

# Developing e-learning content based on character values in mathematics teaching and learning

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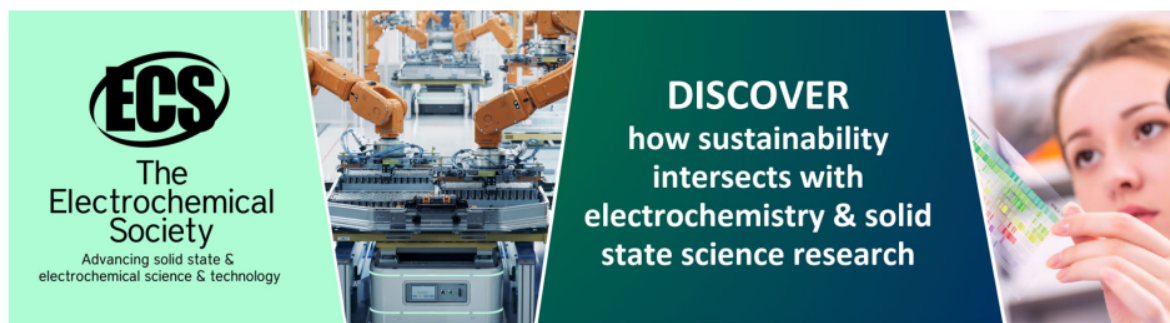
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## Developing e-learning content based on character values in mathematics teaching and learning

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**Abstract.** This study purposed to produce a valid, practical, and having potential effect of character values based e-learning content in teaching and learning mathematics. The method used in this research is development research type Rowntree model. Rowntree development model consists of three stages, namely planning, development and evaluation. Subjects in this study were students of mathematics education program Sriwijaya University in odd semester of 2017/2018 academic year. The result showed that e-learning content developed is valid by experts who tested 3 aspects including material aspect, media display and instructional design; practice based on the results of one to one scale that tested the product on 3 students with different skills and on a small group scale of 6 people; and having a potential effect to support students' understanding of character values in mathematical instructional activities.

### 1. Introduction

Nowadays, along with technological progress, digital education becomes a common feature [1]. Its potential helps students in counteracting the mathematical difficulties that they face [2]. One of digital technology development in education is electronic learning or it is called e-learning. In e-learning, media can be made more interactive because it combines several media that include text, audio, images, graphics, photos, animation, or video that can provide feedback on actions or responses provided by users [2-4].

Recent studies showed that the development of e-learning based teaching materials is able to support the lectures well [5]. Furthermore, e-learning courses emphasize on its influence to users' beliefs and attitudes towards mathematics [6, 7]. However, it becomes a problem if the use of e-learning does not pay attention to the learning objectives to be achieved. Basically, the purpose of education is to foster humans into true human beings who are noble characters both thoughts and feelings or in other words that it humanizes humans [8]. One way, to shape the nature of self as an intelligent and autonomous human being who are able to do the best for themselves and the environment, is character education [9]. Therefore, educational institution also have roles to cultivate character values [10]. Aisyah, & Moh. Uzi Dollah [11] argued that there are 3 types of values that can be applied by teachers in mathematics learning, namely the value of general education (including 18 values), mathematical values (including 10 values), and the value of mathematics education (including 12 values). However, among these 30 values, secondary school mathematics subject teachers are only able to apply a maximum of 8 values in their teaching both explicitly and implicitly [11]. Many factors influence the success of teachers, especially mathematics teachers in applying value education in class. One of them is the teacher's understanding of the importance of value education itself [11]. This shows



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the lecturer also has an important role in shaping positive characters from students since they are prospective teachers, for that the lecturer has the responsibility to provide character education. Moreover, students who are fostered are future math teacher candidates who have a special role to help their students understand the abstract nature of mathematics, and whose role is very important in education, so efforts are needed to create professional mathematics teacher candidates. Through character-based lectures, it is expected to be able to make them as professional teachers in the future, who not only have academic competence and pedagogical competencies but also have good personal competence and social competence. Not only are they able to master mathematical material and teach it but also they are expected to be able to internalize the characters or values that will shape the character of their students in the future so that the goals of national education will be realized.

Thus, considering the advantages of e-learning in mathematics instructional activities and the need to inculcate character values in mathematics instructional activities, researchers wish to develop e-learning content that contains character values in teaching and learning mathematics.

## 2. Methods

This research is a development research. To evaluate the effectiveness of the product, formative research evaluation is done. The development of e-learning content in this research uses Rowntree development model consisting of three stages, namely the planning, development, and evaluation stage [12]. In the planning stage, a review of lecture materials, literature, studies of relevant research results, expert consultation, and participant are carried out. In next step, development stage, designing e-learning content based on character value is done. The product resulted is a prototype that is focused on three characteristics namely content, constructs, and language. The final stage is evaluation. It is done using Tessmer's formative study that includes self-evaluation, expert reviews, one-to-one evaluations, small group evaluations, and field trials [13].

This study involved 30 students of Mathematics Education Study Program who joined P4 Course in odd semester 2017/2018 academic year. Collecting data technique were 1) walk through which is based on expert review to get a valid character values based e-learning content, 2) Observation and interview derived from one to one evaluation and small group to look for the practicality of e-learning, 3) Test is used to find out potential effect of e-learning developed. The collected data were analyzed using descriptive method. They include: 1) analysis of expert review comments to get a validity of character values based e-learning content, 2) analysis of observation and interview result of one to one and small group to get practicality of e-learning, 3) analysis of test result to get potential effect of e-learning.

## 3. Results and Discussion

Testing the validity of the product is done with expert review. The reviews included content, construct, and language aspect. Prof. Z suggested that e-learning content is more adjusted to learning type of teacher students. Dr. S also suggested that the content should make student character values appear. Meanwhile, Dr. H suggested making the size of letters bigger such that they become readable. After revision, the e-learning content is as follow:



Figure 1. E-learning Content Based on Character Values

Figure 1 shows e-learning content after revision done. It was added more learning resources based on character values. It included lesson plan containing instructional activities that were assumed being able to internalize character values to students and video clip related to the important of character values in mathematics teaching and learning.

Then, to find out the practicality of product, e-learning is tested in one to one evaluation which involved three teacher students selected and small group evaluation of 6 teacher students. Students in one-to-one evaluation have the initials DW, GFAS, and DASD. Meanwhile, the initial names of students in small group are PA, SS, NHP, MAT, YS, and SOS. The photographs of one-to-one and small group are as follow:



**Figure 2.** The one-to-one photographs



**Figure 3.** Small group photographs

Figure 2 and 3 show how students use e-learning in one to one phase and small group phase. In this phase, it is seen whether students are able to operate the e-learning or not. It is also figured out whether students experience difficulties in using e-learning or not. The result is that students had no difficulties in operating and using e-learning content developed.

Saran/Kritik:

Konten yang disediakan sudah baik karena terdapat penjelasan dalam bentuk PPT, dokumen, video, PDF beserta contoh LKSnya sehingga bisa menjadi pedoman dalam pembuatannya dan penjelasannya pun sudah bisa membantu memahami-nya

The content provided is good since it includes explanation in the form of slide presentations, documents, videos, pdf and students worksheets that become a guideline and help students in understanding character values based lesson materials.

**Figure 4.** Teacher student's opinion

Figure 4 describes one of student opinion in small group phase. The student stated that e-learning content was good and could support them in making mathematical lesson materials based on character values. However, not all of character values appeared when this e-learning content was tested.

Then, field trials are conducted to determine the potential effect of e-learning content. Field test is done through learning activity using e-learning. Students learnt the material after they filled pretest and they also did posttest at the end of activities. Pre-test was given to 30 students who take P4 courses at the beginning of the meeting. From the results of pretest, the average value of students is 40.42. While the average score in posttest is 72.63. There was comparison of the average score of students on pretest and posttest. It increased 32.31 and after the N-Gain score was calculated in a score of 0.54. It showed that e-learning content based on the value of characters developed by researchers have a potential effect on students' understanding of mathematical instructional activities based on character values.

a) Dit batu bata berbentuk kubus. Untuk mengetahui volume ruangan yang berbentuk balok, bisa menggunakan batu bata yang disusun untuk memenuhi ruangan tersebut.

$$V_{\text{balok}} = p \times l \times t$$

$$= 10 \text{ cm} \times 90 \text{ cm} \times 30 \text{ cm}$$

$$= 120.000 \text{ cm}^3$$

Volume berdasarkan banyak batu bata

$$120.000 = V_{\text{kubus}} (a)$$

$$a = 10^3 (a)$$

$$120.000 = 1000 (a)$$

$$a = \frac{120.000}{1000} = 120 \text{ batu bata}$$

b) cara mengajarkannya dengan menggunakan media/alat peraga yg nyata pada siswa.

c) perbedaan yg paling saya tunjukkan di kelas yaitu kepribadian lugas, tegas, dan cekmat

**Figure 5.** One of teacher student's answer

Related to implementation of character values in the field test, teacher student's answer in figure 5 shows that the student was able to implement discipline value, work hard value, and responsibility value although not all of character values were able to be appeared. According to validation, one-one, and small group results, we obtained valid and practical e-learning content based on character values for teacher students in teaching and learning mathematics.

In this study, the mathematical instructional activity using e-learning content developed based on character values could inculcate some values such as discipline value seen from the way students answer the questions in sequence; work hard value seen from the way students solve the problems seriously; and responsibility value seen from the way students explain the answer well. This is in a line with what Chin [14] stated that values are believed having major influence in mathematics education and they are reflected in the behavior of teachers and students. Aisyah [15], her qualitative research results on three junior high school mathematics teachers in Palembang, showed that only four character values designed by the teacher could appear, namely the value of tolerance, self-reliance, cooperation and responsibility. However, in the classroom implementation, teacher could apply more values such as tolerance, discipline, hard work, creativity, self-reliance, respect for achievement, friendship, cooperation, responsibility and thoroughness [15]. It is also supported by a study done by Bishop [16] that most of mathematics teachers are infrequently aware of teaching values either explicitly or implicitly. However, they mostly appear implicitly in mathematical instructional activity. In any education subjects, it is also important to internalize the character values into the teaching and learning activity like what Marlina [17], Rahima [18], and Wahyu [19] did. Furthermore, Hidayati, in her research results, mentioned [9] that character values need to be internalized since early childhood education. In his study, Putra [20] tried to develop students' character values by using traditional games in nonformal educational institution. Moreover, to internalize character values in physic education, Hindarto [21] used history of physic as media in istructional activities.

#### 4. Conclusion

Based on the research that has been done, it can be concluded that character values based e-learning content which was developed is valid by the experts who tested material aspect, media display and

instructional design. Furthermore, it is categorized into a practice e-learning content based on one-to-one and small group result. It also has a potential effect to support students' understanding of character values in mathematical instructional activities according to N-gain score which was calculated.

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