Online Application Development in Blended Learning to Increase Ease of Collaboration and Communication, and Students' Freedom of Thought Ability

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ABTRACTS: *Entering the 21st century in the industrial era 4.0, it is recommended that the learning process uses a blended learning model that combines face-to-face and online meetings. To facilitate this learning process the researcher wants to facilitate this learning by designing an application form that is easy to access and easily understood by students and has cheap funds to implement it in the field. This research is a development research and aims to develop online applications that are easy to follow to improve communication and collaboration routines and improve students' thinking skills.*

The research method in designing this application uses two methods in its development, namely: To develop the product being developed. The researcher used the instructional development model of Dick and Carey (2001), while the research flow was developed using the Borg and Gall (2003) model.

This study aims to produce a book output on online application development with a blended learning model to improve collaborative routines, communicate and increase students' thinking skills. In the first year of this research, developed an online application tool and a blended learning model. In developing the application, an initial survey will be carried out on online applications that are of interest to students, and the creation of a lecturer web / blog as a forum for providing additional material and reading material to expand students' insights. In the second year, a limited scope (small scale) product dissemination / trial was carried out and product evaluation and revision, after a small group test was conducted and a revision was carried out, this learning design model was continued by implementing the learning design model implementation on a wider scale. After the implementation in this stage, a final revision and evaluation is carried out for final dissemination. The third year of implementing training and assistance for innovative learning design models for learners, it is hoped that additional and compulsory outputs can be published and have been implemented.

From the survey results obtained a high percentage of online application procurement, while the results of material expert validation obtained a percentage of 95% and validation of IT experts with a percentage of 95%, this means that the product developed can be applied as a trial. From the comparison of the old model in the learning process using blended learning, it is found that blended learning is better. Collaboration and communication using a smartphone application is said to be more fun and can facilitate the learning process. Meanwhile, student learning outcomes with the development of problem-based learning strategies, students find significant progress in improving their learning outcomes.

Keywords: Online Application, Blended Learning, Collaboration, Communication, Thinking Ability.

I. PRELIMINARY

Face-to-face meetings have a very short time and opportunities for students and lecturers to collaborate and communicate are very limited. The essence The learning process does not stop after face-to-face meetings have been completed, but how learning can take place all the time. The 21st century which enters the industrial era 4.0 demands that the learning process can take place throughout the day. This era suggests that the learning process can be done with Blended Learning. This learning prioritizes face-to-face and online learning. In this

online learning, it is hoped that students can be facilitated to collaborate and communicate, take lecture materials / materials, materials to enrich learning resources that do not only come from lecture materials / materials from lecturers.

Starting from this background problem, this research aims to find a solution, how to make it easier for lecturers and students to carry out the learning process with the demands of the 21st century industrial era 4.0. Online application development is expected to facilitate collaboration and communication between lecturers and students, between students and students, and between students and anyone who can be invited to frequently. Besides that, the development of this model does not spend very large amounts of money and is even very affordable in its procurement.

In line with these problems, the strategic issues that exist in higher education development, researchers want to develop online applications in the blended learning learning model with a problem-based learning strategy in improving collaborative and communicating routines and increasing students' thinking skills.

This study aims to develop a blended learning model application form to improve collaboration, communication, and to improve students' thinking skills. This research was conducted in two stages, namely the first stage of developing a blended learning model learning application design with a survey on the use of online applications, and then compiling the required application tools according to the survey results. The application that becomes the goal is a lecturer blog / web to store teaching materials / materials and information related to lectures, an online application form so that they can collaborate and communicate between lecturers and students. This tool will be validated to determine the feasibility of implementing it in the field.

Meanwhile, in the second stage, a limited scope (small scale) product dissemination / trial will be carried out and product evaluation and revision. This stage will also produce article revisions. Second, the implementation of the learning design model application will be carried out on a wider scale. Furthermore, from the revision of the learning design model, a dissemination will be carried out for mass production. The evaluation results will be packaged in a book.

This research was conducted on students of two classes of graduate school learning technology study program PGRI AdiBuana University Surabaya with 35 respondents in class A and 36 students in class B.

This research is to develop a learning application with a blended learning model to improve collaborative routines and communication between lecturers and students, students and students, and students with other sources that can be used frequently in completing their learning tasks. What makes the mainstay of developing this application is the ease of access and does not use a lot of funds.

This research is expected to find findings about the development of online applications in the blended learning model to improve collaborative and communicating routines, as well as gain original abilities in students in their creative thinking in completing tasks that must be completed. As stated in the results of previous research, this study prioritizes the principle of diversity in student thinking so that later students are familiar with authentic problems in the developing field. Presentation material is based on authentic events or problems that exist in the field. The learning process besides taking place in class also occurs and is carried out outside the classroom in a cooperative forum / discussion about the findings of learners in completing tasks in groups. Learning also takes place online by promoting collaborative routines and communicating between lecturers and students, students and students, will also be able to increase student competence in thinking by promoting diversity in thinking through online applications such as e-mail, sms, telephone, messenger, WhatsAp, facebook, teleconferent .

The findings in this study are expected that this model can improve the continuity of learning at any time (without any restrictions for collaborating and communicating when students need it. In this study, the existence of a web or blog for lecturers, a site used as a forum for implementing the learning process such as google classroom or the like , module teaching materials and manuals on how to design blended learning with its application.

II.   Blended Learning Design with Problem Based Learning Strategy

The minimum standard to be able to carry out the learning process in the 21st century in the industrial era 4.0 is the Blended Learning learning model. Blended Learning is a learning process that combines face-to-face and

online lecture meetings. Blended learning terminologically emphasizes the use of the internet in sending a series of solutions that can increase knowledge and skills (Rosenberg, 2001). The learning material delivered through this media includes text, graphics, animation, simulation, audio, and video. In this case, learning must provide convenience in communicating and collaborating or called group discussions provided in the form of applications in the internet world such as e-mail, teleconferencing, WhatsApp, SMS, telephone and so on. This learning model certainly cannot be used without a delivery strategy. The strategy used in blended learning is a problem based learning strategy. This strategy is used to solve student learning problems. Any learning model without being followed by the right strategy will make learning that has good effectiveness. This suggestion has been expressed by Reigeluth (1983) that learning should be based on a prescriptive learning theory, meaning a theory that provides a reference on how to solve learning problems. In designing strategies in learning, there are several elements or components that must be considered. The elements or components presented by the designer can be modified or developed according to the needs of what will be conveyed. The elements of a learning strategy in this case include: General objectives of learning to be achieved, techniques or ways to achieve general goals, organizing activities in learning, learning events related to the stages in carrying out the learning process.

Problem based learning is used in this learning model because it is hoped that it can improve students' creativity in solving authentic or real problems. Alder and Milne (1997) provide a review that the problem-based leaning strategy is a method that focuses on identifying problems and compiling an analysis and solution framework. Another opinion from Peterson (2004) states that this method provides students with problems that are not well structured and problem solving that is not only one because it focuses on self-learning and is very far from direct explanation to the core / answer / content and or an explanation given directly by the learner. Wheeler, at al. (2005) states that problem based learning explains that learning is based on thinking through real life problems. Boud and Feletti (1997) argue that "problem-based learning is an approach to structuring the curriculum which involves confronting students with problems from practice which provise a stimulus for learning". White (2001) also argues that overall problem based learning is an effective method for improving problem-solving skills.

The reason researchers use problem-based learning strategies is because this strategy contains skills in collaborating and communicating, so it can be assumed that student learning outcomes in terms of creativity in solving problems will increase and in accordance with expectations in the world of work, namely graduates can be accountable for their abilities in field in solving problems in their field of work. This opinion is reinforced by the opinion that in problem-based learning strategies, collaborative work is an important aspect because collaboration will help develop a learning community where learners feel more able to develop new ideas and raise questions about the material (Alen in White 2001). Furthermore, Cohen in White, (2001) states that collaborative work will be able to improve communication skills and the ability to manage groups dynamically and with collaboration will attract and motivate students because students are actively involved in work and have responsibility for the student's own activities.

In research that has been done by experts in the use of problem-based learning strategies, it can improve their thinking ability in solving problems, such as research conducted by Danielson, et al. (2003) found that the student's problem-solving ability increased because students could identify all the relevant data they got before the students gave a solution. Akinoglu and Tandogan (2007) found that the application of problem-based learning has had a positive effect on academic achievement and student attitudes towards Science subjects. Sasmedi, et al (2005) who conducted classroom action research to carry out learning using problem-based learning to teach English resulted in an increase in English language skills. Blended learning design using problem based learning strategy is designed with authentic learning. The steps for the Blended Learning model are as follows: 1) The lecturer uploads learning materials, assignments to the Quipper School application, 2) The lecturer informs students to study the material that has been uploaded, either directly or indirectly (via the Quipper application School), 3) The lecturer checks the attendance of students, 4) The lecturer explains the teaching material by explaining the learning objectives that the students will achieve in the material, 5) The learner motivates and guides students to get additional information, and provides answers to problems that are

difficult for students to understand, 6) Lecturers appreciate the success of students in doing assignments, 7) Lecturers provide evaluations through the Quipper School application in forming prepared quizzes and essays.

III.   Online Application

In the learning process, learning media are all sources that are needed in communicating with students (Martin and Briggs, 1986). Using and selecting media in learning must consider how much the level of interaction is generated, how much the motivation level is generated and the costs required. In the use of media, it also takes into account the characteristics of learners. This means that the closer to the differences in student characteristics in choosing media, the higher the level of motivation that will be generated by the media. As stated by Heinich, Molenda, and Russell (1985) in Degeng (2008), stated that "if instructional media are to be used effectively, there mus be a match between the characteristics of learner and the content of the learning material and its presetation ".

Online media which is used to access information from sources is also used to communicate with other learners and learners (Smaldino, Lowther, Russell, 2011). The online world has the ability to convey any information, so that anyone can access electronic documents to enrich their studies, and the most important thing is that students can interact with online learning by providing an interactive environment.

For the benefit of application developers in this study, online applications will be packaged into two categories, namely applications intended for students to enrich their studies in completing assignments that are easy to access in the form of web or lecturer blogs. While the second online application is an application developed on a computer / laptop or smartphone that has developed and is in great demand and used by students with reference to the principle of ease of collaboration and communication in the learning process such as e-mail, telephone, sms, messenger, and WhatsAp.

In this learning, students will be given the freedom to use the applications they like and master in collaborating and communicating between peers, with lecturers, or with anyone. Online applications are used to carry out the learning process with a blended learning model when students or lecturers conduct discussions (online tutorials) and make agreements in the learning process.

IV.   METHOD

Research Design

This research is a type of development research that refers to the development research steps of Borg and Gall (2003). Meanwhile, the steps in developing a learning design model refer to the development design of Dick and Carey (2001). In developing online applications, developers carry out several stages including the pre-development stage, the development stage, and the post-development stage.

In the pre-development stage, a literature review and survey will be carried out on the use of online applications by students. In the development stage, learning tools will be developed which includes making a web or blog for lecturers and online applications and developing learning modules as a bridge in implementing the learning process. In this stage there will also be expert testing or what is called the design validation test that has been developed and trials of small groups, limited groups and large groups. In the post-development stage after being tested and declared feasible and perfect, the product being developed will be disseminated, namely massive multiplication of devices.

Data Collection Methods and Data Analysis

In principle, overall in such a design, it is designed in pre-development, it can be specified that in the literature review, all literature related to the problems that will be developed, both books and journals, is carried out, while the survey is carried out using a questionnaire about the learning model and application that will be used. in device development. At the development stage in carrying out learning devices, a list of questions is used for expert validation, a questionnaire for students and lecturers about the use of learning models and their applications. When the trial was carried out, besides the questionnaire, an experiment was also carried out by comparing the old and new models to capture data on the effectiveness and creativity of students' thinking.

The data collected through this research are in the form of data on: (1) the results of expert / expert validation on online applications in blended learning, (2) the relevance of the material being studied, (3) the effectiveness of online applications and the material being studied, and (4) suitability the materials studied with easy access to materials and collaborating / communicating in online tutorials the data obtained will be processed / analyzed using descriptive statistics which are presented in the form of a percentage. While the presentation of qualitative data is in the form of exposure and explanation of the data.

V.   RESULTS

The first step in this research is to conduct an assessment or survey on the online application that students want. The desired application is easy access and is liked by students as a whole. From the survey results, it was found that application students in learning were more familiar with the Google Classroom site which was linked to the lecturer's web or blog and a learning model in the form of blended learning with a problem-based learning strategy, while the method as a bridge in collaborating and communicating was using WhatsApp, SMS, messenger, phone and e-mail. Based on these results, the researcher made a blended learning design with a problem-based learning strategy with applications as a place to collaborate and communicate using WhatsApp, SMS, messenger, telephone and e-mail as well as zoom or meet.

The next stage, the researcher designed teaching material products in the form of modules in the learning evaluation course as material for teaching trials. In addition, researchers also develop applications to communicate and collaborate using WhatsApp, SMS, messenger, telephone and e-mail and the use of meet or zoom as collaboration and online communication can be included in the learning program. The product developed is tested with validation from material experts and IT experts. The results obtained from the validation test show that the material expert validation test gets 98% and the IT expert validation test gets 98%. This means that the product developed for teaching materials and application design for collaboration and communication using the web or blog and google classroom to be used can be said to be feasible for field trials.

After the product validation has been carried out and it is declared worthy of such data, then prepare the content in Google Classroom and the web or lecturer block for small group trials. In small group trials conducted on 10 students to determine the effectiveness of old and new products in students' understanding of the learning design.

The effectiveness of the old product is (1) The highest ideal score is 4, the number of criteria specified is 3, the number of respondents is 10, then the ideal score is 4x3x10 = 120, (2) The ideal score of the effectiveness criteria is 4 (the highest ideal score) x 10 (number of respondents) = 40, (3) The total score of the old product is 44 and the total score of the old product is 120. Then the effectiveness of the old product is 44: 120 x 100% = 36%, and (4) The effectiveness of each old product instrument, The total number of each criterion is A = 15, B = 18, and C = 11, then the effectiveness of the old product from criteria A, B, and C, then A = 15:40 x 100% = 37.5%, B = 18: 40x100% = 45%, and C = 11: 40x100% = 27.5%.

While the effectiveness of the new product is obtained: (1) The highest ideal score is 4, the number of criteria specified is 3, the number of respondents is 10, then the ideal score is 4x3x10 = 120. (2) The ideal score of the effectiveness criteria is 4 (the highest ideal score) x 10 (number of respondents) = 40, (3) The total score of the new product is 44 and the total score of the old product is 120. Then the effectiveness of the old product is 97: 120 x 100% = 80%, and (4) The effectiveness of each product instrument time, the total number of each criterion is A = 37, B = 24, and C = 36, then the effectiveness of the old product from criteria A, B, and C, then A = 37:40 x 100% = 92.5%, B = 24: 40x100% = 60%, and C = 36: 40x100% = 90%.

For the significance between old and new products, the calculation is carried out by determining the correlation value between old and new products, namely the average, standard deviation, and variants, the results are obtained for the old product XX = 44, and for new products $\sum X$ = 97. correlation is obtained for the old product x = 4.4, s = 0.84, s2 = 0.711, and r = 0.6, while for new products obtained x = 9.7, s = 0.48, s2 = 0, 23, and r = 0.6.

VI.   DISCUSSION

The results obtained in the survey indicate that students as a whole like the blended learning model with problem-based learning strategies with applications as a means of collaboration and communication. The product design being developed which is carried out by a validation test on the test of material experts and IT experts can be concluded that the product being developed is suitable for testing. From the results of the trials as a whole such as small group trials, limited group trials, and large group trials did not experience obstacles which meant that the treatment and implementation of the blended learning learning model with a problem-based learning strategy with the application of WhatsApp, SMS, messenger, telephone and E-mail and zoom atrau meet can be said to be worthy of dissemination.

For the comparison of old and new products, there is a significant increase in effectiveness, namely: from 36% to 80.8%. While the comparison of each criterion between old and new products also increased significantly in effectiveness, namely A = 37.5% to 92.5% for speed, B = 40% to 60% for creativity, and C = 27.5 to 90% for learning outcomes.

For the significance between the old product and the new product, it is assumed that:

Ho = The new product has less or the same effectiveness as the old product
Ha = The new product has better or the same effectiveness as the old product

From the results presented, a policy can be made that in the development of online applications in increasing the ability to collaborate, communicate, and students' freedom of thought can be said to have significant effectiveness. So that the products developed can be produced to be used as guidelines for lecturers in designing learning.

VII.   CONCLUSIONS AND SUGGESTIONS

Conclusion

Starting from the results and discussion above, the blended learning model with problem-based learning strategies and online applications as a means of collaboration and communication, which in this case uses the WhatsApp, SMS, messenger, telephone and e-mail applications, it can be concluded that this model is a learning model. which is fun means that it is very liked by all students. And with this learning model the students' thinking ability increases and understands the problems faced in the real or authentic field.

Suggestion

In facing the 21st century in the industrial era 4.0, it is recommended to carry out learning based on blended learning. With that recommendation, researchers are eager to prove the results of learning with the blended learning model by conducting this research to be developed. And the results obtained in this study can be proven that the thinking ability of students is increased and blended learning becomes comfortable in student learning (meaning that it becomes fun learning for students). Students are more free to find existing learning resources, both hard copies and from the internet, and have more time to ask questions with lecturers or other people as a means of collaborating and communicating outside the classroom. Therefore it is suggested that students in both schools and colleges can change the way they teach according to the developments and demands of the 21st century in the industrial era 4.0, namely by using the blended learning model with applications on smartphones that are loved by everyone, namely WhatsApp, sms, messenger , telephone and e-mail.

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