

Students' Respond on Learning Math In Tertiary Education

M Zainil¹, Y Helsa¹, W T Yanti¹

¹Universitas Negeri Padang, Padang, Indonesia

Abstract. This research is motivated from the fact that primary teacher education students of Universitas Negeri Padang are not able to develop a good lesson plan to be used in elementary school. This fact is discovered based on a result of online questionnaires that have been distributed to the 158 students. It is found that there were 73.4% of the students do not understand how to draw the lesson plans. This study aims to provide a guidance for lecturers and students on designing a good lesson plan to be used in elementary schools. This research is the development based on plots with three phases; preliminary research, prototyping, and assessment phase. The sample of this research is primary teacher education students of Universitas Negeri Padang. The results of the study show that the validity of teaching materials is 80 which classified as a very valid category. Furthermore, the results of teaching materials practicality were stated to be very practical. This can be seen from the results of the lecturers' and students' response results. Furthermore, the results of the effectiveness using the t-test with t_{count} was 12.03 and $t_{tabel (0,05)(16)}$ was 2,12 at the real level $\alpha = 0.05$. In conclusion, $t_{count} > t_{table}$ then the teaching material was declared to be effective.

1. Introduction

The 21st-century education demands innovative learning given by a teacher. To deal with the phenomena, early preparation is very needed. It can be started with students' learning [1]. To become a future teacher, the pre-service teachers are required to be able to make and implement a good plan to be carried out in elementary schools later [2]. Thus, the skills to make lesson plans for students at elementary school teacher education have been studied starting at 2nd semester. However, what happened in reality is that there are still many students who complain about lesson plan making tasks. This matter happens because they do not really understand about techniques on writing lesson plans.

Moreover, math is learned in the first semester for elementary school teacher education students in universities [3]. In this semester, the students learn about the basic concepts of mathematics [4]. After that, they start to plan the learning activities in the form of a lesson plan that will be practiced in the class. Therefore, they must be able to make a good lesson plan [5]. On the contrary, most of them have lack understanding on this matter and it becomes the biggest obstacle. In making lesson plans students must be able to use learning and learning models such as integrated learning, but students still do not understand the right [6][7]. Not only learning models but also using media in learning [8]. Not only learning models but also using media in learning [9].

The result of the study showed that there were 73.4% out of 158 students did not understand the techniques to write the lesson plan for math at the elementary level [11]. This fact resulted in a short cut manner of the students to copy the tasks from their seniors [12]. Thus, the lesson plan made by the students were similar to each other every year. This fact was found out from the questionnaire given to the students in which 14.6% of respondents answered that they copied the lesson plans from their seniors. Meanwhile, 22.2% of respondents stated that they copied the lesson plan from the internet[13]. Therefore, the obstacles that are often experienced by practitioners are difficulties in reducing learning indicators and the lack of learning models or strategies used in mathematics learning for elementary students.

From the problems above, it is an obligation to conduct a learning model that can make the students understand techniques on how to design a good lesson plan that can be used in elementary schools. This study will also be useful for lecturers as a guide in directing the students to design a lesson [14].

2. Method

This study used Research and Development methods (R&D)[15]. Research and Development methods contained several types of models. However, this study applied Plomp model which consists of three stages [16]. Research and Development methods contained several types of models. However, this study applied Plomp model which consists of three stages [17]. The second stage was prototyping that was a repetitive design stage consisting of several iterations. Each iteration was a small cycle of research with a formative evaluation that aimed to improve and screen the intervention[18]. The third stage was the assessment stage that was a semi-summative evaluation to conclude whether the solution or intervention has reached the specified specifications or not [19].

2.1 Preliminary Research Phase

At this stage, the study conducted at the preliminary research stage were Needs Analysis, Curriculum Analysis, Material Analysis, Media Analysis, and Student Analysis [18].

2.2 Prototyping Phase

At the prototyping stage, the researchers designed and developed a prototype of learning device iteratively. A formative evaluation was carried out in each iteration. The formative evaluation proposed by Tessmer started from a more informal stage such as the initial stage (self-evaluation, one-on-one evaluation, and expert review) on small group evaluations aiming to test the practicality and effectiveness of field trials [20].

2.3 Assessment Phase

The researchers investigated the effectiveness of the product at this stage. The steps were focusing on evaluating the media management models, whether it can be used to achieve practical and effective goals in improving the students' learning quality and achievement or not [21].

2.3.1 Practicality Test

The field trials were conducted to obtain direct input in the form of responses, reactions, and comments from teachers and students on the developed media [22]. They were also conducted to find the practicality level of instruments used for lecturers and students. At this stage, testing on usability, benefits, appearance, and time was assessed by the lecturers and students.

2.3.2 Effectively Test

The researchers investigated the effectiveness of the product at this stage. The effectiveness test was carried out to find out whether the learning model used to achieve practical and effective goals in improving the students' learning quality and the achievement did work or not. The effectiveness test was seen in student learning outcomes that carried out in the form of observations both affective and

psychomotor domain. Thus, they were given evaluation tests too in the aspect of the cognitive domain [23]. The students' learning outcomes were used to measure the level of students' mastery learning.

3. Results and discussion

3.1 Results

3.1.1 The result of learning material validation

The book for learning material development was said to be valid for certain criteria. While, a test was said to be valid if the test can measure what to be measured. Based on the results of the book validation recapitulation by the validator, the score was 80 and it was said in a very valid category. Then, the total results for each validator were 11 for the feasibility aspect, 9 for linguistic aspects, 22 for the presentation aspect, 18 for graphics aspects, 13 for technical aspects. Thus, the total average for all validators was 80 in a very valid category.

Therefore, it can be stated from the data validation that the developed books met the criteria of the curriculum. The material presentation was also in accordance with the indicators formulated and students' need. In addition, the book used simple and clear language in which sentences used were easily understood by students. Further, the book was also attractive in colors that can motivate the students to take good lectures. Thus, it can be concluded that the teaching material developed has been stated to be very valid and can be used in the learning process, especially in the data presentation material.

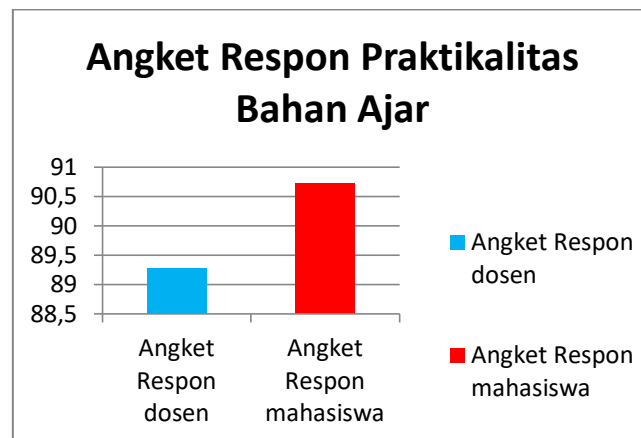
3.1.2 The result of learning material practicality

The book was said to be practical if it facilitates the teacher in teaching and is easily understood by the students. The practicality aspect was easy to implement, check, and equipped with clear instructions for students and lecturers to use the books easily [17]. To see whether the book was practically developed, the teaching materials were tested on lecturers and students in elementary school teacher education department, the faculty of education, Universitas Negeri Padang. For more details, the description can be seen as follows:

3.1.3 The analysis results of the lecturers' and students' respond to the practicality use of the manual book for designing a lesson plan

The recapitulation results of the analysis of the lecturers' and students' practicality on teaching materials got 89.28% with very practical categories, then the results of the students' responses obtained an overall average of 90.73 with very practical categories.

From these data, it can be concluded that the book was declared very practical to be used by lecturers and students at the elementary school teacher education department, the faculty of education, Universitas Negeri Padang. It could be meant that the students were very helpful in making learning designs. The following was a graph of the students' and lecturers' respond analysis to the book consistency.



Picture 1. Instructional learning

Note:

The practicality of the lecturers' and students respond were 89,28 %
The students' respond on the practicality was 90,73 %

3.1.4 The result of learning material effectiveness

It was found from the pre-test and post-test that there were differences in the acquisition of learning outcomes before and after the introduction of teaching material in the PBjL. The number of pre-test score in the experimental class was 863 got an average value of 50.76. On the other hand, the number of post-test scores in the experimental class was 1407 and got an average value of 82.76. The comparison can be seen in the table.

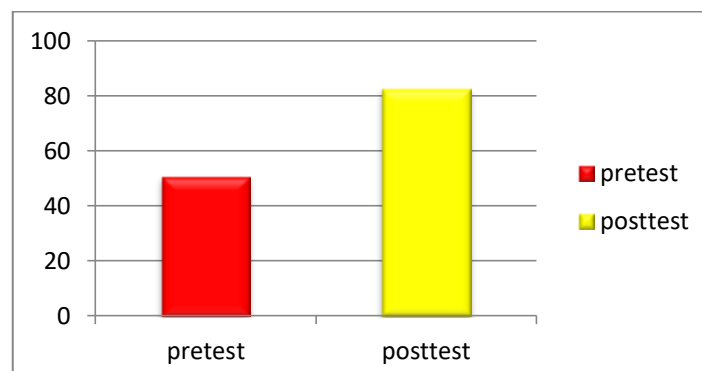
Table .pre-test and post-test comparison in permanent class

Group	Score		Average		D	D^2
	Pre-test	Post-test	Pre-test	Post-test		
Experiment	863	1407	50,76	82,76	-544	19340

Note:

$\sum D$ = Scoring differences in *pre-test* and *post-test*

Based on table 1 above, the comparison of the results of the pre-test and post-test can be presented in the following bar diagram:



Picture 2. The graph of *pre-test* and *post-test* comparison

In conclusion, it can be concluded that the bar chart image showed the difference in the value of learning outcomes before and after the treatment given, in the form of inserting teaching material in the PBJL model. Thus, to compare the two clearly, the value of the pre-test and post-test can be seen in the table of scores differences.

The data were obtained from the student learning outcomes before and after treatment. Meanwhile, the hypothesis testing was done using the t-test technique with the following formula.

$$t = \frac{M_D}{SE_{M_D}}$$

$$t = \frac{-32}{2,66}$$

$$t = -12,03 \text{ with } t_{\text{tabel}} = 2,12.$$

Thus, it can be seen that at the real level (α) 0.05 t-count was greater than t table (0.05) (16) (12.03>). So, it can be concluded that H_0 was rejected and H_1 was accepted. In addition, there were significant differences between student learning outcomes.

3.2 Discussion

The development of a guidebook for the lecturers and students using the learning model has been well implemented. This book has been tested for the students in the faculty of education, Universitas Negeri Padang. It could be meant that the 90 students were very helpful in making learning designs. From the results obtained, the model book for the preparation of lesson plans is very valid, practical and effective.

4. Conclusion

The study concluded some conclusions that can be used as a basic theory of the next implications. Based on the results of validation data by the validator, it can be concluded that the developed books are in accordance with the needs of students based on the observation. In addition, the contents of the book in using simple and clearer sentences that are easily understood by the students. Then, the books are designed in attractive colors so that they can motivate the students to take good lectures. Thus, it can be concluded that the teaching material has been stated to be very valid and can be used in the lecture process.

In addition, the book was declared to be very practical to be used by students in the faculty of education, Universitas Negeri Padang. This means that the students are very helpful in understanding the techniques of drafting the implementation of learning for elementary schools.

5. References

- [1] I. G. N. Japa, "Cooperative Learning Model Group Investigation Type and Mathematic Achievement of Elementary School Students," vol. 134, no. Icirad, pp. 229–232, 2017.
- [2] D. A. Sudjimat, Nopriadi, and Yoto, "Study of Implementation of Project Based Learning in Mechanical Engineering Study Program of Vocational High School," *J. Phys. Conf. Ser.*, vol. 1165, p. 012024, 2019.
- [3] S. Sumirattana, A. Mekanong, and S. Thipkong, "Kasetsart Journal of Social Sciences Using realistic mathematics education and the DAPIC problem-solving process to enhance secondary school students' mathematical literacy," *Kasetsart J. Soc. Sci.*, vol. 38, no. 3,

- pp. 307–315, 2017.
- [4] Y. Hartono and Y. Helsa, “P – 20 Mathematics Learning Within Culture And Nation Character : Using Traditional Dance In Learning The Concept Of Symmetry,” pp. 978–979.
 - [5] K. Johan and F. M. Turan, “The development of Sustainability Graduate Community (SGC) as a learning pathway for sustainability education - A framework for engineering programmes in Malaysia Technical Universities Network (MTUN),” *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 160, no. 1, 2016.
 - [6] R. Amini and Y. Helsa, “Integrated model in science for elementary school,” 2018.
 - [7] C. Series, “The integration of science and math,” 2018.
 - [8] C. Series, “Mathematics learning through Pendidikan Matematika Realistik Indonesia (PMRI) approach and Adobe Flash CS6 Mathematics learning through Pendidikan Matematika Realistik Indonesia (PMRI) approach and Adobe Flash CS6,” 2018.
 - [9] U. N. Padang and U. A. Dahlan, “ICT media design for higher grade of elementary school mathematics learning using CS6 program,” pp. 1–6.
 - [10] V. P. Jeanette Runtu, J. Rawis, and C. Medellu, “The Exploration of the Mathematics Knowledge of the People in Sangihe Regency,” *J. Phys. Conf. Ser.*, vol. 1028, no. 1, 2018.
 - [11] A. Nur, “Mobile technology in a mathematics trail program : how does it works?,” vol. 7, no. 1, pp. 24–30, 2018.
 - [12] R. Paradesa, E. E. Rohaeti, and M. Afrilianto, “Developing self-concept instrument for pre-service mathematics teachers Developing self-concept instrument for pre-service mathematics teachers.”
 - [13] R. Sahara, Mardiyana, and D. R. S. Saputro, “Discovery learning with SAVI approach in geometry learning,” *J. Phys. Conf. Ser.*, vol. 1013, no. 1, 2018.
 - [14] M. Fitriawati and R. H. Lestari, “Design of the Information System for Kindergarten Learning Plan used Scrum Methodology,” *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 407, no. 1, 2018.
 - [15] D. Ampera, “Adobe Flash CS6-Based Interactive Multimedia Development for Clothing Pattern Making,” vol. 102, no. Ictvt, pp. 314–318, 2017.
 - [16] Z. Amir, “The development of thematic materials using project based learning for elementary school The development of thematic materials using project based learning for elementary school.”
 - [17] D. Fisher and Y. S. Kusumah, “Developing student character of preservice mathematics teachers through blended learning Developing student character of preservice mathematics teachers through blended learning,” 2018.
 - [18] S. T. Skills, “A Development of Mathematical Connecting Ability of Students in Junior High School through a Problem-Based Learning with Course Review Horay Method A Development of Mathematical Connecting Ability of Students in Junior High School through a Problem-Based .”
 - [19] O. Access, “Developing workshop module of realistic mathematics education : Follow-up workshop Developing workshop module of realistic mathematics education : Follow-up workshop,” 2018.
 - [20] L. Duan and D. Wan, “Research and Analysis of Mathematical Model for photo voltaic Power Generation Network,” vol. 166, no. Amcce, pp. 525–530, 2018.
 - [21] C. Series, “Developing learning trajectory for teaching statistics at junior high school using RME approach Developing learning trajectory for teaching statistics at junior high school using RME approach,” 2018.
 - [22] R. Deljavan and D. Norouzi, “The impact of e-commerce and R & D on economic development in some selected countries,” *Procedia - Soc. Behav. Sci.*, vol. 229, pp. 354–362, 2016.
 - [23] Z. Zhu and W. Sun, “University Experiment Research on the Development Based on Web of Experimental Teaching Platform,” vol. 189, no. Mehss, pp. 87–92, 2018.
 - [24] “No Title,” vol. 1, no. 2, pp. 41–51, 2014.

Acknowledgments

Thanks to LP2M UNP for sponsoring and supporting this research. As well as all parties who have supported and helped the process of the research to complete.