

## The Influence of Autograph Software Aid STAD Learning Model on Mathematic Communication Ability and Mathematic Disposition of Gender

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### Abstract

*This study aims to determine how the effect of STAD learning model assisted by autograph software on mathematical communication skills and mathematical dispositions in terms of gender. The sample used in this study is Senior High School PAB 4. With the method of data collection literature study. The method used is literature study. The results of this study indicate that the overall STAD learning model assisted by autograph software has an effect on mathematical communication skills and mathematical dispositions, this can be seen from the results of previous studies and strengthened by the theories of experts.*

### Keywords

learning model; STAD assisted by autograph software; mathematical communication skills; mathematical disposition



## I. Introduction

School as an educational institution (institution) is a place where the educational process is carried out, has a complex and dynamic system in relation, the school is a place that is not just a gathering place for teachers and students, but is in a complex and interrelated arrangement. (Sulaiman, 2020)

Education in general aims to develop all the potential that students have. The educational process itself must be carried out optimally in all aspects of education, including mathematics. The essence of education is to humanize humans themselves, namely to civilize humans. Thus the first concern of education is human. Educational actions directed at humans to develop basic human potentials so that they become real.

The quality of education is one of the factors that determine the quality of human resources. In connection with the demand to produce quality human resources, the quality of education needs to be continuously improved. Improving the quality to advance education has been passed in various ways, starting from curriculum changes that occur as the development of science and technology is increasingly rapid.

Through education, humans try to develop themselves to face every change that occurs as a result of advances in science and technology. Therefore, education problems need serious attention and handling related to their quantity, quality and relevance.

At present, Information and Communication Technology (ICT) or Information Communications Technology (ICT) has developed rapidly in all aspects of human life. In the world of education, technology can be used not only in administrative matters, but it is possible to use it as an alternative in selecting learning media. Information and Communication Technology (ICT) needs to be integrated in the world of education. This is stated in Permendiknas number 22 of 2006 in the background explained as follows to improve the effectiveness of learning, schools are expected to use Information and Communication Technology (ICT) such as computers, proprs, or other media.

Current technological developments require each country to prepare human resources who are 'literate' in technology and build a knowledge-based society if they do not want to be left behind with developed countries. This results in the world of education as a means of learning for students to actively use Information and Communication Technology (ICT) in learning activities at school.

However, in reality, learning media based on Information and Communication Technology (ICT) such as computers are still rarely used by teachers in classroom learning. This is due to the lack of facilities and infrastructure based on Information and Communication Technology (ICT) in schools and the lack of knowledge of teachers about Information and Communication Technology (ICT) and its application in learning.

Particularly in mathematics learning, mathematics is a subject that is taught from the play group level (PAUD) to college. In learning mathematics, there are always challenges that are not light from time to time. This is due partly to the fact that students' learning outcomes in mathematics are still not satisfactory, namely, the achievement of student learning outcomes in mathematics tends to be lower than that of other subjects such as Science, Social Sciences and Indonesian (Harnawita, 2008).

In the 21st century, students must be more able to understand the subject matter appropriately. Because in this century the competition in the world of education is growing rapidly. For this reason students must be able to recognize technology in the world of education so that their thinking can be in line with the development of the 21st century. In the 2013 curriculum is inseparable from technological developments. In the era of globalization, technological advances are increasingly rapid, especially information and communication technology (ICT). One of these technologies is computers. Computers are widely used in various fields, engineering, astronomy, biology, health, and also education. Computers are very supportive of both the ability to understand mathematics in student learning, especially unusual math problems, meaning math problems related to everyday life. Students will be more enthusiastic about learning mathematics so that they can improve their mathematics communication skills better using computer software.

Several researchers have pointed out the positive effects of using software in schools. According to Erly (2013: 47) that student learning outcomes have increased after using the "Easy Differentials" Module as ICT-based teaching materials on differential material. This is because the use of the Differential Easy Module is presented more attractively with the help of mathematical software, thereby increasing the attractiveness and enthusiasm of students in learning. Therefore, the use of mathematics software greatly influences the learning process of mathematics, including the Autograph software. By using this software, it is hoped that it can help teachers in teaching mathematics.

Learning media can represent what the teacher cannot express or convey in words or sentences. This is stated by Kosasih (2007,14) that learning media is a method, tool, or process used to convey messages from message sources to message recipients that take place in the educational process.

Students' mathematical communication skills are an integral part of a series of mathematics learning processes. Communication aims to help shape students' perceptions by seeing mathematics as an integrated part of life. Subject matter will be more meaningful and fun if students learn subject matter that is related to the context of their lives. In the process of teaching and learning activities, it is necessary to have a learning model whose emphasis is on mathematical communication skills.

Besides the problems above, there are other problems that are relative. Almost all of the PRIVATE PAB 4 high school students are passive in the learning process. Students very rarely ask questions or answer questions posed by the teacher. Students tend to be silent, even though they cannot understand the teaching materials conveyed by the teacher. This results in a less attractive and communicative learning atmosphere. This is what causes student learning outcomes are still low, especially students in 11<sup>th</sup> grade senior high school PAB 4

In this problem, it is necessary to make improvements in learning activities. The teacher's emphasis on the mathematics learning process must pay attention to the balance between doing and thinking. Communication is a way of sharing ideas and clarifying understanding. Through mathematical communication, mathematical ideas can be reflected, corrected, discussed and developed. The communication process also helps to build meaning and make ideas permanent and the communication process can also publish ideas. When students are challenged with their thinking and thinking skills about mathematics and communicate the results of their thoughts orally or in writing, they are learning to explain and convince. Listening to other students' explanations, giving students the opportunity to develop their understanding (NCTM: 2000: 60).

Mathematical understanding and mathematical communication are two things that influence each other. Mathematical understanding helps the development of students' mathematical communication. By understanding mathematics subject matter, students are able to communicate their understanding to other students and with mathematical communication, students who listen to oral and written explanations can better understand the subject matter.

The expected mathematics learning at this time is student-oriented learning. Students are required to actively build their own knowledge, the teacher is only a facilitator. However, in reality there are still teachers who use the old paradigm, namely teacher centered learning, not student centered. There are still teachers who think that learning mathematics is the pouring of knowledge or a complete transfer of knowledge from the teacher's mind to the students' minds. The teacher as a provider of information and students listen, the teacher gives examples of questions and works on them, then gives questions to be done by students that are similar to the questions given by the teacher. This makes students do not have the opportunity to express ideas and ideas, students only come to low-level thinking while the goals to be achieved are rational, critical, logical, creative and reasoned thinking which is part of higher-order thinking.

Hasratuddin (2008,25) states that teachers dominate learning, while students are only good listeners and note takers. The result is clear that students' attitudes are less independent, do not dare to express their own opinions, always ask for teacher guidance and are less persistent in trying to solve problems, so that the knowledge that students understand is only limited to what the teacher provides.

There are many learning models that can be used. As stated by Slavin (1995), there are six cooperative learning models, namely, (1) Division of Student Achievement Team (STAD), (2) Playing Tournament Team (TGT), (3) Assisted Individual Team, (4) Cross Saw (Jigsaw) , (5) Learning Together (Learning Together), and (6) Group Investigation (GI).

For this reason, it is necessary to do an innovation by applying the learning model used in the Mathematics learning process and it is hoped that it can increase learning motivation and student learning outcomes, one of which is the STAD type cooperative learning model. By choosing the STAD type cooperative learning model, the teacher can activate students and make connections between their knowledge and everyday life where the STAD type of learning can provide opportunities for students to do their assignments in groups, meaningful, and can create togetherness actively, creatively , and productive.

STAD cooperative learning model is a learning model that emphasizes the various characteristics of direct learning, which is based on the principle that each student works together in learning and is responsible for the learning of his friends in the team and also himself. Teachers who use the STAD cooperative learning model apart from referring to student group learning, also present new academic information every week using class presentations.

The STAD type of cooperative learning model is cooperative learning that is not only superior in helping students understand difficult concepts but is also very useful in generating activities and interactions between students and teachers and between students and students, and is able to increase other learning achievement such as: increasing cooperation, creativity, think critically and encourage the willingness of students to help friends and the STAD type of cooperative learning model was chosen because this cooperative strategy is the simplest and is very suitable for use by teachers who are just starting to use cooperative strategies.

According to Slavin (1995) there are five stages in learning with the STAD cooperative learning model. These stages are: the stage of presenting the subject matter (class presentation), the stage of group learning, the stage of testing individual performance, the stage of scoring individual improvement, and the stage of measuring group performance.

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Learning using Autograph is software for intermediate level mathematics, its design involves three principles in learning and learning, namely flexibility, iterative, draw conclusions. Autograph will help students in doing experiments so that it is possible to find new things. Autograph software can make it easier for teachers to demonstrate Mathematical concepts that occur in everyday life. With Autograph Software, Mathematics experiments can be shown in accordance with the original. Even experiments that require a long time can be shortened so that learning activities are more effective without losing the learning experience that should be given to students.

Using the right Autograph Software can also make learning activities more meaningful. By using the Autograph Software program, the learning material becomes more interesting to study, Mathematics material which tends to be full of mathematical calculations when poured in a conventional way will certainly make students easily bored. Meanwhile, by using the Autograph Software program, Mathematics materials can be animated more realistically. With animation, the delivery of material is not only in the form of text which tends to be abstract and monotonous.

Depdiknas (2008) states that the affective domain determines a person's learning success. One of the affective students in mathematics learning is currently known as mathematical disposition. According to NCTM (Mahmudi, 2010: 6), mathematical disposition includes the ability to take risks and explore solutions to various problems, persistence in solving challenging problems, taking responsibility for reflecting on work results, appreciating the communication power of mathematical language, willingness to ask questions. And proposing other mathematical ideas, willingness to try different ways to explore mathematical concepts, have confidence in their abilities, and view problems as challenges. This can be seen when students are in learning and when solving a given mathematical problem.

One of the success of students in following the learning process can be seen from the achievement of students 'mathematical communication skills and students' mathematical dispositions. Students who take the STAD cooperative learning model are believed to have

high learning outcomes. This is based on the idea that if students are happy, active in the learning process, the mathematical disposition of the students they get after participating in the learning will be high. So that a fun learning process will also have a positive impact on students' mathematical dispositions.

## II. Review of Literatures

### 2.1. Understanding STAD Learning Model

According to Slavin, (2010: 143) STAD learning model is one of the simplest cooperative learning methods, it is said that because the learning activities carried out are still closely related to conventional learning. This model is the best model for beginners for teachers who are new to cooperative approaches. Teachers who use the STAD method refer to learning groups of students and present new academic information to students each week using variable and text percentages. Certain classes are divided into groups of 4-5 people. Each group must be heterogeneous, consisting of men and women, coming from various ethnicities, having high, medium and low abilities.

Trianto, (2007: 52) states that this type of STAD cooperative learning is one type of cooperative learning model using small groups with a heterogeneous number of members of each group of 4-5 students.

### 2.2. Media Autograph Software in Learning

The word media comes from Latin and is the plural form of the word medium. It literally means an intermediary or an introduction. Thus, the media is an intermediary or messenger of messages from sender to recipient of messages (Sadiman, 2002: 6). Learning is learning efforts so that the learning process occurs in students (Sadiman et al, 2007: 7). So learning media is anything that can bear the thoughts, feelings, concerns and interests of students in such a way that the learning process occurs. So it can be said that one of the main functions of instructional media is as a teaching aid that contributes to the climate, conditions, and learning environment organized and created by the teacher.

Hamalik (in Arsyad, 2008: 15) states that: "the use of learning media in the teaching and learning process can generate new desires and interests, generate mathematical communication skills and stimulation of learning activities, and even bring psychological influences on students. In addition to generating mathematical communication skills and student interest, learning media can also help students improve understanding, present data in an interesting and reliable manner, facilitate data interpretation, and condense information. "

The use of media during teaching is at least used by the teacher in the following situations:

- a. The teaching materials described by the teacher were poorly understood by students.
- b. There are limited teaching resources because not all schools have source books or not all teaching materials in these source books are in the form of media.
- c. Student attention to teaching is reduced due to boredom of listening to teacher descriptions.

Autograph is very versatile and dynamic software as a learning medium for learning and teaching intermediate mathematics developed by Douglas Butler. Douglas Butler is a mathematician graduated from Mathematics and Electrical Sciences at Cambridge University, and has joined EMI Records. Douglas also taught in secondary mathematics for about 30 years. Then Douglas has also been Head of Mathematics at Oundle School (Peterborough UK) in 1990, and has also been Chairman of the MEI Schools project, a leading UK curriculum development project, for six years.

Autographs can change the conventional way of learning by lecturing into student-led classroom learning where students learn by investigation. The teacher is only a facilitator. This software can help teachers and students to see the relationship between visuals and symbolic presentation.

The autograph is a new computer program that comes in three models:

1. 1D (one dimension) is used for statistics and odds
2. 2D (two dimensional) for graphs, coordinates, transformations, and bivariate data
3. 3D (three dimensional) for graphs, coordinates and transformations.

### 2.3. Mathematical Communication Skills

In mathematics learning, from the communication aspect, it trains students to be able to communicate ideas, ideas both orally and in writing. Sumarno (in Saragih, 2007: 35) suggests that one of the essence of mathematics is the language of symbols which means that mathematics is universal and can be understood by everyone. . This is in line with Esty da Teppo's opinion (in Saragih, 2007: 36) that symbolic language is a tool to communicate and present concepts, structures, and relationships in mathematics. So that students are challenged to argue to communicate the results of their thoughts to others orally or in writing, learn to explain so that others believe.

In learning activities students are given the opportunity to develop their knowledge. However, students must be able to communicate mathematics coherently with the aim that the thoughts made by students are accepted correctly by the learning community. Thus communication is an essential part of learning mathematics.

### 2.4. Mathematical Disposition

In the process of solving mathematical problems, the attitudes that students must have are critical and careful, objective and open, appreciating the beauty of mathematics, as well as curiosity and enjoyment of learning mathematics. This attitude will essentially form and foster mathematical dispositions, namely the desire, awareness and strong dedication of students to learn mathematics and carry out various mathematical activities.

Mathematical disposition is a student's attitude towards mathematics which can be realized through his actions in completing mathematical tasks. The mathematical disposition is called by Sumarmo (2010) as a desire, awareness, tendency and strong dedication to students to think and act mathematically in a positive way. Students' disposition to mathematics is manifested through their attitudes and actions in choosing an approach to completing tasks. Is it done with confidence, curiosity looking for alternatives, perseverance, and the tendency of students to reflect on the way they think they do.

### 2.5. Gender

Gender refers to the concept of men or women based on socio-cultural and psychological dimensions. Gender is distinguished from gender, which involves the biological dimensions of women or men. Gender roles are social expectations that determine how men and women should think, act and feel (Santrock, 2008: 217).

Gender in social science is defined as the polar relationship between men and women based on their respective social characteristics (Zainuddin, 2006: 1). Gender justice is a process and fair treatment of women and men. It is said that there is a gender gap if one gender is left behind compared to the other sex ( $L > P$  or  $L < P$ ).

Lippa (in Santrock, 2008: 217) reveals that there are various ways to view gender development. Some emphasize biological factors in male and female behavior; others emphasize social or cognitive factors. Several biological approaches explain the differences

in the brains of women and men. Le Doux (in Santrock, 2008: 218) describes an approach that focuses on the differences between women and men in the corpus colosum, a set of nerve fibers that join the two hemispheres of the brain. Gur, et al (in Santrock, 2008: 218) added that the corpus colosum in women is bigger than in men and this may explain why women are more aware than men about their own emotions and the emotions of others. This can happen because the right brain is able to pass more information about emotions to the left brain. The part of the brain involved in emotional expression shows more metabolic activity in women than in men. In addition, Frederikse (in Santrock, 2008: 218) states that the part of the parietal lobe (one of the brain lobes at the end of the head) which functions in skills men are bigger in visual and space than in women. However, the brains of women and men have more similarities than differences. In short, biology is not the goal for issues of gender attitudes and behavior. The socialization experience of children plays a very important role.

Many people already believe that there is no difference between men and women in terms of intelligence. There are also many studies that prove that there is no significant difference between male intelligence and female intelligence. Of the tests that have been given, women are especially exaggerated in terms of taking the test -tests involving the use of language, rote memorization, aesthetic reactions and social problems. On the other hand, men are excessive in abstract reasoning, mastery of mathematics, mechanics, or structural skills. From heredity we can only suspect, that perhaps the differences in interests and behavior between men and women are due to differences in the nature of "genes" or chromosomes.

In school grades, women start with an edge over men and maintain this advantage through high school. Even in mathematics and science, where women score slightly lower on exams, women still score better in class (Maher and Ward (in Slavin, 2008: 159)). Despite this, male high school seniors tend to overestimate their ability in language and mathematics (when measured by standardized tests), while women underestimate their ability. In elementary school, men are much higher than women to have reading problems and are much more likely to have learning disabilities or emotional disorders (Smith (in Slavin, 2008: 160).

### **III. Research Method**

#### **3.1 Types of Research**

This research is a research that is library research using books, journals, previous research and other literatures as the main object (Hadi, 1995: 3). The type of research used is qualitative, namely research that produces information in the form of notes and descriptive data contained in the text under study (Mantra, 2008: 30).

Based on the above understanding, it can be concluded that the library research method or literature study is research conducted by researchers by examining and analyzing books, journals, previous research literature, magazines, notes and reports relating to the problem to be researched by means of books, journals, previous research literature, magazines, notes, and reports are used as data sources to be processed and analyzed.

#### **3.2 Object of Research**

This research was conducted in 11<sup>th</sup> grade Senior High School PAB 4. The research was carried out in accordance with the learning activities at school and lasted 3 meetings for each sample class.

## IV. Conclusion

### 4.1 The Influence of STAD-Assisted Autograph Software-assisted Cooperative Learning Model on Students' Mathematical Communication Ability

From several sources, experts who expressed their opinions regarding the STAD type of software-assisted cooperative learning model on students' mathematical communication skills stated that the autograph software assisted cooperative learning model was learning that involved students working collaboratively to achieve common goals, besides that it was also a learning model that supported contextual learning, or it can be called a structured group learning system. In addition, the use of learning media in the teaching and learning process can generate new desires and interests, generate mathematical communication skills and stimulate learning activities, and bring psychological influences on students. This is a reference that the STAD type cooperative learning model assisted by autograph software affects students' mathematical communication.

### 4.2 The Influence of STAD-Assisted Autograph Software-assisted Cooperative Learning Model on Students' Mathematical Disposition

Mathematical disposition is a student's attitude towards mathematics which can be realized through his actions in completing mathematical tasks. The mathematical disposition is called by Sumarmo (2010) as a desire, awareness, tendency and strong dedication to students to think and act mathematically in a positive way. Students' disposition to mathematics is manifested through their attitudes and actions in choosing an approach to completing tasks. Is it done with confidence, curiosity looking for alternatives, perseverance, and the tendency of students to reflect on the way they think they do. From the understanding of mathematical disposition, we can find out whether the STAD cooperative learning model assisted by autograph software affects students' mathematical dispositions.

The use of learning media in the teaching and learning process can generate new desires and interests, as well as the use of autograph software which can change conventional learning methods with lectures into student-led classroom learning where students learn by investigation, the teacher is only a facilitator, autograph software can help teachers and students to see the visual relationship and symbol presentation. In addition, autograph software has advantages and features that can become a new enthusiasm for learning for students, including whiteboard mode, equation entry, interpreting data in 1 and 2 dimensions, slow plots, and save pages. This is the basis that the autograph software assisted learning model has an effect on students' mathematical dispositions.

### 4.3 The Influence of STAD Type Cooperative Learning Model Assisted by Autograph Software on Students' Mathematical Communication Ability and Disposition according to Previous Research

According to Aminatin, Halini and Rustam (2015) in their research there is a significant difference in the mathematical connection ability between students who are given learning using the Student Team Achievement Division (STAD) cooperative model and students who are given learning using the direct learning model on fraction material in 7<sup>th</sup> grade. It can be concluded that learning using the STAD cooperative model on the mathematical connection ability of students in fraction material in 7<sup>th</sup> grade junior high school 2 Subah provides a moderate effect size of 0.80.

From research conducted by Aminatin, Halini and Rustam (2015), we can conclude that the STAD learning model affects mathematical communication, this happens because the learning model with the help of autograph software has advantages when compared to



conventional learning models, because with conventional learning methods students tend to be bored with what the teacher explains, it is different if you use a learning model assisted by autograph software, with this model students are more active and their curiosity will be higher, and also affects students' mathematical dispositions because with this method students can be more active in doing learning.

## V. Conclusion

This study aims to determine the effect of STAD learning model assisted by autograph software on mathematical communication skills and mathematical dispositions in terms of gender. Based on the research results, the following conclusions can be drawn:

1. The STAD learning model assisted by autograph software has an effect on mathematical communication.
2. The STAD learning model assisted by autograph software has an effect on mathematical disposition. The results of this study are based on the understanding of experts, and from previous research journals.

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