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Design of Web-Based Practical Material Management Information System in Dental Health Department Laboratory (SIP BATIK JKG)

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ABSTRACT: The web-based SIP BATIK JKG model is an information system designed for the management of laboratory practice materials in order to solve the problems of the current manual management system. This research uses R & D method, testing using pre-experimental design method with purposive sampling. The independent variable is the SIP BATIK JKG model and the dependent variable is the quality of the information system. Respondents numbered 50 people with model test using proportion test and paired difference test. Expert validation results using kappa coefficient test with a value of 0.737 ($k > 0.6$) in the satisfactory category. The subject's ability to the quality of the information system after treatment increased significantly compared to before with $p = 0.000$. Conclusion of the application of SIP BATIK JKG model is relevant and suitable for use in material management by users to improve the quality of information systems in JKG laboratories

KEYWORDS: LAB MATERIALS, SIP BATIK JKG MODEL, INFORMATION QUALITY SISTEM

I. INTRODUCTION

The industrial revolution 4.0 in the world has entered the digital era through the link and match program, namely the existence of a link between the world of education and industry [1]. Indonesia has a digital impact with the phenomenon of disruptive innovation, namely the era of innovation transforming a system with practicality, ease of access, accuracy and economical costs [2]. The laboratory must be able to ensure the availability and affordability of efficient, effective and rational BHP [3]. Laboratories in education have a very important influence in efforts to improve the quality of education and teaching systems. The management process in the laboratory is the shared responsibility of both the manager and the user [4]. In practical activities students need consumables (BHP). BHP is a practical material used in the practical learning process in the laboratory [5]. The goal is to ensure the availability and affordability of materials that are efficient, effective and rational in realizing information systems and service quality control [6]. The laboratory management information system is a process of processing, integrating and coordinating human resources in the laboratory to achieve goals so that it is more effective and efficient and makes it easier for someone to make decisions [7].

Based on the observations made by the researchers, the condition of the materials in the dental nursing department (JKG) Semarang laboratory has not gone well because the material management is done manually, there are various problems. These problems can be grouped into three categories namely in the process of planning, use, and reporting. In the planning process, it is difficult to find out information on demand, receipt, use and stock of materials, takes a long time, is inaccurate and incomplete. The problem of use is that in practice in the laboratory there is often a shortage of practical materials due to uncontrolled material management so that it interferes with the practicum process, some expired materials were found. ensure the availability and affordability of efficient, effective and rational BHP knowing information on demand, receipt, use and stock of materials, takes a long time, is inaccurate and incomplete. The



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problem of use is that in practice in the laboratory there is often a shortage of practical materials due to uncontrolled material management so that it interferes with the practicum process, it was found that some materials were expired because they did not use the FEFO (First Expiry First Out) method, namely by issuing BHP with more Expired Date (ED) short first from a long ED and the FIFO (First in First Out) method, namely issuing BHP in the order of receipt of the Kadar Expiration date [8]. The problem found in the process of reporting is that there is no regular and continuous report.

The existence of an information system-based material management is very much needed in overcoming the problems of practical materials in the laboratory. This system is one of the technological solutions to overcome problems in management with ease in the data collection process, monitoring of cost-effective materials, time efficiency and reducing errors in making reports and decisions [9]. The program at the JKG Semarang laboratory that already uses the application is the tool inventory program. using the APKAL application system (Application for completeness of laboratory equipment) and E-Planning (Application for budget planning). Meanwhile, in the management of practical materials in the laboratory, they still use the system manually by filling out written forms.

Journals related to this research from lukic et all (2017) explain that the existence of an information system brings benefits and advantages to the laboratory clinic services of the Railway Health Care Institute in Serbia. Before the use of the information system in the laboratory, the admission procedure and patient data collection were carried out manually, causing various problems in patient analysis and requiring a long time in patient data collection, frequent errors in the addition and patient laboratory specimens resulting in errors in health insurance claims. After using the information system, a positive impact on the quality of service in the laboratory was seen [10].

The innovation that will be developed in the website-based laboratory materials management information system involves students and lecturers in charge of practical courses. The involvement of students as users has a positive influence because students who know best the situation of immediate needs in the laboratory and involve the role of lecturers in procuring materials will result in better quality information systems. Based on these problems, the researchers were interested in analyzing the feasibility and effectiveness of the website-based model for the management of practice materials in the laboratory of the Department of Dental Health on the quality of services for the management of practical materials in the laboratory. The goal is to produce a website-based practical materials management information system model (SIP-BATIK JKG) that is feasible and effective to improve the quality of practice materials management services in the Semarang Dental Health Department laboratory.

II. RESEARCH METHODS

This study uses the Research and Development (R&D) method with model testing using the pre-experimental design one group prepost test method with purposive sampling. This study aims to develop a new product, namely a website-based information system model on material management in the laboratory. The research and development procedure has five steps, namely: 1) Gathering information, 2) designing product structures, 3) expert validation and revision, 4) product testing and revision 5) producing products. In-depth interviews were conducted to 5 respondents including the head of the department, secretary of the department, laboratory officers, BMN officers and department treasurers. The 50 respondents included (40 students, 8 lecturers and 2 laboratory staff). Research data using an interval scale and expert validation data using the kappa coefficient test. The results of the model test use the proportion test and the two-mean difference test in pairs. If the data is normal, use the Paired T-Test and if the data is not normal, use Wilcoxon.

III. RESULTS AND DISCUSSION

A. Information Gathering

Information was collected by means of in-depth interviews and observations. Interviews were conducted to 5 respondents. The results of in-depth interviews concluded that the management of materials that had been running so far had not been maximized because it was done manually. Manual processes have limitations in control and reporting. Problems were found in terms of the quality of the information system. An information system-based model is needed that can help laboratory workers with limited human resources to copematerial management problems in the JKG laboratory.

B. Product/Model design

From the results of collecting information, a model of SIP BATIK JKG is designed which is a system for managing practical materials in the laboratory. Design and build the model using the SDLC (Development Life Cycle System) method. SDLC serves to describe the main stages and steps of each stage which is broadly divided into five main activities, namely: data collection stage, system planning, implementation, testing, and maintenance

C. Expert Validation

Expert validation was carried out to 2 experts, namely Information Systems experts and laboratory management experts. The results of the assessment from the expert validators who were assessed using the kappa coefficient test resulted in a value of 0.737 which could be interpreted in the satisfactory category (good) because the kappa coefficient value $k > 0.6$. This means that there is an agreement between the experts that the website-based SIP-BATIK JKG model is relevant and feasible as an information system on material management in the JKG laboratory.

D. Product/Model trial

Respondents in this study amounted to 50 people consisting of 40 students, 8 lecturers and 2 laboratory officers. Respondents from lecturers and laboratory staff because they have functions and characteristics that are not much different from the system, the researchers group them in the same column.

The results of the characteristics of the respondents in this study serve to describe the respondent's data simply which is presented in the following table:

1. Results of Respondent Characteristics Data

The characteristic data in this study looked at the characteristics of gender, education level and duration of using the laboratory

Characteristics	College student		Lecturers and laboratory staff	
	n	%	n	%
Gender				
Man	6	15	1	10
Woman	34	85	9	90
Education				
D3	10	25	2	20
D4/S1	30	75	1	10
S2			7	70
Long time using the lab				
2 years	21	50	1	10
3 years	15	37.5		
4 years	5	12.5		
> 5 years			9	90

Table 1: Respondent characteristic data

The table above describes the data characteristics of 50 respondents with the highest gender proportion in female students at 85%, while for lecturers and laboratory staff the highest is female at 90%. namely the master's education of 70%. Based on the experience of using the laboratory for a long time, students are the highest with a duration of 2 years by 50%, while for lecturers and laboratory staff the highest is for 5 years by 90%.

2. Results of Information System Quality Analysis After Giving the SIP BATIK JKG Model

Analysis of the quality of information systems to see the categories of information system quality in terms of data completeness, convenience, timeliness, accuracy and security

Assessment Aspect	Category	n	%
Completeness of Data	Good	28	56
	Very good	18	36
	Enough	4	8
Convenience	Good	31	62
	Very good	12	24
	Enough	7	14
Punctuality	Good	33	66
	Very good	11	22
	Enough	6	12
Accuracy	Very good	25	50
	Good	23	46
	Enough	2	4
Security	Good	32	64
	Very good	9	18
	Enough	9	18

Table 3: Results of Information System Quality Analysis After Giving SIP BATIK JKG Model

The table above shows that the respondents' assessment of the data completeness aspect on average chose good and very good, totaling 46 respondents (92%) and 4 respondents (8%) stating enough. Respondents' assessment of the convenience aspect, the highest stated that it was good and very good, amounting to 43 respondents (86%) and 7 respondents (14%) stating it was sufficient. Respondents' assessment of the highest punctuality aspect stated that it was good and very good, 44 respondents and 6 respondents (12%) stated that it was sufficient. Respondents' assessment of the highest accuracy aspect stated that it was good and very good, amounting to 25 respondents (96%), and 2 respondents (4%) stating enough. Respondents' assessment of the highest security aspect stated that it was good and very good, amounting to 41 respondents (82%) and 9 respondents (18%) stating it was sufficient.

3. Menu Assessment Analysis on the JKG Laboratory Material Management Information System

The analysis of the menu assessment in the aspect information system that is assessed consists of: initial menu, login menu, laboratory staff menu, student menu, lecturer menu, and agenda menu

Assessment Aspect	Category	n	%
Home menu	Agree	32	64
	Strongly agree	18	36
	Disagree	0	0
Login menu	Agree	30	60
	Strongly agree	18	36
	Disagree	2	4
Officer Menu laboratory	Agree	26	52
	Strongly agree	24	48
	Disagree	0	0
Student menu	Agree	35	70
	Strongly agree	12	24
	Disagree	3	6
Lecturer menu	Agree	29	58
	Strongly agree	20	40
	Disagree	1	2
Agenda menu	Agree	39	78
	Strongly agree	9	18
	Disagree	2	4
System Guide Menu	Agree	38	76
	Strongly agree	11	22
	Disagree	1	2

Table 4: Analysis Results of Menu Assessment Model SIP BATIK JKG

The table above shows that the average respondent's assessment of the SIP BATIK JKG model menu is in the agree and strongly agree categories. In the initial menu of the system, those who agreed and strongly agreed were 50 respondents (100%). Respondents' assessment of the login menu who agreed and strongly agreed was 48 respondents (96%). Respondents' assessment of the menu of laboratory personnel who agreed and strongly agreed was 50 respondents (100%). Respondents' assessment of the menu of students who agreed and strongly agreed was 47 respondents (94%),

while those who disagreed were 3 respondents (6%). Respondents' assessment of the menu of lecturers who agreed and strongly agreed was 49 respondents (98%) while those who stated disagreed were 1 respondent (2%). Respondents' assessment of the agenda menu who agreed and strongly agreed was 48 respondents (96%), while disagreeing was 2 respondents (4%) Respondents' assessment of the system guide menu who agreed and strongly agreed was 49 respondents (98%) while not agree amounted to 1 respondent (2%)

4. Menu Feasibility Analysis on the SIP BATIK JKG Model

The results of the feasibility analysis of the menu on the SIP BATIK JKG model were assessed on the respondents with the results in the table below

Assessment Aspect	Category	n	%
Menu On SIP BATIK JKG	worthy	30	60
	Very Worthy	12	24
	Enough	8	16

Table 5: Results of Menu Feasibility Analysis in the SIP BATIKJKG Model

The table above shows that the respondents' assessment of all menus in the SIP BATIK JKG model majority stated that it was appropriate, amounting to 30 respondents (60%), very decent, 12 respondents (24%), while those who stated sufficient were 8 respondents (16%) said enough.. The majority of respondents stated that the SIP BATIK JKG menu was feasible and very interesting as a system in material management. The menus displayed are easy to understand and can be accessed easily, have different access rights between each user, providing more security and comfort to users, this is evident from more than 70% of respondents stating it is feasible and very feasible while 8 respondents stated that it was more because they had not get used to the new system.

5. Normality Test Results

Based on the results of the normality test for the quality aspect of the information system, most of them are not normally distributed because the P-Value value < 0.05 so that a non-parametric test is carried out, while for the results on the security aspect and the total score of the dependent variables of the pretest and posttest are normally distributed because the value P-Value > 0.05 parametric test was performed.

6. Bivariate Analysis

Bivariate analysis a data analysis that is carried out to find a correlation or influence between 2 or more variables studied [11].

a. Assessment Analysis of Laboratory Practice Materials Management Information Systems Before and After Application of the model

Assessment Aspect	Statistics		
	Before	After	P-Value*
Aspects of Data Completeness			
a. Mean ± SD	13.18±2.310	15.06±2.161	0.000
b. Min-Max	7-19	7-20	
Convenience Aspect			
a. Mean ± SD	12.88±2.256	13.14±3.417	0.040
b. Min-Max	7-18	8-20	
Aspect Punctuality			
a. Mean ± SD	12.56±2.459	14.76±2.880	0.000
b. Min-Max	7-18	9-20	
Aspects of Accuracy			
a. Mean ± SD	13.16±2.324	14.90±2.485	0.000
b. Min-Max	9-19	7-20	
Security Aspect			
a. Mean ± SD	11.98±2.272	13.18±2.505	0.001
b. Min-Max	7-16	7-19	
Total system quality aspect score			
a. Mean ± SD	63.76±9.301	71.04±7.2	0.000
b. Min-Max	42-81	53-90	

*Wilcoxon *Paired test

Table 7. Paired Results of Information System Quality Aspects Before and of the Model

The table above shows that the average respondent's assessment of the SIP BATIK JKG model menu is in the agree and strongly agree categories. In the initial menu of the system, those who agreed and strongly agreed were 50 respondents

(100%). Respondents' assessment of the login menu who agreed and strongly agreed was 48 respondents (96%) while those who stated disagreed were 2 respondents (4%) with reason forgot their password and username when logging in. Respondents' assessment of the menu of laboratory officers who agreed and strongly agreed was 50 respondents (100%). Respondents' assessment of the student menus who agreed and strongly agreed were 47 respondents (94%), while those who disagreed were 3 respondents (6%) because they were not used to requesting materials on the student navigation menu. Respondents' assessment of the lecturer menu who agreed and strongly agreed was 49 respondents (98%) while those who stated disagreed were 1 respondent (2%) because they were still not used to logging in with the lecturer menu. Respondents' assessment of the agenda menu who agreed and strongly agreed was 48 respondents (96%), while disagreeing was 2 respondents (4%) because they felt difficult with different logins for each user. Respondents' assessment of the system guide menu who agreed and strongly agreed was 49 respondents (98%) while disagreeing amounted to 1 respondent (2%) because they did not know if the system guide was in the help menu on each access right.

7. Effect Size Analysis

Effect size is a statistical method to find out how big the scale or difference in the effectiveness of the model that has been tested and applied is. The following is the effect size formula according to Cohen for single group one group[12].

<i>SIZE</i>	<i>INTERPRETATION</i>
0-0.20	<i>Weak effects</i>
0.21-0.50	<i>Modest effect</i>
0.51-1.00	<i>Moderate effect</i>
>1.00	<i>Strong Effect</i>

Table 8: Interpretation of Effect Size for single group

The following table is the result of testing and calculating the effect size of the SIP BATIK JKG

Composite Variable	Average Value		SD	Effect Size	Interpretation
	Pretest	Posttest			
Quality aspect information Systems	63.76	71.04	7.20	1.01	<i>Strong Effect</i>

Table 9: Analysis of Effect Size Model of SIP BATIK JKG

The table above shows that the information system quality aspect has an effect size above 1 which is categorized as having a high effect, meaning that the SIP BATIK JKG model has a large effect on the quality aspect of the information system. So it can be concluded that the SIP BATIK JKG model is very effective in improving the quality of the material management information system in the JKG laboratory.

IV. DISCUSSION

1. Product Results/ Model SIP BATIK JKG

The SIP BATIK JKG innovation model integrates technological developments with website-based information systems with management concepts in the laboratory the specifications for practical materials that are expected to overcome all problems in material management by laboratory officers with manual systems. The trial conducted on respondents who, in this case, are active users and managers in the SIP BATIK JKG laboratory, proves that this model is suitable for application in practical materials management services in the laboratory because it can provide an effective change to the old system, which is proven to improve quality. practical materials management information system. the information system model developed by the researcher is as follows:

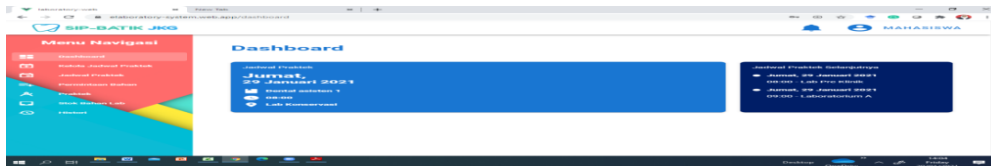


Figure 1: Main menu display

Access rights for the SIP BATIK JKG model can be done by 3 different users (students, lecturers and lab staff) with different logins and passwords.

a. Student Menu Display

Navigation menu includes dashboard menu, manage practice schedule, practice schedule, material request, practice, lab material stock, notification alert history, help menu and log out

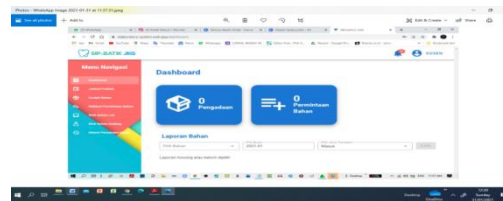
**Figure 2: Student menu display**

The analysis table for the assessment of the SIP BATIK JKG menu on the student menu the majority agreed and strongly agreed by 47 respondents (94%) because this menu was considered applicable and practical in material management and respondents who disagreed were 3 respondents (6%) on the grounds that they were not used to it. use and cannot be used directly in the laboratory.

b. Lecturer Menu Display and Admin menu

Lecturer menu display with navigation includes dashboard menu, practice schedule, material proposal, material request validation, lab material stock, warehouse material stock, material usage history and notification menu

The admin menu is a menu for lab staff with navigation menus including dashboard menus, practice schedules, procurement, validation of material requests, warehouse material stock, material masters, laboratories, account management, notification signs, help menu and log out

**Figure 3: Lecturer menu display****Figure 4: Admin menu display**

Based on the analysis table for the assessment of the SIP BATIK JKG menu on the lecturer menu, the majority of respondents agreed and strongly agreed by 49 respondents (98%) because the lecturer menu was considered to make it easier for lecturers to monitor practicum learning and stated that they did not agree with 1 respondent (2%). Respondents stated that they did not agree with the lecturer menu because they were not used to using the lecturer menu in the new system.

Based on the analysis table of the SIP BATIK JKG menu assessment, all respondents agreed and strongly agreed 100% on the laboratory staff menu. Respondents stated that the laboratory staff menu at SIP BATIK JKG can facilitate and speed up officers in carrying out activities in managing laboratory materials and assisting officers in making periodic material reports.

V. CONCLUSION

The application of the website-based practical materials management information system model (SIP BATIK JKG) is relevant and appropriate for use in the management of practical materials based on the assessment of respondents, namely lecturers, students and laboratory officers to improve the quality of the material management information system in the Dental Health Department laboratory.



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