



Development of E-Module Mikrotik Training Information Technology Teacher in the Field of Computer Network Engineering

Khairul Anshari[✉], Kasman Rukun, Asrul Huda

Vocational Technology Education, Faculty of Engineering, Padang State University, Indonesia

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Abstract

This research aims to develop module products in electronic or digital form about mikrotiks and reveal their validity and practicality. This type of research is the development of research using the ploomp and nieveen models, with three stages of development, namely 1) preliminary research 2) prototyping stage and 3) assessment stage. The instrument used was a questionnaire in the form of a validity questionnaire and a practicality questionnaire. The mikrotik training module was validated by six experts namely three mikrotik material experts and three module experts. The practicality of mikrotik e-modules is carried out on computer network engineering teachers in several State Vocational High Schools in Padang. The validity test results obtain results with a valid category. Based on the practicality test by the computer network engineering teacher at the State Vocational High School in Padang, the results obtained indicate that the module has a very high practicality category. Based on the results of this study, it can be concluded that the mikrotik e-module training is considered valid and practical.

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✉ Correspondence :
Universitas Negeri Padang
Jl. Prof. Dr. Hamka Air Tawar Padang, Sumatera Barat
Pascasarjana FT Universitas Negeri Padang, Indonesia
E-mail: anshari_khairul@yahoo.co.id

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INTRODUCTION

Based on the implementation of the National UKG in 2015 the Indonesian government set targets for the achievement of the success of teachers throughout Indonesia, at least getting an average of 55.00. The results obtained in 2015 National UKG average the national average 50.97, showed still a lack of competence of teachers nationwide who need to be improved to achieve national learning objectives. To improve the ability of teachers needs competency training in each area of expertise possessed by teachers.

Based on observations in the field of computer network engineering (TKJ), there are several needs of teachers in conducting training, namely on mikrotik, cisco, optical fiber, network administration, Softswitch and IP V6. From the results obtained by many teachers who need training on mikrotik as many as 20 people. In software engineering (RPL) there are several needs of teachers in conducting training that is about Android, Web, and Java. From the results obtained by many teachers who need training on Android as many as 12 people, and in the field of multimedia (MM) there are several needs of teachers in conducting training namely about graphic design, filmmaking and shooting, from the results obtained by many teachers who need training about animation as many as 18 people.

Based on the results of observations, network computer engineering teachers need mikrotik training, the researchers researched about developing mikrotik e-modules to carry out mikrotik training. Lack of the proxy e-module is the display of material such as PowerPoint with pdf format, so that only displays the core material, without a more detailed explanation of the work steps, the lack of material regarding troubleshooting on the proxy network, installing networks and proxies on the proxy, most teachers use video on the internet to be used as a job sheet and e-module still contains old material that has not been updated with the current situation.

The mikrotik training e-module that will be developed is a module that is made in the

form of a .exe format, which can be run with the help of the Adobe Flash application. The learning process is carried out independently by the abilities of each individual. E-training module used a proxy is expected to be a means or a tool to help learn effective and efficient in the use of time and energy using technology and laptop computers.

By combining text, images, audio, and video in a mikrotik training e-module, it is hoped that it can make training participants easier to learn. The training module to be developed is an electronic module or e-module in the form of an application so that it can be used on the training participants' computers and laptops. The e-modules are designed using the Flipbooks application which is expected to make it easier to master the material, attract training participants to read and understand the material and increase the teacher's success in increasing the competency of expertise.

Training is an activity to provide the knowledge and skills of new workers or old workers. The basic ability was given to the workforce to increase the ability of the workforce to better master their work fields. Gary Dessler (2013, p. 235)

Training is the systematic process of altering the behavior of employees in the direction that will achieve organizational goals. Training is related to present job skills and abilities. It has a current orientation and helps employees master specific skills and abilities that need to be successful. Ivanceich (2013, p. 392). Training a planned effort to facilitate the learning of job-related knowledge, skills, and behavior by employees. Noe (2012, p. 271).

Modules as an independent learning package that includes a series of learning experiences that are planned and systematically designed to help students achieve learning goals. Modules are materials arranged into a form of unity that can be used in the interests of learning. Rusman (2011:375).

Modules are one form of teaching materials that are packaged in a whole and systematic way, including learning objectives, learning materials/substances and evaluations

with the aim that students can learn independently or learn in small teams without teacher guidance to achieve the competencies expected to match the level of complexity. Sunismi (2015:45).

E-module is learning by using computer media, so that enable students to learn in accordance with their abilities and speed in understanding the subject matter delivered. Sunismi (2016). E-Modules are also called media to be studied independently in the form of software or applications that are opened through electronic devices. Mikrotik is an operating system and software used to be a reliable network router computer.

The problem that was found was that the Teacher in Network Computer Engineering (TKJ) needed training on mikrotik, cisco, optical fiber, network administration, Softswitch, and IP V6. But here researchers will only examine the proxy. The existing mikrotik training module is in the form of a pdf with the contents of the powerpoint display so that the material display does not explain the work steps in detail. The

material in the module has not been updated yet and there is no material about troubleshooting so that it does not match the current material and overcomes errors in running proxy.

The research objectives are adjusted to the formulation of the problem obtained, then the following research objectives are carried out:

Develop mikrotik training e-modules for informatics teachers in computer network engineering. Develop a valid and practical e-module training module for informatics teachers in the field of computer network engineering

METHODOLOGY

The research model used is *Research and development* (R&D). Development model is a set of procedures carried out sequentially in carrying out the design and development of a product. The development method used is the development model proposed by Ploomp and Nieveen (2013; 27) which consists of three steps, namely *preliminary research, prototyping stage, and assessment phase*

Table 1. Evaluation Criteria in Development Research

Phases	Criteria	Activity Description
Preliminary Research	Emphasis on content validity	Problem analysis and literature study. The result of this phase is the initial prototype design form
Development Stage	Focus on consistency (construct validity) and practicality	The prototype development will be tested in stages and revised based on the formative evaluation stage
Assessment Stage	Practicality	Assess whether users can use the product practically (practicality)

Source: Translated from Ploomp and Nieveen (2013)

1. Preliminary research (preliminary research)

The preliminary research conducted an analysis of the curriculum content structure, concept analysis and teacher character analysis.

a. Analysis of curriculum content structure

In the analysis of the structure of the contents of this curriculum, an analysis of mikrotik material is based on curriculum references that apply to schools today. This analysis is intended to determine the purpose of the subjects to be able to develop modules appropriately.

b. Concept analysis

Concept analysis is done by analyzing existing material then researching and analyzing it then choosing the right concept that will be developed in this research.

c. Teacher analysis

Teacher analysis is carried out in order to find out the character of the teacher so that the development of e-modules is in accordance with the user's character and can function more effectively and efficiently used.

2. Prototyping stage (prototype development)

The results of the mikrotik training e-module design are then evaluated and refined

gradually based on the formative evaluation stage. The stages of formative evaluation consist of self-evaluation, expert reviews, one-to-one

evaluation, small group evaluation, and field tests. As shown in figure 1.

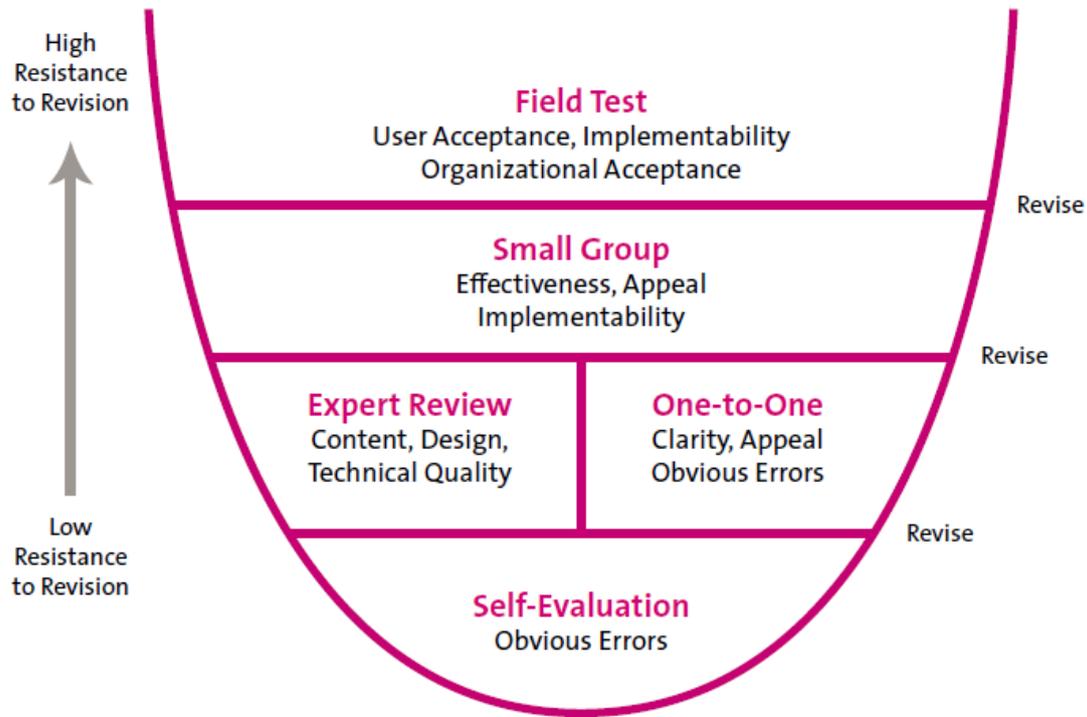


Figure 1. Steps on the prototype stage (ploomp)

Source: Ploomp & Nieveen. (2013)

3. Assessment phase (assessment phase)

The assessment stage is used to determine the practicality of the product to be developed. Practicality is the level of practicality and implementation of the product prototype by instructors and training participants, namely conducting training trials using a revised training e-module in accordance with the results on prototype I and prototype II.

Implementation of field trials proxy e-module training teachers of informatics engineering field of computer engineering competence network implemented with the 30 people Master Computer Network in West Sumatra

The research sample at the State Vocational School in the city of Padang has a major in computer network engineering, namely SMKN 2, SMKN 3, SMKN 5, SMKN 6, and SMKN 8 in Padang City. The total number of Computer Network Utilities Technical Teachers

at State Vocational Schools in Padang city is 32 teachers.

Table 2. Research Sample of TKJ Teachers in Padang City

School name	Number of TKJ Teachers
SMKN 2 Padang	3 people
SMKN 3 Padang	7 people
SMKN 5 Padang	4 people
SMKN 6 Padang	8 people
SMKNi 8 Padang	10 people
Total	32 people

4. Validity Analysis of Mikrotik Training E-Modules

Validity analysis uses a Likert scale based on a validity questionnaire with the steps:

- Each score uses a 1-5 Likert scale
- Add up the scores for each validator for all validators
- Giving validity value by statistical aiken'n V

$$V = \sum s / [n (c - 1)] \tag{1}$$

With $s = r - I_0$; I_0 = lowest validity rate ; c = highest validity rating score ; r = number given by an assessor

d. The results of the Aiken'V calculation range from 0 to 1.00 and the number 0,3 can be interpreted to have a high enough coefficient so the value of V 0,3 and above is stated in the valid category

5. Analysis of E-Module Training Practicality Analysis

Practicality analysis uses a Likert scale based on practicality questionnaire, with the steps:

- a. Rating each with a Likert scale of 1-5
- b. Determine the average score obtained by adding up the values obtained from many indicators
- c. Giving practical value to the formula

$$NA = \frac{S}{SM} \times 100\% \quad (2)$$

With NA = final value; S = score obtained; SM = maximum score

Table 3. E-Modul Practicality category

Level of Achievement	category
81-100	Very practical
61-80	Practical
41-60	Practical enough
21-40	Not Practical
0-20	Not practical

source: modification of Riduwan (2010)

RESULTS AND DISCUSSION

The results of the study were obtained through several research steps, namely preliminary research , prototyping stage, assessment phase.

1. Preliminary research

a. Curriculum Structure Analysis

Curriculum analysis refers to the curriculum mastered by network computer engineering teachers, with material related to mikrotiks, namely Basic Configuration, DHCP, Bridge, Routing, Wireles, Firewalls, QoS, Tunnels.

b. Concept Analysis

Material analysis is done by reviewing books that discuss mikrotiks. Then the researchers poured the material points into the Mikrotik Training *E-Module*. After conducting various analyzes, the concepts adopted for packaging in the E-Module of mikrotik training are basic level mikrotik material.

c. Analysis of training participants

In the analysis of training participants carry out individual learning using e-module training, so that training participants can see and learn for themselves how e-module training can improve teacher understanding of mikrotik.

2. Prototyping Stage

In the prototype development step is done to test the modules developed.

a. Prototype I

In this Prototype I module that has been developed is seen and revised by the researcher himself.

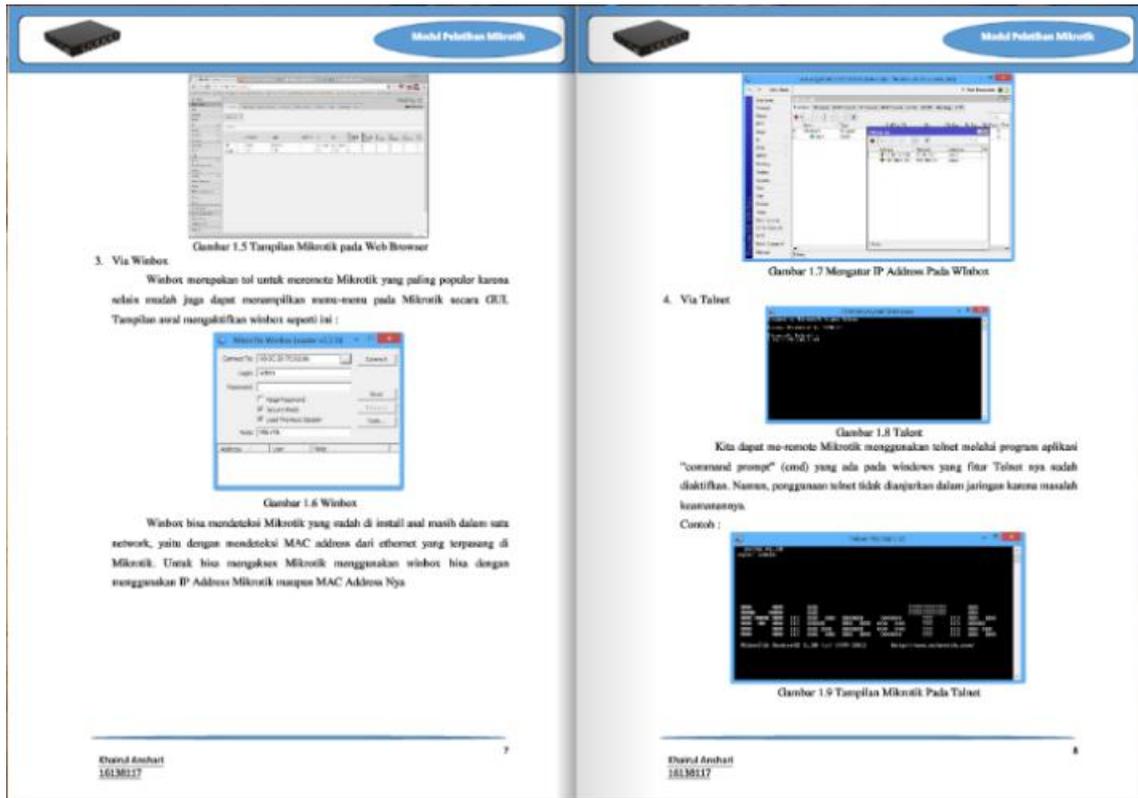


Figure 2. Display of E-Mikrotik Training Module

b. Prototype II

In this Prototype II individual evaluations are carried out. This individual evaluation is to meet with 6 experts to be asked for input on

improvements to the developed module. The results of the e-module validation assessment data by media experts can be seen in Table 4.

Table 4 . Validation Results for E-Training Modules

Validation aspects	Validator 1	Validator 2	Validator 3	Category
Didactic Requirements	0.92	0.92	0.88	Valid
Construction Requirements	0.92	0.83	0.88	Valid
Technical Requirements	0.92	0.87	0.90	Valid

The results of material validation can be seen in Table 5.

Table 5. Data Validation of Material Against E-training modules

Validation aspects	Validator 1	Validator 2	Validator 3	Category
Quality of Content	0.83	0.83	0.88	Valid
Quality of Learning	0.85	0.85	0.75	Valid
Quality of Interaction	0.83	0.83	0.83	Valid
Display Quality	0.83	0.81	0.81	Valid

Based on the results of the assessment obtained an average of module validity by validator 1 with an average of 0.92, validator 2 with an average of 0.87, validator 3 with a value of 0.89 and material validity by validator 1 with an average of 0.84, validator 2 with an average of 0.83 , validator 3 with a value of 0.82. Based on

the results of the validation of the material and modules by 6 validators, the e-module is categorized as valid.

3. Assessment Stage

The Assessment Stage is used to determine the practicality of the modules that have been developed. Practicality questionnaire results for

practicality questionnaire responses given to training participants

Table 6. Practicality Data

Aspect	Instructor (%)	Training participants (%)
Ease	86.67	84.75
Time	86	77.33
Usability	85	78.86
Total average	85.89	80.31
Category	Very practical	Very practical

The results of the study the practicalities of e-training modules proxy-based response training participants and instructors of the aspects of ease, time, and efficiency or the use of e-modules including the practical category. practical based on the results of an analysis of the instructor response questionnaire on 3 aspects, from the aspect of convenience, obtained 86.67% results, on the aspect of time effectiveness obtained 86% results, on the aspect of utilization obtained 85% results with practical categories, then on the participants of the education and training facility ease result 84.75%, in the aspect of the effectiveness of time has gained 77.33%, in the aspect utilization of obtained results of 78.86% with a practical categories, it can be concluded that the training module said practical.

The fundamental difference between the research development of mikrotik training e-modules with other research on the development of e-modules by (Adhin Setyo Winarko 2013) which states that practicality is obtained with a value of 3.50 categories is very practical, effectiveness with an average of 81.40, and t-test results obtained the significance of 0.02 smaller than 0.05. So the electronic module is said to be very good and significant to use. Research by (Tein Aminatun, 2016) about mobile modules effectively improved the skills of students with $p < 0.05$. Research by (Moh Fausi and Danang T, 2015) on productive e-modules obtained the results of t-test 2.499 and t_{table} 2.042, effective categories to improve learning outcomes.

CONCLUSION

This research is the development of clicking produce e-training modules proxy. Based

on the process and the results of the study, obtained concluded that e-training modules developed by using application proxy flipbooks with several stages of development, e-training module generates a valid proxy and practical.

Implications on the development of mikrotik training modules provide convenience in training, need to be used wherever and whenever using a laptop/ PC, e-modules are used as learning resources and ideas for developing media-based learning aids.

Suggestions for mikrotik training e-module users, that this e-module is suitable for use by their respective schools, there must be the further application so that it is more widely known for the assessment of modules from several schools, and can be used as an innovation to develop other e-modules.

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