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# The Effect of Learning Video-Based Javanese Culture and Learning Style Towards Junior High School Students' Mathematical Communication Skills

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**Abstract**. This research aims at determining the effectiveness of interactions between learning video based-Javanese culture and learning style towards junior high school students' mathematical communication skills. The research sample was determined by cluster random sampling of class VII students of *SMP Negeri 29 Semarang*. Data were analyzed using a two way analysis of variance (Anova) and continued with the Scheffe test. Based on the research, the results obtained were: (1) there is the effect of learning video-based Javanese culture and learning style towards junior high school students' mathematical communication skills (F = 14,921; significance level 0.05), (2) there is the difference between junior high school students' mathematical communication skills who learned through learning video-based Javanese culture and conventional media (F = 8,828; significance level 0.05), and (3) there is the difference in junior high school students' mathematical communication skills which is reviewed from student learning styles (F = 6.692; significance level 0.05). The conclusion of the research results indicates that learning video-based Javanese culture and learning styles are more effective and show a significant effect on junior high school students' mathematical communication skills.
**Keywords:** Learning Video, Javanese Culture, Learning style, and Mathematical Communication.

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## INTRODUCTION

Mathematical communication is an important part of the process of learning mathematics in class because this is an activity that involves students with students and students with teachers to communicate both oral and written. Mathematical communication is a way of conveying mathematical ideas and understanding with oral, visual, written, numbers, symbols, images, graphics, diagrams, and words. According to Wahyumiarti et al (2015) mathematical communication is a way for students to convey ideas or thoughts, strategies and solutions in solving problems both verbally and in writing. The National Council of Teachers of Mathematics stated that there are five basic abilities students must have, namely: Reasoning, Representation, Communication, Problem Solving, and Connections. The purpose of the Ministry of Education is in line with those formulated by NCTM (2000). But there are still some teachers who have not paid attention to the abilities of this mathematical communication to students.

Mathematical communication abilities are the abilities of students to convey mathematical ideas both orally and in writing. Mathematical communication abilities of students can be developed through the learning process at school, one of which is the process of learning mathematics. Mathematical communication is the process of expressing mathematical ideas and understanding verbally, visually, and in writing, using numbers, symbols, images, graphs, diagrams, and words Fuson (2019). Meanwhile, research conducted by Vale et al. (2017) stated that mathematical communication can see various difficulties, responses, and images of the teacher's future in connecting tasks that have different forms of communication in a visual context. These tasks focus on seeing information directly or listening to information without seeing it. The results of his research revealed that many students responded positively to the given assignment, although some students had difficulty expressing it in the form of communication.

Because of the importance of mathematical communication skills in the process of learning mathematics, so the teacher should try to create learning scenarios in order to improve the mathematical communication skills of their students. Efforts that were carried out by teachers included choosing innovative learning models and learning media that can attract the students learning interest in the process of learning mathematics in schools. One of the learning media that can be developed is video learning because with this media students are more interested and happier to learn mathematics. With the video learning teacher has the opportunity to insert material that will be given to students Woolfitt Zack (2015).

Learning videos are one of the products of e-learning learning systems. By using video learning, teachers can be more creative to make an interesting display of the learning process, because it is supported by a video display that is more easily understood by students. Additionally, being engaged in a video project encourages students to assume a greater responsibility of their learning while providing a rich, memorable and authentic learning experience Kearney & Schuck (2006). Among the various technological tools at the disposal of teachers and learners, digital video has been identified as especially beneficial for promoting active and creative learning Loveless (2002), and for stimulating social interactions among learners Goldfarb (2002).

Learning video media is an audiovisual media that displays images and sound. When compared with image media, the use of instructional video media further enhances students' mathematical communication skills. Videos can also display objects that are too small, too big, dangerous, or even that students cannot find directly. So with the existence of the learning video can explain abstract material and is very good for explaining a process of understanding certain concepts Uno, H, B & Lamatenggo (2014). The message delivered is more interesting and enjoyable in the learning process using video, it encourages and increases student motivation so that students make more memory of the material Kirkorian, H.L (2008). So that the existence of video learning media makes students more motivated and interested in learning mathematics and in the end little by little can improve mathematical communication skills.

Mathematical communication skills in learning mathematics in junior high schools are also influenced by the environment and culture of the local community, so contextual approaches and realistic learning also need to be developed by the teacher. Because the research was conducted in Semarang City, mathematics learning was associated with Javanese culture. Javanese culture respects all religions and plurality so that it is considered syncretic by certain cultures which only recognizes one particular religion and sectarian Koentjaraningrat (2002). The students' ability in the learning process is influenced by the local culture, so the preparation of learning tools as a tool in the learning process must be arranged according to the environment and culture where the students come from. Thus in the learning process, students do not feel strange and can also interact naturally with the surrounding environment Conscience (2014). This is in accordance with the opinion of Vygostky (in Karwati, 2014), emphasizing the existence of cultural contributions, social interaction and also parallel in developing student behavior. This is certainly closely related that the learning process is done consciously in developing all the potential of the child.

Mathematical communication skills are also influenced by student characteristics, one of the characteristics of students who influence is learning style. Learning style is an approach that explains how individuals learn or the way taken by each person to concentrate on the process and master difficult information and through different perceptions Ghufron and Risnawita (2012). Furthermore, according to Kolb (Ghufron and Risnawita, 2012), learning styles are methods that individuals have to obtain information, so that in principle learning styles are an integral part and active learning cycle. Learning styles are usually referred to as learning modalities or learning types this is divided into 6 types of learning, namely visual, auditive, kinesthetic, tactile, olfactory and gustative Wiyani (2013). In addition to these 6 types of learning styles, there are also learning styles based on sensory modalities. Characteristics of students in learning that are often and commonly used are learning styles based on these sensory modalities, namely: visual, auditory and kinesthetic learning style Irham and Wiyani (2014). Connell ( in Yaumi, 2012), divides learning styles into three parts, namely visual learning style (visual learners), auditory learning style (auditory learners), and kinesthetic learning style (kinesthetic learners).

Visual type learning style is a learning style where students tend to learn through what is seen. For students who have a visual learning style, they rely on their sense of sight (eyes). Children who have a visual learning style must see the body language and facial expressions of the teacher directly to understand the subject matter. Auditory learning style is a learning style where students tend to learn through what is heard. They enjoy listening to what other people say. Meanwhile, the kinesthetic learning style is a learning style where students tend to learn through motion and touch. Individuals who have kinesthetic learning style tendencies will learn better if physically involved in direct activities. In the opinion of Thobroni (2015), learning styles can determine student learning achievement. If given a strategy in accordance with the learning style, then students in the learning process can develop better.

Based on the description above, the study was conducted to find out the effectiveness of interactions between learning video-based Javanese culture and learning style towards junior high school students' mathematical communication skills.

## RESEARCH METHODS

The research used a quasi-experimental method with a 3x2 factorial design in which the first factor was the two learning media namely learning video-based Javanese culture and conventional media. The second factor was the learning style, including visual, auditory, kinesthetic learning styles. The dependent variable was the junior high school students' mathematical communication skills. The design of this research can be seen in Table 1 below.

**Table 1.** *Treatment by Level 3x2 Design*

| **Learning Styles** | **Learning Media** | |
|---|---|---|
| | Learning Video-Based Javanese Culture (A1) | Conventional Media (A2) |
| Visual (B1) | A1B1 | A2B1 |
| Auditory (B2) | A1B2 | A2B2 |
| Kinesthetic (B3) | A1B3 | A2B3 |

The population in this research was all class VII students of *SMP Negeri 29 Semarang* as many as 8 classes. Sampling was used by random cluster technique which was used to determine the experimental class and the control class. The experimental class in the learning process used learning video-based Javanese culture media, while the control class used conventional media.

To collect the data of student learning styles, learning styles scale was used. Meanwhile the tests that have been validated by Experts were used to collect mathematical communication skills data. The prerequisite test analysis technique used is the normality test with the Lilliefors test and the homogeneity test with the Bartlett test Sudjana (2012).

To test the research hypothesis, a two way analysis of variance (Anova) was used with a significant level $\alpha = 0.05$. After knowing the interaction between the two research factors on the dependent variable, then proceed with the Scheffe test.

## RESEARCH RESULTS AND DISCUSSION

The data obtained from this study are the junior high school students mathematical communication skills who learned by using learning video-based Javanese culture media (A1) and students who learned by using conventional media (A2) by considering student learning styles namely visual (B1), auditory (B2), and kinesthetic learning style (B3).

Before the hypothesis test was performed, the prerequisite test data were the normality test and the homogeneity test. The two prerequisite tests were carried out using Statistical Product and Service Solutions (SPSS) version 19. The following is the normality test results in Table 2 and the homogeneity test results in Table 3.

**Table 2.** *Normality Test Results for Mathematical Communication Skills*

| **Variable** | ***Lilliefors*** $\mathbf{L_{counted}}$ | $\mathbf{L_{table}}$ **α=0,05** | **Conclusion** |
|---|---|---|---|
| $A_1 B_1$ | 0,117 | 0,242 | Normal |
| $A_1 B_2$ | 0,109 | 0,242 | Normal |
| $A_1 B_3$ | 0,124 | 0,242 | Normal |
| $A_2 B_1$ | 0,179 | 0,242 | Normal |
| $A_2 B_2$ | 0,162 | 0,242 | Normal |
| $A_2 B_3$ | 0,185 | 0,242 | Normal |

Based on Table 2 above, the results of the normality test analysis show that the overall value of Lcounted is smaller than the Ltable with a 0.05 level of infection. This means that data about junior high school students' mathematical communication skills come from populations that are normally distributed.

**Table 3.** *Homogeneity Test Results for Mathematical Communication Skills*

| Variable | $\chi 2$ counted | $\chi 2$ table | Conclusion |
|---|---|---|---|
| Mathematical Communication Skills | 0,98 | 5,99 | Homogeneous Variance |

Based on the homogeneity test results of Table 3 above, the counted = 0.98 is less than the table = 5.99 with a significance level of 0.05. This means that the data about junior high school students' mathematical communication skills have a homogeneous variance of the population.

Furthermore, the hypothesis test was performed with a two-way analysis of variance (Anova) technique with a significance level of alpha 0.05, the calculation process using Statistical Product and Service Solutions (SPSS) version 19. The results of the analysis of variance analysis (Anova) are in Table 4 below.

**Table 4.** *Anova Test for Mathematical Communication Skills*

| Variation Source | JK | db | RK | $F_{counted}$ | $F_{table}$ $\alpha = 0,05$ |
|---|---|---|---|---|---|
| Between A | 2,463 | 1 | 2,463 | 8,828 | 4,13 |
| Between B | 3,734 | 2 | 1,867 | 6,692 | 3,28 |
| Interaction of A and B | 8,326 | 2 | 4,163 | 14,921 | 3,14 |
| Inside | 18,422 | 66 | 0,299 | | |
| Total | 32,945 | 71 | | | |

## Analysis of Interaction of Learning Media and Learning Styles

Based on the analysis results in Table 4, obtained F (AB) counted = 14.921> F table = 3.14 for a significant level α = 0.05, this means that Ho is rejected. It means that there is a very significant effect of interaction between factor A (learning media) and factor B (learning style) towards mathematical communication skills. These results indicate that there is a very significant interaction between learning video-based Javanese culture and learning styles towards junior high school students' mathematical communication skills. This is possible because print and PowerPoint media are the most frequently used media by teachers. After all, it is easy to develop and search for various sources. However, most of the media used is highly dependent on verbal symbols (words) that are very abstract, so it requires a very high abstraction ability of learners, it is this which can complicate the student Siagian et al. (2014). In line with this, video communication also offers file transfers and manipulations of documents, allowing the user to generate content (Nielson and González-Lloret 2010) [21]. Video communication tools permit naturalistic oral conversations; complement verbal modes; can act as stimuli for interaction; support socio-affective interaction; and permit the use of gesture in communication Lamy and Hampel (2007).

This result is reinforced by the opinion of Star and Strickland (2008), revealing that the use of instructional videos increases the observation ability of prospective teachers, especially the ability of teachers to pay attention to the characteristics of the classroom environment, the content of mathematics learning, and communication between teachers and students during learning. Also according to the opinion, Gambari, James and Olumorin (2014) that video learning can improve mathematics learning outcomes and the benefits of using video in learning include increasing student motivation, increasing learning experiences and facilitating thinking skills and problem-solving.

## Analysis of Learning Media

From Table 4, F (A) counted = 8.828> F table = 4.13 with a significant level α = 0.05. The results of the analysis are also strengthened by the results of the Scheffe test analysis which is obtained Fcounted = 6.478> Ftable = 4.30. From both analyzes, Ho is rejected. This means that there are differences in mathematical communication skills between students taught with learning video-based Javanese culture and conventional media. These results indicate that the learning video-based Javanese culture has a very significant effect on mathematical communication skills compared to students taught with conventional media. This is supported by Khan (2013), showing that videos online mathematics learning give students a safe, personal, comfortable and thought-provoking experience. So, in the end, students can experience good moments, where students are sure to be able to understand mathematical concepts in depth. Also agree with Abramovitz, Berezina, Berman, & Shvartsman (2012), suggesting that learning mathematics

through the help of online sources such as videos, animation of mathematical concepts that are relevant and challenging can increase student curiosity, although not significantly statistical data shows ability different mathematical communication from ordinary face-to-face learning classes.

### Analysis of Learning Style

Based on the analysis in Table 4, obtained F (B) counted = 6.692> Ftable = 3.28 with a significant level α = 0.05. The results of the analysis are also strengthened by the results of the Scheffe test analysis in Table 5 below.

**Table 5.** *Summary of Learning Style Analysis with Scheffe Test*

| $F_{(i-j)}$ | Fcounted | $F_{0,05;k-1,N-k}$ | Decision Test |
|---|---|---|---|
| $F_{(1-2)}$ | 5,475 | 4,84 | $H_0$ rejected |
| $F_{(2-3)}$ | 0,126 | 4,84 | $H_0$ accepted |
| $F_{(1-3)}$ | 7,562 | 4,84 | $H_0$ rejected |

The results of the Scheffe test analysis in Table 5 show that: (1) there are differences in mathematical communication skills between groups of students with visual learning styles and groups of students with auditory learning styles, (2) there is no difference in mathematical communication skills between groups of students with auditory learning styles and groups of students with kinesthetic learning styles, and (3) there is a difference in mathematical communication skills between groups of students with visual learning styles and groups of students with kinesthetic learning styles. This means that the help of images in varied learning videos is more beneficial to groups of students with visual learning styles compared with both auditory and kinesthetic student groups. That fact shows that the varied images in the learning video are able to stimulate students with visual learning styles better than students with auditory and kinesthetic learning styles. Students with visual learning styles have difficulty absorbing information through verbal presentations without being accompanied by visual images. There are some special characteristics for students who like visual learning styles, namely the need to see things visually to know and understand them, have a strong sensitivity to colors, images, and forms of video and have sufficient understanding of artistic problems. Visual learning styles help students remember the subject matter directly seen so that it has a positive effect on the learning achievement obtained Mulyono, et al. (2007). According to Styles (2006), students can become better learners if they know their learning styles and use their respective strategies.

## CONCLUSION

In general, the results of this study can be concluded that there is a significant effect between learning video-based Javanese culture and learning styles towards junior high school students' mathematical communication skills. Specifically, based on the research objectives and the results of the analysis of research data and the discussions put forward, the following conclusions can be drawn: (1) there is the effect of learning video-based Javanese culture and learning styles towards junior high school students' mathematical communication skills, (2) there is the difference between junior high school students' mathematical communication skills who learned through learning video-based Javanese culture and conventional media and conventional media, and (3) there is the difference in junior high school students' mathematical communication skills which is reviewed from student learning styles.

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