# Developing a Blended Learning-Based Method for Problem-Solving in Capability Learning

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## ABSTRACT
The main objectives of the study were to develop and investigate the implementation of blended learning-based method for problem-solving. Three experts were involved in the study and all three had stated that the model was ready to be applied in the classroom. The implementation of the blended learning-based design for problem-solving was conducted between 2015 and 2016 where sixty graduate students majoring in physical education became the participants. Furthermore, the model was implemented for the second time between 2016 and 2017 in different settings where 3 (three) students became the participants. Based on the observation during the development and the evaluation process, the implementation of the blended learning-based method for problem-solving had positive effect. Implications for further implementations, suggestions for further research, and limitations of the current study are also discussed.

## INTRODUCTION
The purpose of learning is to improve and develop the quality of learning. In order to develop the quality of learning, one should select, establish and develop an optimum learning method to achieve desired outcome (Degeng, 1991). Reigeluth (1983) defines learning design as a process to determine which learning methodology that works most effectively so that learners experience change of knowledge and skills towards the expected direction. Furthermore, Reigeluth (1983) also uses the term blue print for learning design and the blue print for learning is developed in the same proses as an architect designs a building and bridge; the design of the building should match the blue print.

In order to develop learning design, one should also analyze future trends in learning especially those related to learning strategy and content. There is a tendency that learning strategy has been shifted from traditional learning method to future learning, which is called the era of knowledge, where learners can learn anywhere be it in the classroom, library or at home, anytime be it in the morning at school, in the afternoon or in the evening, from anyone that means learners can have various learning sources i.e. lecturers, experts, practitioners or the society and by any means which means learners can use numerous types of learning media, for example the internet, CDs, radio, television, laboratory or their own experience.

The kind of learning that combines various learning sources and modes is currently called blended learning which is derived from the world ”blended” which means combination or mixture and ”learning” which means to learn or study. The real and most general meaning of blended learning refers to learning activity that combines or mixes face-to-face learning and computer-based learning (online and offline). Thorne (2003) describes blended learning as it represents an opportunity to integrate the innovative and technological advances offered by online learning with the interaction and participation offered in the best of traditional learning.

The findings of Purcell, Boxall, and Wright’s study (2009) about the contributions of blended-learning components show that the learning components with the most contribution in blended-learning are assignments, textbooks, face-to-face presentation, and face-to-face lecture with instructors. Online learning video has also had contribution towards learning while online textbook gives average contribution towards learning. Even though they have a relatively low contribution toward learning, the learners argue they use video and online textbooks for learning occasionally.

In higher education, blended learning usually consists of once-a-week face-to-face lecture where learners use online learning to finish their projects or other assignments (Molenda & Boling, 2008). It is proven by the findings of the study that reveals some of the advantages of blended learning strategy are (a) to achieve the purpose of learning, (b) to change the pattern of learning from teacher-centered to learner-centered learning,

(c) to balance learner's learning independence as well as to motivate learners to achieve learning discipline (Murphy, 2003; Osguthorpe & Graham, 2003; Voos, 2003; Dziuban, Joel, & Moskal, 2004) and learning management, (2) to facilitate access to knowledge, (3) to improve learning interaction, (4) personal agency, (5) cost effectiveness, and (6) to ease revisions of learning materials (Osguthorpe & Graham, 2003). It means blended-learning is a strategy that takes the advantage of the two learning modes, conventional learning (face-to-face) and computer-based learning, be it online or offline learning (Collis & Moonen, 2001; Graham, 2006; Korkmaz & Karakuş, 2009). Therefore, the combinations of both learning methods (online and conventional) bring more effective learning and facilitate access to learning (Morgan, 2002; Osguthorpe & Graham, 2003; Murphy, 2003). Kurtus (2004) states that "blended learning is a mixture of the various learning strategies and delivery methods that will optimize the learning experience of the user." It contains the definition that blended learning is combination of various learning strategies and methodologies that will eventually enhance learning experience for the learners.

Related to learning outcome, Gagne (1985) states that one of the highest skills is called higher order thinking or problem-solving capabilities since problem-solving requires skills in thinking, collaboration, communication and some others. The topic of thinking and problem-solving learning has been the attention of experts in psychology in 1980s; it is considered as the skill to master in the 21st century. Their interest can be traced back to rapid change and challenge in the society that requires problem-solving individuals (Bransford et al., 1986; Marzano, Brandt, Hughes, Jones, Presseisen, Rankin, & Suho, 1988; Marzano, Pickering, & McTighe, 1993). Having achieved a problem-solving ability, an individual can overcome both similar and different obstacles he or she encounters in the real-life (Gagne, 1985; Gagne, Briggs, & Wager, 1992; Bransford, Sherwood, Vey, & Reiser, 1986).

Until recently, the type of learning adopted by most of education institutions in Indonesia is teacher-centered where teacher or lecturer becomes the major source of learning. However, since the printing technology has been discovered, most of learning sources are in the form of textbooks. Hence, the development of audio and audio-visual technology, computer, the internet and mobile phone (smartphone) in the 21st century enables the development of learning media using those gadgets. However, most teachers in various types and stages of education have yet used themselves and textbooks as the sources of learning. In order to develop learning that takes the advantage of technology as various learning sources, a sensitive learning model that combines learners and technology called blended-learning-based model should be developed. Blended-learning-based approach is the type of learning that combines three major sources of learning, namely face-to-face, offline and online.

The findings of Dwiyogo's (2013; 2014) studies show that the most current trends in learning is one that combines face-to-face, offline (computer interactive) and online (internet) learning. The traditional, face-to-face learning has recently been shifted towards the offline and online learning, and at the same time online learning, for example distant learning, has started to be combined with face-to-face meeting. Thus, teacher's ability to manage learning should be directed towards blended-learning. Based on the data from the respondents, 11% of the respondents have understood the concept of blended-learning, 41% of them have yet heard about blended-learning and 48% of the respondents learn and become familiar to blended-learning from the study. Related to the need of developing blended-learning-based problem-solving learning, 97% of the respondents agree to the blended-learning-based problem-solving learning development. The remaining 3% disagrees since they are about to retire in a short time so they do not feel the need to learn blended-learning concept; limited school facilities is another reason why the respondents disagree to the learning concept. Their hesitation to using technology as an integral part of learning can be traced back to the requirements to keep themselves updated with the most current trends in technology.

Based on the previous studies, the need analysis indicates that the development of blended-learning-based problem solving is urged. Based on the elaboration, the study has two main objectives. The first is to develop blended learning-based method for problem-solving (PBBL) and the second is to investigate the implementation of the blended learning-based method for problem-solving (PBBL) in order to see how the methods solve some challenges in the learning process.

## METHODOLOGY

### Phase one: Developing the blended-learning-based model design for problem-solving learning outcome

The study was a research and development (R & D) research using general instructional development (ID) model that was consisted of analyze, design, develop, implementation, and evaluation (Gustafson & Branch, 2002). The study took place in 2015 until 2016.

The study involved three experts in educational technology that were selected using purposive sampling. The three experts involved in the study were those having expertise in media, learning, and educational technology, teaching in the same university, holding doctoral degree, and all of them are senior lectures. The instrument was questionnaire to gather the data that consisted of two parts that was developed to collect review results from the experts. The first part used 5-point Likert scale (5= strongly agree, 4= agree, 3= neutral, 2= disagree, and 1= strongly disagree) then, the second part was addressed to get comments from experts.

Before the implementation stage, the model was sent to the experts to be evaluated. The data analysis was descriptive statistics evaluating relevant data and standard deviation to describe the experts' judgement and to revise the model developed before it was applied.

**Phase two: Investigating the implementation**

The study consisted of 2 (two) phases. The first was survey taking place between 2015 and 2016 during the blended learning course was conducted. The purpose of the survey was to obtain data related to the implementation of blended learning-based design for problem-solving (*PBBL*) in Blended Learning class the graduate students majoring in physical education took on their second semester. The second phase of the study was a case study of which purpose was to obtain data related to temporary phenomena taking place in real-life context where the blended learning-based design for problem-solving (*PBBL*) was implemented.

The subjects of the survey were all of graduate students of the State University of Malang majoring in physical education that consisted of 60 students from six classes. They were selected because they took Blended Learning course on the second semester. The objective of the survey was to obtain data related to the implementation of the blended learning-based design for problem-solving (*PBBL*) once the Blended Learning class had finished.

In the case-study, which took place between 2015 and 2016, three students were involved as active participants. The selection criteria for students were those who (1) have taken Blended Learning course, (2) chose to write a thesis on blended learning, (3) who conducted a Research and Development type of research, and (4) used the blended learning model in its product. These three students conducted research theses related to the implementation of the blended learning-based design for problem-solving (*PBBL*). They tried the method out in the classroom. The data collection methods were documentation, observation, questionnaire, and semi-structure interviews. The data collection emphasized on describing several challenges the three students encountered when they applied the blended learning-based design for problem-solving (*PBBL*) in the real setting (classroom).

**Data analysis**

Descriptive analysis was the data analysis method applied during the survey. The data were described in the form of percentage. Prior to distributing the questionnaire that consisted of eight components, namely organization, suitability, clarity, effectiveness, efficiency, flexibility, and user friendliness. Related to significance of the model , the researcher conducted reliability testing. The questionnaire was reliable since the Cronbach's α score was 0.902. Triangulation, as the method to guarantee the validity of the data, was conducted during the qualitative study. The reason in choosing this reseach design is because qualitative descriptive study could expose the data gathered from implementation stages deeply. The data obtained through questionnaire were cross-checked with the ones obtained through the interview, observation, and documentation.

## RESULT OF THE STUDY

**Phase One: Developing the blended-learning-based model design for problem-solving learning outcome**

Based on the need analysis, the learning theories and learning outcomes, blended learning-based approach is then developed into a model of learning design. The model is a flexible one where developers make some adjustment depend upon their need. The process of the development of the blended learning-based method is presented in Figure 1.

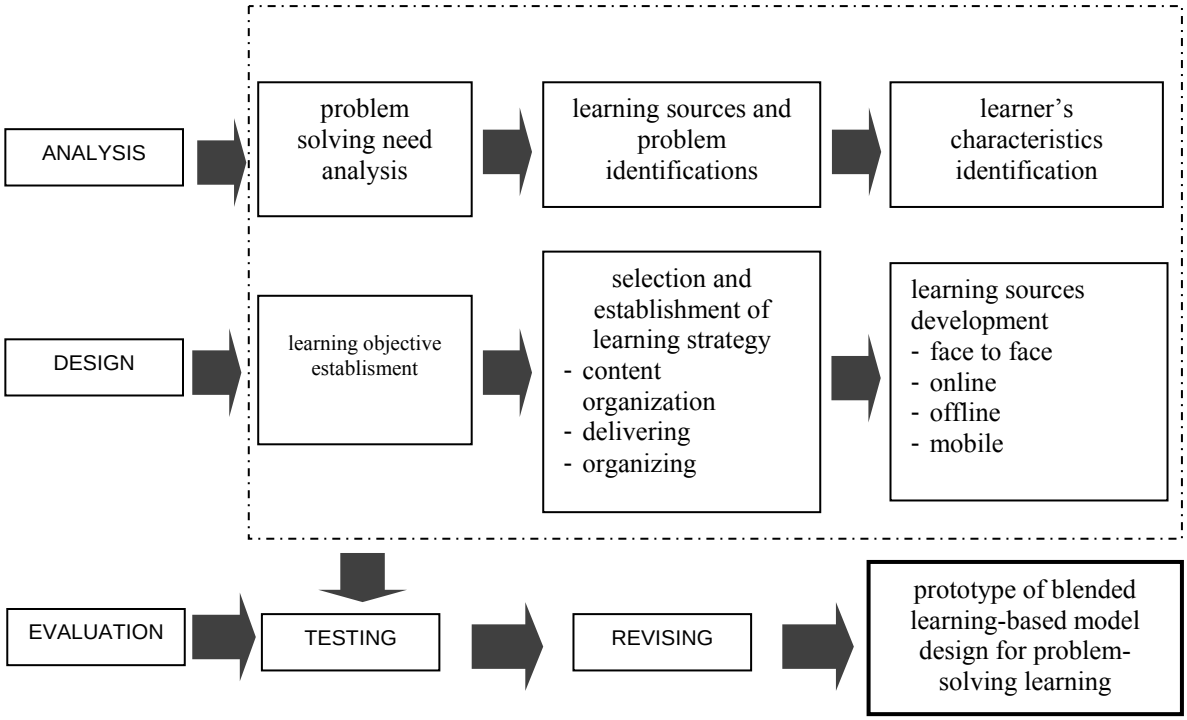


**Figure 1:** Blended-learning-based model design for problem-solving learning outcome (Dwiyogo, 2014)

In general, the development of the model is conducted in three stages, namely (1) analysis, (2) design, and (3) evaluation.

**Stages of model development**

*Analysis*, the first stage, analysis, consists of (1) problem-solving need analysis, (2) learning source and problems identification in the implementation of blended-learning based approach, and (3) learner's characteristics identification. *Problem-solving need analysis**,*** ***i***n problem-solving need analysis stage, the researcher conducts the following activities i.e. (a) analyze the current condition that is finding out the source of problems from the need that the learners going to solve that is the purpose of problem-solving learning outcome, (b) identify some aspects to master (knowledge, attitude and skills) to encounter problems and some follow-ups whenever new problems arise, (c) identify differences between the purpose, the current condition and the expected conditions, (d) decide and take notes about some advantages related to the performance, and (e) decide the priorities in some problem-solving efforts to overcome the current issues. The data collection methods in the stage are phone calls, direct interviews, emails, questionnaires, videos as well as observations.

*Learning sources and problems identification**,*** the purpose of the stage is to analyze some information from particular parties and media that involves (a) identifying teachers as learning source that includes the capabilities of the teachers, other teachers and computer technicians to develop online, offline and mobile learning sources owned by the schools or outside the schools, (b) identifying learning sources i.e. textbooks, audio, audio-visual, computer, the internet, smart phone/ tablet at the schools, (c) identifying learning sources i.e. textbooks, audio, audio-visual, computer, the internet, smart phone/ tablet outside the schools (web and other access). The aspect being analyzed in the stage is availability of the types of technology in the learning environment. The finding of the analysis is various types of technology that overcome the learning problems. Besides that, other findings show how close the learners are with the technology and to what extent they use the technology. Some aspects to be taken into an account are the types of available technology to use as references or those that supports the expected purpose that is the type of technology that enhances process of learning. The findings of the analysis are used to decide the appropriate to solve problems in learning process. In addition, the following step is to determine which skills the teachers should have.

*Learner's characteristics identification*, in the stage, the researcher conducts an analysis towards the learners' initial capabilities and characteristics. The learners' initial capability is pivotal for the researchers as the platform to decide the starting point for learning. The researcher then gathers some data about the characteristics of the population. Besides the initial capabilities, characteristics of the learners who become the targets of the study are of necessities. Learner's characteristics involves learner's age, stage, interest, occupation, health, learning

motivation, achievement, initial capability, capabilities in literacy, socio-economic status and/or foreign language mastery. As an addition, it is important to find some information about the learner's attitude towards the materials they are going to study and how they study the materials.

**Design**

The second stage of development is design consisting of (1) learning purpose establishment, (2) selection and establishment of learning strategy, and (3) learning source development. *Learning purpose establishment,* the purposes of the stage are to establish learning purposes that have been identified based in the previous steps and organize the learning purposes based on their level of importance. The learning purpose involves cognitive, affective, and psychomotor strands (based on the Bloom's Taxonomy) or verbal information, intellectual capability, cognitive strategy, attitude and psychomotor (the Gagne's (1985) Taxonomy). *Selection and establishment of learning strategy*, organizing the content of learning means elaboration of some steps of which purpose is to achieve the learning purpose. In other words, it is elaboration of learning purpose into some sub-skills or capabilities to achieve.

Learning analysis is carried out to conduct the elaboration of general purpose of learning into specific purpose of learning. The stage is the component of variable methods to implement learning program. There are at least two functions of the strategy, namely (1) to deliver the content of learning to the learners, and (2) to provide information/ materials learners need to show their capabilities (for example assignment and test). The strategy of delivery involves physical condition, teachers/ lecturers, learning materials and other activities related to learning. In other words, media is one of the essential components in the strategy for learning delivery. Therefore, learning media is the main discussion for the strategy. The strategy is related to decision-making about organizing strategy and delivery stage that are going to be used in the learning process. The management process includes (1) scheduling, (2) taking notes on learning progress, (3) managing learner's motivation, and (4) control of learning.

*Learning source development,* the source of learning that facilitates learners' blended learning-based learning process—face-to-face, online and offline learning. The activity carried out in the stage is selecting the most appropriate learning source to deliver information or learning materials that matches the availability of the technology in particular learning environment. The bases of the analysis are availability and access to technology in learning environment, learner's access to technology and how easy it is for the learners to use the technology, as well as ability of learning media to deliver learning materials. The result of the analysis is to decide the most suitable media to develop.

Development of learning source is carried out in four stages. The first is making storyboard or describing process of delivering learning materials into pictures so that everyone has a clear idea about the programs being developed. The process involves organizing both visual images and audio recording into well-organized manner in line with learning stages. The second is production or producing every element of the program and combine all of the elements into one unified program. The third is program testing and review which involves editorial, functional and technical reviews. The goal of the testing is to evaluate some errors the program encounters, for example the function of every button to operate the program. The technical review is conducted to ensure the revisions done towards the program have been done correctly. The final stage is implementation that is implementation of media into learning activities. In the stage of development, some software is used to produce the multimedia. The VideoMakerFX is used to create user interface. The software can create interactive user interface with animations for each look/ icon. The AutoPlay Studio version 8 is the software used to create overall outlook of the interactive multimedia. Video-recording is carried out using desktop-based outlook with the help of software called the ScreenCastOMatic. Meanwhile, the Ncesoft FlipBook Maker is the software to use for e-book outlook.

**Evaluation**

In the evaluation stage, the following activities are to be carried out: (1) formative evaluation, (2) revising, and (3) producing a prototype of blended learning-based problem-solving learning outcome. The type of evaluation carried out is formative evaluation of which purpose is revision. In the study, the formative evaluations are in the form of experts' reviews, individual, small-group and field tests. Based on the experts' reviews, individual, small-group and field tests, the researcher gain some feedbacks which stages of the blended-learning design to improve and revise. The researcher does some revisions and returns the revised version to the experts for another advice. Having been revised and reconfirmed, the result of the design is a prototype that is readily implemented in order to develop blended-learning-based method for problem-solving learning outcome. Having finished developing the model, the following procedure was conducting expert validation. The experts involved in the study were learning technology, media and learning experts. Based on the result of the expert validation, the

blended learning-based design for problem-solving (*PBBL*) model had been ready to apply in the classroom. The scores were pretty high. Table 1 described the result of the expert validation.

**Table 1:** The results of the experts' evaluation toward blended-learning-based model design for problem-solving learning outcome

| No. | Variables/ Main Statement | Mean | SD |
|---|---|---|---|
| 1 | Organization | 5.000 | 0.000 |
| 2 | Suitability | 4.667 | 0.577 |
| 3 | Clarity | 5.000 | 0.000 |
| 4 | Effectiveness | 5.000 | 0.000 |
| 5 | Efficiency | 4.667 | 0.577 |
| 6 | Flexibility | 5.000 | 0.000 |
| 7 | User friendliness | 4.333 | 0.577 |
| 8 | Significance of the model | 4.667 | 0.577 |
| | Total | 4.750 | 0.361 |

Based on Table 1, items 1, 3, 4, and 6 had the highest score ($\bar{X}$=5.000, SD=0.000). User friendliness had the lowest score ($\bar{X}$=4.333, SD=0.000). Overall, the eight items had high scores ($\bar{X}$=4.750, SD=0.361). Based on the scores, blended learning-based design for problem-solving (*PBBL*) the researcher developed was ready to use in real-life context (classroom).

**Phase 2: Investigating the implementation**

The second phase of the study aimed at finding out the implementation of the blended learning-based design for problem-solving (*PBBL*). It consisted of two stages, survey and case-study. The participants of the survey were 60 graduate students majoring in physical education. The survey was conducted on the second semester of the 2014-2015 academic year after Blended Learning class finished.

The survey showed that all of the graduate students agreed to all of the items of the blended learning-based design for problem-solving (*PBBL*) as seen in Table 2. Some students responded disagree (score 2) for cost efficiency ($\bar{X}$=3.367, SD=0.609), clarity of description ($\bar{X}$=3.300, SD=0.591), user friendliness (($\bar{X}$=3.233, SD=0.563), and increasing motivation ($\bar{X}$=3.317, SD=0.536).

**Table 2:** The results of the students' opinions toward blended-learning-based model design for problem-solving learning outcome

| No | Variables/ Main Statement | N | Min | Max | Mean | SD |
|---|---|---|---|---|---|---|
| 1 | Effective | 60 | 3.00 | 4.00 | 3.500 | 0.504 |
| 2 | Interactive | 60 | 3.00 | 4.00 | 3.467 | 0.503 |
| 3 | Flexible | 60 | 3.00 | 4.00 | 3.450 | 0.502 |
| 4 | Time Efficient | 60 | 3.00 | 4.00 | 3.467 | 0.503 |
| 5 | Cost Efficient | 60 | 2.00 | 4.00 | 3.367 | 0.609 |
| 6 | Clear Description | 60 | 2.00 | 4.00 | 3.300 | 0.591 |
| 7 | User Friendly | 60 | 2.00 | 4.00 | 3.233 | 0.563 |
| 8 | Increasing Motivation | 60 | 2.00 | 4.00 | 3.317 | 0.536 |
| | Total | | | | 3.388 | 0.539 |

Based on Table 2, the majority of the students agreed on all of the items related to the blended learning-based design for problem-solving (*PBBL*) ($\bar{X}$=3.388, SD=0.539). In other words, the students had positive attitude towards the development of the blended learning-based design for problem-solving (*PBBL*).

The researcher conducted another survey of where the students conducted self-evaluation about their Blended Learning competence. The students described how much they understood the software introduced using the blended learning-based design for problem-solving (*PBBL*) in the Blended Learning class. Table 3 described the result of the self-evaluation. More than a half of the respondents (53%) stated that they could use PowerPoint well. Only 15% of the respondents stated that they could use AutoPlay and Sigil well. The students could at least operate one type of software related to Blended Learning introduced in the class.

**Table 3:** Result of the self-evaluation

| *Software* | Mahir | | Bisa | | Tidak Bisa | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| WORD | 27 | 45 | 33 | 55 | 0 | 0 |
| PPT | 32 | 53 | 28 | 47 | 0 | 0 |
| Flipbook | 17 | 28 | 43 | 72 | 0 | 0 |
| ScreenCastO'Matic | 11 | 18 | 49 | 82 | 0 | 0 |
| AutoPlay | 9 | 15 | 51 | 85 | 0 | 0 |
| Mind Manager | 10 | 17 | 50 | 83 | 0 | 0 |
| Sigil | 9 | 15 | 51 | 85 | 0 | 0 |

The purpose of the case-study was to obtain more detail information about the implementation of the blended learning-based design for problem-solving (*PBBL*). Rohi (2017), Purwaningtyas (2016), and Fardhany (2016) were 3 (three) students participating in the case-study. The three of them enrolled in the post-graduate program in 2014 and finished their master degree at 2016 and 2017. They conducted a Research and Development (R & D) study that developed and applied the the blended learning-based design for problem-solving (*PBBL*) in the classroom setting.

Rohi (2017) conducted a study that developed a lesson for swimming class in the Department of Sport, Health and Recreation in Artha Wacana Christian University, Kupang, East Nusa Tenggara. He developed Blended Learning-based lesson using AutoPlay for face-to-face session, e-book downloaded using Android (using Sigil) for offline class, and the massive open online course (MOOC) accessed from the cite http://belajar.riwurohi.com, as seen in Figure 1, for online class. The study was conducted in 2016 where 32 students of the Department of Sport, Health and Recreation in Artha Wacana Christian University, Kupang, East Nusa Tenggara became the participants.


**Figure 2:** MOOC outlook (Rohi, 2017)

Rohi (2017), stated that he encountered several issues in the implementation of the blended learning-based design for problem-solving (*PBBL*) in Artha Wacana Christian University, especially ones related to the facilities (internet network) and the students' attitude toward the blended learning-based design for problem-solving (*PBBL*). Information and Technology was a foreign idea for the students so they were not used to the use of technology for learning. Rohi stated that the subjects in the implementation of the blended learning-based design for problem-solving (*PBBL*) had yet been specific. Therefore, in his study, he combined the participants and the Dick, Carey, and Carey procedures for the implementation of the blended learning-based design for problem-solving (*PBBL*). The following study was a study conducted by Purwaningtyas (2016) entitled "Pengembangan Modul Elektronik Mata Pelajaran Pendidikan Jasmani, Olahraga, dan Kesehatan (PJOK) Kelas XI Berbasis *Online* dengan Program Edmodo." It emphasized on online learning. The study was conducted in SMA Brawijaya Smart School, Malang where 30 eleventh grade students became the participants. The product was electronic module developed using Autoplay, Flipbook, and Quizcreator. The module was then uploaded in Edmodo that used software Autoplay, Flipbook, dan Quizcreator. The outlook of the Edmodo and the e-module were described in Figure 2 and 3.


**Figure 3:** Edmodo autoplay outlook (Purwaningtyas, 2016)


**Figure 4:** Edmodo front page (Purwaningtyas, 2016)

Purwaningtyas (2016) had the same challenge as Rohi (2016) in terms of internet network. Although the school had internet network, it had yet been sufficient in facilitating the implementation of the blended learning-based design for problem-solving (*PBBL*). In the interview, she stated that:

> The school has had facilities for online learning. However, there is problem with the internet network when all students are online at the same time. Therefore, internet network was the issue (Purwaningtyas, 2016)

Furthermore, Purwaningtyas (2016) had positive response towards the implementation of the blended learning-based design for problem-solving (*PBBL*). In general, she stated that the description was clear and it was easy to apply (user-friendly). She had positive suggestion related to the ideal percentage even though her study was limited to online learning.

> The procedures were clear because the specification was clear and it did not combine more than one method. It was clear that it combined online, offline, and conventional class. However, there has yet been clear percentage between online, offline and conventional class in the blended learning-based method for problem-solving (*PBBL*). Ideal percentage for each of them in every semester is needed (Purwaningtyas, 2016).

The third study was conducted by Fardhany (2016). He developed blended learning-based module for physical education class for the tenth grade of vocational school. The subjects of the study were 30 (thirty) tenth grade students of *SMKN 8*. He developed a product consisting of printed module, offline, and MOOC using Edmodo that consisted of materials about small and big balls, athletics, martial art and physical exercises. Figure 4 described the offline learning outlook developed using AutoPlay Fardhany developed.


**Figure 5:** Autoplay outlook for offline learning (Fardhany, 2016)

Fardhany (2016) stated that he encountered several difficulties when he developed the learning method since the blended learning-based method for problem-solving (*PBBL*) was designed for three modes of learning, conventional, online, and offline.

> Development is the most time-consuming phase out of the nine phases of the development of the blended learning-based method for problem-solving (PBBL). One of the reason is the product is designed for conventional, offline, and online learning. The first is using printed module for conventional learning and the second is interactive multimedia for offline learning. On the other hand, Edomodo is used for online learning (Fardhany, 2016).

Fardhany (2016) encountered difficulties during online learning because several students did not have any access to the internet when they were supposed to. The students said they could not afford internet network. The suggestion Fardhany (2016) had related to the participants was as follow:

> There should be more detail information related to the implementation of the method. I adopted and combined between the instructions available and Dick, Carey, and Carey's model (Fardhany, 2016).

Fardhany (2016) revealed that one of the advantages of the blended learning for physical education class was time efficiency. The physical education classes were conducted between 11 to 2 p.m. Conventional, face-to-face learning was not effective due to the weather. The field they used for physical education class was too hot. Blended learning allowed the teacher to combine the conventional learning to offline and online learning. In other words, blended learning offered an alternative learning method for the teacher.

## DISCUSSION

Based on the need analysis, 97% of the respondents agree to the blended-learning-based problem-solving learning development (Dwiyogo, 2013; 2014). The result of the need analysis becomes the basis for the development of the blended learning-based method for problem-solving (PBBL) that consists of 9 steps and is categorized into 3 phases. The first stage, analysis, consists of (1) problem-solving need analysis, (2) learning source and problems identification in the implementation of blended-learning based approach, and (3) learner's characteristics identification. The second stage of development is design consisting of (1) learning purpose establishment, (2) selection and establishment of learning strategy, and (3) learning source development. In the evaluation stage, the following activities are to be carried out: (1) testing, (2) revising, and (3) producing a prototype of blended learning-based problem-solving learning outcome.

Having finished the development and implementation phases, holistically, it is found out that the blended learning-based method for problem-solving (*PBBL*) being developed earns positive feedback for both the development and implementation. The survey shows that the blended learning-based method for problem-solving (*PBBL*) helps students learning the softwares they need for physical education class (for example Ms.WORD, PPT, Flipbook Maker, Screen Cast O'Matic, Auto Play, Mind Manager, and Sigil). Studies show that the implementation of Blended Learning (BL) increases learning effectiveness and facilitates process of learning for students (Morgan, 2002; Graham, 2006; Murphy, 2003; Osguthorpe & Graham, 2003). The students have positive attitude towards the blended learning-based method for problem-solving (*PBBL*) because it

increases their competence. Furthermore, the findings of Varol (2014) and Herguner's (2016) studies revealed that teachers or teacher trainee thought it was vital to have competence in information technology. In this case, the blended learning-based method for problem-solving (*PBBL*) develops student's competence in information technology as well as enables them to evaluate their IT competence independently.

The implementation refers to not only the result of the survey but also the case studies conducted by the three graduate students. All three of them did not find major challenge in the implementation of the blended learning-based method for problem-solving (*PBBL*). The only obstacle they encountered was the amount of time they needed to develop the products. In general, the implementation had positive impact. Some suggestions given after the implementation of the blended learning-based method for problem-solving (*PBBL*) in the classroom are percentage of the online, offline and conventional teaching modes and subjects being involved as participants. Related to the suggestions and Gustafson and Branch's idea (2002), instructional development model has various different characteristics. At the same time, it can be generalized that all types of instructional development consists of analysis, design, development, implementation and evaluation. Based on the interviews, the three students said that they adopted Dick, Carey, and Carey's (2015) sets of procedures during the implementation of the blended learning-based method for problem-solving (*PBBL*). The procedure may be carried out when a researcher needs to alter or modify certain model to meet objective of his or her study. Dick, Carey, and Carey model is the foundation for scientific studies in various disciplines, more particularly integration of technology into learning during implementation and evaluation stages (Gustafson and Branch, 2002). The suggestions are taken into account for further studies.

As an addition, internet network is the issue all three of the students encountered during the implementation of the blended learning-based method for problem-solving (*PBBL*). It sometimes is difficult for their students to get internet access. Internet is one of the most frequent issues in learning (Yapici & Akbayin, 2012; Zaka, 2013). Access to internet should be one of the considerations in deciding the percentage of conventional, offline and online learning. As what has been mentioned in the steps for applying the blended learning-based method for problem-solving (*PBBL*) into the real classroom setting, analysis is the basis for the following step.

## CONCLUSSION

The main objectives of the study are to develop and to investigate the implementation of blended learning-based method for problem-solving (*PBBL*). The findings show that the blended learning-based method for problem-solving (*PBBL*) the researcher developed is ready to use in the real classroom setting. The implementation of the method shows positive effect; the responses are positive. Overall, the blended learning-based method for problem-solving (*PBBL*) can be used as an alternative for research and development study that provides specific and thorough application of Blended Learning (BL). The implementation of the blended learning-based method for problem-solving (*PBBL*) consists of 3 (three) main stages. The first stage, analysis, consists of (1) problem-solving need analysis, (2) learning source and problems identification in the implementation of blended-learning based approach, and (3) learner's characteristics identification. The second stage of development is design consisting of (1) learning purpose establishment, (2) selection and establishment of learning strategy, and (3) learning source development. In the evaluation stage, the following activities are to be carried out: (1) testing, (2) revising, and (3) producing a prototype of blended learning-based problem-solving learning outcome. The limitation of the study were focused on the study design that was used to reveal the effectiveness. This study only provided data qualitatively in order to gather the implementation stage results. Furthermore, it is needed a more sytematical quantitative research using experimental design to investigate the result of blended learning implementation to students learning capabilities in problem solving

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