Students' mathematical communication skills through vlog in project-based learning based on the unity of sciences

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Abstract. This study aims to determine the increase in mathematical communication skills of students of UIN Walisongo Semarang using mathematics teaching materials that apply Project Based Learning through vlogs based on unity of sciences. The importance of mathematical communication skills can help students more easily communicate the results of their mind on mathematical problems through symbols, diagrams, tables, or the other media. Mathematical communication skills make it easier for students as prospective teachers to convey messages in the form of mathematical concepts, principles, and objects. Students who have mathematical communication skills have an easy understanding of the level of understanding the concepts and application of mathematics in everyday life. Mathematical communication skills can be honed through a learning process that involves groups in creating and completing a project. Giving projects in the form of vlogs trains students in communicating and expressing their ideas or truths and can inspire others to do the same on the vlogs that have been made. Project-based learning through vlogs with Islamic values as the implementation of the unity of knowledge can instill a paradigm that all knowledge is one interconnected unit, sourced from the verses of Allah, both qualtiyah and kauniyah verses, so that it is getting higher. Owned mathematical knowledge, makes someone who studies mathematics more faith in Allah. The results showed that there was an increase in the mathematical communication skills of mathematics education students by using a project-based learning model through vlogs based on science unity.

1. Introduction
The era of the industrial revolution 4.0 has had an impact on changes in the lifestyle and global culture of Mathematics Education students of UIN Walisongo who are oriented towards the use of technology, so that students must be able to master skills in the fields of information, media, and technological abilities [1]. Students are prepared as prospective teachers who must have 21st century skills, namely critical thinking, collaboration, communication, and creative thinking skills [2].

Mathematical communication skills is one of the goal of learning mathematics [3], it makes easier for students as prospective teachers to convey messages in the form of concepts, principles, mathematical objects, and various problem solving techniques in mathematics to their students [4]. Students can communicate the results of their minds on mathematical problems through symbols, diagrams, tables, or other media that can clarify a mathematical problem [5], according to The Intended
Learning outcome Mathematical communication is a skill to coherently express mathematical ideas to friends, teachers and others through spoken and written language [6]. The mathematical communication process may also provide students with opportunities to share ideas [7].

Baroody argue there are at least 2 important reasons that make communication in learning mathematics the focus of attention, namely (1) mathematics as language; mathematics is not just a tool to aid thinking, a tool to find patterns, or solve problems, but mathematics is also "an invaluable tool for communicating a variety of ideas clearly, precisely, and succinctly," and (2) mathematics learning as social activity; As a social activity, in mathematics learning, interaction between students, as well as teacher-student communication is an important part of "nurturing children's mathematical potential"[8].

However, based on observations in the field, students have difficulty communicating when given mathematical problems both in writing and orally. Students are still shy or do not have confidence in expressing their mathematical thinking ideas in front of the class, so that the lecturer does not know the extent of students' understanding of the mathematics material being studied.

According to NCTM the indicators of mathematical communication are 1) expressing mathematical ideas through oral, written and demonstrate and describe visually; 2) understanding, interpreting and evaluating mathematical ideas both verbally and in other visual forms; 3) Ability to use terms, mathematical notations and their structures to present illustrative ideas [9]. Sumarmo said that the indicators of mathematical communication skills are 1) the ability to express a situation, picture, diagram, or real object into language, symbols, ideas, or mathematical models, 2) explaining mathematical ideas, situations, and relations orally or in writing, 3) listening to, discussing and writing about mathematics, 4) reading with the understanding of a written mathematical representation, 5) making conjectures, formulating definitions, and generalizations, and 6) restating a mathematical description or paragraph in its own language [10].

The mathematical communication skills can be grown through the learning process using a project-based learning model [11]. Joel L Klein et. al argued that the model Project Based Learning is learning that empowering students to acquire and building new knowledge and understanding based on his experience through various presentations [12]. Project-based learning is centered on the learner and affords learners the opportunity for in-depth investigations of worthy topics. The learners are more autonomous as they construct personally-meaningful artifacts that are representations of their learning [13].

Trianto argues that PjBL is a learning model that involves students in problem-solving activities and provides opportunities for students to work autonomously in constructing their own learning and ultimately producing student work products with realistic values [14]. Lecturers can choose projects that can develop mathematical communication skills, one of which is making vlogs or vlogging. The advantage of a vlog is that it is an attractive display containing images, audio, text combined in a complete unity, a person can also freely work [15]. learning activities through vlogs can provide a more interesting and meaningful learning experience for students. Based on observations, 100% of students are active on social media, want to be seen as recognized by their existence by taking pictures and uploading stories on their social media. Vlogs on YouTube are currently a trend among the public to express creative and innovative ideas in sharing life stories, making tuorials, sharing knowledge and experiences in the form of videos, audios, images, and texts that are packaged attractively into a whole.

The steps for the learning process in the Project Based Learning model generally put forward by the Ministry of Education and Culture are (1) determining the project; (2) designing the steps for completing the project; (3) preparation of a project implementation schedule; (4) project completion with facilitation and lecturer monitoring; (5) preparation of reports and publication of project results; and (6) evaluation of project processes and results.

Learning should be carried out in accordance with global developments but still prioritizing local wisdom. This attitude is one of the manifestations of the unity of sciences (UOS) paradigm which will produce character graduates with mastery of many sciences and view all branches of knowledge as a holistic unity for humanity and civilization amidst rapid technological developments. The Unity of sciences paradigm affirms that all knowledge is basically a unity that comes from and leads to Allah.
through His revelation, either directly or indirectly. This paradigm emphasizes that all sciences dialogue with each other and lead to one goal, namely to get the student to know and get closer to Allah, the Most True (al-haqq) [16].

The strategy for implementing the Unity of Science paradigm in the curriculum is as follows. 1) Humanization of Islamic sciences. Humanization is meant to construct Islamic sciences so that they can touch and provide solutions to the real problems of Indonesian human life. The humanization strategy of Islamic sciences includes all efforts to combine the universal values of Islam with modern science in order to improve the quality of life and human civilization; 2) spiritualization of science. Spiritualization is to provide a foundation of divine values (Ilahiyah) and ethics to secular sciences to ensure that basically all sciences are oriented towards improving the quality or survival of humans and the universe, not defaming or destroying both of them. The spiritualization strategy of modern sciences includes all efforts to build new knowledge based on the unified awareness of knowledge, all of which are derived from the verses of Allah, whether obtained through prophets, exploration of reason, or exploration of nature; 3) revitalizing local wisdom. Revitalizing local wisdom is the strengthening of the nation's noble teachings. The local wisdom strategy consists of all efforts to remain loyal to the noble teachings of local culture and their development in order to strengthen the nation's character.

However, the UOS paradigm is still a problem for lecturers when it is implemented into mathematics learning, how Islam and mathematics both in terms of material and the learning process are an inseparable whole, where both are integrated with each other. Where as in learning mathematics, it must pay attention to several aspects including: 1) using contextual problems, 2) encouraging reasoning to make conclusions, 3) developing creativity by involving imagination, intuition, and discovery through divergent, original and experimental thinking, 4) developing problem solving abilities, 5) using models, 6) rediscovering concepts / definitions / formulas / procedures, and 7) accommodating all human abilities from the highest, middle, and low levels.

One of the factors that influence the achievement of learning objectives is the using of teaching materials. Teaching materials are a set of materials that are systematically arranged either written or unwritten with the aim of creating a learning environment for students [18]. Widodo and Jasmadi argue that teaching materials are a set of learning tools or tools that contain learning materials, methods, limitations, and ways of evaluating which are designed systematically and attractively in order to achieve the expected goals, namely achieving competencies or sub-competencies [19]. Teaching materials are materials or subject matter that are arranged in a manner systematic, which is used by teachers and students in the learning process [20].

2. Method
This research method uses research and development methods, namely it uses the ADDIE model [21]. The development stages of this research are Analysis, Design, Development, Implementation, and Evaluation. This research method is used to develop products in the form of mathematics teaching materials by applying a project-based learning model through vlogs based on unity of sciences. The purpose of this study was to improve the mathematical communication skills of students of Mathematics Education at UIN Walisongo Semarang on trigonometric material after using the developed mathematics teaching materials. The research data was collected by using interviews, questionnaires and tests.

3. Results and Discussion
Based on the research that has been done, mathematical communication skills of mathematics education students have increased, because in the learning process students use teaching materials that apply a project-based learning model through vlogs to make it easier for students to develop their communication skills, including mathematics communication, how students should explain and interpret real situations into sketched images, symbols and mathematical models.
In Figure (1), it can be seen that student work on a project to find the height of Laksamana Cheng Ho’s Statue in Sam Pookong Semarang that it use a clinometer which is made from simple tools that can be found around us.

In Figure (2), it can be seen that student communicate a problem into image sketch to find out an elevation angle to determine the hight of Laksamana Cheng Ho’s Statue.

The results of the improvement using the independent sample t-test calculation can be seen in the following table bellow.
Table 1. Group Statistics

|        | N  | Mean  | Std. Deviation | Std. Error Mean |
|--------|----|-------|----------------|-----------------|
| Posttest 1 | 26 | 81.4308 | 5.90828        | 1.15871        |
| Posttest 2 | 26 | 46.4231 | 5.92738        | 1.16246        |

Based on table (1), it shows that the average mathematics communication skills at the time of the pretest or before using mathematics teaching materials by applying the project based learning model through vlogs based on unity of sciences reached 46.42, this happened because the questions given were not familiar and has never been prepared by a mathematics education student.

After students participate in the learning process using mathematics teaching materials that apply a project-based learning model through vlogs based on unity of sciences, the average value of students’ mathematical communication skills has increased to 81.43. This is the teaching materials developed according to the needs of students and lecturers as a learning resource certainly. students more easily understand trigonometric material, especially trigonometric comparisons. Students are able to communicate mathematical problems of story into picture and symbols to find solutions to these problems easily. Students are able to solve daily problems by applying mathematical concepts.

| Levene's Test for Equality of Variances | t-test for Equality of Means | 95% Confidence Interval of the Difference |
|----------------------------------------|-----------------------------|----------------------------------------|
| postest Equal variances assumed        | .005                        | .947 21.329 50 .000 35.00769 1.64131 31.71102 38.30437 |
| Equal variances not assumed            | 21.329 49.999               | .000 35.00769 1.64131 31.71102 38.30437 |

Based on Table 2. It can be seen that the Sign value is <0.05, so that Ho is rejected and H1 is accepted.

4. Conclusion

Based on the result of research it can be concluded that the mathematical communication skills of Mathematics Education students of UIN Walisongo Semarang have increased significantly.

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