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MATHEMATICAL PROBLEM SOLVING ABILITY IN SOLVING SEQUENCE AND SERIES PROBLEMS USING POLYA STAGES

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Mathematical Problem Solving Ability in Solving Sequence and Series Problems Using Polya Stages

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ABSTRAK

Penelitian ini bertujuan untuk mengetahui kemampuan pemecahan matematis peserta didik dengan menggunakan tahapan polya pada materi barisan dan deret. Jenis penelitian ini menggunakan penelitian kualitatif dengan sampel yang digunakan adalah 6 peserta didik yang memiliki kemampuan matematis tinggi, sedang, dan rendah. Sampel diambil secara acak dari satu kelas X yang terdiri dari 35 peserta didik. Pengumpulan data yang digunakan adalah tes tertulis materi barisan dan deret, dan wawancara terhadap 6 peserta didik. Hasil dari penelitian ini adalah peserta didik memiliki kemampuan pemecahan masalah tinggi dapat menyelesaikan masalah dengan menggunakan tahapan polya dengan lengkap dan urut, peserta didik yang kemampuan pemecahan masalah sedang dapat menyelesaikan masalah dengan lengkap dan urut, akan tetapi terdapat kekeliruan penyelesaian sehingga diulang kembali. Sedangkan peserta didik yang kemampuan pemecahan masalah rendah dalam menyelesaikan malasah tidak melakukan satu tahap akhir. Dari hasil tersebut, berharap agar guru lebih memberikan penjelasan kembali terkait materi tersebut.

Kata Kunci : Matematika, Materi, Polya

Abstract

This study aims to determine students' mathematical solving abilities using polya stages in sequences and series material. This type of research uses qualitative research with the sample used is 6 students who have high, medium, and low mathematical abilities. Samples were taken randomly from a class X consisting of 35 students. The data collection used was a written test on sequences and series material, and interviews with 6 students. The results of this study are students who have high problem-solving abilities can solve problems using polya stages completely and sequentially, students with moderate problem-solving abilities can solve problems completely and sequentially, but there is a mistake in solving so that it is repeated. Meanwhile, students with low problem-solving abilities in solving problems do not do one final stage. From these results, it is hoped that the teacher will provide more explanation regarding the material.

***Keywords**: Mathematics, Material, Polya*

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1. INTRODUCTION

Mathematics learning can be interpreted as a process of learning mathematics carried out by educators and students. In learning mathematics requires an ability possessed by students, one of which is the ability to solve problems. Problem solving is a way of solving problems that is not based on the skills and knowledge that each student has (Umam et al., 2019). Students who can solve a mathematical problem can be said that these students have the ability to solve mathematical problems. Problem solving is considered as an important activity in learning mathematics (Bunyamin et al., 2020). Mathematical problems in learning mathematics require solutions or problem solving, so problem solving is considered important. Problem solving research on sequential and sequential chapter material is important, because to improve problem solving abilities when questions are in the form of stories.

Students' mathematical problem solving abilities are of course different, namely high, medium, and low. As in previous research, students in solving linear equations and inequalities with one variable varied, namely high, medium, and low (Izzati et al., 2019). Students who experience errors when solving SPLDV questions mean that these students have problem solving skills (Kuhfeld et al., 2020). Based on school observations, students are still lacking in problem solving skills because they do not understand the problem. In addition, students are still confused about what is known and asked, so that their problem-solving abilities are still lacking. Therefore, researchers want to conduct research with the title "Problem Solving Ability in Solving Mathematical Problems Using Polya Stages".

That problem solving should be at the core of learning mathematics, because it is the main objective of learning mathematics and improving mathematics learning activities (Qureshi et al., 2021). Problem solving ability is an effort to find a way out of difficulties to achieve the desired goal (Camellia et al., 2021). This means that problem solving abilities are needed by students, especially in learning mathematics.

There are four stages of polya, namely understanding the problem, making plans, implementing plans, and looking back at solutions that have been completed. Understanding the problem or understanding the problem means that students must understand the problem before working on the problem by reading it. Making a plan or

make a plan means that after understanding the questions, students can plan the right solution to the problem (Lickona, 1991). Carrying out a plan or carrying out a plan means that students can work on the problem after understanding the problem and making a plan for its completion. Finally, looking back at the completion that has been completed or looking back at the completion that has been completed means that after completing the problem, students must check the results of their work before submitting it, the goal is to determine whether it is correct or not.

2. METHOD

This research is a qualitative research, where the researcher wants to see students who have high, medium, and low problem-solving abilities (Sugiyono, 2016). Then the research results were analyzed into a statement. The sample used was 6 class X students taken randomly from 35 students based on classroom observations. The six students were then grouped into 3 groups, namely 2 students who had high-level problem-solving abilities, 2 students who had medium-level problem-solving abilities, and 2 students who had low-level problem-solving abilities. Solving this research problem using polya stages. At the polya stage there are 4 stages, namely understanding the problem, preparing a settlement plan, implementing the settlement plan, and reviewing the solutions that have been obtained (Sugiyono, 2015).

3. RESULTS AND DISCUSSION

High Ability Category Students

Flowchart of Polya Stages of High Ability Category Students

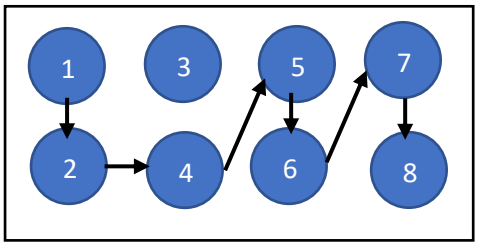


***Figure 1**. Stages of Polya for BB Students*

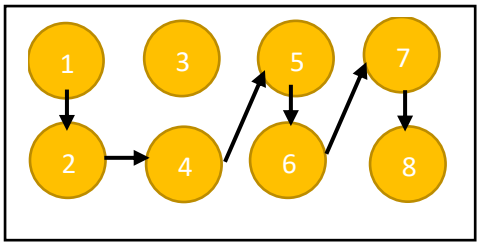


Figure 2. MJ Student Polya Stages

Information:

1) read the questions.
2) understand the problem.
3) redraw
4) identify what is known and asked.
5) write down what is known and asked from the problem.
6) work on questions according to the concepts of sequences and series
7) get answers from what is done.
8) re-check the answers along with the answers

BB and MJ students are said to have high abilities, these students carry out all the steps on the polya indicator. Students have high problem-solving skills if they solve problems based on problem solving steps according to Polya (Hasani & Wardani, 2023). The polya stage indicators for BB and MJ students include understanding the problem, planning the problem, carrying out problem solving, then checking again. However, BB and MJ students on the indicator of understanding the problem did not redraw the picture on the problem.

After the written test, the researcher conducted interviews with the students. The results of interviews with students in the high ability category showed that BB and MJ students after getting the questions, they immediately read the questions repeatedly and then understood the problems from the problems and the pictures on the questions. After that, BB and MJ identified what was continued by writing down what was known and asked from the questions.

In the indicator of carrying out problem solving, there are differences in the steps taken by BB and MJ. On this indicator, BB immediately wrote down the formula and worked on it because BB already understood the material for sequences and series. Meanwhile, MJ needed time to recall the formulas for sequences and series material. After finishing the work, BB and MJ made conclusions and re-checked the answers along with the calculations that had been done.

Medium Ability Category Students

Flowchart of Polya Stages of Students in Moderate Ability Category

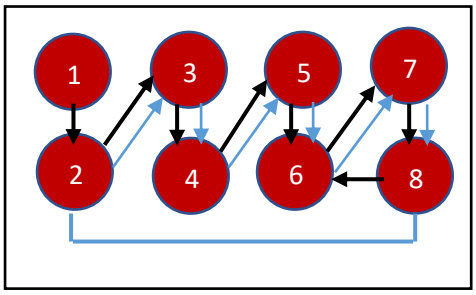


Figure 3. Stages of Polya Elementary School Students

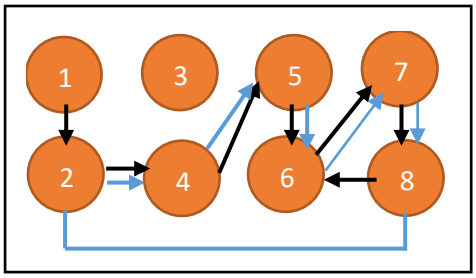


Figure 4. Polya Stages of NF Students

SD and NF students are said to have moderate abilities. It can be seen that these students carry out all the steps on the polya indicator. Based on the results of the written test, SD and NF students solve problems in a coherent way, starting from understanding the problem, planning, carrying out problem solving, and finally checking again. However, there are obstacles when solving problems in these questions.

Based on the results of interviews with SD and NF students that they had doubts after finishing working on the questions. Then SD and NF tried again to understand the question, after understanding and finding an error, i.e. mistakenly identifying what was being asked. So SD and NF are less precise in answering questions. Furthermore SD and NF improve and feel they are right in doing. From these problems, after completing the problem with the correct polya steps, SD and NF return to the first step, namely understanding the problem.

Low Ability Category Students

Flowchart of Polya Stages of Students in the Low Ability Category

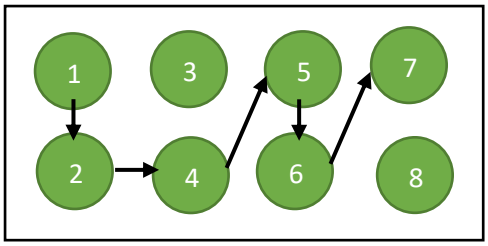


Figure 5. Polya Stages of AM Students

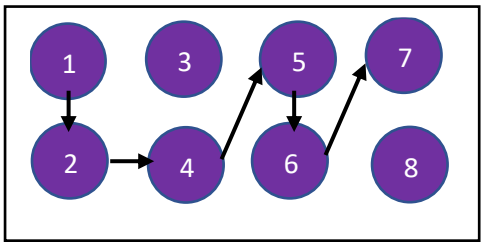


Figure 6. Polya Stages of MH Students

AM and MH students are said to have low ability, because there is 1 polya stage indicator that they do not work on. Based on the results of the written test, AM and MH carried out the stages of understanding the problem, then planning the problem, then implementing problem solving. AM and MH completed using the polya stages without ending the completion with indicators re-checking. Based on the results of interviews with AM and MH students, they did not carry out the last indicator because they thought the answer was correct, and they were already feeling dizzy with the problem.

4. CONCLUSION

Based on the results of this study, it can be concluded that students who have problem solving abilities are in the high category and are doing all stages of polya in sequence. However, students in the middle category repeated back to the initial stage because they did not read the questions carefully so they did not understand the problem. In contrast to students in the low category, namely AM and MH, they did not carry out one stage, namely the final stage (re-checking answers), because they considered that the answer was correct.

With students having low problem-solving abilities, the teacher should pay more attention and explain the material again so that students understand more about the material. As for future researchers, it is advisable if you want to do research on problem-solving abilities to use different materials.

5. References

Bunyamin, B., Umam, K., & Lismawati, L. (2020). Critical Review of M-Learning in Total Quality Management Classroom Practice in an Indonesian Private University. *International Journal of Interactive Mobile Technologies (IJIM)*, *14*(20), 76–90. https://doi.org/10.3991/ijim.v14i20.15141

Camellia, Kurnisar, & Nurdiansyah, E. (2021). *The Development of Documentary Film Media in Civics Education Subject*. *524*(Icce 2020), 38–42. https://doi.org/10.2991/assehr.k.210204.005

Hasani, R., & Wardani, H. (2023). Analisis Kemampuan Pemecahan Masalah Matematis Siswa Kelas VII Pada Materi Bangun Ruang Segiempat Di MTS Nurul Huda. *Journal Research and Education Studies*, *4*(1), 55–66. https://doi.org/10.51178/invention.v4i1.1240

Izzati, U. A., Bachri, B. S., Sahid, M., & Indriani, D. E. (2019). Character education: Gender differences in moral knowing, moral feeling, and moral action in elementary schools in Indonesia. *Journal for the Education of Gifted Young Scientists*, *7*(3), 547–556. https://doi.org/10.17478/jegys.597765

Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E., & Liu, J. (2020). Projecting the Potential Impact of COVID-19 School Closures on Academic Achievement. *Educational Researcher*, *49*(8). https://doi.org/10.3102/0013189X20965918

Lickona, T. (1991). *Educating for Character: How Our School Can Teach Respect and Responsibility*. Bantam Books.

Qureshi, M. A., Khaskheli, A., Qureshi, J. A., Raza, S. A., & Yousufi, S. Q. (2021). Factors affecting students' learning performance through collaborative learning and engagement. *Interactive Learning Environments*, *0*(0), 1–21. https://doi.org/10.1080/10494820.2021.1884886

Sugiyono. (2015). *Statistika untuk Penelitian*. Alfabeta.

Sugiyono. (2016). *Metode Penelitian Kuantitatif, Kualitatif, dan Campuran*. Alfabeta.

Umam, K., Nusantara, T., Parta, I. N., Hidayanto, E., & Mulyono, H. (2019). An Application of Flipped Classroom in Mathematics Teacher Education Programme. *International Journal of Interactive Mobile Technologies (IJIM)*, *13*(03), 68. https://doi.org/10.3991/ijim.v13i03.10207