The Development of Blended Learning at Information and Communication Technology Subjects

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Abstract:

Information and Communication Technology is one of the subjects taught at SMA Don Bosco 2 Jakarta. In the learning process, various problems were found, the learning material consisting of cognitive and practical learning required more time while the time provided was limited. The current condition is also a new challenge where the Covid19 pandemic occurs so you are required to study at home. This research was conducted using the Dick and Carey Research & Development (R&D) method integrated with the PEDATI blended learning design model. The research was conducted from January to October 2020, at SMA Don Bosco 2 Jakarta. The results of the study generally show that the quality of the prototype based on the validation of the material, media and instructional design expertsreview is 94%, 80%, and 82%. Meanwhile, based on the results of the one to one trial, the small group and the large group the quality obtained was 96%. After being applied, it got an N-Gain Score of 0.78 and was classified in the high category.

Keywords: *Blended, Development, instructional, Information and Communication Technology*

INTRODUCTION

In the Covid19 pandemic situation, the Ministry of Education provided instructions for all schools to carry out technology-assisted learning to replace face-to-face activities in schools, or better known by educational institutions and teachers as PJJ (Distance Learning). Through circular number 27 of 2020, formal and non-formal education under the auspices of the Jakarta Special Capital Region Provincial Education Office is ordered to be carried out at home starting on March 16, 2020 (Provincial Education Office of the Special Capital Region of Jakarta, 2020). This Long Distance Learning activity continues to be extended and is still ongoing until the time this thesis was written in October 2020.

This condition of distance learning poses various obstacles because face-to-face learning settings in schools which are the main power of the majority of teachers in formal education are closed and cannot be carried out in undetermined time. Face-to-face learning at school is the most commonly used and relied on by the majority of teachers in Indonesia, especially teachers in formal education. This condition forces teachers to immediately adapt to using internet technology and learning applications to replace face-to-face learning in schools while maintaining the quality of learning and learning outcomes.

The absence of face-to-face at school raises many problems, the teacher's stuttering application of online learning has caused many complaints from students, parents, and even by the teachers themselves. This stuttering application is considered reasonable because in an emergency and urgent condition, teachers and schools try to formulate e-learning activities that are suitable for the conditions of their respective students.

Based on the press conference conducted by KPAI, students complained about the large number of tasks that had to be completed, unclear material that was not even given, and the time students had to spend in front of a computer screen because all learning activities that were originally held in class were changed directly to online using a video application conference, this causes health problems such as fatigue and sore eyes due to prolonged sitting in front of a smartphone or computer. In addition, students also ask for more interactive and less boring learning, as well as subsidizing internet costs (CNN Indonesia, 2020).

A similar voice was also conveyed by the parents of students, apart from complaining about the same thing with their children, the majority also complained about the amount of internet costs that had to be incurred and they had to spend more time helping their children do tasks that their children could not complete (Republika, 2020).

Information and Communication Technology is one of the subjects taught at SMA Don Bosco 2, East Jakarta. The Information and Communication Technology subject at Don Bosco 2 High School focuses on the introduction of computers and programming logic to equip students with problem-solving logic and the basic skills to develop entrepreneurship by utilizing information and communication technology.

The results of preliminary observations and interviews conducted on January 8, 2020 which were conducted with information and communication technology teachers at SMA Don Bosco 2 Pulomas, East Jakarta, obtained data that the average value of learning achievement results of class XI students in Information and Communication Technology subjects was still low. . Based on the odd semester learning outcomes for Information and Communication Technology subjects, there are still many students whose grades are below the KKM (Minimum Completeness Criteria) before remedials are made. This low result is also reflected in the average Odd Semester Final Examination owned by class XI students is 63, while the KKM score determined by the school is 75. This shows that the average learning achievement of students is still below the KKM value which is determined.
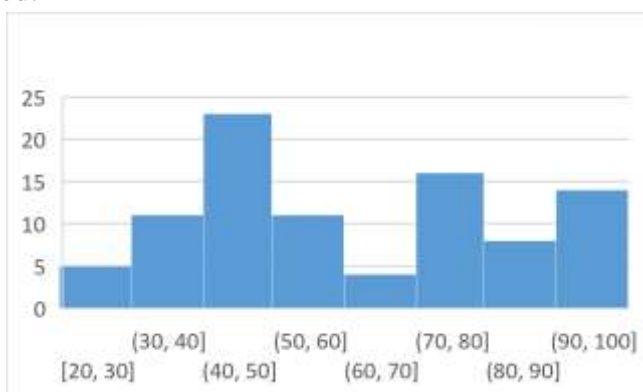

Figure 1. ICT UAS Value

Class XI students of SMA Don Bosco 2 learn about web programming, the material focuses on programming logic and the use of websites for entrepreneurship, in further interviews, the teacher stated that one of the main causes of less than optimal learning in class XI information and communication technology was the incomplete discussion. subject matter optimally. This is due to various factors, first the scope of the material being taught is quite broad, the two materials are considered quite complicated and it takes more effort by the teacher to increase student motivation, third, due to differences in students' perceptual power, the teacher finds it difficult to explain the material again. previously without having to sacrifice the time of students who already understand, fourth, because the material taught is very complex so that the available learning resources are still very limited. This causes learning activities to be slow and there are some materials left behind, making it difficult for students to learn.

Based on the problems that occur in the subject of information and communication technology at SMA Don Bosco 2 Pulomas, East Jakarta above and the current conditions where the Covid19 pandemic occurs which requires students to learn from home, an immediate solution is needed to overcome the weaknesses of e- learning. The use of the Blended Learning model can be a smart solution in overcoming the Covid19 pandemic conditions where students cannot meet in class (Utami, 2018).

Blended learning is a combination of synchronous learning with asynchronous learning (Littlejohn & Pegler, 2007). Because learning in Blended Learning can be done asynchronously, it allows teachers to overcome the problem of lack of time to provide material and repeat learning activities for students whose learning process is slower so that it is detrimental to students who already understand.

Blended learning is also a learning model that can be offered to improve the quality of learning (Utami, 2018). It is expected that by using Blended Learning student learning outcomes can improve. In addition, blended learning can also be a solution for learning that has limited face-to-face time (Rachmadtullah et al., 2020). This makes Blended Learning a learning solution in the current conditions of the Covid19 pandemic, even though face-to-face learning in class can be substituted for virtual face-to-face with the help of technology, but directly transferring class chases usingapplications *video conferencing* cannot be done. Virtual face-to-face learning with *video conferencing* must consider the duration, network support, and the various limitations of the interactions that occur.

With *blended learning*, problems that arise in e-learning can be reduced, because the synchronous and asynchronous delivery system plays an integral part of the overall learning process (Chaeruman, 2013). The role of the teacher as a facilitator and motivator is also accommodated both in synchronous learning (face to face) and asynchronous learning (independent and collaborative).

Blended learning takes the advantages that exist in traditional learning methods (face to face in pandemic conditions is replaced by virtual face to face), and combines them with the advantages that exist in *e-learning learning*. Weaknesses in online learning can be overcome by advantages in face-to-face learning. Likewise, the weakness in face-to-face can be overcome by the advantages of online learning (Chaeruman, 2013).

Based on these various things, the ICT material at SMA Don Bosco 2 class XI can be done with blended learning to improve student learning success. The problem that arises is the unavailability of learning resources specifically designed for this learning.

The state of the art of this research is that researchers will develop *Blended Learning* in the conditions of the COVID-19 pandemic where face-to-face meetings at school do not exist, so that face-to-face meetings and the presence of teachers and peers that are usually done in the classroom will be facilitated withapplications *video converence* and remote discussions. Researchers will also use the latest features in online learning such as special features to increase interaction and control in learning, work on remote collaboration tasks, discussion features, and other features that are developing very rapidly during the pandemic that are made

specifically to improve the quality of distance education. currently held all over the world. In addition, the research will integrate the Dick and Carey model with the PEDATI Model to develop alearning strategy *flipped classroom.*

The Flipped Classroom starts with student learning that is carried out online outside of the classroom or at home with content that has been provided previously. After carrying out the online learning process outside of school students then deepen and practice solving problems at school with their teachers and / or peers. Thus, it can be considered that the role of traditional learning in the classroom is "reversed" (Horn & Staker, 2014).

PEDATI is a blended learning system design model which consists of acronyms for the words learn, explore, apply, and evaluate. The PEDATI learning system design model describes a systematic and logical work procedure, and has elements (components) that are clear and related to one another. PEDATI can be used as a guide or reference in designing a blended learning system. (Chaeruman, 2017)

RESEARCH METHOD

Research was conducted at SMA DON BOSCO 2 Pulomas, East Jakarta from January 2020 to October 2020. In developing *blended* learning in information and communication technology subjects in class XI SMA Don Bosco 2 Jakarta will follow the Dick and Carey procedure which is integrated with the model. PEDATI in developing learning strategies will use. Dick & Carey is a learning development model that uses a systems approach as its rationale (Dick & Carey, 2005). PEDATI is an acronym for Belajar, Dalami. Apply. and Evaluation. PEDATI can be a guide or reference in designing alearning system *blended* (Chaeruman, 2017).

The research process begins with conducting needs and objectives analysis, instructional analysis, identifying student characteristics, writing learning objectives, developing assessment instruments, developing learning strategies, developing and selecting learning materials, designing and conducting formative evaluations, and ending with summative evaluation.

In conducting formative evaluations, researchers used material expert testing, media, learning design followed by trials on the target using ascheme *one to one*, small groups, and large groups. Meanwhile, for summative evaluation, the researchers conducted a pre-test on students, conducted developed learning, and conducted a post-test.

To collect data, researchers conducted observations, questionnaires, interviews, pre-tests and post-tests. Analyzed with quantitative descriptive techniques to see the results of trial scores and N-Gain to assess the effectiveness of learning outcomes.

RESULTS AND DISCUSSION

Learning *blended* developed by researchers were learning for information and communication technology subjects in class XI at SMA Don Bosco 2 Jakarta. Information and communication technology subjects are not compulsory subjects in the 2013 curriculum, information and communication technology subjects are one of the local content subjects and identity subjects or excellence at SMA Don Bosco 2 Jakarta. In the learning process, teachers of information and communication technology subjects use face-to-face lecture methods in class and practice in the computer lab.

The problem that arises in learning information and communication technology in class XI at SMA Don Bosco 2 is that the amount of material that must be taught and the learning time consisting of knowledge and practice processes is deemed insufficient so that it makes teachers have difficulty achieving good learning outcomes. This is based on the results of interviews with subject teachers and is strengthened by the acquisition of student scores on the semeter final exam in the 2019/2020 school year before the remedial process is carried out which has an average of 62, these results are below the minimum completeness criteria (KKM) value of 75. , the subject teacher also conveyed

the problem that the students' abilities varied enough so that several times the explanation of the material had to be repeated for some students, while some students who had already understood had to wait.

New problems also arise due to the conditions of the Covid19 pandemic, all schools in Jakarta are required to conduct distance learning. Teachers who are accustomed to relying on face-to-face learning in class are required to redesign learning strategies to be applied through online learning. Based on the results of interviews with subject teachers and questionnaires given to students, teachers find it difficult to present interesting lessons to increase student motivation, students feel burdened by the many tasks given by their teachers.

Thus it is concluded that face-to-face learning in information and communication technology subjects has not been effective and efficient, especially when faced with new challenges of distance learning due to the Covid19 pandemic, an appropriate learning strategy is needed immediately to overcome problems that arise in learning information technology subjects. and communication for class XI at SMA Don Bosco 2 Jakarta.

In overcoming problems that arise in learning information and communication technology for class XI SMA Don Bosco 2 in this pandemic condition, learning must use information and communication technology.learning *Blended* is the right solution to overcome the limited time for synchronous learning by providing asynchronous learning either independently or collaboratively.

Flipped Classroom is one of the models inlearning *blended* which is included in the category of *rotation model* (Horn & Staker, 2014). In the *Flipped Classroom the* teacher can facilitate learning by providing material asynchronously for previously studied by students, then followed by synchronous learning to facilitate discussion, question and answer, practice, and provide conclusions and feedback on learning activities that have been carried out by students. *Flipped Classroom* is the right solution because it allows teachers to take advantage of the limited synchronous learning time effectively because students can be more active because they have previously studied the material discussed, and do not spend synchronous learning time explaining a material over and over.

By usinglearning *blended* with themodel *Flipped Classroom,* class XI students will learn material that is knowledgeable through online texts, presentation materials, infographics, discussions, and learning videos outside synchronous lesson hours. Students can also determine their own learning duration according to their respective abilities and abilities.

In developing *blended* learning in information and communication technology subjects in class XI of SMA Don Bosco 2 Jakarta, it will follow the Dick and Carey procedure which is integrated with the PEDATI model in developing learning strategies. Dick & Carey is a learning development model that uses a systems approach as its rationale (Dick & Carey, 2005). PEDATI is an acronym for Belajar, Dalami. Apply. and Evaluation. PEDATI can be a guide or reference in designing alearning system *blended* (Chaeruman, 2017).

After completing the design *prototype* of the blended learningfor information and communication technology in class XI SMA Don Bosco 2, before the learning is implemented to students, the *prototype* blended learninggoes through trials to ensure the product is feasible and makes improvements at each stage.

The first trial conducted was an expert test, the product was tested on material experts, based on the results of the study of material experts, it was found that the feasibility of the learning aspect was 100% with very good qualifications, the material aspect was 93% with very good qualifications, and the language aspect was 92%. with very good qualifications. The average assessment obtained from the study of material experts is 94.8% and suggestions need to be added with enrichment material for students who are quicker to understand the lessons given. Based on these results, the *prototype* learning *blended* made suitable for use and still making revisions by providing enrichment material for students according to material expert suggestions.

Table 1 Recap of the results of the feasibility assessment by material experts

No	Aspect	Score Maximum	Total Score	Percentage Achievement
1	Learning	35	35	100%
2	Material	55	51	93%
3	Language	25	23	92%

The results of the media expert test, for the media display aspect got a score of 80% in a good category, the compatibility and accessibility aspects of the program got a score of 80% in the good category, and for the media presentation aspect, it got a score of 80% in the good category. So that the average media feasibility results obtained are 80% and advice from instructional experts for teachers should not be included in the "steps" section, simply given in the guide outside the channel. Based on these results, the *prototype* learning *blended* that was made was categorized as good and suitable for use by making improvements by eliminating the step part according to the advice of media experts.

Table 2. Recap of the results of the feasibility assessment by media experts

No	Aspect	Maximum Score	Amount Score	Percentage Achievement
1	Display	35	28	80%
2	Program Compatibility and Accessibility	50	40	80%
3	Presentation	30	24	80%

While the results of the learning design expert test, for the learning aspect get a score of 85% in the good category, the display aspect gets a score of 80% in the good category, and the language aspect gets a score of 80% in the good category. So that the average result of the learning design expert test score is 82% with a good category and get suggestions to add many motivational elements to teaching materials and multiply examples and non-examples. Based on these results, the *prototype* learning *blended* made suitable for use by making improvements added many motivational elements and increased examples and non-examples according to suggestions from learning design experts.

Table 3. Recap of the results of the feasibility assessment by learning design experts

No	Aspect	Maximum Score	Total Score	Percentage Achievement
1	Learning	45	38	85%
2	Display	10	8	80%
3	Language	25	20	80%

After the *prototype* learning *blended* passes expert review from material experts, media , and learning design, then a trial is carried out against the target. The trials were carried out on students with ascheme *one to one*, small groups and large groups.

The results of thetrial were *one to one* conducted on 3 students with low, medium, and high abilities. After conducting atrial *one to one* , an average score of 96% was obtained with the very good category. Then the testing was continued with a small group scheme, in the small group scheme, the *prototype was* learning *blended* tested on 9 students who were divided into 3 each from groups with low, medium, and high abilities. Based on the small group trial, the results were 96% in the very good category. After that the testing was continued again with large group testing, in this scheme the testing was carried out on 34 students. After processing the data, the results are 96.7% with very good categories.

Thus, it can be concluded that the *prototype* blended learningin information and communication technology subjects in class XI SMA Don Bosco 2 is suitable for use in learning.

To see the effectiveness of thelearning *blended* that is made. The researcher implemented this learning to 67 students of class XI SMA Don Bosco 2 Jakarta. The results of the pre-test and post-test data analysis conducted on students showed an average increase in accordance with the N-Gain Score analysis of 0.78 and included in the high category. There are 54 students with a high N-Gain Score category, 13 students with a moderate N-Gain Score category, and no student who gets a low N-Gain Score category. So that it can be concluded learning *blended* subjects Information and communication technology in class XI SMA Don Bosco 2 effectively improves student learning outcomes.

DISCUSSION

Development oflearning *blended* using themodel *flipped classroom* in information and communication technology subjects in class XI at SMA Don Bosco 2 helps teachers in the learning process as a solution to the problem of lack of learning time, difficulty finding independent learning resources, and becoming a distance learning solution which is good when all students are required to study at home because of the Covid19 pandemic situation. Learning development uses the Dick and Carey development procedure which is integrated with the PEDATI model to designlearning *blended.* The platform used is Microsoft Teams.

The results of the feasibility of developinglearning *blended* in information and communication technology subjects according to material experts are in very good qualifications and suitable for use, according to media experts are in good qualifications and suitable for use with revisions as necessary, and according to learning design experts are in good qualifications and suitable for use with revisions as necessary

CONCLUSION

Based on the results of the research that has been carried out,learning *blended* with themodel *flipped classroom* in the subject of information technology and communication in class XI at SMA Don Bosco 2 is effective in increasing student motivation and learning outcomes.

suggestions

Teachers'can use blended learning with the flipped classroom method as a solution to learning conditions have limited face-to-face time especially in conditions that require distance learning.

Other researchers can conduct blended learning development research on other subjects at an equivalent level (SMA or SMK).

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