Letters in Information Technology Education (LITE)
Vol 4, No 1, 2021, pp. 5 – 10
e-ISSN: 2654-5667

Development of Web-based 2013 Curriculum Learning Set Compiler Apps for Teachers in Vocational High Schools

Asih Setiani [a,1,*], Syaad Patmanthara [a,2], Heru Wahyu Herwanto [a,3], Kai-Lun Wu [b,4]
[a]Faculty of Engineering, Universitas Negeri Malang, Malang, Indonesia
[b]Department of Computer Science and Information Engineering, Southern Taiwan University of Science and Technology, Tainan, Taiwan
[1]asihsetiani48@gmail.com, [2]syaad.ft@um.ac.id, [3]heru_wh@um.ac.id, [4]ma7g0201@stust.edu.tw
*Corresponding author

Article Info

Article history:
Received: Jan 28, 2021
Revised: Feb 10, 2021
Accepted: Feb 25, 2021

Keyword:
Learning Set
Text Mining
2013 Curriculum
Vocational High School
Teacher

ABSTRACT

The curriculum is a set of plans and arrangements regarding the objectives, content and learning materials, and methods used as guidelines for the implementation of teaching and learning activities. Permendikbud 22/2016 stated that every teacher in the education unit was obliged to prepare a complete and systematic learning plan. So, every teacher was obliged to make a comprehensive and systematic learning plan, but what was currently being done to make it needed to be typed again or only copy-paste. Based on the research results on teachers at SMKN 1 Banyuwangi, the teachers wanted a dynamic application to facilitate teachers in preparing learning tools effectively and efficiently. Based on the problem, a solution was needed to assist teachers in compiling syllabus and lesson plans. This research and development aimed to design, develop, test the feasibility, and implement a website-based application for the learning set compiler to facilitate vocational school teachers. The research and development model used was the development model. It is consisted of: (1) Analysis, (2) Design, (3) Code (4) Test. This application also applied a text mining algorithm to analyze basic competencies with active verbs. Fifty teachers of SMKN 1 Banyuwangi conducted the feasibility test and implementation of this research and development. The validation tests that software experts have carried out obtained a percentage of 100%. Based on these data results, the application of the learning device compiler is declared to be very valid and can be tested. Tests by users, both functionality and usability of the application, resulted in a score of 99.83% and 91.11%, respectively. The results showed that the application of learning tools was considered good, so the Vocational High School teachers can use it to compile learning sets effectively and efficiently.

I. INTRODUCTION

According to Permendikbud Number 34 of 2018 concerning National Standards for Vocational High School Education, these are the minimum criteria for the education system at the Vocational High School level in all jurisdictions of the Unitary State of the Republic of Indonesia in order to achieve graduate competence according to the needs of graduate users. National Vocational High School Education Standards consist of Graduate Competency Standards, Content Standards, Learning Process Standards, Educational Assessment Standards, Educators and Education Personnel Standards, Facilities and Infrastructure Standards, Management Standards, and Operating Cost Standards.

Graduate competency standards are used as an assessment guide in determining student graduation which includes competencies for all subjects and includes aspects of knowledge, aspects of attitudes and aspects of skills [1]. Vocational High School is part of the national education system which has the aim of vocational education, namely to produce

skilled workers who have the ability to meet the demands of the business world, and are able to develop their potential in adopting and adapting to developments in science, technology, and the arts. So that the Graduate Competency Standards are formulated thoroughly in one complete ability by integrating the dimensions of attitudes, knowledge, and skills based on the Gradation of Competence in each of the three-year and 4-year education programs.

Process standards are criteria regarding the implementation of learning in educational units or programs in order to help fulfill the level of developmental achievement in accordance with the child's age level. As regulated in Permendikbud No 137 of 2014, the standard process includes lesson planning, learning implementation, learning evaluation and learning supervision, [2]. In the standard process there are minimum criteria regarding lesson planning, learning implementation, learning assessment, and learning supervision in vocational secondary education units to achieve graduate competence. In the learning process in the classroom there are three stages, namely planning, implementation, and assessment of the learning process. The curriculum is a set of plans and arrangements regarding the objectives, content and learning materials as well as the methods used as guidelines for the implementation of teaching and learning activities, [3].

In the planning stage, the teacher makes learning plans in the form of lesson plans and other learning tools that refer to the syllabus developed by SMK and the curriculum. The reason teachers are required to make lesson plans and other learning tools is so that teachers have a plan of what things will be done before learning begins [4]. In the implementation phase, the teacher in carrying out learning follows the steps of the predecessor activities, core activities, and closing activities [5]. The last stage is the assessment stage of the learning process is an assessment of the implementation of learning for improvement. So, from the results of the assessment, it is used to plan learning improvement programs, enrichment, and counseling services to overcome learning difficulties.

The standard process in the learning process carried out by teachers is to teach a material to their students [6]. One example of the implementation of the learning process is in compiling a lesson plan as outlined by the teacher in the Learning Implementation Plan and other learning tools that refer to the syllabus. According to Permendikbud No. 22/2016, every teacher in the education unit is obliged to prepare a complete and systematic RPP. So, every teacher is obliged to make a complete and systematic lesson plan, but what is currently being done to make it need to be typed again or copy-pasted. If this is done, the learning objectives are not achieved optimally. Therefore, it required a learning device application that makes it easier for teachers to make learning tools: lesson plans.

Based on these problems, to find out the truth of the problem, the researcher asked several teachers at SMK Negeri 1 Banyuwangi who said that in compiling RPP that HOTS must know the level of operational verbs that are suitable for use and hope that there are applications that can make it easier for teachers to develop learning tools; an application that could facilitate teachers in dynamically preparing Syllabus and RPP learning tools was needed and hoped to develop learning activities according to the characteristics of students. Furthermore, it was revealed that the difficulty in preparing lesson plans for learning activities made a longer duration of time.

II. METHOD

The application development model for the preparation of syllabus and lesson plans using the waterfall development model. The waterfall model or so-called classic Life Cycle is a classical model that is systematic, sequential in building software [7]. Because by using this model can be done with a sequential and systematic approach. The stages in the waterfall development model consist of analysis, design, code, and test, [8]. This development procedure is shown in Fig. 1.

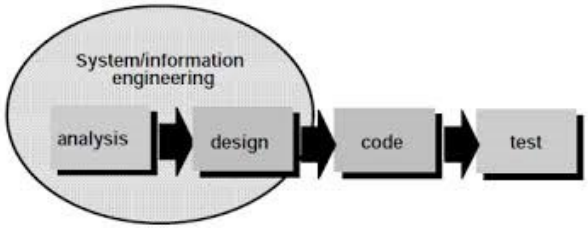

Fig. 1. Waterfall development model

Analysis

The analysis phase conducted observations and interviews to analyze the teacher's needs for the application of the syllabus and lesson plans preparation tools by identifying the needs and problems related to this application.

Design

This stage is the stage used to convert the data obtained at the analysis stage into the design of an application. This stage makes process modeling (Data Flow Diagram), data modeling (Schema Relationship), and application interface design. Data Flow Diagram that describes how the process flow that runs on the application. Schema Relationship to describe the relationship between tables that exist in the application. The interface design is used as an illustration of the appearance of the developed application.

Code

This stage is the stage of the design results that have been made in the previous stage are converted into the form of program code. The process modeling design is converted into programming using the PHP Native language. The data modeling design is implemented using SQL (Structured Query Language). For the database system using MySQL software. Meanwhile, the application interface design is implemented using HTML5, Javascript, CSS, and JQuery. The scripting code process uses the Sublime editor and for the program code execution process using the latest version of the Google Chrome or Firefox browser.

Test

This stage is carried out to determine the progress of the application being developed to run. For testing this system, it is divided into two stages of field testing, namely testing of functionality and usability. Functionality testing is done by making test cases that are trying all functions by using the software whether it is in accordance with the required specifications. Testing with usability techniques is carried out using a questionnaire or questionnaire instrument to test the usefulness of the application in schools. The trials were carried out by waka curriculum users, principals, and teachers at schools.

The test subjects of this learning device compiler application consisted of categories, namely Individual Trials and Field Trials. Individual testing is carried out by software experts using black-box testing. From the results of this trial, obtained revisions and suggestions about the product as an improvement material so that the resulting product becomes more qualified.

The field trial of this learning device compiler application consisted of several groups, namely: (1) Deputy Head of Curriculum at SMK Negeri 1 Banyuwangi; (2) Principal of SMK Negeri 1 Banyuwangi; (3) Teachers, namely teachers of SMK Negeri 1 Banyuwangi. The number of teachers used as experimental subjects was 50 teachers; (4) Admin, namely the manager of the learning device application web. The techniques used in the waterfall model data collection are observation the processes that occur in the transaction system and data storage, interviews by asking several questions, and literature study to find references from various sources [9].

The type of data in this study uses qualitative data and quantitative data. Qualitative data obtained from responses and suggestions both verbally and non-verbally. While quantitative data is obtained from the results of filling out the instrument at the functionality testing stage by software experts and users in the field.

The instrument used is in the form of a checklist. Checklist for functionality and usability aspects of the developed application. This instrument will be given to information systems experts and application users. This instrument contains the application functionality requirements and fields for validation requirements.

The form of the instrument given to the user is added with a usability test using a Likert scale. The Likert scale used in this research instrument was made in the form of a checklist. The selected scale has four categories and is shown as in Table 1.

TABLE I. ASSESSMENT CRITERIA BASED ON LIKERT SCALE

Criterias	Descriptions
1	Strongly agree/very good/very suitable/very interesting
2	Agree/good/appropriate/interesting
3	Disagree/not good/not suitable/less interesting
4	Disagree/not good/not appropriate/not interesting

Data analysis techniques are used to process all the data that has been collected obtained from the questionnaires that have been distributed in the trial. The data is in the form of quantitative and qualitative data that will be processed and analyzed, so that it can be understood easily and can be informed to others.

Qualitative data is obtained from the responses of software experts and application users which will be used as feedback and input in the next developer. While quantitative data can be obtained from the scoring of each item in the questionnaire and processed using the processing of the percentage of the total score.

To calculate the final result of the questionnaire using the assessment aspect with the answer percentage formula adapted from (1) [10],

$$V = \frac{\sum x}{\sum xi}\ x\ 100\% \quad (1)$$

where V is validity, ∑x is answer score, and ∑xi is maximum answer score**.** The criteria for determining the validity of the application made are shown in Table 2.

TABLE II. APPLICATION VALIDITY CRITERIA

Percentage	Validation Criterias
85,01 – 100,00	Very valid, or can be used without revision
70,01 – 85,00	Fairly valid, or usable but need minor revision
50,01 – 70,00	Not valid, it is recommended not to use because it needs a major revision
01,00 – 50,00	Invalid or should not be used

Based on the validity criteria above, the application development can be said to be successful and in accordance with the criteria if it has reached a minimum percentage of 70.01%. While the criteria for determining the success of the application made are shown in Table 3.

TABLE III. APPLICATION SUCCESS CRITERIA

Percentage	Qualifications	Results
85 – 100	Very good	Succeed
65 – 84	Good	Succeed
55 – 64	Enough	Not successful
0 – 54	Not enough	Not successful

Based on the success criteria above, the application development can be said to be successful and in accordance with the criteria if it reaches a percentage of 65%. The implementation stage is the stage after the feasibility test, then the application will be implemented. The application of the learning device application will later be hosted on the domain. This makes it easier for users to access it. An illustration of how to access the application will be shown in Fig. 2.

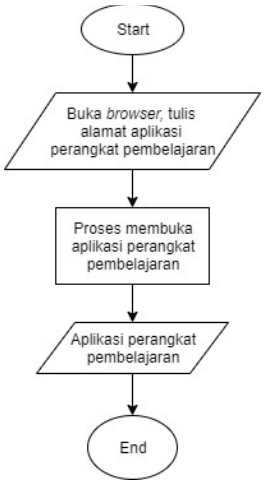

Fig. 2. Application access flowchart

III. Result and Discussion

The resulting product is a website-based application for curriculum 2013 (revision 2018) learning tools. The basic competency analysis page interface is the basic competency input process page which is then analyzed using a text mining algorithm [11]. Its appearance is shown as in Fig. 3.

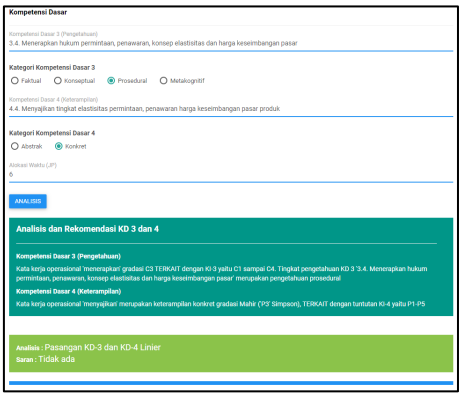

Fig. 3. Basic Competency Analysis Page

The Syllabus Components page is a syllabus component display that contains Competency Achievement Indicator data, subject matter, learning activities, assessments obtained from selected basic competency data in the form of a tab menu. Each tab menu has an add data button which is used to add data and a trash and pencil image icon button on each table row which is used to delete data and edit data. This interface is shown as in Fig. 4.

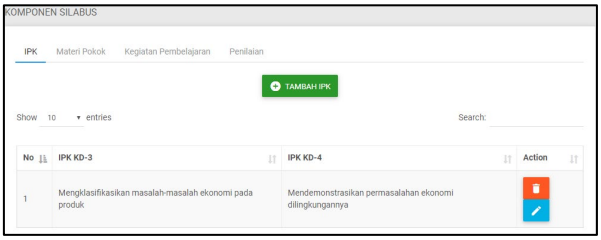

Fig. 4. Syllabus Component Page

The RPP Component page is divided into two stages, namely the first stage which contains several tab menus, namely Competency Achievement Indicators, Learning Objectives, Main Materials, Methods, Media, Tools/Materials, Learning Resources, Assessment Techniques as shown in Fig. 5.

Fig. 5. Initial Stage RPP Component Page

Next is the second stage which contains several tab menus, namely several tab menus, namely preliminary activities, core activities, closing activities, knowledge, skills, enrichment, remedial as shown in Fig. 6.

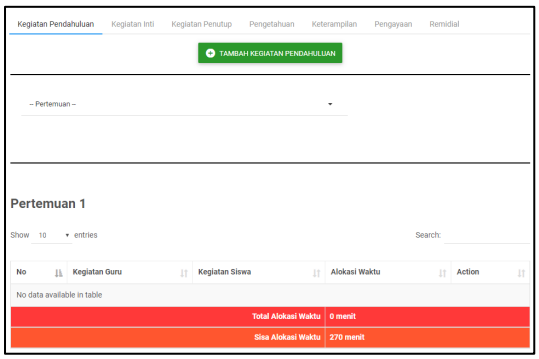

Fig. 6. Syllabus Component Page

The generate syllabus page is the final process page for compiling the syllabus which can be directly printed or saved in PDF form. This page is shown as in Fig. 7.

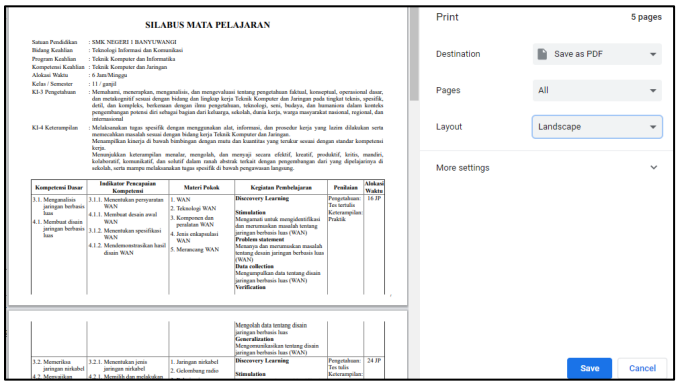

Fig. 7. Syllabus Print Page Feature

The generate RPP page is the final process page for compiling the RPP which can be directly printed or saved in PDF form. An example of this page display is shown in Fig. 8.

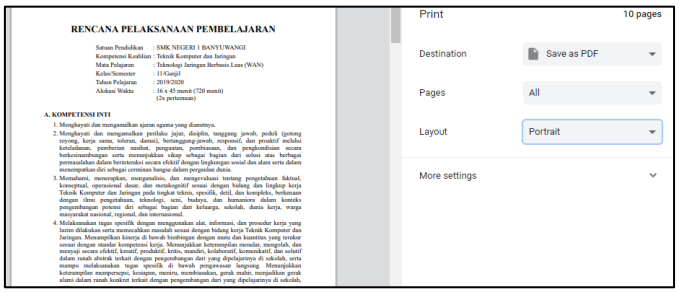

Fig. 8. Lesson Plan Print Page Feature

Test Results

Based on the functionality trials conducted on software experts and users of each level, the results of the feasibility of the learning device application are shown in Fig. 8.

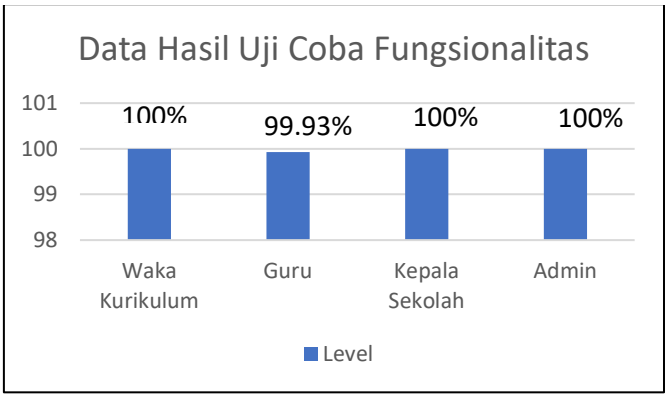

Fig. 9. Graph of Functionality Test Result Data

Furthermore, based on usability tests conducted by users of each level, the usability results of the learning device application are shown in Fig. 10.

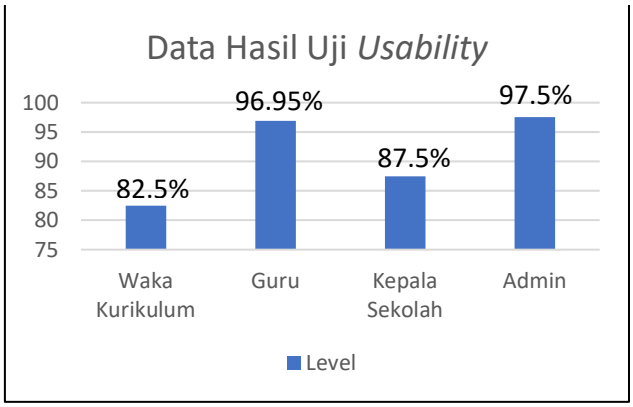

Fig. 10. Usability Test Result Data Graph

Analysis of Application Functionality and Usability Test Results

The results of the analysis on 4 aspects of the validity criteria show that the criteria are very valid and most of the respondents think that: (1) the application runs smoothly from the learnability aspect; (2) the features in the application run well from the aspect of efficiency; (3) the application is easy for users to understand because of the good menu layout; (4) error handling and application security level are running well.

Furthermore, the results of the analysis on 4 aspects of usability showed very good results and most of the respondents thought that: (1) the benefits of the application and the features in the application were very good, also the information displayed was easy to understand; (2) application users such as the ease of operation of the application and the ease of understanding the sentences or words used in the application are very good; (3) the display quality of the application is very good in terms of writing, color composition, and user interface quality; (4) the ability of the application to process data and the speed of the application when displaying information is very good.

Based on the results of functionality testing by software experts, the percentage is 100%. The percentage is from the calculation based on equation 3.1. The criteria for application validity, the percentage of the test results are declared very valid or can be used without revision. Based on the results of the functionality testing by users, the average percentage of the functionality test results from all test subjects was 99.83%. The success of the application seen from the average percentage of the test results was stated to be very good so that the Learning Device Application was suitable for use in SMK [12].

Based on the results of the user usability test, the average percentage of the functional test results from all test subjects was 91.11%. The success of the application seen from the average percentage of usability test results was stated to be very good so that the Learning Device Application could be used in SMK.

Implementation of Learning Device Applications

The implementation of the learning device application will be uploaded to the domain after getting the results of the application's feasibility test. Then the application will be hosted on rumahweb.com with a page (http:// devices-guruku.com/). On the device-guruku.com page, it is a Learning Tool Application that is used to facilitate teachers in preparing learning tools in accordance with the 2013 revised 2018 curriculum in Vocational High Schools.

From the data from the user feasibility test, there are some users who still access it and there are verbal comments from users using this learning device application, they feel very facilitated and make it easier to make learning tools. However, this page is open to the general public by users within the scope of SMK

IV. Conclusions

The product resulting from this development is a website-based 2013 revision 2018 curriculum Learning Tool Application to facilitate vocational teachers in the preparation of 2013 revised 2018 curriculum syllabus and lesson plans. This application implements the Text Mining algorithm in the Basic Competency analysis section. This application can be accessed using various devices or gadgets that are connected to the

internet, making it easier for users to access application services. The users who can access the application are divided into 4 levels of users, namely: (1) waka curriculum; (2) teachers; (3) the principal; (4) admin or web manager.

The Learning Toolkit application has been tested for feasibility by software experts and users of every level. The results of the feasibility test state that this application is very valid and very good so it is suitable for use in SMK with the percentage of functionality test results of 100% from software experts and 99.83% of users, and the percentage of usability test results being 91.11% from the user.

Some suggestions obtained from the development of this learning device application include (1) In terms of appearance to provide color differentiation between the currently open or active menu; (2) The subject features should be grouped in each department to make it easier; (3) For greater data usage on learning device applications, it is better to use a VPS to speed up the usage process; (4) The application of learning tools is added with the key features of Competency Achievement Indicators if the learning tools lead to HOTS.

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