Developing blended learning environment to improve learning performance and self-reliance for junior high school students

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Abstract. Blended learning grows rapidly in recent decade. It is defined as a combination of online learning and face-to-face classroom learning. This research aimed at developing blended learning environment to improve the students’ learning performance and self-reliance. This research is a part of a larger study which used development research as its method. The research subject were 38 (8 male and 30 female) grade 8 students of SMPN 3 Sukawati in the academic year 2016/2017. The data gathered from questionnaire, observation and students’ online activities in the Learning Management System (LMS). The data were analyzed using content analysis techniques and coded based on type of students’ responses. The result show that (a) the total of students’ responses to the implementation of tutorial video in BLE were 67 consisting of 73,1% positive and 26,9% negative responses. (b) the total of students’ responses to the implementation of online discussion in BLE were 68 consisting 61,7% positive and 38,3% negative responses. Based on the results of data analysis of students’ responses to the implementation of tutorial video and online discussions in BLE, it can be inferred that the students were be helped to understand the content, active in learning, prepare themselves to be ready and confident while studying in the face-to-face classroom learning.

1. Introduction
Blended learning (BL) is a learning approach built on "blend" of electronic learning and face-to-face classroom learning [1]. Furthermore, BL also defined as a teaching strategy that combines ICT and traditional face-to-face learning in the classroom which can help students to convert from passive to active learning and overcome the problems of low motivation for course completion and low satisfaction [2]. BL has various model and variations of its "blend" to allow for different blended learning environments (BLE). In line with that, BL study with different "blend" of the learning process could have a different impact on students’ learning performance and different research recommendation. For instance, a study conducted by Wu et al. [3] with a ‘traditional’ BL model where learning materials were given in a traditional face-to-face learning settings in the classroom and then student skills in problem-solving were enhanced through the provision of exercises in online learning settings. The results of the research were not satisfied. It was because the taught material was not flexible. It is merely given in the classroom and the students have no chance to ask when facing the problem while doing the exercises in the online learning session.

On the other hand, a research conducted by Mehmet and Arzu [4] has a better strategy whereby through the BLE used, learning materials were not only given in class but also given again at online meetings via text, images and video animation on the website. This was able to increase the students' understanding of the concept. However there still a negative response toward this study. It was given
by the majority of students who feel they need an adequate discussion panel to discuss case studies that given at online learning session.

Moreover, there also BL with flipped classroom model where in this model lecture content is given to students at home through electronic means while face-to-face classroom learning is focused on practical application activities [5]. Research by Thuy, Bram, and Martin [6] showed that the flipped classroom model gives better results than other BL models, especially to students' self-efficacy and intrinsic motivation. This is also supported by the results of research from Montserra, Eliana, Jordi, Roger, and Javier [7] which showed that the flipped-classroom learning environment could give better impact than other models because it can promote self-learning, autonomous working, and time management concern in students and because it helps increase the classroom session effectiveness.

On the other hand, the advance of technology in recent decades have contributed to the development of BL models by integrating the innovation in the learning process [6]. Various ways can be used to present the learning material in a BLE, such as through e-books, e-text, images, animations, or video. Of the ways, the material learning that presented through the video tends to be more appropriate to use, especially at the elementary or middle level students. Certain concepts or skills could be presented and visualized in a more real and challenging manner so that it is easier to understand, especially on subjects that are considered difficult by most students, for example, mathematics. Furthermore, the various concepts that can be accessed through video can involve students in thinking and do learning activities more effectively, faster, and deeper [8].

In addition BLE that provides space for students to be able to inquire and discuss with other students or with online instructors (teachers) during online learning session is also important which is also as a recommendation from previous research [3] [4]. The availability of online discussion feature, students can ask about problems faced earlier and also enables to find the solution only by the online discussion process without having to wait for a face-to-face learning session in the classroom. It helps students prepare early before face-to-face meetings so that classroom learning activities become more effective by focusing on problem-solving exercises. In this case, the use of video tutorials and online discussions is seen as an important factor as a base in BLE practice. This particular research aimed to developing BLE based tutorial video and online discussion to improve students’ learning performance and self-reliance. The formulations of the problems as follows (1) How is the students' responses to the implementation of tutorial video in BLE? (2) How is students' responses to the implementation of online discussion in BLE?

2. Methods
This research is part of a larger study which uses a development research approach, which consists of the following stages: Define, Design, Development and Dissemination [9]. In this current research have successfully defined and designed BLE prototype based on video tutorial and online discussion. The research subject were 38 (8 male, 30 female) grade 8 student of SMPN 1 Sukawati in the academic year 2016. Data about students’ responses to tutorial videos and online discussion in BLE in this study obtained through in-depth interview and students’ posts stored in online discussion board on the learning management system (LMS) which used as a tool to support the BLE in this study. Then data were collected and analyzed descriptively qualitative using content analysis technique and coded based on type of student responses. In total, 4 codes were created tutorial video and online discussion. Data about students’ responses to tutorial video in BLE divided into groups in term of accessibility, content, effective learning, and motivation. While data about students’ responses to online discussion in BLE divided in term of features, effective learning, accessibility and motivation.

3. Result and Discussions

3.1. Implementation of tutorial videos in BLE
Before face-to-face classroom learning is held, first, the students were given tutorial videos that present various concepts and mathematical skills on the website at online learning session. Expert
judgment results for content validity of tutorial video indicated that the video in this study is valid and feasible to be used with attention to some suggestions for video improvement as seen in table 1 below.

**Table 1.** Expert advice.

| No. | Advice                                              |
|-----|-----------------------------------------------------|
| 1   | Make the duration of each video only 5 - 7 minutes  |
| 2   | One video enough to discuss one indicator           |
| 3   | Note the size of the video, make each video has maximum 5Mb |
| 4   | Adjust background music volume with vocals on video |

In the following Table 2, the summary of students’ responses toward the tutorial video in BL in online learning can be observed.

**Table 2.** The frequency of the positive and negative responses of students towards tutorial video.

| Aspect          | Positive |          | Negative |          | Total |          |
|-----------------|----------|----------|----------|----------|-------|----------|
|                 | F        | %        | F        | %        | F     | %        |
| Accessibility   | 16       | 61,5     | 10       | 38,5     | 26    | 38,8     |
| Content         | 16       | 69,6     | 7        | 30,4     | 23    | 34,4     |
| Effective Learning | 7       | 87,5     | 1        | 12,5     | 8     | 11,9     |
| Motivation      | 10       | 100      | 0        | 0        | 10    | 14,9     |
| Total           | 49       | 73,1     | 18       | 26,9     | 67    | 100      |

From Table 2 it can be seen that around 61.5% of 38.8% students who responses to the accessibility of the video tutorial were expressed their positivity. In this aspect, the positive responses was indicated the advantages of tutorial videos in BLE, such as: it can be accessed anywhere and anytime so that the students can learn the material even though they cannot attend the class and it can also be watched repeatedly. This finding are supported by the results of Mehmet and Arzu [4] and Rosende, Garcia and Otero [10] studies in which the application of BL makes it easier for students to access learning materials whenever and wherever online. The asynchronous access to tutorial video can help the student who need time to review information or to understand the learning material better through pause, rewind and replay features [5]. Meanwhile, the negative responses indicated the students’ difficulties in learning through the website, such as their limited access to internet at home, unstable internet connection which contribute to the video buffering and sometimes the video cannot be played through smartphones.

The previous study has predicted the possible obstacles to the application of BLE. Nielsen [11] explained inequities in students' home lives can also cause a barrier for the flipped blended-learning model. Technology needed for viewing or interacting with learning material may not be available in every student. In this study, the limitations of the Internet network became the main obstacle factor causing the number of students who did not have time to access and study tutorial videos before class began. Therefore, the teacher reminded the students to utilize the internet access that available in schools. Although it must be admitted that sometimes unstable connections also be complained by some students.

In addition, Montserrat et al. [7] in their study reported that unaccustomed students learning in new learning environments (BLE) is one of the important factors that could explain why student
participation was low. Therefore, in the improvement of this study, the students were motivated by reward and punishment points to enhance students’ activity.

Talking about the content, it was found that 69.6% students were responses positively. The students explained the benefits of learning using tutorial videos in BLE are as follows: 1) more easily understand the learning materials presented in video tutorials, 2) material presented on the video more complete and details than students textbooks, 3) animations video make the learning experience more memorable, 4) enthusiastic and less formal voice characters in explaining preferred material creating an interesting impression for students. While the negative responses are given by the students indicate some shortcoming such as students argue the background on the video should be more varied and the videos containing discussion of the problem should be more numerous.

Mehmet and Arzu [4] in their study, reported that students found the section of animation, video, and online assignment are more useful, but indicated that a discussion forum should be included in online learning session. The same is also mentioned by Wu et al. [3] where online forum discussion is needed in BLE especially when students faced problems when learning independently. While it has been addressed in this current study which in the online learning process, online discussion feature included, so it can be used to discuss the problems that faced by students. In addition, it can also be used to strengthen the concepts discussed in the video tutorial before face-to-face classroom learning that simultaneously also serves to further enhance the activity and understanding of students without requiring more resources [12].

Furthermore, students' responses indicated that the tutorial video was effective in helping them learning. It leads to a more meaningful learning activities where the students can easily build their cognitive understanding, not only memorize the formula and also tutorial video help students work on similar problems even more difficult. In addition, students also revealed by studying the material through the video early makes them more prepared when studying in the classroom.

| Maha Deivy (14) |
|------------------|
| © 20 April 2017, 13:35 AM |
| 1) video nya segi biasa mudah dimengerti apalagi dengan ilustrasi kertas berpetak membuat siswa menjadi lebih mudah untuk mengikuti cara melukis pada video. 2) mungkin sebelumnya kesulitan saya ada saat membayangkan memotong bangun prisma atau limas sehingga membantu jaringan jaringnya, tapi setelah saya menonton video, saya menjadi lebih mudah membayangkannya. |

Translation:
Maha Deivy (14): 1) the video as always easy to understand, especially with the illustration of grid paper makes me more easily understand how to draw 3D shape as exemplified in the video. 2) my previous difficulty was how to imagine cutting up the prism or pyramid to create its web. but after I learned the tutorial video, I became easy to imagine.

Figure 1. The example of positive response for video tutorial appeared in students’ post.

The students expressed the benefit of the video help her to imagine the three dimensional shape that used to be hard for her. In conjunction with this result, Mehmet & Arzu [4] in their study identified that BLE is able to establish a positive learning environment where student' responses indicated learning activities became more interesting and easy to understand through 3D images and video. Moreover, Montserrra et al. [7] reported at their research the process of clarification given in the face-to-face classroom learning, based on students’ performance in the self-learning activities before, improves the degree of understanding oh taught contents.

However, in certain circumstances, when tutorial videos explained what students already understand, there are some students who tend to feel bored watching the review and then prefer to skip that section. One of the sample of students’ comment related to the video can be seen in the following Figure 2. After reflecting to the comment of the students, it was found that the cause of boredom of the video is because it contains many repetition of words.
Putri Anggina (34) 02 Mei 2017, 08:09 AM
Pak videonya menarik tapi kadang” agak ngabosenin”.

Translation:
Putri Anggina (34): Sir, the video is an interesting but sometimes little bit boring

**Figure 2.** The example of negative response for tutorial video appeared in students’ post.

Lastly, all students’ responses in the motivation aspect indicated that they feel more interested in having to study independently at home because the learning material presented in the video is quite easy to understand. In addition, students feel more active use their own leisure time to learn independently especially to use their gadgets and the internet to find positive things like other related learning resources.

### 3.2. Implementation of online discussion in BLE

Students’ responses data to the implementation of online discussion during learning in BLE was obtained by using questionnaire. Various positive and negative responses are obtained from students’ response for tutorial video and then all of answers are grouped into four aspects, including features, accessibility, effective learning, and motivation. The data is used to see how the quality and effectiveness of the implementation of online discussion in BLE corresponding to students' views as users.

| Konteks            | Positive |  | Negative |  | Total |  |
|--------------------|----------|---|----------|---|-------|---|
|                    | F        | % | F        | % | F     | % |
| Features           | 9        | 37,5 | 15       | 62,5 | 24    | 29,6 |
| Effective Learning | 15       | 83,3 | 3        | 16,7 | 18    | 22,3 |
| Accessibility      | 17       | 58,6 | 12       | 41,4 | 29    | 35,8 |
| Motivation         | 9        | 90  | 1        | 10  | 10    | 12,3 |
| **Total**          | 50       | 61,7 | 18       | 38,3 | 67    | 100 |

Table 3 shows that the students were not really welcome to the features given in the online discussion. This happened because of the difficulties in using the digital learning, such as not being able to upload images, malfunctioning the enter key on the keyboard to create new paragraphs, no equation for mathematical symbols, and there are no notifications appearing if someone replied to a students’ post. However the rest of the students also stated that the discussion features help them to be more comfortable in conveying questions or opinions.

In term of effectiveness, 83.3% students express the benefits of the flexibility of online discussions in BLE. It could help them when studying independently at home where students can ask questions and discuss problems with other students and even with teachers or online instructors before attending face-to-face meeting. The example of how the students use the online discussion as a place for sharing can be seen in Figure 3.
Desy Muliani (07): I thought the more difficult is to find the surface area of the pyramid because usually the height of the plane of the pyramid is not yet known so we must search for it first using the formula Pythagoras

Pandetresna (10): I agree with Anggina for question number 2 more difficult to find the surface area of pyramid than prism. Suppose there are pyramids that are trapezoidal-shaped then we should search for three times the height of the plane of pyramid using the formula Pythagoras

Pandetresna (10): Because on the trapezoidal-pyramid there is no erect plane which is congruent

Figure 3. The sample of students' post contains reasoning competence on online discussion.

Figure 3 contains mathematical reasoning competency of students while discussing the surface area of the prism and pyramid. The student with code (1) argued that the surface area of the pyramid is more difficult to determine because usually its height is unknown and must be searched first using the Pythagoras theorem. Next, the student with code (2) completed the previous answer by giving a specific example, that is determining the pyramidal surface area of a trapezoidal base where it is necessary to determine each height because there is no congruent side. Those opinions indicate that students have been able to analyze what might be faced when determining the surface area of the prism or pyramid and also show a good reasoning ability.

The various mathematical competencies that appear in online discussions such as reasoning, conceptual understanding, problem solving, connections and mathematical representations certainly could represent the extent to which students were able to construct their initial cognition by learning through tutorial video and online discussion. Furthermore, student's posts that contain various mathematical competencies significantly will be discussed more deeply in face-to-face classroom learning. Therefore, the teacher or online instructor has a responsibility to facilitate online discussions constantly conducive thus students' post that contains the competence of mathematics significantly always emerge in each learning activity.

Furthermore, the students also feel the accessibility of the online discussion is in fair level. It can be seen that 59.6% students stated it as positive while the rest negative. The positive point of accessibility is given to the availability of online discussion feature in BLE that able to students' self-reliance learning during online learning session. This is in accordance with the statement of Arnold and Garza [5] which mentioned the feature of flipped-blended learning can enhance the role of students who are more active and ultimate responsibility for their learning. However, the negative response is due to the limited network of internet owned by students in their homes. Moreover, the unstable internet connection sometimes causing students experiencing failed login and also could not post comments. This caused the degree of participation shown by students in following online discussion activity is quite low at the beginning of the stud but then slowly increase as the time being.
This finding is different from the results of research conducted by Geri, Gafni, and Winer [13] where student activities visit the website to access the material visually presented as a u-curve.

Finally, 9 out of 10 students were positively motivated to follow the online discussion. The students indicated that they feel challenged to be able to answer questions from online task. Moreover, they also interested and enthusiastic to discuss with other students and also teachers in online discussions. Meanwhile, the negative response on this aspect is more caused by feelings of reluctance or disappointment from students because sometimes students failed to login or added comments on online discussions when the internet connection is unstable.

At the beginning of the study, the utilization of online discussion by students did not go as expected. Students only employed online discussions to post the answers of online tasks and give corrections to other students’ answers. But as time passes, students become accustomed and able to adapt well to customize their way of learning within BLE.

4. Conclusion
From the discussion of the findings, it can be concluded that the use of video tutorial in BLE is very helpful for students to more easily understand the concept or mathematics skills that tend to be boring if presented only through textbooks or explained by teacher traditionally. Furthermore, the advantages of tutorial video that can be accessed anywhere and anytime and can be viewed repeatedly makes learning activities more accessible and practical. Learning by videos that could present sound, images, text, and animation at once as well as help students more easily understand what they have learned with more meaningful. It also helps teachers in developing more effective learning activities and supports student self-reliance by reflecting on the perceived convenience of students when they have to learn independently through online learning sessions. However, it is important to note some weaknesses that emerge in this study, such as the limited internet connection on some students so that sometimes the video could not be accessed by students indirectly can decrease student motivation. In addition, the demands of students to get more interesting video and not so long in duration should be noted by the teacher before creating the learning materials.

Meanwhile, through the implementation of online discussion in BLE obtained various benefits for both students and teachers. For students, the availability of online discussion in the learning process is very helpful to overcome the difficulties often faced. Students feel facilitated where they can ask and discuss these difficulties more flexible, anytime and anywhere without having to wait for a face-to-face learning activities in the classroom.

As for teachers, the implementation of online discussion in BLE is very helpful in developing independent learning attitudes for students. The availability of online discussions that can be a common forum to construct the initial cognition of students before face-to-face classroom learning is very potential to establish more effective learning and focus on improving students’ learning performance. However, some weaknesses are also found from these online discussions such as students cannot post pictures, no math symbols are available, cannot create new paragraphs using enter key on the keyboard, there are none of the notifications when someone replies to a students’ post became the thing most students complained about.

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