ANALYSIS OF THINK -PAIR-SHARE ASSISTED BY AUTOGRAPH TO FOSTER STUDENTS' PROBLEM SOLVING SKILL

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ABSTRAK

Kata Kunci :
think-pair-share; autograf; penyelesaian masalah

Penelitian ini bertujuan untuk mengetahui hasil analisis dengan menggunakan model pembelajaran Think Pair share berbantuan Autograph untuk membantu siswa dalam keterampilan pemecahan masalah. Penelitian ini merupakan penelitian kepustakaan sehingga data yang diperoleh berasal dari kumpulan literatur yang relevan yaitu jurnal-jurnal terkait untuk dibaca dan dipelajari. Pengumpulan data dilakukan dengan mengumpulkan jurnal-jurnal terkait kemudian membaca dan mereviewnya. Setelah data terkumpul, dilakukan pengujian dan perbandingan data yang ditemukan. Teknik analisis data dilakukan secara kualitatif dengan mengutip pendapat yang sesuai. Hasil penelitian menunjukkan bahwa dapat disimpulkan bahwa model pembelajaran Think Pair share berbantuan Autograph dapat meningkatkan kemampuan pemecahan masalah siswa dan memiliki tingkat penerimaan yang baik. Dengan demikian, pembelajaran Think Pair Share berbantuan Autograph untuk membantu siswa dengan keterampilan Problem Solving dapat diterapkan dalam pembelajaran. Pembelajaran dengan menggunakan model Think Pair Share berbasis Autograph memiliki pengaruh yang besar serta berpeluang memberikan pengaruh positif berupa peningkatan Keterampilan Pemecahan Masalah Matematika Siswa

Keywords :
think-pair-share; autograf; problem solving

ABSTRACT

This study aims to determine the results of the analysis using the Think Pair share learning model assisted by Autograph to help students with problem-solving skills. This research is library research so that the data obtained comes from a collection of relevant literature, namely related journals to be read and studied. Data collection is done by collecting related journals and then reading and reviewing them. After the data is collected, testing and comparison of the data found are carried out. The data analysis technique was carried out qualitatively by quoting the appropriate opinion. The results of the study indicate that it can be concluded that the Think Pair share learning model assisted by Autograph can improve students' problem-solving skills and have a good acceptance rate. Thus, Autograph-assisted Think Pair share learning to help students with Problem Solving skills can be applied in learning. Learning by using the Think Pair Share model based on Autograph has a great influence as well as the opportunity to have a positive influence in the form of an increase in Students' Mathematical Problem-Solving Skills.

INTRODUCTION

Education is essentially a very important thing in life. Education is a forum to educate the nation's life because education creates educated human resources who can face the increasingly rapid progress of the times. Education has a very important role in the progress of a nation. Therefore, it is not wrong for the government to always prioritize education and always improve the quality of education in Indonesia so that it is better and better. Based on Permendiknas Number 22 of 2006 concerning Standard Content of Mathematics Subjects, the objectives of learning mathematics are for students to be able to: (1) Understand mathematical concepts, explain the relationship between concepts and apply concepts or algorithms, in a flexible, accurate, efficient and precise manner, in problem-solving, (2) Using reasoning on patterns and properties, performing mathematical manipulation in making generalizations, compiling evidence, or explaining mathematical ideas and statements, (3) Solving problems which include the ability to understand problems, designing mathematical models, solving models and interpreting the solutions obtained, (4) Communicating ideas with symbols, tables, diagrams, or other media to clarify situations or problems, and (5) Having an attitude of appreciating the usefulness of mathematics in life, namely having curiosity, attention, and interest in learning mathematics, and attitudes. resilient and confident in problem-solving.

As a goal in learning mathematics, Gick (1986) designed a model that can be used for problem-solving learning as shown in Figure 1 below:
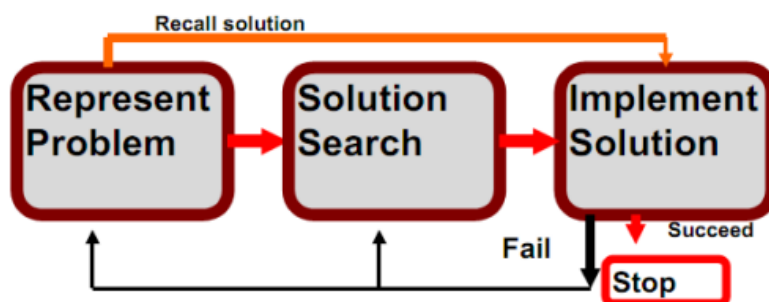

Figure 1: A model of the problem solving process

This model identifies the basic sequence of three cognitive activities in problem-solving, that is:

1. State the problem, including calling back
   Previously acquired knowledge. Next, identify the goals and start solving them by using the prerequisite materials (appropriate) to solve the problem.
2. Develop a plan to solve the problem.
3. Implement the plans that have been prepared to get the completion results. Next, evaluate (correct again) whether the solution obtained is correct or not.

Based on the things mentioned above, it can be said that problem-solving skills need to be developed in students learning mathematics. it can be concluded that learning mathematics, even though it is a field of study that is difficult to understand, really needs to be taught because it is always used in all aspects of life and play an important role in leading to success. Likewise, as a means to improve logical thinking skills and develop challenging problem skills. It can be seen that one of the goals of learning mathematics is solving problems. Nurdalilah, et al (2010) stated that problem-solving is a very important part of the mathematics curriculum because, in the learning and completion process, students are possible to gain experience using the knowledge and skills they already have to be applied to non-routine problem-solving.

In learning mathematics, problem-solving skills have an important role, namely as the initial ability for students to formulate concepts and capital for success for students in solving mathematical problems. Memnun, et al (2012) also suggest that enabling individuals to acquire problem-solving skills and train individuals who can overcome problems encountered during their real life, is a priority goal and main goal of education today. This shows that problem-solving skills have an important role in education. According to Polya (Hamiyah and Jauhar, 2011: 17), problem-solving skills contain four indicators, namely 1) understanding the problem, 2) planning a solution, 3) solving the problem according to plan, and 4) re-checking all steps. In accordance with the facts in the field, there are still many students who still have difficulty solving mathematical problems. Some of the causes of students having difficulty in solving problems, namely students are less able to write down what is known and asked from the questions as a result students do not know what to solve, students are less able to assume and change sentence questions into mathematical sentences (make a mathematical model), students do not understand the overall material presented by the teacher, students are weak in basic mathematical operations, or other factors in the form of the teacher's teaching method.

Based on the research of Ema Dwi Wardani (2015) that "Research conducted on 30 students in one junior high school showed that students' problem-solving skills varied. Problem-solving skills of students in learning mathematics, namely students who can understand problems as many as 11 children (36.67%), planning a solution for as many as 9 children (30.00%), carrying out problem-solving according to plans for as many as 7 children (23.33%), and re-checked all the steps as many as 5 children (16.67%). The most dominant root cause of low problem-solving skills comes from the teacher. Teachers still use conventional learning methods such as lectures which indirectly students are only required to listen, causing students to become bored and lazy to take lessons. Students are still less actively involved in learning because teachers tend to teach still using the lecture method, question and answer, and discussion. Some of the students still think that mathematics is one of the fields of study that is difficult to understand. Class conditions are not conducive cause some students still do not understand. When faced with other questions from the examples, some of them began to have difficulty and were still hesitant to ask.

The above problems can be pursued by providing solutions, namely designing mathematics learning that can present meaningful learning situations for students. So the teacher must be able to design meaningful learning that is by making students the center of learning that teachers need to choose a learning model that requires students to be actively involved and can develop problem-solving skills so that learning objectives are achieved. By Joyce's statement (Trianto, 2009: 22) that "The learning model directs into designing learning to help achieve learning objectives". Therefore, to achieve problem-solving skills, students can apply the TPS (Think Pair Share) type of cooperative learning model. The TPS (Think Pair Share) type of cooperative learning model was developed by Frank Lyman and his colleague I at the University of Maryland. Think-Pair-Share learning is an effective way to vary the atmosphere of class discussion patterns. The TPS (Think-Pair-Share) type of cooperative learning model is one type of cooperative learning model that is carried out in pairs (Trianto, 2016: 80).

Joyce and Weil (Siswono, 2018: 78) suggest several key ideas that need to be understood as components of a learning model, namely 1) syntax, 2) reaction principle, 3) social system, 4) support system, and 5) instructional impact and impact. accompaniment. Likewise, the TPS (Think Pair Share) type of cooperative learning

model also has components of a model, ranging from syntax, reaction principles, social systems, support systems, and instructional impacts and accompanying impacts.

The components of the Think Pair Share cooperative learning model are 1) syntax: the teacher presents the material, gives problems to students and students work in groups in pairs (Think Pair), group presentations (Share), and gives rewards. 2) The principle of reaction can be seen from the cooperation of students in groups to solve problems, and the role of the teacher here is only as a companion, mentor, facilitator, and motivator, not placing themselves as the main source of knowledge for students. 3) Social System, there is a pattern of relationships between teachers and students, namely two-way interaction, which means that interactions occur between teachers and students and between students and other students. 4) The Support System, in its implementation, requires facilities and infrastructure that can assist the implementation of this model. 5) Constructional Impact, which is to provide students with knowledge, concepts, abilities, and understanding while the Accompaniment impact is that students are expected to gain interest, independence, values , and positive attitudes in learning.

In line with the research results of Puji Rahayu and Ani Widayati (2019) show that: " Effectiveness of Think Pair Share And Spontaneous Group Discussion Towards Problem Solving Skill Student of X Accounting Graders SMK NEGERI 1 Wonosari. Based on the results of data analysis, previous explanations, and the relevant research results, it can be concluded that a problem-based introduction to accounting learning using the Think-Pair-Share (TPS) learning model is effective enough in terms of problem-solving skills. The average value (mean) N-Gain Score for experimental class 2 is 61.4629 or rounded to 61.5%. The above statement shows the importance of involving students' active role in the teaching and learning process, through this Think Pair Share type of cooperative learning students are expected to experience mathematics learning that is more interesting, enjoyable for students, more active students, and improves their mathematical problem-solving skills. Through active student involvement, it is expected that students' problem-solving Skills will be well trained. Based on the survey of the literature, it has been found that TPS is an active learning strategy where learners get an opportunity to develop problem-solving skills, enhance critical thinking, to improve communication skills besides providing a powerful tool for unleashing discussion among peers as well as teachers. As a result of its implication in teaching-learning, a democratic environment is set up in which learners learn without the fear of teachers and peer criticism.

Nowadays, the use of e-learning or Information and Communication Technology (ICT) has penetrated almost all developing countries as well as Indonesia. E-learning becomes a learning tool. Supposedly, the use of e-learning or ICT has already integrated with everyday learning. This is confirmed by Jamieson-Proctor, Burnett, Finger & Watson (2006) who said: "The integration of information and communication technology (ICT) has become a high priority across Australian schools, just as it has in schools internationally." Autograph software is a medium that can be used to learn about two dimensions, three dimensions, statistics, transformations, geometry, equations, coordinates, differentials, graphs, algebra, and others. According to Ahmadi (Rusdianto, et al: 2012) Autographs can improve scientific discourse in mathematics class which directs students to the learning experience of investigating and solving mathematical problems. Autographs will help teachers and students to see the relationship between visual and symbolic representations and scientific discourse which will further create an environment for using correct terms and concepts that are explored. During the COVID-

19 pandemic, researchers have experienced difficulties in carrying out direct visits to schools or conducting online learning to apply the think pair share type of cooperative learning model. This is due to government directives to practice social distancing. The impact of covid 19 requires researchers to research by analyzing the increase in students' mathematical problem-solving abilities through the think pair share type learning model at home by collecting secondary data from various reading materials and journals that have material related to the research being conducted. So based on the problems above, problem-solving needs to be sought to improve learning so that student mastery can increase and the results can be better.

RESEARCH METHOD

This research was conducted at the UNIMED Digital Library, which is located at Jl. William Iskandar Ps V, Kecamatan Percut Sei Tuan, Kabupaten Deli Serdang. The reason for choosing this agency is because the UNIMED Digital Library contains many librarian sources that can help complete library research and the use of internet media as a means of finding literature sources, namely by comparing several theses and journals that discuss the same subject. This type of research is library research or literature study. Library research or library research is one type of qualitative research method. Literature research utilizes library resources to obtain research data, in this case regarding the application of the think pair share type of cooperative learning model in improving students' problem-solving skills. Strictly speaking, library research limits its activities to only library collection materials without the need for field research. Literature study or library research aims to describe systematically the problem solving with think pair share cooperative learning model.

Data collection techniques with documentation, identifying discourse from books, papers or articles, magazines, journals, newspapers, web (internet), or other information related to writing titles to search for things or variables in the form of notes, transcripts, books, etc. which are related to the study of the conception and the urgency of implementing the think pair share type of cooperative learning model in improving students' mathematical problem-solving abilities. In qualitative research, the instrument or research tool is the researcher himself (Human Instrument). The human instrument functions to determine the focus of research, interpret data, and conclude its findings (Sugiyono, 2017). The researcher is the key instrument in collecting data, the researcher must be actively involved in the field himself (Gunawan, 2013). Data collection is the main thing in scientific research. To obtain the necessary data according to the wishes of the researcher, a well-defined and appropriate research procedure was carried out. The steps taken in the research procedure in the literature study include:

1. List all the variables to be studied, while the variables in this study are the application of the think pair share type cooperative model and students' mathematical problem-solving abilities.
2. Choose the required materials from available sources.
3. Checking the index containing the variables and the topic of the problem under study.
4. Next, collect materials that are relevant to the problem under study. The materials collected include articles, books, theses, journals, and biographies.
5. After the researcher found the relevant information, the researcher then reviewed and compiled the library materials.
6. The materials are then read, written down, analyzed, and rewritten

7. The last step, the researcher conducts the research writing process from the materials that have been collected into one research concept and concludes the research results that have been obtained

Data analysis in this literature research is content analysis, namely research that is a discussion of the content of written or printed information. Or content analysis is a research technique to make inferences that can be imitated and valid data by taking into account the context (Evita and Wiryo, 2018).

The data analysis activities in the field include:

1. Data Display

Presentation of data is an activity when a set of information is compiled, the picture is in the form of a complete narrative to give the possibility of concluding. The form presentation of qualitative data is in the form of narrative text (in the form of field notes), which is compiled using easy-to-understand language.

The presentation of the data in this study was carried out by seeking information/data from the topic of the problem raised on the internet in the form of journals, theses, and books related to the topic of the problem. Next, content analysis will be carried out, which is an in-depth discussion of the contents of written or printed information.

2. Verification

In this activity, several conclusions were drawn based on the results of the research that had been done. The initial conclusions put forward are still temporary and will change if strong evidence is found to support the next stage of data collection. The conclusion of qualitative writing is a new finding that has never existed before. Findings can be in the form of a description or description of an object that was previously unclear so that it is clear after research.
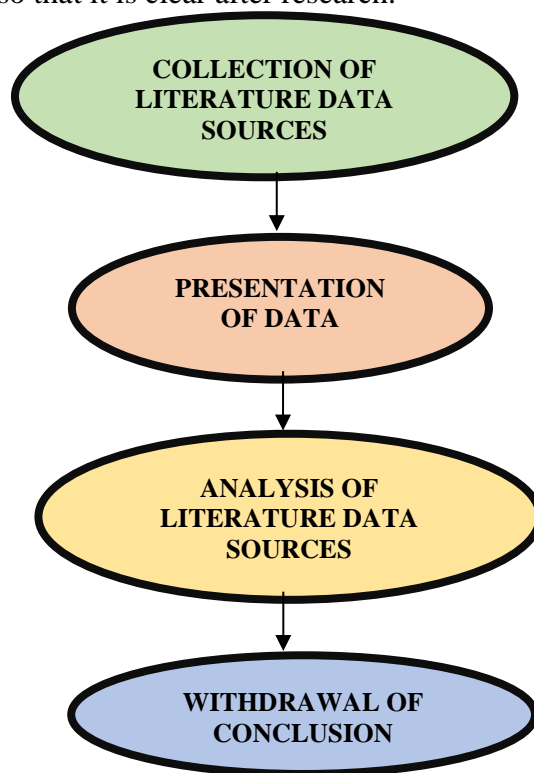

Figure 2 Schematic Research Procedure

RESULT AND DISCUSION

In this study, previously discussing the results of the research and discussion, the researchers conducted a literature study with a literature study so that the data obtained related to the research topic were secondary data or the results of previous research which would then be analyzed.

Description of Research Results

Based on the results of research conducted by researchers in several articles about factors that influence problem-solving skills that can help students in the Think Pair Share learning model with or without the help of an autograph. Then it will be summarized as follows:

1. Think Pair Share

The following are the results of research findings on Think Pair Share, where researchers will start to collect data before analyzing the data. Therefore the steps needed in collecting data according to research procedures are, first the researcher will collect data related to Think Pair Share then reduce the data to obtain the main things or important things related to the research, the second researcher will perform the presentation of the data so that the data presented will be in the form of a description based on the aspects studied according to the formulation of the research problem, the last step is that the researcher will make conclusions based on the presentation of the data that has been described.

The findings along with the main description of the data related to Think Pair Share are as follows:

a. *"Problem solving skill: Effectiveness on think pair share with comic written by Isti Dwi Mustafia, Sri Adi Widodo (2018)".* Based on the results of data analysis, The mathematical problem-solving test contains a rectangular problem. These problems consist of five questions. Problem to find is a problem in the way of determining or obtaining a value or a particular object that is unknown in the question and fulfilling the conditions or conditions that are by the problem, the objective that is asked or unknown (terms), and data or the information provided is an essential part of the problem looking for and must be understood and recognized well at the beginning of solving the problem (Polya, 1973). By using the problem-solving test scoring model referring to table 1, it is found that the ideal maximum score is 5 x 10 = 50 and the ideal minimum score is 5 x 0 = 0.

b. *"Penerapan Model Pembelajaran Tipe Think Pair Share Dengan Softre Autograph Untuk Meningkatkan Kemampuan Pemahaman Materi Grafik Fungsi Trigonometri written by Arnold Fidelis Naibaho (2020).* Based on the data obtained, there was an increase from before the action was taken and after the action was taken. Before the action, the percentage of students who can understand mathematics is 17%. After learning TPS in the first cycle, students who have mathematical understanding abilities increased to 67%, then increased again in the second cycle to 86%. Mathematical understanding ability increases both individually and classically. Based on the results of the research and the application of the TPS type cooperative learning model with Autograph software media it can improve students' mathematical understanding abilities in learning, it can be seen after learning in cycle I and cycle II is carried out.

c. *"Problem solving skill through think pair share model with murder approach viewed from learning interest of tenth grade students written by Najichatul*

Millaha, St. Budi Waluyaa, Walida (2018)". Based on the result of the learning interest scale analysis from 33 students, there were 10 students with high learning interest, 19 students with moderate learning interest, and 4 students with low learning interest. In the selection of research subjects, two students of each level of learning interest have been selected. The selected subjects were then interviewed. Based on the results of interviews with research subjects and problem-solving skill analysis of tenth grade of AP of State Vocational High School 2 Rembang, it is found that student who has high learning interest levels have good problem-solving skills and vice versa.

d. *"Enhancing Mathematical Problem Solving and Mathematical Connection Through the Use of Dynamic Software Autograph in Cooperative Learning Think-Pair-Share written by Ida Karnasih & Mariati Sinaga (2014)".* From the results of the analysis of the observation sheet, it can be concluded that students' activities during mathematics learning with Autograph dynamic software are in good activity (3,995 on a scale of 5 or 79.95% in percentage). The lowest percentage was shown when students were asked to formulate their thoughts and ideas and write them down as needed in preparation for sharing with a partner, which was 73%. The highest percentage (88%) occurred when students read LKS in the core activity. At the time of introduction, the highest percentage (87%) was shown when students listened to the learning objectives. Student activities listening to the motivation of the teacher and answering the teacher's questions about apperception have the same percentage, namely 78%. In the core activity, the lowest percentage was also the lowest percentage for this observation when students formulated their thoughts and ideas, writing them down as needed to prepare for sharing with a partner. In the closing section, participation in making summaries and conclusions is 87%, and listening to a brief explanation for the next material is 75%.

e. *"Effectiveness of Think Pair Share And Spontaneous Group Discussion Towards Problem Solving Skill Student of X Accounting Graders SMK NEGERI 1 Wonosari Written by Puji Rahayu, Ani Widayati (2019)".* Based on the results of data analysis, previous explanations, and the relevant research results, it can be concluded that a problem-based introduction to accounting learning using the Think-Pair-Share (TPS) learning model is effective enough in terms of problem-solving skills. The average value (mean) N-Gain Score for experimental class 2 is 61.4629 or rounded to 61.5%. Based on the table of categories of interpretation of the effectiveness of the NGain value (%) above, it can be concluded that using the Spontaneous Group Discussion learning model is effective enough to improve introduction to accounting skills in students of X accounting graders SMK N 1 Wonosari. This is in line with the research conducted by Nurhidayah (2012) in students of VIII graders SMP 2 Tanete Rilau which states that the application of the Spontaneous Group The most effective learning model in improving mathematics learning outcomes. This is indicated by a significant increase from the pretest average of 32.16 which increased to the posttest average value of 45.67. Based on the results of the interpretation of the effectiveness category of the NGain value (%) for each learning model, it can be concluded that Think Pair Share (62.9%) and Spontaneous Group Discussion (61.5) are quite effective in improving problem solving skills.

**Table 1 Summary of Think Pair Share
Research Results.**

No	Name	Title of Research	Result of Research	Result of Analysis
1	Isti Dwi Mustafia, & Sri Adi Widodo (2018)	Problem solving skill: Effectiveness on think pair share with comic	There is an average difference between the class that uses think pair share and comics to the group that only uses think pair share. To determine which group is performing better, it is necessary to look at the average of each group. From the calculation results, the average experimental group was 21.85 while the control group average was 19.00. so it can be concluded that students' ability to solve math problems using think pair share media with comic media is better than the ability to think pair share alone.	Based on the research, it can be concluded that the higher the students' abilities, the more effective the learning model used during learning (Widodo, 2015). This is because one of the objectives of learning mathematics is to develop the ability to think critically, logically, systematically, carefully, effectively, and efficiently in problem solving (BSNP, 2006). So that the success of students, one of which can be seen in the ability of students to solve mathematical problems.
2	Arnold Fidelis Naibaho (2020)	Penerapan Model Pembelajaran Tipe Think Pair Share Dengan Softre Autograph Untuk Meningkatkan Kemampuan Pemahaman Materi Grafik Fungsi Trigonometri	Based on the results of research and the application of Think pair share cooperative learning model with Autograph software media can improve students' mathematical understanding skills in learning, this can be seen after learning in cycle I and cycle II is carried out. Before the action was taken, the results of data analysis showed that the level of students' mathematical understanding ability with the percentage of student learning completeness was 17%. After the action was taken, namely the application of the TPS type cooperative learning model with Autograph software media on the graph material of trigonometric functions, the results of data analysis were 67% in the first cycle and 86% in the second cycle.	This study provides a clear picture that the success of the learning process depends on several factors, which can come from the teacher, students, as well as the models and media used by the teacher. The ability of teachers to develop materials, deliver materials, manage classes and select and apply learning models.
3	Najichatul Millaha,St. & Budi Waluyaa, Walida (2018)	Problem solving skill through think pair share model with murder approach viewed from learning interest of tenth grade students	problem solving skills through the Think Pair Share model with the MURDER approach succeeded in achieving mastery learning and the students' problem solving skills through the TPS model with the	the results of this research are similar to Nataliasari's research (2014), the problem-solving skill of students who obtained the TPS learning model is better than those who gained expository learning. Graceful & Raheem (2011)

No	Name	Title of Research	Result of Research	Result of Analysis
			MURDER approach were better than the expository learning model.	explain that students with TPS models have superior skills to those with expository models.
4	Ida Karnasih & Mariati Sinaga (2014).	Enhancing Mathematical Problem Solving and Mathematical Connection Through the Use of Dynamic Software Autograph in Cooperative Learning Think-Pair-Share	the average mathematical connection of students in treatment 1 which applies dynamic software only for presentation boards for teachers, there is no significant difference with the average mathematical connection of students in treatment 2 which applies dynamic software. Signatures are only used when students are paired in Think-Pair-setting Share. Significant differences occur when dynamic software implementations are involved all the time during mathematics learning.	The data that has been collected from the results of this study were analyzed to obtain an interpretation that can answer the research questions described in the introduction. The data includes student scores on tests, observations, and questionnaire results. From the results of all tests, it can be concluded that the average mathematical problem solving of students in treatment 1 which applies dynamic software only for presentation boards for teachers does not have a significant difference from the average student. Mathematical problem solving in treatment2 whose dynamic software implementation Autograph is only used when students are paired in a Think-Pair-Share setting.
5	Puji Rahayu, & Ani Widayati (2019).	Effectiveness of Think Pair Share And Spontaneous Group Discussion Towards Problem Solving Skill Student of X Accounting Graders SMK NEGERI 1 Wonosari	Think Pair Share and Spontaneous Group Discussion are most effective for improving accounting skills in class X accounting students at SMK N 1 Wonosari. In addition to supporting the results of data analysis and explanation, the effectiveness of problem-based adjustment journal learning using the TPS learning model in terms of problem solving skills is also supported by previous studies even though it is applied to different subjects.	Research conducted by Fadiah Khairina (2008) on seventh grade students of SMP Negeri 1 Wonosari shows that problem-based learning in mathematics with Think Pair Share can improve students' problem solving abilities. In addition, research conducted by Dini Kinanti Fardah (2010) on class VIII C students of SMP Negeri 1 Bantul concluded that the Thinks Pair Share (TPS) learning model can improve students' mathematical problem solving abilities. Thus, based on the results of data analysis, previous explanations, and relevant research results, it can be concluded that problem-based introduction accounting learning using the Think-Pair-Share (TPS) learning model is quite effective in terms of problem-solving skills.

2. **Autograph**

The following are the results of research findings on Autograph, where researchers will begin to collect data before analyzing the data. Therefore the steps needed in collecting data according to research procedures are, first the researcher will collect data related to the Autograph then reduce the data in order to obtain the main things or important things related to the research, the second researcher will conduct presentation of data so that the data presented will be in the form of a description based on the aspects studied according to the formulation of the research problem, the last step is that the researcher will make conclusions based on the a presentation of the data that has been described.

The findings along with the main description of the data related to Autograph are as follows:

a. *"Critical Thinking Skills of Students Through Mathematics Learning with ASSURE Model Assisted by Software Autograph Written by Y Kristianti , S Prabawanto and S Suhendra (2017)".* Based on the results of data analysis, Influence of application of mathematics learning with ASSURE model assisted by Autograph software toward improvement of critical thinking ability to junior high school students (Hypothesis accepted). From the result of the research, it can be seen that there is an improvement of critical thinking ability of junior high school students using mathematics learning with ASSURE model assisted by Autograph software compared to the students using conventional model. Starting with the result of pretest mathematical critical thinking ability, obtaining normal data from each pretest result, then both homogeneous data and tested the average difference obtained displayed that both data pretest has no difference. Based on the pretest, posttest and N-gain results obtained normal and homogeneous data so that t test is done, and the obtained result shows difference of the average of both classes. Furthermore, the test gain is normalized, the two classes have normal and homogeneous data, afterwards the average equation test is tested and there is an average difference between the two classes. Apparently the statistical hypothesis data can be concluded that the critical thinking skills of students whose learning mathematics using ASSURE model assisted by Autograph software is better when compared with students who that uses conventional models.

b. *"The Effect of Cooperative Learning Type Think Pair Share with Autograph on the Mathematical Representation Ability and Self-efficacy Written by Yuli Ragelia Sinaga, Edi Syahputra, Faiz Ahyaningsih , Siti Hanijah Br. Saragih (2018)".* Based on the results of data analysis, For children's intellectual development to take place optimally, they need to be motivated and facilitated to develop theories that explain the world around them. Research conducted by Sari, D.P, Syahputra, E dan Surya, E, (2018) concluded that the self-efficacy of students in Muhammadiyah SMAS 8 Kisaran after learning using the Jigsaw model cooperative learning was getting better. This can be seen in 34 students in learning, 26.47% have high self-efficacy, 61.76% students have moderate self-efficacy, and 11.76% students have low self-efficacy. In general, 73.31% of students are a moderate level of self-efficacy. In addition, the research conducted by Sapta, A, Syahputra, E dan Hamid, A (2017) concluded that the increase in self-efficacy students can improve student learning outcomes. From the results of calculations, it was found that there was an effect of TPS-assisted cooperative learning on student self-efficacy. In other words, the influence of Autographed

Assisted Type TPS cooperative learning on student self-efficacy is better than TPS type cooperative learning without Autograph help on student self-efficacy.

c. *"Kemampuan Pemecahan Masalah Matematis Siswa antara Model Problem Based Learning (PBL) dengan Model Think Pair Share (TPS) Berbantu Autograph Written by Perihandi, Suwarno Ariswoyo & Abdul Mujib (2021)".* Based on the results of data analysis, the test results of students' problem-solving abilities in experimental class 1 were higher than in experimental class 2, namely 0.22> 0.17. The high average n-gain in experimental class 1 compared to experimental class 2 shows that the increase in the mathematical problem-solving ability of the experimental class 1 students is higher than the increase in the mathematical problem-solving ability of the experimental students 2. Thus, the treatment is given using the Problem Based Learning (PBL) learning model. provides a better improvement than the learning model with Think Pair Share (TPS). The KAM data of this study was used to determine the group of students' KAM based on high, medium, and low KAM groups. KAM grouping is used to answer problems related to improving problem-solving abilities given the PBL learning model and the TPS learning model. And also students with high KAM get an average increase in math problem-solving ability (N-Gain) which is greater than students with medium and low KAM. So it can be concluded that there is no interaction between learning and students' initial mathematical abilities on students' mathematical problem-solving abilities. Based on the results of the study showed that the increase in students' mathematical problem-solving abilities who were given the PBL learning model was higher than the TPS learning model.

Table 2 Summary of Autograph Research Results.

No	Name	Title of Research	Result of Research	Result of Analysis
1	Y Kristianti, S Prabawanto & S Suhendra (2017)	Critical Thinking Skills of Students Through Mathematics Learning with ASSURE Model Assisted by Software Autograph	From the results of the study, it can be seen that there is an increase in the critical thinking ability of junior high school students who use ASSURE model of mathematics learning with the help of Autograph software compared to students who use conventional models.	Based on the results of research from Rohayati showed that the thinking ability of junior high school students who received contextual learning was better than students who received conventional learning.
2	Yuli Ragelia Sinaga, Edi Syahputra , Faiz Ahyaningsih , & Siti Hanijah Br. Saragih (2018).	The Effect of Cooperative Learning Type Think Pair Share with Autograph on the Mathematical Representation Ability and Self-efficacy	The effect of TPS-assisted cooperative learning on mathematical representation abilities is better or more effective than TPS-type cooperative learning without the help of Autograph on mathematical representation abilities.	Research conducted by Sari, D.P, Syahputra, E and Surya, E, (2018) concluded that the self-education of students at SMAS Muhammadiyah 8 Kisaran after learning using the Jigsaw model of cooperative learning is getting better. This can be seen in 34 students in learning, 26.47% of students have high self-education, 61.76% of students have moderate self-education, and 11.76% of students have low self-education. In general, 73.31% of students are at a moderate level of self-education.
3	Perihandi, Suwarno Ariswoyo &	Kemampuan Pemecahan Masalah Matematis Siswa	The average problem-solving ability pretest scores in the experimental classes one and	Fachruraz (2011) concluded that there were differences in the improvement of mathematical communication skills

Abdul Mujib (2021).	antara Model Problem Based Learning (PBL) dengan Model Think Pair Share (TPS) Berbantu Autograph.	two are 71.00 and 69.00 and the difference between the two classes is 2.00. Then the average post-test score of problem-solving skills in experimental classes one and two are 79.11 and 74.00. The two classes have a difference of 5.11.	between students who learned mathematics using a problem-based learning model and students who received conventional learning.

3. Problem Solving Skills

The following are the results of research findings on Problem Solving Skills, where the researcher will start to collect data before analyzing the data. Therefore the steps needed in collecting data according to research procedures are, first the researcher will collect data related to Problem Solving Skills then reduce the data in order to obtain the main things or important things related to the research, the second researcher will perform the presentation of the data so that the data presented will be in the form of a description based on the aspects studied according to the formulation of the research problem, the last step is that the researcher will make conclusions based on the presentation of the data that has been described.

The findings along with the main description of the data related to Problem Solving Skills are as follows:

a. "Analisis Keterampilan Pemecahan Masalah Pada Pembelajaran Matematika Written by Heru Kurniawan". Based on the results of data analysis, problem-solving skills in students are still low. The problem-solving process which includes: the identification of prerequisite questions and materials, preparation of a settlement plan, and evaluation of the results and completion plan have not been carried out by students. With these results, it is necessary to inculcate problem-solving in every lecture activity to produce students who have good problem-solving skills. Problem-solving must be an inseparable part of the whole process of learning mathematics. Thus, teachers and lecturers are required to apply appropriate learning models, methods, and techniques so that problem-solving skills can be possessed and embedded in students and students.

Table 3 Summary of Problem Solving Skill
Research Results.

No	Name	Title of Research	Result of Research	Result of Analysis
1	*Heru Kurniawan.*	Analisis Keterampilan Pemecahan Masalah Pada Pembelajaran Matematika	problem-solving skills in students are still low. The problem-solving process which includes: the identification of prerequisite questions and materials, preparation of a settlement plan, and evaluation of the results and completion plan have not been carried out by students. With these results, it is necessary to inculcate problem-solving in every lecture activity to produce students who have good problem-solving skills..	This is to the findings of Schoenfeld (1992: 359) in Mayer (2008) "students who have understood mathematics, they can solve a given problem in just five minutes or less. The effect of this belief is that students will give up on the problem if they can't solve it in a few minutes. Students who have completed twelve whole years of math class and have worked on thousands of problems, hardly anyone expects to be able to solve a problem that can't be done in just a few minutes."

Discussion of Research Results

Based on the results of several data sources above as a whole it can be stated that the results of applying the think pair share type cooperative model in improving students' problem-solving skills Assisted autographs from several kinds of literature. Based on several articles, journals, and theses that have been reviewed, it is found that Think Pair Share Assisted by Autograph can improve Students' Problem-Solving Skills. This is supported by several studies that examine the effect of the three variables, Think Pair Share, Autograph and Problem Solving Skills, namely: Mathematical Problem Solving and Mathematical Connection Through the Use of Dynamic Software Autograph in Cooperative Learning Think-Pair-Share (2014) This study states that Think Pair Share Assisted by Autograph can improve Students' Problem Solving Skills based on the results of the questionnaire which shows that most students (88.62%) like mathematics; most students (85%) want to study mathematics seriously; most of the students (88%) liked the Think Pair Share type of cooperative learning; most students (93.21%) think that Think Pair-Share cooperative learning is useful in learning mathematics; most of the students liked the Student Worksheet (LKS) and the Signature manual; most students like Autograph dynamic software; all students like to use Autograph dynamic software, it can be concluded that students' activities during mathematics learning with Autograph dynamic software are in good activity.

CONCLUSION

Based on the results of research and discussion, it can be concluded that concluded as follows:

1. Based on the results of the analysis through several kinds of literature, it can be concluded that the Think Pair Share learning model with the help of Autograph is more effective on students' problem-solving skills as seen from several test results of problem-solving skills using the Think Pair Share learning model with the help of Autograph achieve mastery learning. Students' problem-solving skills using the Think Pair Share learning model with the help of Autograph are better than other learning models. With the use of Autograph software in Think-Pair-Share cooperative learning, student activities are more active and present at a good level. Students have a good perception of the use of Autograph software in Think-Pair-Share cooperative learning.
2. This study provides a clear picture that the success of the learning process depends on several factors, which can come from the teacher, students, and the models and media used by the teacher. The ability of teachers to develop materials, deliver materials, manage classes and select and implement learning models

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