Developing student character of preservice mathematics teachers through blended learning

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Abstract. This study aims to develop communicative, creative, curiosity, and hard work to students through learning mathematics using blended learning method. The method in this research is qualitative research with analytical descriptive study approach. The subject of this research is a level 3 student of preservice mathematics teachers in one of private universities in Bandung. The instrument used in this research is the observation sheet of student character in each learning activity. Based on the research, it can be concluded that learning with effective blended learning method can develop communicative character, creative, curiosity, and hard work. Overall, it can be concluded that learning using blended learning method can develop the character of the students of preservice mathematics teachers.

1. Introduction
The effort to improve the quality of learning is something that is not separated from the responsibilities of an educator. Being an educator today is certainly very different from yesterday. The challenges faced are huge, considering the current education has entered a new era of technological era and scientific progress rapidly. The world of education is currently being spoiled by technological developments that are easily absorbed and learned by almost in all circles. The 21st century learning of fulfilling the needs of life in various contexts is more knowledge-based. Efforts to meet the needs of educations, economics and development in the field of industry must be knowledge-based. It is quite clear that efforts to improve the quality of education are essential and fundamental in the face of the challenges of this century. Mathematics is the basic science in developing knowledge and technology. Based on the "21st Century Partnership Learning Framework", there are several competencies and/or expertise that must be possessed by HR XXI century, namely: (1) Critical-Thinking and Problem-Solving Skills; (2) Communication and Collaboration Skill; (3) Critical-Thinking and Problem-Solving Skills; (4) Communication and Collaboration Skills; (5) Creativity and Innovation Skills; (6) Information and Communications Technology Literacy; (7) Contextual Learning Skills; (8) Information and Media Literacy Skills.

Mathematic learning in the 21st century is expected to contribute significantly to the development of the character of students who are ready to face the rapidly growing global life. Moral education including the character development of students even up to the process of education in universities, should have received serious attention in the practice of education in Indonesia. It is actually very clearly contained in the function and purpose of the Law of the Republic of Indonesia Number 20, 2003 [1] About the National Education System that "National education functions to develop the
ability and shape the character and civilization of dignified nation in order to educate the nation, the development of the potential of learners to become human beings who believe and cautious to God Almighty, have noble character, healthy, knowledgeable, capable, creative, independent, and become citizens of a democratic and responsible. Character education is not only applied in elementary, junior and senior high schools, but also at university level. This paper will discuss how to apply character education among students, in order to produce candidate leaders of the nation who are not only able in the academic field, but also praised in character.

One of the demands of 21st century education is closely related to the character and technology of communication and information. Educational experts [2] formulate academic or skill achievements required by students and students in the 21st century, among others: "(1) Having character as a thinker, skilled in innovative creative thinking characterized by high adaptability, able to solve complexity problems, strong self-control and self-direction. Smart, creative, and brave to take risks. Relevant characters include curiosity and great curiosity about new discoveries and want to try, think openly, and be reflective; (2) Productive and have high work motivation. Have the ability to set priorities, develop planning, and map out the results achieved. Skilful use and keep up with technology. Have a clean and healthy life behaviour, discipline, sportsmanship, unyielding, tough, reliable, resolute, hard work, and competitive; (3) Proficient in communicating characterized by the ability to work in teams that vary, collaborate, and competently develop interpersonal relationships so that they can always put themselves in a harmonious interaction. Have a personal, social, and skilful communication skill in carrying out responsibilities. No less important students are skilled in interactive communication with smart and humble. Characters that are relevant to these skills are appreciated, tolerant, caring, helpful, cooperative, and nationalist, prioritize public interest and pride in the nation's own products; (4) Proficient technology and information as the basis for the development of mastery of science, the skills of managing money, has the spirit of entrepreneurship as a foundation of economic and technological literacy skills. Equally important is the technological support of students developing multicultural skills, working together and communicating in a cross-national space, as well as developing skilful global awareness; (5) The Responsibility of Faith. The Indonesian people consider that intellectual, digital, social, and academic skills are not enough. Indonesian children are required to have a more valuable life skills characterized by their faithful and cautious skills, honest living skills, skilled in performing their mandate, are skilled at doing justice, are skilled at performing their responsibilities, are skilled at empathy, and obediently observe the religious life and obey the commands of God Almighty.

Given the growing evidence that internet information and communication technologies are changing a lot of things to society, this is what the 21st century challenge is [3]. The focus of the research study is to develop character values on blended learning model that is aimed at students of mathematics teacher candidates. Of the eighteen values of the characters listed in the values of the nation's cultural character, in this study only focus on the character of hard work, curiosity, creative, and communicative. Urgency about character education, should get special attention especially in college. So that the implementation of character learning can be seen its development. Through some activities in learning mathematics for preservice teachers, this study will answer the question of whether the learning with blended learning model can develop the character of the students of preservice mathematics teachers.

2. Theoretical Study
The Law of the Republic of Indonesia number 20 of 2003 on National Education System (UU Sisdiknas) formulates the function and objectives of national education that should be used in developing educational efforts in Indonesia. Article 3 of the National Education Law states, "National education functions to develop and form the character and civilization of a dignified nation in order to educate the nation's life, aiming for the development of potential learners in order to become human beings who believe and cautious to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen”.

Narvaez [6], the dilemma that faces teacher educator, then is whether it is acceptance to allow character education to remain part of a school’s hidden curriculum or whether advocacy for the value commitments immanent to education and teaching should be transparent, intentional and public.” A
dilemma faced by teachers in receiving character education which lies in a hidden curriculum and the need for open and comprehensive teaching commitment to the school aspects.

Education culture and character of the nation is the development of values derived from the perspective of life or ideology of the Indonesian nation, religion, culture, and the values formulated in the goals of national education. Culture is defined as the whole system of thinking, values, morals, norms, and beliefs (beliefs) of human beings produced by society. Character is the character, character, morality, or personality formed by the internalization of virtues that are believed and used as the basis for the worldview, thinking, acting and acting. Virtue consists of a number of values, morals, and norms, such as honest, courageous, trustworthy, and respectful to others. The interaction of someone with others fosters the character of society and the character of the nation.

Character According to the Guidelines for the Development of Cultural Education and Character of the Nation of the Ministry of National Education [7] is the character, character, morality, or personality formed from the internalization of virtues that are believed and used as the basis for the worldview, thinking, Act. Virtue consists of a number of values, morals, and norms, such as honest, courageous, trustworthy, and respectful to others. The interaction of someone with others fosters the character of society and the character of the nation. Therefore, the development of the character of the nation can only be done through the development of one's individual character. However, since humans live in certain social and cultural environments, the development of one's individual character can only be done within the social and cultural environment.

Development or character building is believed necessary and important to be done by schools and stakeholders to become a foothold in the implementation of character education in schools. Throughout the history of human culture, Thomas Lickona [8] states that the goal of moral education is to help learners become smart and make learners good. In other words, the purpose of character education is basically to encourage the birth of good children (Insan Kamil). Growing and developing a good character will encourage learners to grow with the capacity and commitment to do the best things and do everything right and have a purpose in life.

Character is developed through knowing, acting and habit. Character is not limited to knowledge alone. A person who has knowledge of goodness may not be able to act in accordance with his knowledge, if not trained (become a habit) to do well. Characters also extend to areas of emotion and habit. Thus required three components of good character (component of good character) that is moral knowledge, moral feeling or feeling (emotional reinforcement) about moral, and moral action or moral deeds [7]. This is necessary so that learners and / or other schoolchildren involved in the education system can understand, feel, live, and practice moral values.

Description of the value of the nation's character formers in question is; (1) Hard work, is a behaviour that shows genuine efforts to overcome barriers to learning and duty, and to complete the tasks as well as possible; (2) Curiosity, is an attitude and action that always strives to know more deeply and extends from something he learns, sees, and hears; (3) Friendly / communicative, is an act that shows the pleasure of talking, socializing and cooperating with others; (4) Creative, is thinking and doing something to produce new ways or results from something that has been owned.

Blended learning is the process of bringing together a variety of learning methods that can be achieved by combining virtual and physical resources. Driscoll & Carliner [4] defines: blended learning integrates-blends-learning programs in different formats to achieve a common goal. It means blended learning integrates - or combines - learning programs in different formats to achieve common goals. Blended learning is a combination and a variety of strategies in learning. So it can be said that blended learning is a learning method that combines two or more methods and strategies in learning to achieve the purpose of the learning process.
Allen, Seaman, and Garrett [9], defined blended learning as: “The definition of an online program or blended program is similar to the definition used for courses; an online program is one where at least 80 percent of the program content is delivered online and a blended program is one where between 30 and 79 percent of the program content is delivered online.”

To implement blended learning in college, Gynther's theory [5] states that there are four focused didactic questions, namely (1) what knowledge the student must achieve and the form of education to be achieved; (2) how room arrangements are needed for learning; (3) how to set up the learning environment needed; and (4) what learning resources are needed. Problems encountered in the implementation of learning in college is if teaching in a large class, then learning with one-to-one and hands-on is rather difficult to implement. Another problem is the problem of learning time. Cotrell and Robinson [11] blended learning is not only a method that reduces lecture time issues but also a way to lecture programs with more students.

Taradi [10] blended learning is one of the three principles of learning that exist in higher education, the three principles are web-based learning, problem-based learning, and collaborative learning. Blended learning is included in the principle of web-based learning because in blended learning there is online learning, that is learning through website that has been designed.

Development of learning steps that apply Blended Learning also needs to be well designed, so that in the implementation of learning learners do not feel technical difficulties. Therefore, educators need to prepare in advance everything that is needed, such as materials that will be delivered or discussed, the platform that will be used in learning with Blended Learning, tutorial use of the platform used in learning by applying Blended Learning and so forth. Before implementing learning by applying Blended Learning, educators must prepare all of their learning needs, especially the use of technology platform that will be used in learning that will be used without implementing face to face. Some of the platforms that can be used in learning with Blended Learning like Group Mailing List (Mailing Lists, Yahoo Groups, Google+, etc.), Web Blog Teachers, Social Media (Facebook, Twitter, Instagram, Path, etc.) Learning Management Systems or LMS applications (such as Moodle, Edmodo, Quipper, Kelase, etc.) and so on. Furthermore, how the educator-defined platforms are applied in the learning process previously arranged in the designed learning steps.
According to Garnham and Kaleta [5] hybrid or blended learning is a learning activity that is partly done online and the time normally used in the classroom can be reduced but not eliminated. In this study online activities conducted outside the face-to-face without reducing face-to-face activities so as to provide sufficient time for the occurrence of communication between students and students with faculty lecturers. Communication is done online to helps students master competence.

Student learning activities also experienced an increase in the presence of blended learning. Students can independently access the learning resources that have been prepared in the website. Students can conduct discussions with other lecturers and students on a scheduled or independent basis. This is in accordance with Garnham and Kaletas's opinion [8] that the purpose of developing blended or hybrid learning is to combine the best features of classroom learning (face-to-face) and the best characteristics of online learning to actively enhance active learning. Based on the above opinion blended learning developed in the course done face-to-face, offline, and online is the right way to improve the achievement of student competence as a preservice teacher who must master the philosophy and theory of learning as a whole. Learning activities develop critical thinking skills, communicate oral and written, manage discussions, and rational opinions.

Siemens in Yaniawati [16] mentions one of the categories of e-learning that is blended learning, which provides the best opportunity for the learning transition from class to e-learning. Blended learning involves class (or face-to-face) and online learning as a learning process. This model is effective enough to increase the efficiency of learning in the classroom and conduct discussions or add / seek information outside the classroom.

Kurtus [11] 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 states that blended learning is a mixture of various learning strategies and delivery methods that will optimize the learning experience for its users. Implementation of this strategy allows the use of online learning resources, especially web-based / blogs, without leaving Elliot's face-to-face activities [6].

Meanwhile, according to Allen, Seaman, and Garrett Hasbullah [9], defines blended learning, namely: The definition of an online program or blended program is similar to the definition used for courses; an online program is one where at least 80 percent of the program content is delivered online and a blended program is one where between 30 and 79 percent of the program content is delivered online.

To implement blended learning in college, Gynther's theory in Hapizah [10] states that there are four focused didactic questions, namely (1) what knowledge the student should achieve and the form of education to be achieved; (2) how room arrangements are needed for learning; (3) how to set up the learning environment needed; and (4) what learning resources are needed. Problems encountered in the implementation of learning in college is if teaching in a large class, then learning with one-to-one and hands-on is rather difficult to implement. Another problem is the problem of learning time. Cotrell and Robinson in Hapizah [10] blended learning is not only a method that reduces lecture time issues but also a way to lecture programs with more students. There are several reasons for using blended learning according to Garnham [7], namely: (1) increasing pedagogy; (2) ease of access and flexibility; (3) improve effectiveness

Edmodo is a personal microblogging platform developed for teachers and students, prioritizing student privacy. Teachers and students can share notes, links, and documents. Teachers also have the ability to send warnings, events, and assignments to students and may decide to post something in a time frame that is publicly visible. Edmodo is a social learning platform for teachers/lecturers, students/for parents guardians developed in late 2008 by Nic Borg and Jeff O’Hara who feel the need to thrive in a school/college environment to reflect that an increasingly global world and connected, then they create a tool/application that can close the gap between how students and their lives learn how they study at school/college, for which Edmodo exists. Edmodo is created as a social networking learning platform for teachers/lecturers, students/students, and parents/carers.

3. Methodology
This research is a qualitative descriptive research that describes the value of characters that arise as a result of learning mathematics using blended learning method. There are three characters studied, namely: (1) hard work, (2) communicative, (3) creative and (4) curiosity. Subjects in this study as
many as 39 students of preservice mathematics teachers. Student mathematical character data obtained from observation sheet containing 12 characteristic of character assessment.

The Observation Sheet used to look at the student's mathematical character is the result of a discussion with one psychologist and several colleagues. Data of learning result obtained from mathematics learning mathematics course. The platform used in this study is a learning management system application that is Edmodo.

Data analysis on each learning activity is divided into three parts as follows: (1) in the introduction; (2) core activities; (3) closing activities.

Some indicators of character values that can be developed through Learning Activities through blended learning model for students of preservice mathematics teachers include: **Hard Work**; (1) do all class assignments finish well at a predetermined time; (2) do not despair in facing difficulties and face problems in working on problems; (3) it is not easy to give up in the face of problems that are considered difficult in the learning process. **Communicative**; (1) provide responses or ideas of questions or explanations relating to the material being studied; (2) interaction with friends, discussing math assignments provided by teachers; (3) Participation in groups when learning math. **Creative**; (1) to submit an opinion concerning a subject; (2) asks about the application of a theory under study. **Curiosity**, (1) ask a lecturer or friend about the subject matter of mathematics; (2) trying to find out from learning sources about the concepts / problems learned / encountered; (3) trying to find a more challenging problem; (3) active in finding information related to mathematics.

### 4. Result and Discussion

Based on the observation, many interesting things during the learning took place. Especially the characters that appear at the time of learning. Since the blended learning method used is the enhanced course web model in this learning model, students search for and find sites relevant to the learning materials, present the material through the web interesting and desirable, serve guidance and communication over the Internet, and other necessary skills. The following are the values of characters that appear as a result of learning activity outcomes.

| No | Learning Activities | Execution time | Platform | Character Education |
|----|---------------------|----------------|----------|---------------------|
| 1  | Introduction        | Before the implementation of learning on campus | Edmodo lecturer | Hard Work |
|    | a. Lecturers give assignment to students to read the course material and answer some initial questions given by lecturer (on record platform in Edmodo) | | | Working on all class assignments finishes well at predefined time. |
|    | b. Students access Edmodo, then read and do some lecturer questions | | | |

|    | | Communicative | Provide responses or ideas of questions or explanations related to the material being studied, |
|    | | Curiosity | Ask a lecturer or friend about mathematics subject matter, |
|    | | Seeking to learn from learning sources about concepts / problems learned / encountered. |
|    | | Seeks to find more challenging issues |
c. The lecturer gives a schedule to conduct a discussion of the results of student answers to some questions given. Before the implementation of learning on campus with a predetermined schedule. Meeting 1 (2 x 50 minutes) (face to face 20 minutes)

| Main Activities                                      | Edmodo students | Website Study Program                                                                 |
|------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------|
| a. Students present the results of previous discussion by showing their work that has been uploaded through Edmodo |                 | http://matematika.fkip.unpas.ac.id/#                                                  |
| b. Students are asked to make a report of the results of discussions and presentations are then published through the Website Study Program | 30 minutes      |                                                                                       |

d. Lecturers convey competence and learning objectives. WhatsApp between Lecturer and student representative

Hard Work
Working on all class assignments finishes well at predefined time.

Communicative
Provide responses or ideas of questions or explanations related to the material being studied

Creative
propose opinions concerning a subject;
ask about the application of a theory being studied

Curiosity
Ask a lecturer or friend about the material being discussed
Seeking to learn from learning resources about concepts / problems learned / encountered
Seeks to find more challenging issues
Active in searching for information related to math

Hard work
Working on all class assignments finishes well at predefined time

Not despairing in the face of adversity and facing problems in working on problems
Not easy to give up in the
Character values that arise from each learning activity are as follows: (1) preliminary activities are: hard work, communicative, and curiosity; (2) core activities are: hard work, communicative, curiosity and creative; (3) closing activity is communicative. The above findings are supported by some previous research by; (1) D. Fisher [15] that learning CORE models can develop the character of junior high school students; (2) V. N. Anwar [12] The mathematical characters developed in explorative learning include unyielding, persevering, confident and communication.

5. Conclusion
Based on the results obtained, it can be concluded that learning by using the method of blended learning, can develop the character Curiosity, Hard work, Creative, and Communicative to students of preservice mathematic teachers. The characters that focus on this research only develop the character of curiosity, hard work, creative and communicative. There are still some student characters that can be developed in the learning activities. Some learning models, approaches, strategies and learning techniques can facilitate the growth and development of characters.

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