

The Design and Development of *Sistem Pengurusan Data Pemulihan Khas (SPDPK) PPD Cameron Highlands*

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Abstract : Managing the remedial education data is considered difficult when using the traditional method where teachers need to insert the data manually and submit it via email to *Pejabat Pendidikan Daerah (PPD)* officers. Then, PPD officers need to check each of the data that need to analyze in the file list. It is time-consuming and can cause the data checked to be overlooked. Therefore, *Sistem Pengurusan Data Pemulihan Khas (SPDPK)* aims to provide an online desktop application that can help teachers and PPD Cameron Highlands (PPDCH) officers save time in managing remedial education data. SPDPK can be used to insert remedial education data from schools across Cameron Highlands. The data that has been inserted will be displayed in the system dashboard to help PPDCH officers to analyze the data. Moreover, this system can also generate reports that can be customized according to the needs of PPDCH officers such as displaying the number of students based on race, school, and others. The design and development of the system followed the waterfall methodology. Firstly, the function requirement was gathered through the interview with the PPDCH officers and later was analyzed. After that, the SPDPK prototype has been developed based on the gathered requirements and a usability evaluation was conducted to evaluate this system. The result of the evaluation has shown that SPDPK is very useful and easy to use. Most of the respondents also stated they were satisfied with the SPDPK. The implementation of SPDPK could improve the traditional method to manage remedial education data more efficiently and conveniently.

Keywords: Remedial Education, Data Management, Education Management, ICT in Education

1. Introduction

In this modern era, the use of information systems is increasing day by day. It has greatly simplified the affairs of everyone in managing various things. The efficiency and effectiveness of information systems have caused their usage in education management to grow quickly [1]. Nowadays, education departments and schools need to record and store enormous amounts of student data that could provide them with information on the students that were not even previously possible [2]. Officers from the education department and teachers today have better alternatives due to improvements in technology compared to the past when they had to spend a lot of time monitoring school operations and handling difficult allocation issues. Information technology makes it possible for job duties to be decentralized and coordinated in a real-time, interactive network of communication.

Data management is one of the information systems that has helped a lot to facilitate officers of education department and teachers in managing fast-growing data volume. The use of data management systems in educational sector has significantly changed the duties and working methods of management. Data management systems in education have influenced leadership, decision-making, workload, human resource management, communication, accountability, and planning in schools. Data management refers to the process of collecting, organizing, securing, and storing an organization's data so that it may be used for analysis and business decision-making. The increasing amount of data today makes manual management systems no longer relevant. This is because people will waste time by managing data using labor-intensive methods. Therefore, the use of data management system allows people to easily acquire the data they want for analysis [3]. Generally, the benefits of using data management systems include improving management effectiveness by satisfying information needs, enhancing worker performance by processing information, and obtaining an advantage in competitions by directing strategies [4]. Thus, these systems are distinct from traditional information systems in that they are made to be utilized for strategic and operational activities in the organization, as well as for analysis and facilitation. Although data management in the education sector today has used a lot of information systems, there is still data that is managed manually, which is remedial education data.

Remedial education data is managed by the *Pejabat Pendidikan Daerah* (PPD) and schools involved in the remedial education program. The remedial education program is an educational program is provided for students who have difficulty in understanding 3M (reading, writing, arithmetic) basic skills due to environmental factors. The program is run by a specialized teacher, in a specialized place [5]. Managing the remedial education data is considered difficult when using the traditional method where teachers need to insert the data manually and submit it via email to PPD officers. Then, PPD officers need to check each of the data before analyzing it in the file list. It is time-consuming and can cause the data checked to be overlooked. To overcome this problem, Sistem Pengurusan Data Pemulihan Khas (SPDPK) is introduced to PPD officers and remedial teachers. SPDPK is an online desktop application that can help remedial teachers and PPD Cameron Highlands (PPDCH) officers save time in managing and analyzing the remedial education data. SPDPK can be used to record remedial education data from schools across Cameron Highlands. The data that has been inserted will be displayed in the system dashboard to help PPDCH officers to analyze the data. Moreover, this system can also generate reports that can be customized according to the needs of PPDCH officers such as displaying the number of pupils based on race, school, and others.

2. Materials and Methods

The approach used in this project is a Waterfall model. The waterfall model is a sequential model that separates software development into pre-established phases. There are five phases involved in this model which are planning, analysis, design, implementation, and testing. There cannot be any overlap between the phases, and each phase must be finished before the next phase may start [6]. Every phase of the model has a specified task that needs to be completed. The flow of the Waterfall model is demonstrated in **Figure 1**.

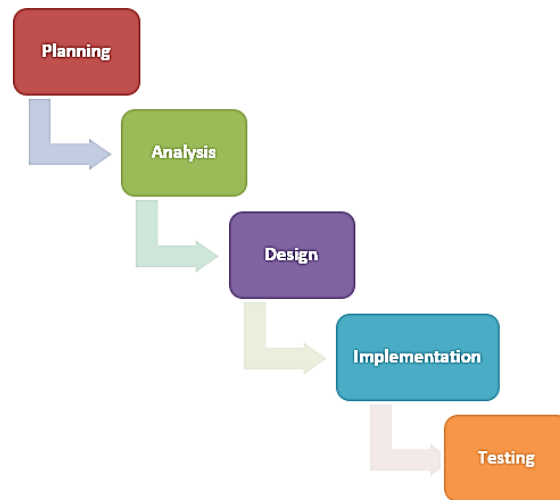


Figure 1: Waterfall Model

The planning phase helped the developer to make a schedule to make sure all these phases can be completed in the allotted time. After that, the interview with the PPDCH officers was conducted to gather the requirement and information needed. The requirement analysis phase aimed to identify the user requirements to develop SPDPK. The functional and non-functional requirements for the whole system are established during the requirements analysis phase of component-based service development. The requirements are documented and demonstrated using Unified Modelling Language (UML) diagrams such as use case diagrams, sequence diagrams, and class diagrams. This phase helped the developer to gain a clear picture of the flow of the system and how it works. During the design and development phase, the suitable software and programming language to be used for system development were identified including database storage. The design for the system interface is also done in this phase. The implementation phase involved the development of the source code and the system based on the requirement analysis and system design. Finally, during the testing phase, a usability evaluation was conducted to evaluate the system performance and provide feedback on this system. This phase also recorded the entire malfunctioning requirements, and the maintenance was done later.

3. Results and Discussion

3.1 The Evaluation Setting

Usability evaluation has been conducted to evaluate the system. Usability evaluation is a method of testing the functionality of the system by observing real users as they attempt to complete tasks on it. Tasks that users complete can help to measure ease of use, perceived usefulness of the system, and user satisfaction with the system. Moreover, it focuses on how well users can learn and use the system to fulfill their requirements. Usability is about effectiveness, efficiency, and the overall satisfaction of the user. The evaluation was conducted through an online platform that was participated by 32 respondents consisting of eight PPDCH officers and 24 remedial teachers. Before starting the evaluation session, the questionnaire was distributed to all PPDCH officers and remedial teachers by using the Google Form. The questionnaire consists of 17 questions, divided into four sections which are Section A: Respondent Demography, Section B: Usefulness of SPDPK, Section C: Ease of Use of SPDPK, and Section D: Satisfaction of SPDPK. The five-point Likert scale has been used in section B, section C, and section D where 1 represents as strongly disagree, 2 as disagree, 3 as neutral, 4 as agree, and 5 as strongly agree.

3.2 The Usability of SPDPK

The analysis was conducted to see the feedback from the respondents who answered the questionnaire. Section B is designed to measure the usefulness of SPDPK, section C measures the ease of use of SPDPK, and section D identifies respondents' satisfaction towards SPDPK application. **Tables 1, 2, and 3** display the frequency points as well as the average of the respondents. The scale value of 1 is lowest, while 5 is the highest score for each item. In light of this, most respondents rated only on a range of 2 to 5, with the average scores between 4.00 to 4.44. On the other hand, no respondents rated 1 on the scale.

Table 1: Usefulness of SPDPK

The post-task questionnaire items	Scale					Average
	1	2	3	4	5	
1. SPDPK is able to increase my productivity in managing remedial education data.	0	0	4	18	10	4.19
2. SPDPK brings convenience and control with technology.	0	0	4	15	13	4.28
3. SPDPK met my expectations in managing remedial education data.	0	0	4	11	17	4.41
4. SPDPK saves my time while using it.	0	0	3	13	16	4.41
5. Overall, SPDPK is very useful in managing remedial education data.	0	0	2	14	16	4.44

Table 2. Ease of Use of SPDPK

Question	Scale					Average
	1	2	3	4	5	
1. SPDPK is easy to use.	0	0	1	20	11	4.31
2. SPDPK is user-friendly.	0	0	6	14	12	4.19
3. SPDPK is easy to learn how to use it.	0	0	3	12	17	4.28
4. I can easily remember how to use it.	0	0	4	12	16	4.38
5. I did not detect any inconsistencies while using SPDPK.	0	2	9	8	13	4.00

Table 3. Satisfaction of SPDPK

Question	Scale					Average
	1	2	3	4	5	
1. I am satisfied with SPDPK.	0	0	5	13	14	4.28
2. SPDPK works the way I want it to.	0	0	7	13	12	4.16
3. SPDPK is wonderful and pleasant to use.	0	0	6	11	14	4.16

The result of the evaluation has shown that SPDPK is very useful and easy in managing remedial education data. Moreover, the respondents also stated they were satisfied with the features of the SPDPK application that helps them in inserting, managing, and analyzing remedial education more effectively and systematically. Based on the feedback given by the respondents, they were very satisfied with the features available in the SPDPK such as login, manage pupil, manage teacher, manage class,

manage report, and also analysis report. This is because all of these features are really easy to use even without using the user guidelines. Respondents also revealed that SPDPK had met their expectations in managing remedial education data and works the way they want. However, there were respondents who suggested making improvements in terms of system design to make it look more attractive and adding some features to the system to make it easy to use and more user-friendly.

4. Conclusion

This paper described the design and development of a desktop application for managing remedial education data. There are many aspects that can be studied and make improvements to solve the problem of managing remedial education data. With the help of the information system that is growing today such as the data management system, it will facilitate the organization, management and analyses of the required data. The education sector today uses many types of management systems to manage all educational information from all schools. Data management systems in the education sector provide a strong emphasis on organizational elements and the distribution of pedagogical information, including curricular performance, student engagement, and academic achievement. The responsibilities and techniques of management work have been radically changed by the usage of data management systems in the educational sector. Therefore, the use of data management system can also help facilitate the education sector to manage remedial education data more effectively and systematically.

In sum, this study has successfully achieved its main objective to develop an online remedial data management system. However, the limitations in the development process have caused some functions in this application did not work properly. Improvements to the system interface are also difficult to do due to the difficulty of finding the appropriate tools to design this system. Because of that, the developer intends to make improvements to this application in terms of the system design and performance of this system in the future. In addition, the existing functions also need to be reviewed to ensure the quality of this system could be improved. All the improvements made can give a positive impact on the use of the SPDPK application among the PPD officers and also teachers who manage the remedial education data.

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