliver learning outcomes more intensively, including suggestions for joint simulations that should be carried out.

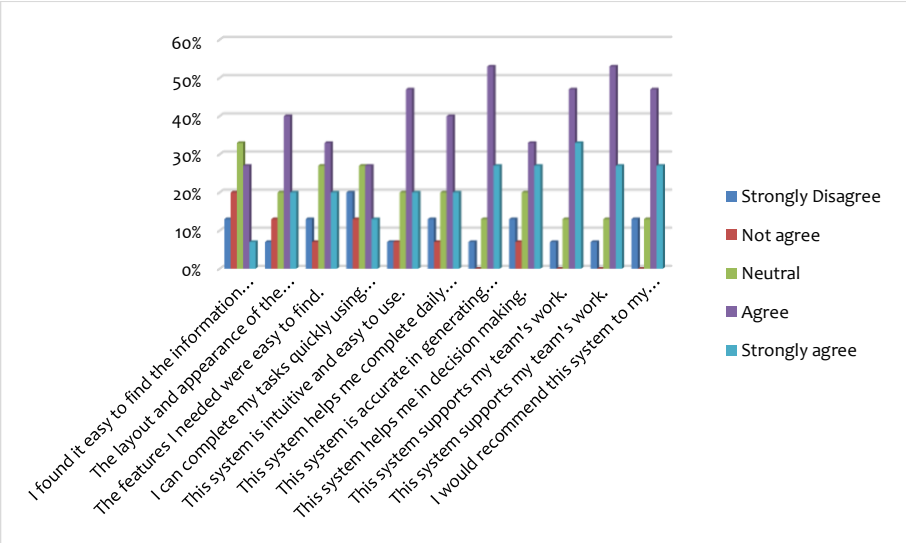

Figure 4. The result of UAT

Of the 100 respondents who tested the system, 95% expressed their willingness to continue using the child growth and development system which is integrated with the learning curriculum in daycare.

The results of the study indicate a high need for an information system to monitor the growth and development of children in daycare. An effective information system in this context can help in monitoring important parameters of children's health and development. Accurate growth monitoring, including weight and height, is crucial to ensure children grow well and to detect potential health problems early [9]. In addition, information about healthy food menus can support a balanced diet, which is an important factor in child development [10].

Expected features such as growth monitoring, healthy food menus, and child development reports reflect the main focus in designing this information system. Growth monitoring allows for continuous monitoring of important physical parameters, while healthy food menus provide useful information for optimal nutritional planning [11]. Child development reports provide insight into developmental progress covering cognitive, social, and motor aspects, which are essential for holistic child development [12].

Positive assessment from 85% of respondents who strongly agree that SI-GoChild can improve service quality indicates that this information system meets user expectations and has the potential to improve operational efficiency at the TPA. User involvement in the design of the information system and high acceptance indicate that the features developed are relevant and useful for end user [13]. Database testing that shows that the table design meets the Third Normal Form (3NF) indicates that the data structure implemented is effective in avoiding redundancy and ensuring data integrity [14]. Database normalization is an important step to ensure that data is stored efficiently and consistently. System testing on a computer laboratory scale that shows that S SI-GoChild

functions well and meets user needs confirms that the technical implementation of the system is in accordance with the desired specifications [15].

Conclusion

The conclusion of this study is that SI-GoChild has great potential to be an effective tool in monitoring the growth and development of children in Pekalongan Regency Child Care Centers. The development of this system can improve the quality of service, provide accurate information to parents, and support optimal child growth.

Suggestions

Information systems can be developed to integrate children's education and health systems which can be developed to optimize children's health and intelligence.

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