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Pre-Service Teachers' Evaluation of E-Modules in Mathematics Materials

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ABSTRACT

This study is an advance research to evaluate the use of e-modules in mathematics learning. The research method used is developmental research. Total subjects were 52 pre-service mathematics teacher. The instrument used is a questionnaire which related with uses, advantages and disadvantages of e-modules in mathematical material. The focus of this study is to categorize the results of an evaluation questionnaire about the perceptions of prospective teacher the e-modules on. There are 41 subjects considered that the e-module facilitated the subject to more understand the material and practice questions easily. However, there are 11 subjects who argue that the e-module used is still not helpful in understanding material. Since they were difficult to accessing the module by using their gadget, they cannot understand the concept of the material. Moreover,the description of the material less and types of question were related with daily life make subjects cannot changed to mathematics model. Through the questionnaire, the subject also revealed some suggestions, namely the need for a hardcopy of the mathematical module in order to more easily understand the material and do the exercises directly. In addition, the subject also provides suggestions for adding steps to work on the problems in accordance with the material and provide some practice questions that are not in the form of story problems.

Keywords: Evalution Teacher, E-Modules, Mathematic

INTRODUCTION

Mathematics have a role in many discipline field and always related with processes in learning (A. Faradillah, Hadi, & Tsurayya, 2018) .Thus, mathematics learning strategy is a plan which designed by teachers to achieve the desired goals in mathematics (Kusumawati & Nayazik, 2018). The use of good learning strategies is also seen from the selection of learning resources such as textbooks, modules and others. Learning modules can help mathematics pre-service teachers to more easily understand subject matter (Kariman, Harisman, Sovia, & Prahmana, 2019). The results of his study revealed that the module can make pre-service teachers manage themselves to learn independently because there is guidance of the steps on description of the materials on the module. Therefore, they can learn without the guidance of their lecturer (Kariman et al., 2019; Kusumawati & Nayazik, 2018; Ng, 2016).

Good modules have several criteria that must be considered so problems which there can make learning objectives are achieved. The problem here is non routine type which is a question that need high order thinking skills to solve it (Ayu Faradillah, 2018). There are some arguments which state the criteria, such as the importance of focusing pre-service teachers on the appropriate content and prevent them suffering from information (McCrum, 2017). In addition, Irfan and Wanarti said one of criteria to develop modules is it can monitor pre-service teachers learning activity and progress (Kusumawati & Nayazik, 2018).Thus, lecturer can know information when his pre-service teachers have obstacle about the material. In addition, the module development two phases such as foster students' learning and as assessment and validation step to see suggestion from students (Mirkouei, Bhinge, McCoy, Haapala, & Dornfeld, 2016).

There are a lot of research which used module to develop mathematics learning such as (Date-Huxtable, Cavanagh, Coady, & Easey, 2018; Geiger et al., 2018; Hourigan & Leavy, 2017; Kariman et al., 2019; Kusumawati & Nayazik, 2018; Mirkouei et al., 2016; Prendergast, Spassiani, & Roche, 2017; Salmi, Vainikainen, & Thuneberg, 2015; Yao, 2016). According to the research, the module give positive effect such as subjects were easily to understanding the concepts although without their lecturer. Besides, the research above there are several research which did evaluation about the modules namely (McCrum, 2017; Ramírez-Noriega, Juárez-Ramírez, & Martínez-Ramírez, 2017; Uttl, White, & Gonzalez, 2017). All of the research did evaluation based on subjects perception. Student Evaluation of Teaching used to evaluate their lecturer's teaching strategy to see how effective the strategy used based on their

assumption (Uttl et al., 2017). From the research about the evaluation above there is not used e-module in mathematics learning.

This research want to see the evaluation e-module about how preservice teachers perception of e-module design and content. The purpose of this research did evaluation of e-module in mathematics learning based on pre-service teachers assumption. The evaluation given by using google form so all of preservice teacher can said everything with honestly. This evaluation will be used to develop new module which are in accordance with the advice given.

RESEARCH METHOD

Once the module was developed and evaluated with a pre-service teachers who were enrolled in a higher mathematics education program. Mathematics e-module, in the course of Linier Program develop with 4D (Define, Design, Develop and Disseminate) development methods (Basori, Isnaini, Setyowati, & Phommavongsa, 2018). The first phase analysing the needs of the pre-service teachers obtained the results that they need instructional materials capable of guiding to find the concepts. After going through a defining phase, that is the analysis of the syllabus, previous module, interviews, mid and finale test question can be concluded that pre-service teachers require e-module. The second phase is the design stage. The module is designed with has mathematical creative thinking questions. The next phase is the validation. Lastly, this study reveals how the effectiveness of the modules that have been developed. The effectiveness of the module to be reviewed on the pre-service teacher evaluation of 52 pre-service teachers who participate in Linier Programme courses.

This research has been conducted for two years toward 52 students who took courses Linier. Programme in one of private University in Indonesia. One of the relevance of the subject matter that can be chosen for the study is conditioned by the difference between (a) the educational orientation pedagogical modern at future teachers and training based on the subject matter and content, and (b) the need to develop pedagogically (Kariman et al., 2019). There are two aspect which asked on the questionnaire such and module content and design and subject suggestion about development the module.

RESULTS AND DISCUSSION

Module Content and Design
The problem of the e-module related with mathematical creative thinking ability which have four indicators, namely fluency, flexible, originality and elaboration (Hadar & Tirosh, 2019). Questions about the learning module in the questionnaire were given as many as two questions, namely did the giving of modules in the subjects of this linear program help you in understanding the material and practice questions based on mathematical creative thinking abilities?. In question questionnaire No. 3, which is about how much influence or how much this linear program learning module helps in understanding material and questions based on mathematical creative thinking ability, 41 subjects stated that the module is very helpful and influential in helping the subject in understanding and solving problems based on mathematical creative thinking abilities. Learning by using modules will be more effective, efficient and relevant so that it can help in solving problems by issuing new ideas (Sari, Farida, & M.Syazali, 2016). The application of the module in learning allows the subject to study independently outside the classroom and repeats the material and examples of questions provided.

As many as 11 subjects argued that the learning modules provided lacked contribution in understanding the material and practice questions based on mathematical creative thinking abilities. They argue that the application of the module by using the gadget makes it difficult for the subject to do the exercises contained in it and also the discussion of the material.The discussion as follows.

a. Material

   In the material contained in the learning module used, the subject gives his advice to provide steps for applying each method contained in the specific linear program material. It aims to make the subject easier to understand and differentiate the use of methods in accordance with the appropriate type of questions. Prastowo explained that the use of modules in the learning process in class has several goals, such as the subject being able to learn independently or with the help of the teacher to a minimum, the role of the lecturer not dominating and not authoritarian in learning, practicing honesty, accommodating various levels and speeds of learning and the subject is able

to measure own level of understanding of the material that has been learned (Tjiptiany, As'ari, & Muksar, 2016). So that the application of modules in mathematics learning has many benefits for subjects in the classroom.

b. Exercises

The use of modules in a linear program course makes it easy for the subject to understand the questions and do the exercises in the questions contained therein. The subject needs to be given the opportunity to act as a problem solver in completing the exercises. So the subject can develop his ideas to solve the problems in the learning module provided (Tjiptiany et al., 2016). As well as about the purpose of applying the subject learning module can measure the extent to which he is able to understand the material learned so that in giving criticism and suggestions too the subject feels the need to add extra or multiply the example questions or exercises so that he can practice more.

c. Hardcopy

Giving this learning module using sofcopy in the form of a .pdf file raises opinions from several subjects. A total of three subjects felt that the use of this learning module should be presented in hardcopy format so that the subject could more easily do the exercises directly on the module and provide some additional notes on the existing material. The e-module on mathematics was not popular with pre-service teacher (Martin, Cupples, & Taherzadeh, 2019). Due to they were used to printed textbooks in their teaching and learning proccess.

Preservice Teacher Feedback

The subject expressed several criticisms and suggestions for the development of the module, like in terms of material, practice questions and hardcopy. In addition to several categories of criticism and there are 17 subjects who do not give their opinions about criticism and suggestions for the learning modules that are used and feel the modules are as expected in terms of the content of the material and the exercises. According to preservice teachers feedback were used to assess whether and higher order thinking to creatively solve the problems given (McCrum, 2017).

The discussion as follows.

a. Material

In the material contained in the learning module used, the subject give advice to provide implementation steps. As stated by one subject that is "the materials discussed in the module so that steps are added to solve the problems in accordance with the material sub-section". In addition, there are also subjects who expect that module writing is moretidy like "the composition of module writing is more tidy because this module is an e-module so there are some writing structures that are less appropriate". Feedback related to this material was given by most subjects, as many as 20 subjects gave suggestions relating to the material in the module.

b. Exercises

The use of modules in linear course subjects makes it easy for subjects to understand the questions and do the exercises the questions contained therein. Even some subjects asked to be given additional good examples and practice questions in order to try it at home. As one subject said, "modules for more questions in it with various operations on linear program material". Learning can be defined as personal change since the learners's experience (Ramírez-Noriega et al., 2017). On the theme of the question exercise given by the subject as a suggestion, there are 13 subjects that discuss it.

c. Hardcopy

The last category the preservice teacher gives regarding this module is hardcopy. There are as many as 3 subjects who revealed that "the module should also be available in hardcopy format so that the subject can immediately solve the problems by writing it in the module". Further, they said that they were more likely to write their answers by using pencil rather than Microsoft Office.

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CONCLUSIONS

Subjects were given a questionnaire to evaluate the use of the learning module by asking ten essay questions on the Google form. Based on the questionnaire the percentage of subjects who liked the learning modules used and the selection of learning methods in the linear program subjects was higher than those who disliked it. Although the application process in the classroom experienced some obstacles or difficulties such as lack of time to implement it, the lack of presentation of the material in the module and the difficulty of the subject to understand the material and complete the practice questions presented in the module because the form of the module was still in the form of a soft file. In addition, the use of discussion methods in these courses makes it difficult for other subjects to understand the material presented by the presenter group. So that an explanation or reinforcement of the material is needed again. As for suggestions for further research, in order to pay attention and consider the suggestions given by subjects related to 3 things namely material, practice questions and hardcopy module.

REFERENCES

Basori, Isnaini, R., Setyowati, A., & Phommavongsa, D. (2018). Development of an Android-Based Reward System to Enhance the Activity of Learning. Jurnal Pendidikan Teknologi Dan Kejuruan, 24(1), 116–124. https://doi.org/10.21831/jptk.v24i1.18088

Date-Huxtable, E., Cavanagh, M., Coady, C., & Easey, M. (2018). Conceptualisations of infinity by primary pre-service teachers. Mathematics Education Research Journal, 30(4), 545–567. https://doi.org/10.1007/s13394-018-0243-9

Faradillah, A., Hadi, W., & Tsurayya, A. (2018). Pre-service mathematics teachers' reasoning ability in solving mathematical non-routine problem according to cognitive style. Journal of Physics: Conference Series, 948(1). https://doi.org/10.1088/1742-6596/948/1/012006

Faradillah, Ayu. (2018). Analysis of Mathematical Reasoning Ability of Pre-Service Mathematics Teachers in Solving Algebra Problem Based on Reflective and Impulsive Cognitive Style. Formatif: Jurnal Ilmiah Pendidikan MIPA, 8(2), 119–128. https://doi.org/10.30998/formatif.v8i2.2333

Geiger, V., Mulligan, J., Date-Huxtable, L., Ahlip, R., Heath Jones, D., Julian May, E,. Wright, I. (2018). An interdisciplinary approach to designing online learning: Fostering pre-service mathematics teachers' capabilities in mathematical modelling. ZDM - Mathematics Education, 50(1–2), 217–232. https://doi.org/10.1007/s11858-018-0920-x

Hadar, L. L., & Tirosh, M. (2019). Creative thinking in mathematics curriculum: An analytic framework. Thinking Skills and Creativity, 33(September 2018), 100585. https://doi.org/10.1016/j.tsc.2019.100585

Hourigan, M., & Leavy, A. M. (2017). Preservice Primary Teachers' Geometric Thinking: Is Pre-Tertiary Mathematics Education Building Sufficiently Strong Foundations? Teacher Educator, 52(4), 346–364. https://doi.org/10.1080/08878730.2017.1349226

Kariman, D., Harisman, Y., Sovia, A., & Prahmana, R. C. I. (2019). Effectiveness of guided discovery-based module: A case study in Padang city, Indonesia. Journal on Mathematics Education, 10(2), 239–250. https://doi.org/10.22342/jme.10.2.6610.239-250

Kusumawati, R., & Nayazik, A. (2018). Developing Mathematics Learning Strategy Module Based on Journal Review. Al-Jabar : Jurnal Pendidikan Matematika, 9(2), 111–120. https://doi.org/10.1017/CBO9781107415324.004

Martin, K., Cupples, A., & Taherzadeh, S. (2019). Learning advanced engineering online: from distance delivery to online learning of finite element analysis. European Journal of Engineering Education, 0(0), 1–16. https://doi.org/10.1080/03043797.2019.1647408

McCrum, D. P. (2017). Evaluation of creative problem-solving abilities in undergraduate structural engineers through interdisciplinary problem-based learning. European Journal of Engineering Education, 42(6), 684–700. https://doi.org/10.1080/03043797.2016.1216089

Mirkouei, A., Bhinge, R., McCoy, C., Haapala, K. R., & Dornfeld, D. A. (2016). A Pedagogical Module Framework to Improve Scaffolded Active Learning in Manufacturing Engineering Education. Procedia Manufacturing, 5, 1128–1142. https://doi.org/10.1016/j.promfg.2016.08.088

Ng, E. M. W. (2016). Fostering pre-service teachers' self-regulated learning through self- and peer assessment of wiki projects. Computers and Education, 98, 180–191. https://doi.org/10.1016/j.compedu.2016.03.015

Prendergast, M., Spassiani, N. A., & Roche, J. (2017). Developing a Mathematics Module for Students with Intellectual Disability in Higher Education. International Journal of Higher Education, 6(3), 169. https://doi.org/10.5430/ijhe.v6n3p169

Ramírez-Noriega, A., Juárez-Ramírez, R., & Martínez-Ramírez, Y. (2017). Evaluation module based on Bayesian networks to Intelligent Tutoring Systems. International Journal of Information Management, 37(1), 1488–1498. https://doi.org/10.1016/j.ijinfomgt.2016.05.007

Salmi, H., Vainikainen, M. P., & Thuneberg, H. (2015). Mathematical thinking skills, self-concept and learning outcomes of 12-year-olds visiting a mathematics science centre exhibition in Latvia and Sweden. Journal of Science Communication, 14(4), 1–19.

Sari, F. K., Farida, & M.Syazali. (2016). Pengembangan Media Pembelajaran (Modul) berbantuan Geogebra Pokok Bahasan Turunan Fiska. Jurnal Pendidikan Matematika, 7(2), 135–152.

Tjiptiany, E., As'ari, A., & Muksar, M. (2016). Pengembangan Modul Pembelajaran Matematika Dengan Pendekatan Inkuiri Untuk Membantu Siswa SMA Kelas X Dalam Memahami Materi Peluang. Jurnal Pendidikan - Teori, Penelitian, Dan Pengembangan, 1(10), 1938–1942. https://doi.org/10.17977/jp.v1i10.6973

Uttl, B., White, C. A., & Gonzalez, D. W. (2017). Meta-analysis of faculty's teaching effectiveness: Student evaluation of teaching ratings and student learning are not related. Studies in Educational Evaluation, 54, 22–42. https://doi.org/10.1016/j.stueduc.2016.08.007

Yao, R.-F. (2016). Creating Learning Environments for Indigenous Students through Cultured-based Math Modules. Universal Journal of Educational Research, 4(8), 1809–1814. https://doi.org/10.13189/ujer.2016.040810