International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024

Development of Website Based Modules on Basic Networks and Computer Subjects at SMK Negeri 5 Padang

Indah Permata Edi[1], Sukardi[2], Wawan Purwanto[3]
[1]Vocational Technology Education, Padang State University, Padang, Indonesia, 3166-1
[2]Vocational Technology Education, Padang State University, Padang, Indonesia, 3166-1
[3]Vocational Technology Education, Padang State University, Padang, Indonesia, 3166-1
Email address: indahpermataeddy65@gmail.com

Abstract— *This study is driven by the limitations of free learning facilities that can be used by students wherever they are and learning materials require visualization, and limited study time in the classroom results in unsatisfactory learning outcomes. The purpose of this study is to develop a web based learning module on the basic and computer network at the Department of Computer and Network Engineering at SMK Negeri 5 Padang which is valid, practical and effective. The web-based module is designed to help students in learning by using information and communication technology, so learning can be done freely without the need to be bound by time and place. The development model used in this study is adapted to the 4-D (Four-D) model. This model consists of four stages: (1) Determining Phase,(2) Design Phase, (3) Development Phase and (4) Implementation Phase. Data types used are primary data where data is obtained directly from source, SMK Negeri 5 Padang, teachers, experts and students. Data analysis technique used is descriptive analysis technique by describing the validity, practicality and effectiveness of developed learning media. The results obtained from this development research are e-learning modules and basic computer networks. Based on the findings of this study, it can be concluded that the valid e-development module with validation of two validator 0.86 with a valid category, from the material aspect of the second validator validation is 0.89 with a valid category. Web-based modules are built practically with the practical value of teacher response 96.67 and student responses 86.86 and effective student motivation after using the web-based module is 86.31 with a very high category, in improving students' understanding of the calculation of scores obtained by 0.68 in the moderate category. It can therefore be concluded that the basic e-learning network and computer modules are valid, practical, and effective to be used as a learning tool.*

Keywords— *Electronic Modules, Network and Computer subjects modules, Research and Development.*

I. INTRODUCTION

Education is a basic necessity for the life process to have knowledge, values and attitudes. Education is a measure of the quality of human resources development for a country, both spiritually, knowledgeable, and capable of claiming as a developed nation. Quality human resources will be able to develop a nation and participate in answering the challenges of time that will always change. Quality human resources can improve the quality of quality education, government efforts to realize quality human resources are Vocational High School (SMK).

Vocational Secondary Schools (SMKs) provide skilled manpower to play an important role due to the growing needs of the market. Vocational education is an education that provides students with skills in their choice of choices and needs in the workforce. Students must be skilled in the field of expertise they choose in accordance with the needs of the world of work and are required to produce graduates with quality Human Resources through a mix of learning to acquire skills, and attitudes that interact for technological advancement and scientific. Technological advances require vocational high school (SMKs) to innovate in learning so they can incorporate existing learning methods, with technology to improve the quality of education and improve student competence by optimizing conventional learning processes into digital learning. Digital learning has a freely designed and freely designed democratic learning principle considered optimal in the implementation of the learning process. Digital learning has the principles of improvement, independence, flexibility and independence [1].

The principle of independence is created through the application of the 2013 curriculum, the 2013 curriculum requires student-centered learning, students in this regard are required to be active in classroom and outside classroom learning, accessible outside the classroom can be accessed via online electronic media via the internet. The 2013 curriculum states that teachers act as facilitators, this makes teachers need to provide media and teaching materials that can help in the teaching and learning process and provide space for students to learn independently in line with the abilities and interests of these students. One of the subjects that requires media materials and teaching in the learning process, namely, the Basic Network and Computer subjects [2].

The basic network and computer subjects are one of the standard of competency in the Computer and Network Engineering Department curriculum. The basic network and computer are the subject of compatibility in computer and network engineering. The basic network and computer efficiency include understanding, explaining and using basic theoretical and basic computer working methods. This efficiency needs to be mastered as a rule in sharpening the theoretical understanding of the next material. Basic subject study and computer various analyzes and tests applications as needed to be difficult to explain directly. This competency can

Indah Permata Edi, Sukardi, and Wawan Purwanto, "Development of Website Based Modules on Basic Networks and Computer ubjects at SMK Negeri 5 Padang," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 145-149, 2019.

be achieved if the learning component supports the learning process, but during the learning process there are still obstacles and difficulties.

Problems encountered during Basic Network and computer learning processes such as difficulty understanding, analyzing before applying for student motivation loss. Limited time for teachers and students in delivering materials at face-to-face sessions. Other problems include theoretical and practical materials that the students need to master, so that this competency needs teaching material and media that can help students understand learning. To reinforce the understanding of the material, the student is still dependent on the learning process in the classroom, while the learning time in the classroom is very limited and the learning style of each student is also different - not all that is presented by the teacher in the classroom can be understood in one explanation.

Based on observations made by 33 students in the odd semester of the Department of Computer and Network Engineering at 2018/2019, where researchers test on the Basic Network and Computer.

Unacceptable efficiency can be fulfilled with the use of learning components that support the learning process. One of these components can be in the form of teaching materials. Instructional materials are all materials that are systematically structured, featuring complete numerical competencies that will be mastered by students and used in the learning process (Prastowo, 2015). One of the teaching materials that teachers can use to support the learning process is the learning module Based on this fact, it is necessary to develop teaching materials in the form of learning modules that can be used as an alternative in the learning process in implementing computer assembly materials.

Through the module, students can study according to their respective rates. With the help of the module, students can easily learn the material at home, though the material has not been delivered by the teacher. The module can be used as a reference for information on Basic Computer and Computer learning materials.

The learning module to be developed is a digital module consisting of texts, images, interactive quizzes, discussion forums, videos to visualize materials so that students can better understand them. The use of digital modules during learning can reduce the weaknesses in printed, interactive teaching materials, which facilitate navigation, allowing display of pictures, interactive quizzes, and videos.

The use of e-modules in learning is very strategic and reduces the weakness in print books. The distinction between e-module material and printed material is providing interaction, facilitating navigation, enabling images, audio, video and animation to be displayed and synced cynically and out of sync through the teacher portal, with the site's unique Uniform Resource Locator (URL) address to be able to display audio, image and animation [3].

This learning module, then uploaded to the website, the website is the process and activity of implementing e-learning learning, which creates a learning process that can take place anywhere and anytime. E-learning is a presentation through a website that creates a virtual learning environment (Virtual Learning Environment) of the learning environment provided by this site will be equipped with several facilities that are used for the learning process, namely materials, discussion forums, chats, online assessments, and administrative system.

The web-based learning modules on Basic and Computer Network Basics, are used as an alternative to improving student learning motivation, learning modules will be uploaded to the website, this module can be downloaded by students and prepares the material in the learning module, performs training activities, tasks, and discussion forums with other teachers and students to be held on this site. Website-based module learning can control independent student learning to determine their own learning methods, and learning activities can be done anytime and anywhere.

II. Review of Literature

A. Learning Resources Module Learning Module Web

The theory that studies how learners are called learning theories. Learning theories pay attention to how one learns about the relationship of variables that determines motivation and learning outcomes. According to Smaldino there are three perspectives of learning theory, namely behavioristic perspective (behavioral perspective), cognitive perspective (cognitivist perspective), constructivist perspective (constructivist perspective). Each learning theory has its own characteristics - each in determining the learning process [4]. Three paradigms of learning theory can be used together and proportionally to support the implementation of learning through web-based learning modules.

Behavioristic Theory, Behavioristic is a theory of learning that emphasizes the advent of the desired response, which is a change of behavior as a form of learning. The learning process in behavioral theory only emphasizes visible and measured results (Budiningsih, 2005).

Cognitive Theory, Learning based on cognitive learning theory is a change of perception and understanding that can not be seen from behavior (Budiningsih, 2005). Cognitive learning theories have the perspective that students process lesson information through efforts to organize, store and find relationships between new knowledge and existing knowledge (Rahyubi, 2012).

Constructivistic Theory, Constructivistic learning theory is a learning theory that emphasizes learning experience. With constructivist learning process the teacher is not centered. Constructivistic paradigm is the first component that supports the concept of free learning (Budiningsih, 2005). The three previously defined learning theories can be used as taxonomies for learning. According to Etmer & Newby (Rusman, 2012), three theories of learning (behavioristic, cognitive and constructivistic) are the basis for the development of information-based and communication technology. Behavioral strategies can be used to teach "what" (about facts), cognitive strategies can be used to teach "how" (on processes and principles), and constructivist strategies can be used to teach "why" (higher level of thinking and contextual). The development of learning modules through this website is expected to not only be able to develop aspects

Indah Permata Edi, Sukardi, and Wawan Purwanto, "Development of Website Based Modules on Basic Networks and Computer ubjects at SMK Negeri 5 Padang," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 145-149, 2019.

of knowledge but also improve the level of thinking of students [5].

B. Basic Computer and Subject Network

Basic Networks and Computers are compulsory subjects in the field of Computer and Network Engineering expertise (TKJ) that must be run by students, Based on the curriculum structure of the Basic Computer Network and Computer delivered in the first semester X classes, every 3 hours of teaching, one of the basic competencies to be learned is, occupational safety and environmental health (K3LH), computer assembly, computer installation testing, BIOS configuration, operating system installation, driver installation, application software installation. In this basic competence there is the theoretical and practical material that the students need to master, so this competency requires a web-based module that helps students understand learning. Computer Assembly, Computer assembly materials discuss things related to computer hardware. This material is an introduction to exploring basic Computer Basic and Basic materials so that students understand this material well. Learning objective, After studying this, students are expected to explain computer hardware parts, determine computer specifications according to work requirements, determine computer installation steps according to industry standards, implement computerized K3 installation procedures, carry computer installations according to industry standards, make computer assembly reports.

From the above definition, it can be concluded that Computer and Basic Networking are basic computer-related learning and networks that are very important to be learned by grade X students in the Computer and Network Engineering expertise program at Vocational Schools [6].

C. Understanding Web-Based Modules

The electronic module is based on a learning module that uses World Wide Web (WWW) technology. is a teaching material module with material delivery using electronic technology in the form of a web site [7]. Website-based modules are electronic modules with book formats that display information that are electronically designed and readable using computer technology and electronic book reader (book audience or e-book reader) (B.P Sitepu, 2006) [8]. The development of e-books (electronic module) is a module, which is presented in electronic form involving the use of technology in the learning process.

The web-based module is an independent teaching material presented in electronic formats systematically arranged into the smallest learning unit to achieve continuous efficiency. Where students influence interaction with this program, comes with video presentations [9].

Some of the above definitions can be concluded that web-based modules provide convenience during the learning process, both for students and teachers. Creating this learning module uses web sites to help students learn unlimited time and space and students can take the materials they have provided and store various documentation or information provided by teachers through the website.

The purpose of using the module, among others, educational goals can be achieved effectively and efficiently. "Students can participate in learning programs in accordance with their own abilities and abilities, learn more freely, learn their own learning outcomes, by emphasizing the material optimal learning [10].

Ebook is an information display or text in a recorded electronic book format and can be opened and read using a computer or an electronic book reader (book reader or e-book reader) [11].

Book development promotes the use of technology in learning activities. Various print learning media, one of which is a module, can be transformed into an electronic form, known as e-module (electronic module). There is no definitive definition of e-modules, referring to various terms that can be identified that e-modules are a combination of module requirements in the form of electronic teaching materials. Therefore, e-modules can be defined as a form of free teaching materials arranged systematically into the smallest learning unit to achieve certain learning goals, presented in electronic format. Where every learning activity is related to navigation that makes students more interactive with the program, equipped with video, animation and audio presentations.

III. DEVELOPMENT METHOD

The method in this study is Research and Development (R & D) research. The development research method is a requirement analysis that can produce a certain product, and test the effectiveness of this product [12].

The purpose of this study is to develop a website based learning module product to be used in Basic Network and Subject Computer SMK 5 Padang.The development model used in this study is the modification of the 4 - D model model (Four D - Model) which consists of 4 main stages, namely, Defining, Designing, Developing, Developing and Dissemination (Dissemination) (Trianto, 2012: 189).

This model is selected because of several advantages, ie (1) in detail and detail describing the procedure steps development, (2) detailed and systematic, (3) before being tested, developed learning modules have been self-assessed and referred by experts first. The subjects to test the development of web based learning modules on Basic Computer Network and Computer subjects were students of X Computer Engineering and Network of State Vocational College of Padang by 33 people in odd semester which will be given the concept of basic computer assembly materials using web-based module

The type of data used in the development of web-based module on basic network and computer subjects is the primary data, which confirms the data taken from the verification of the learning device carried out by the verifier. The data obtained from the experimental exercise are: student responses to basic network based web-based modules and computer subjects developed after the product is tested (practical), and student learning outcomes from student cognitive aspects (efficacy) are analyzed using statistical formula.

The data from the validity results was analyzed using the validation coefficient of Aiken V, according to Azwar [13]

Indah Permata Edi, Sukardi, and Wawan Purwanto, "Development of Website Based Modules on Basic Networks and Computer ubjects at SMK Negeri 5 Padang," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 145-149, 2019.

International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024

Aikern has formulated the Aiken V formula to minimize the Content Testimony Coefficient based on the expert's assessment of the item on the extent to which the item represents the measured element. Next, find the average score. Practical practical techniques of web based module modules are derived from the research findings through questionnaires about the network module subjects and basic computers used by students. The questionnaire comprises statements to determine practical web-based networking and computer learning modules and provide alternative answers to these statements. The effectiveness analysis of web-based interactive learning modules is done to determine the effectiveness of the media used in learning. For the effectiveness test, this study uses the Preetest and Postest methods which are part of the Pre-Experimental Design method.

IV. Development and Discussion Results

A. Data Analysis

1. Data analysis test validity of network based website modules and basic computers

The results of the assessment of each aspect given by the validator were analyzed using the V. Aiken statistical formula. The results obtained are validation values for the products produced. The results of the validation recapitulation are summarized from the aspects of the e-learning module assessed as shown in table I.

TABLE I. Validation results of network based website modules and basic computers

No	Validation	Indicator	Validator 1	Validator 2	Average
1	Material expert	Content Aspect	0,81	0,92	0,895
		Learning Aspect	0,84	0,94	
		Summary Aspect	0,83	1,00	
2	E-module expert	Display Aspect	0,75	0,95	0,865
		Programming Aspect	0,91	0,84	
		Utilization Aspect	0,75	0,88	

Based on the results of the analysis of the validity of the material experts, the average aspect of 0.895> 0.667 network subjects and basic computer-based modules is included in the legal category. In addition, the results of verification with website-based module experts obtained an average of 0.865> 0.667, so that the developed e-learning module was declared valid.

2. Data analysis of practicality test of network based website modules and basic computers

a. Teacher's response to the practicality of network based website modules and basic computers

Practicality is related to aspects of learning, material and design in a website-based module was developed. Practical data is obtained through a questionnaire filled in by a teacher majoring in computer and network engineering. The results of the practicality assessment of the website-based learning module and basic computer modules are summarized in table II.

TABLE II. Practicality recapitulation based on teacher's response.

No	Aspect	(%)	category
1	Learning	97,5	Very Practical
2	Material	95	Very Practical
3	Desain	97,5	Very Practical
Average Lecturer Response		96,67	
Aspect Category		Very Practical	

The results of the analysis get the average results of the website-based module learning practice test on network and basic computer subjects according to the teacher to assess the percentage value of 96.67 with a very practical interpretation.

b. Student response to practicality of network based website modules and basic computers

The practice of modules on network subjects and the basic components of e-learning also require feedback in the form of feedback from students. This data is obtained after students use a website-based module on basic network and computer subjects so students fill out the questionnaire provided. Practical assessment results of the e-learning module modules are summarized in table III.

TABLE III. Practical recapitulation based on student responses.

No	Assessment Aspect	Percentage (%)	Category
1	Learning	89,02	Very Practical
2	Desain	84,97	Very Practical
3	Program	86,58	Very Practical
Average Practicality of Student Response		86,86	Very Practical

Based on Table II and Table III, the results of the website-based module practice test average on basic network and computer subjects were obtained based on the acquisition of teacher data of 96.67% and based on student data acquisition of 86.86% so that it can be concluded that the website-based module classification included in "very practical".

3. Effectiveness judging from classical completeness

Classic perfection can be seen from the percentage of students completing (comparing the KKM value set) after using a website-based module on the subject of network learning and basic computers. The basis for determining the effectiveness of basic network and computer-based website learning modules is that if the percentage of classical completeness is greater or equal to 85%, the basic network and computer based learning of the website is used effectively. If the opposite, the percentage classification of students is less than 85%, then the basic learning network and computer modules are not used effectively. Here it is the results of the average scores of students in basic computer and network majors are presented in Table IV.

TABLE IV. Results of effectiveness analysis based on KKM.

Total College Student	Value Range			
	< 80 (Not finished)	%	≥ 80 (finished)	%
33	0	0	33	100

Based on the results of the analysis described in table 4.5, there are 33 students (100%) who complete the data, indicating that classical perfection has been achieved, it can be concluded that basic network and computer-based learning modules are effective when viewed from classical perfection.

Indah Permata Edi, Sukardi, and Wawan Purwanto, "Development of Website Based Modules on Basic Networks and Computer ubjects at SMK Negeri 5 Padang," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 145-149, 2019.

4. Effectiveness is assessed from student motivation

On network subjects and the basic components of e-learning also requires effectiveness on student motivation. This data is obtained after students use a website-based module on basic network and computer subjects so students fill out the questionnaire provided. The results of the evaluation of the effectiveness of module learning modules based on website data from the questionnaire instrument aim to test the effectiveness of student motivation after being given a website-based module based on instruments, the following results are obtained in table V:

TABLE V. Recapitulation of effectiveness based on student motivation.

No	Aspects of assessment	Percentage (%)	Category
1	Intrinsic motivation	86,67	Very high
2	Extrinsic Motivation	85,95	Very high
		86,31	Very high

5. Effectiveness judging from the gain score test

The Data from the pretest and posttest were analyzed using a profit score test aimed at testing the effectiveness of the treatment given to a particular group. Based on the profit score test, the following results are obtained.

TABLE VI. Gain score test results

Number of Samples	Gain Score	Interpretation
33 people	0,668	Medium

Based on the profit score test above, it can be concluded that the effectiveness of basic website and computer-based network modules developed is in a simple / simple category. So this website-based module can be used to improve learning outcomes on basic computer and network subjects in the computer and network engineering department at Padang State Vocational High School 5.

B. Discussion

Based on the results of the investigation conducted, it can be seen that the basic network and computer website-based modules develop module modules that are valid, practical and effective. After testing the authenticity of material verification and website-based module verification, and continuing practical tests to teachers and students. Finally, the effectiveness of the website-based module was tested for students from computer engineering and business majors at SMK 5 Padang

Based on the website-based module validity test, the material validation values are 0.89 and website-based module validation is 0.86. In addition, in assessing the practicality of the teacher's response a score of 96.67 was obtained with a very practical interpretation. Then based on student responses as much as 86.86 with very practical interpretations. Overall, the network and computer learning modules are basic practical to use.

In testing the effectiveness through classical completeness, 100% perfection is obtained. In addition, the effectiveness of student motivation after using a website-based module is 86.31 with a very high category, the profit score is 0.668 with the medium category. Therefore, it can be concluded that website-based modules on effective network and basic computer subjects have been used and used in engineering and computer majors and networks at Padang N 5 Vocational School.

V. CONCLUSION

Based on the research findings on the development of the website-based module that has been done, the following conclusions are obtained:

(1) The wealth learning modem in Padang Vocational High School 5 developed using the 4D method with the final result in the form of softcopy.

(2) The findings show that the legitimacy of the website-based module is tested by verification, all aspects are considered "valid". Website-based module practicality tests were obtained from teacher responses and responses of students in Padang N 5 Vocational School, in the "Practical" category. The results of the e-learning module effectiveness test come from the scores of the pre-test and post-test after using e-learning modules in a very effective category. In conclusion, the e-module learning developed can be used in the learning process to improve student learning outcomes

REFERENCES

[1] Rusman, *Pembelajaran Berbasis Komputer.* Jakarta: Raja Grafindo, 2011.
[2] Kemendikbud, *Kerangka Dasar Kurikulum 2013*. Kementerian Pendidikan dan Kebudayaan Direktorat Jenderal Pendidikan Dasar Direktorat Pembinaan Sekolah dasar, 2013.
[3] Prasetya, Didik Dwi, *Kesiapan Pembelajaran Berbasis Buku Digital*. Jurnal Teknologi Elektro dan Kejuruan, 2015.
[4] Budiningsih, Asri, *Belajar dan Pembelajaran.* Jakarta : Rineka Cipta,2005.
[5] Rusman, *Belajar dan Pembelajaran Berbasis Komputer: Mengembangkan Profesionalisme Guru Abad 21*. Bandung: Alfabeta, 2012.
[6] Bauer, Pavol and Fedak, Viliam. Philosophy of Interactive E- learning for Power Electronics and Electrical Drives: a Way from Ideas to Realization, *Journal of Power Electronics*, 2010.
[7] Rusman, *Pembelajaran Berbasis Komputer.* Jakarta: RajaGrafindo, 2011.
[8] B.P, Sitepu, *Penyusunan Buku Pelajaran.* Jakarta: Verbum Publishing, 2006.
[9] Rusman, *Pembelajaran Berbasis Komputer.* Jakarta: Raja Grafindo, 2011.
[10] Nana Sudjana, *Media Pengajaran.* Bandung: Sinar Baru Algesindo, 2013.
[11] B.P, Sitepu, *Penyusunan Buku Pelajaran.* Jakarta: Verbum Publishing, 2006.
[12] Sugiyono, *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D.* Bandung : Alfabeta, 2014.
[13] Azhar Arsyad, *Media Pembelajaran.* Jakarta: PT RajaGrafindo Persada, 2015.

Indah Permata Edi, Sukardi, and Wawan Purwanto, "Development of Website Based Modules on Basic Networks and Computer ubjects at SMK Negeri 5 Padang," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 145-149, 2019.