The Development of Probability Material using Edmodo

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Abstract. This research is aimed to describe the process and to get product development of learning material using Edmodo. Learning material is developed in the form of interactive learning material using Edmodo. This research belongs to Research and Development (R&D). The procedure includes the steps of Borg and Gall such as conducting research, collecting information, planning and developing preliminary form product, preliminary field testing and main product revision, main field testing and operational product revision, operational field testing and final product revision, dissemination and implementation. Expert judgment conducts data validity with the average score of media expert 3.57 and 3.67 from the material expert with a maximum score of 4 on a Likert scale. Practicability is obtained by the implementation of learning materials in each meeting which has exceeded 75%. The effectiveness of the response questionnaire of the student has achieved 80%. The students have received instructional materials well. The result of focus group discussion (FGD) can be concluded that learning material can be used in the teaching-learning process in curriculum 2013.

1. Introduction
Probability is a material in a mathematics subject that has existed in elementary school to university. Probability is essential in daily activity in Indonesia. Based on the curriculum in Indonesia, probability material starts to be taught in primary to middle school [9]. As noted at National Conference of Teachers in Mathematics (NCTM), the probability is taught in curriculum from kindergarten [6]. Gal stated that probability is an essential material to help students in life [10]. On the other hand, Jones et al. Ministry of Education, Pratt, Schield, stated that the “importance of probability in everyday life has led to calls for increased attention to this strand in the mathematics curriculum” [11]. Therefore, probability material is essential to be mastered. However, students’ ability on probability is low. It can be seen in national examination of senior high school in 2015. It shows the low result with only 8.09%.

Some experts have examined Students’ understanding of probability concept with various perspectives. Jones, et. al. described how students think probabilistic. It means how the students solve problems in probability (see [4] and [5]). Probabilistic matter contains uncertainty. According to Sujadi stated that uncertainty matter tends to be a random activity that can deliver probable result [12]. However, the certain result cannot be previously determined accurately. Students who think in an uncertain situation are supposed to think probabilistic. To know how students think probabilistic, the researcher conducts pre-survey by using the instrument of Jun [6]. The result shows that many students are in subjective to quantitative informal level (see [4] and [5]).

Now, Indonesia applies curriculum 2013 that emphasises the development of students in some aspects, such as knowledge, behaviour and skill. Curriculum 2013 is also expected to be able to implement all integrated subjects in communication and information technology. Minister of culture and education, Hesta stated that nowadays, developing technology becomes important information in knowledge. In an international seminar on “21st Century Learning” in January 20th, 2016, Minister of
culture and education stated that main resource of information is a way to reach all sides in giving information in education and teaching-learning process. One of the implementations that have been conducted is national examination with Computer Based Test (CBT). Furthermore, he conveyed that the use of technology is not only used for the examination but also in teaching-learning process.

In the digital era, most of the students have used various social media. Most of them prefer to use technology from smartphone, tablet, gadget and computer then open book or repeat material in school. It is also probable that bad information can turn up as well. Therefore, teachers must also use technology in teaching-learning process.

Fast development of information technology can be used in teaching-learning process as a provider of online media. Online media is usually named as e-learning, a kind of teaching-learning process that uses electronic technology and the internet. Teaching-learning process with the internet can use Edmodo. According to Pitoy [10], Edmodo is a platform of social media for teachers and students to share idea, file, agenda, activity and task. Edmodo is aimed to help teachers in using social media in teaching-learning process. Edmodo is almost same as Facebook. However, it is not as free as Facebook. Edmodo feature is a special design in education to make an interaction among teachers, students and parents.

The government expects that developed technology can be used well in education. Utomo has developed e-learning material basis Edmodo in lithosphere material of geography subject. Based on the above explanation, the researcher will develop interactive material through social media of Edmodo [14]. Development of Edmodo material is expected to create high thought skill of probability. It can also facilitate students to use a cellphone or tablet and internet service as learning media. Tomlinson added material development is what the writers, teachers, and students conduct to give input resource as a designed experience to improve learning [13]. Therefore, amaterial using Edmodo is expected to give easy way when the students want to repeat material and facilitate them to be independent in learning.

2. Method
This research uses research and development method. This research modifies the Borg & Gall model of research and development [1]. Education research and development is a process that is used to improve and validate an education product such as teaching-learning model, instrument, textbook, module, and media[1]. The following are research procedure of this research: 1) Collecting research and information: in this stage, researcher conducts a literature review about level probabilistic thought, analyses students’ level probabilistic thought, observation and interview with the teachers. 2) Planning; it is conducted by defining, arranging interactive material design with a worksheet, determining material arrangement. 3) Developing preliminary form product; it includes preparing material or content design and producing a material draft in which product form that is developed is an interactive material with the worksheet. Afterwards, it is well kept by using Edmodo. 4) Testing preliminary field and revising main product; it is conducted to state that the previous product has been valid with average valid criteria more than 2.5 with the scale of Likert (1-4). 5) Testing themain field and revising operational product; researcher conducts limited experiment towards developed material. The limited experiment is conducted by teaching ten students using Edmodo material. After conducting an limited experiment, revision is conducted based on the result of the limited experiment through response questionnaire that has been validated by the experts. 6) Testing operational field and revising final product; it is conducted by applying the product in the teaching-learning process. Validated lesson plan must be prepared for this testing. The operational testing field is conducted in a class that is chosen randomly to get practical and effective data.

The used instrument is material observation sheet for practice and response questionnaire for effectiveness. Criteria for practice is obtained if the percentage is more than 75% [8]. It is scored by two observers with statistical analysis “percentage of agreement” Grinnel [8]. An effective data product is obtained from the result of response questionnaire using Edmodo in Poll feature. Effective criteria product is observed by students’ response towards product implementation if no more than 80% of students give positive average result toward the developed product [12]. Furthermore, to declare valid product whether it is practical or effective, Focus Group Discussion (FGD) is conducted through assessment of practitioner or teachers.
3. Results and Discussion

Development process starts from research with data that is obtained probabilistic thought level. Collecting information is obtained from observation and teachers’ interview. Data of probabilistic thinking level is mostly in subjective and transitional level. Observation shows that teachers use material from official government. The same result is also obtained from teachers’ interview in which the material is from compulsory book and worksheet. Therefore, it is needed to develop interactive material with the technological element. The idea will be supported because school has adequate facility and students have smartphone that can be used to study.

Steps of product arrangement are planning and developing preliminary form product by designing material content and teaching-learning and producing material. The resulting product is interactive material. The form is interactive multimedia that can be accessed by smartphone or computer. The material will be completed with the worksheet. According to Depdiknas [2], the interactive material is arranged based on the principal of material development, such as 1) starting from easy to difficult, and from concrete to abstract. 2) repetition will strengthen understanding, 3) positive feedback will give strength towards students understanding, 4) high learning motivation is a factor of successful learning, 5) achieving success seems like rising stairs, step by step and finally it will reach the top, 6) knowing result that will be achieved encourages students to continuously achieve the aim. Probability in the interactive material is arranged based on main competence of Junior high school in curriculum 2013. Display of interactive material is shown in Figure 1.

![Figure 1. Display of Interactive Probability Material](image)

Next step is preliminary field testing and main product revision. Experts conduct preliminary field testing by scoring related product that is developed from media and material aspect. The experts are lecturers of mathematics education of Sebelas Maret University (UNS), informatics technique of UNS, the technique of information and computer education of UNS and outstanding teachers. The experts have previously ever made teaching material and media. Data for a valid product with an average percentage of three validators is shown in Table 1.
Table 1. Result of Interactive Valid Material by Experts

| Scoring | Validator | Statement   |
|---------|-----------|-------------|
|         | 1         | 2           | 3           |              |             |
| Media experts | 3.75 | 3.52 | 3.46 | very valid |             |
| Material experts | 3.67 | 3.74 | 3.59 | very valid |             |

Main product revision is conducted by improving the content and material display (interactive material and worksheet) as the experts suggest. After conducting revision, there will result in interactive material as below:

![Figure 2. Display of Interactive Probability Material](image_url)

The interactive material contains probability material that has been arranged orderly. It starts with recognising experiment and statistic experiment, differentiating experiment and statistic experiment, sample point and sample space, recognising possible, impossible, and certain event, empirical and theoretical probability of an experiment, differentiating empirical and theoretical probability and probability complement of an event. The valid interactive material is completed with the worksheet. The interactive material can be accessed through a smartphone. However, the display adjusts with the smartphone screen of each user.

Next step is main field testing and operational product revision. It needs to prepare response questionnaire to know the readable product that is developed. Main field testing is conducted by using interactive material and worksheet. It is taught to 10 students who are chosen randomly. Before testing, students have had Edmodo account because it has been able to be downloaded. The limited test result is obtained from the vote of students through Edmodo or response questionnaire. The result of response questionnaire obtains a percentage of 89.10%. It means that students can accept material well and use it as a learning source. Operational product revision is conducted based on a questionnaire, students’ suggestion and researcher’s note as material for revision.

The sixth step is operational field testing and final product revision. An instrument that must be prepared is arranging lesson plan that adopts the use of developed material and observation sheet of conducting material. All teaching-learning process that includes introduction, content, and closing is conducted by using interactive material and worksheet. The teaching-learning process is conducted in a group. Each group use one laptop, and each student is given a worksheet. Before conducting teaching-learning process, lesson plan and observation sheet are validated by three experts. The result of teaching-learning includes planning of lesson plan, observation sheet and response questionnaire that stated lesson plan could be conducted, observation sheet can be used to measure the material conducted, and response questionnaire can be used to measure the acceptance of students’ material.

Operational field testing is conducted in a class to know practicability and effectiveness. Practicability is based on observation result with material observation sheet in the teaching-learning process. Observation result of 2 observers in the first meeting is 93.75% and in the second meeting is 100%. According to Borich [8], criteria of practicability is more than 75%. Effectiveness based on response questionnaire is 93.25%. It means that students can accept material well. Besides that, notes from observers and students can be used as a remedial and teaching-learning process.

Final product revision is the last step that is conducted in this development process. This last step is aimed to reveal a product that is developed. It is a valid, practical and effective final product. It is discussed in Focus Group Discussion (FGD) with mathematic teachers. The process of FGD uses...
assessment sheet filled by five teachers. The average of assessment result and comment is 3.82. It means that the developed product is very valid. Comments can also be used as a material alternative which can be used in the teaching-learning process. The interactive material can help students to understand the concept of probability because the abstract material can be represented in animation as mentioned in research result of Yung and Pass [17] related to the influence of visual representation and computer on mathematic learning. The result of teaching-learning mathematic with visual representation by using a computer can support teaching-learning process, transform abstract mathematic concept and give influence on cognitive skill. The following is the display of interactive material and worksheet as the last product of development process.

Figure 3. Final Product of Probability Material

The use of Edmodo has not been effective yet since many students have not been accustomed to smartphone to study. According to Hankins, teaching-learning result using Edmodo does not give significant influence towards students’ achievements [16]. However, Edmodo helps students to study. Besides that, students are taught to use technology. Research of Wardono also supports this case; he found that e-learning using Edmodo gives good result in developing the literate skill of junior high school students [15]. Furthermore, research conducted by Jun shows that only 4% of students do not understand probability concept [6]. It can be concluded that the step conducted can improve concept understanding of probability.

The development process of material using Edmodo is an introduction. It includes research and collecting information. Development step includes planning and developing an early product, testing field and revising, testing the main field and revising, testing operational field and revising. The result of introduction step shows that probabilistic level of students is on the subjective and transitional level. Collecting information is obtained through interview and observation. In the step of product development results validity with average 3.57 from media experts and 3.6 from material experts. Validator experts state that Edmodo can be used in the teaching-learning process. It is also suitable with the basic competence of probability. Practicability means that percentage of material using Edmodo has achieved an average of more than 75%. Effectiveness also shows that students well accept Edmodo with response percentage of 93.25%. The result of FGD shows that material using Edmodo can be used and expanded in the teaching-learning process.

Learning material of probability using Edmodo can be used to the learning process of mathematic either inside the class or outside the class. Learning material of probability can help students to understand the concept of probability and to increase the level of students’ probabilistic thinking.

4. Conclusions
Conclusions of this study are: (1) the ability to think critically mathematical junior high school students are still, (2) in terms of cognitive styles critical thinking skills mathematical junior high school students with a higher FI cognitive styles of the students FD, (3) From the aspect of students’ critical thinking aspect with FI cognitive style is better than the FD on the viability inference, assumptions, deduction, and argument evaluation.
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