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Implementation of the Case Method in Learning Mathematics to Improve the Creative Thinking Ability of Electronics Engineering Students

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Abstract: Learning in class found that lecturers did not give students the opportunity to think creatively in solving math problems. Learning is still centered on the teacher so that communication is still one-way resulting in teacher dominance. The research objective resulted in the implementation of the case method in mathematics learning to improve the creative thinking skills of D4 Electronics Engineering students in solving mathematical problems. This type of research is experimental by using data collection documentation, questionnaires, observations and tests. The research was conducted in class 1B in the even semester of the 2022/2023 academic year with a total of 24 students discussing the Linear Equation System material. Data analysis used normality test, homogeneity test, completeness test, comparative test, and n-gain test. The results showed that the results of the validation of the research instrument were 4.11 in the good category. Individual completeness tests meet the minimum completeness criteria, students' creative thinking skills in case method group are higher (81.56) than expository learning (70.05). N-gain score for creative thinking test of 0.363 which is in the medium category.

Keywords: case method, system of linear equations, creative thinking ability.

Abstrak: *Pembelajaran di kelas ditemukan bahwa dosen kurang memberikan kesempatan kepada mahasiswa untuk berfikir kreatif dalam memecahkan soal matematika. Pembelajaran masih berpusat pada pengajar (Teacher Center) sehingga komunikasi masih satu arah mengakibatkan dominasi pengajar. Tujuan penelitian menghasilkan implementasi metode kasus dalam pembelajaran matematika untuk meningkatkan kemampuan berfikir kreatif mahasiswa D4 Teknik Elektronika dalam memecahkan masalah matematika. Jenis penelitian eksperimen dengan menggunakan pengumpulan data dokumentasi, angket, observasi dan tes. Penelitian dilakukan di kelas 1B semester genap Tahun Akademik 2022/2023 sejumlah 24 mahasiswa bahasan materi Sistem Persamaan Linear. Analisis data menggunakan Uji Normalitas, Homogenitas, Uji Ketuntasan, Uji Banding, dan Uji N Gain. Hasil penelitian menunjukkan bahwa hasil validasi perangkat instrument penelitian skor 4,11 dengan kategori baik. Uji ketuntasan Individu sudah memenuhi kriteria ketuntasan minimal (66), kemampuan berfikir kreatif mahasiswa pada metode kasus dalam pembelajaran matematika (81,56) lebih tinggi dari pembelajaran ekspositori (70,05), adanya peningkatan kemampuan berfikir kreatif mahasiswa dengan dilakukan uji N-Gain sebesar 0,363 dengan kategori sedang.*

Kata kunci: *metode kasus, sistem persamaan linear, kemampuan berfikir kreatif.*

▪ INTRODUCTION

Within six years SN-Dikti has undergone three changes, namely from Permenristekdikti No. 49 of 2014 changed to Permenristekdikti No. 44 of 2015, and finally changed to Permendikbud No. 3 of 2020 in line with the Ministry of Education and Culture's policy on Freedom to Study-Campus Merdeka (MBKM). In order to prepare students to face social, cultural, world of work changes and rapid technological

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advances, student competencies must be prepared to be more dependent on the needs of the times. The Malang State Polytechnic Electronics Engineering Study Program (Polinema) is a vocational college that emphasizes the contribution aspect of all academics' role in society. Polinema graduates are required to be ready to compete with graduates from other tertiary institutions, so that knowledge and skills development includes soft and hard. Even though it has been written in the form of guidelines, the implementation of learning tends to be centered on hard skills by ignoring improvements in student soft skills including evaluating Creativity, Collaboration, Communication, and Critical Thinking, so that this is an indicator of low alumni work uptake (Andayani et al., 2022). Thinking skills in the field of education are being able to think creatively in solving problems so that they can produce complex solutions or products (luthfiyah Nurlaela; Euis Ismayati, 2015). Higher Education is required to be able to design and implement innovative learning processes so that students can achieve learning outcomes covering aspects of attitude, knowledge, and skills optimally and always relevant. Government support in seeking to expand innovative technology and expand internet reach (Hoq, 2020). Learning mathematics needs to require the selection of the right technology so that learning runs effectively (Mulenga & Marbán, 2020). Seeing this, the Mathematics Semester Learning Design (RPS) is designed with an alternative using the casemethod.

In preparing students to face the demands of the 4.0 era which continues to develop dynamically (Gebze et al., 2020). Education and humans are two things that cannot be separated, because education can be used as a measuring tool to determine a person's quality. Mathematics is a field of study that has an important role at every level of education starting from elementary school, middle school to tertiary institutions (Adi Candra Kusuma, 2020). Over time, every human being is faced with problems for improvement and self-improvement. Problems that arise are solved by various solutions taken through thought processes. This requires humans to think creatively in finding the right solution (Uloli et al., 2016). In developing ideas that are not routine then produce new ideas that have a broad outlook. Doing creative thinking needs to be supported by knowledge possessed by developing good knowledge (Febrianti et al., 2016). The role of mathematics in education is very important, but the fact is that mathematics is considered a difficult subject for students, which results in low student achievement (Mustofa et al., 2020).

The development of Covid 19 has recently begun to decline, so institutional policies follow the rules of the Ministry of Education and Culture, so odd semester lectures for the 2022/2023 academic year are allowed offline with strict rules for maintaining health protocols. The impact of the pandemic has forced educators to learn technology to produce quality learning (Cortez, 2020). Basically, online learning apart from having an impact on students, also involves the psychology of educators in presenting learning (Hasan, 2023). Students are starting to adapt again, learning which is usually online using several tools such as zoom, googlemeet, classroom, and others. There are still many educators who are not familiar with social media or matters related to technological developments (Vlasenko et al., 2020). Learning in online classes found

that lecturers use the lecture learning method where this learning focuses in one direction on the lecturer (teacher center). Lecturer domination in learning causes students not to be given the opportunity to think in solving the problems given, so that the learning outcomes obtained are not maximized. Learning strategies must change to learner-centered learning (Tholibon et al., 2022). There needs to be a learning approach in which students are trained to solve mathematical problems in stages. Mathematics learning will be meaningful if students can be directed to solve contextual problems. Students need to be trained in contextual solving in which there is an abstraction process, meaning the process of solving a concrete problem to an abstract problem such as mathematical modeling, then the mathematical modeling solution is returned to the concrete problem. Students' creative abilities cannot be created just like that in solving problems, there needs to be guidance from the lecturer so that flexibility, originality and detailing are created. Each individual's style in solving problems encourages these individuals to think creatively and innovatively (Kim et al., 2018). This is of course a challenge for lecturers to prepare learning instruments that are creative, innovative and contextual. To support the improvement of students' creative abilities, lecturers need to choose the right learning, as an alternative to using the Case Method.

Case Method is learning that focuses on students by using constitutive topics as cases that must be solved (Safitri & Purbaningrum, 2020). This method pays attention to students' interests and talents to provide students with the breadth to be able to analyze from various points of view (Vahlepi & Tersta, 2021). Case Method is participatory learning and promotes discussion so that it can train to analyze problems, think critically, train to accept the views of others (Taufiq et al., 2022). The development of critical thinking encourages students to be able to think creatively in solving problems, it is necessary to provide contextual cases in learning which are then approached by choosing the right syntax in learning (Harahap & Yusra, 2022). From this, this research is to obtain the Case Method in learning mathematics to improve the creative thinking skills of D3 Electronics Engineering students.

▪ METHOD

Participant

Research subjects in class 1B students of the DIV Electronics Engineering Study Program, State Polytechnic of Malang, were 24 students in odd semesters of the 2022/2023 Academic Year. The population consisted of 7 classes with a total of 162 students in semester 1 of the 2022/2023 academic year DIV of the Malang State Polytechnic Electronics Engineering Study Program. The class sample was taken by random sampling by paying attention to the school exam scores obtained and then determining the experimental class using class 1B and the control class for class 1A consisting of 23 students. This type of research used quantitative research.

Research Design and Procedure

Research takes about 3-4 months starting from the initial stage to the end. The stages of research carried out include a) data collection, b) preparation of research instruments, c) validation of research instruments, d) implementation of research, e) analysis of research results and f) conclusions. Stages of data collection using the results of observations and interviews. Observations were made to photograph the state of

learning in class, find out the character of students, then continued with interviews with students and fellow teachers. The information obtained is used as notes to design research instruments that are in accordance with the conditions that occur which are used as a solution in increasing students' creative thinking abilities. Questionnaires are made for the assessment rubric of the research instrument which will be filled in by the validator. The stages of the research implementation were carried out in 4 meetings where 3 meetings were given material then at the end of the meeting an evaluation was carried out. The learning method is carried out at each meeting with the following picture scheme.

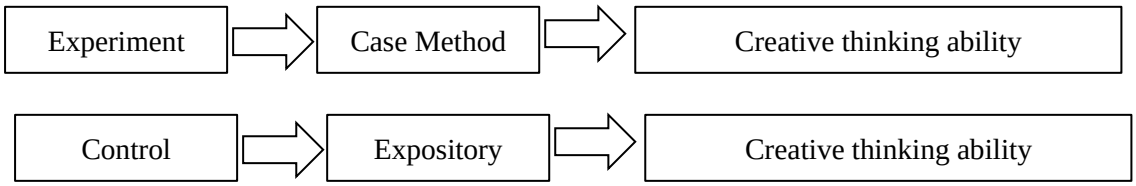

Figure 1. Research design

Instrument

Development stages of research instruments conducted by looking into Lesson Plan of Mathematics provided by the Department which is then developed according to the research topic. The material discussed is the System of Linear Equations (SPL). The research instruments include Student Worksheets which consist of Group and Independent Worksheets, Teaching Modules, and Test questions. Validation of the research instrument is intended to obtain research feasibility by taking into account the validator's suggestions and input. The validator was carried out by 2 colleagues and 1 expert lecturer. Assessment of the instrument with a questionnaire using a Likert scale (1-5), after the validator gave an assessment then obtained the average of each research instrument. After validating the test questions, a question test is carried out to obtain validity, reliability, differential power of the questions, and the level of difficulty of the questions (Kusuma & M Junus, 2022). The criteria for the research instrument used were to obtain a good predicate. The criteria are as follows (Behind, 2006).

Table 1. Research instrument criteria

Rating index	Criteria
$1.00 \leq IP \leq 1.80$	Bad
$1.80 < IP \leq 2.60$	Poor
$2.60 < IP \leq 3.40$	Faid
$3.40 < IP \leq 4.20$	Good
$4.20 < IP \leq 5.00$	Excellent

Analysis

Data analysis was performed using SPSS with Cronbach alpha (Velazco et al., 2021). Individual completeness tests pass the minimum completeness criteria (66), test

the proportion of completeness on average 75% exceeding the minimum completeness criteria, comparative tests to determine students' creative thinking abilities using the expository case method, N-Gain tests to determine the movement or decline under study (Kusuma & Afriliana, 2018). Testing individual completeness in achieving minimum completeness criteria (66) Then continue testing to see who achieves minimum completeness criteria of at least 75%. Tests to find out the increase in students' creative thinking abilities were carried out by the N-gain test (Kusuma & Mujiono, 2019). Indicators of students' creative thinking abilities in this study include fluent thinking skills, flexible thinking skills, original thinking skills, and detailing skills (Rasnawati et al., 2019). The analysis of the research results is described to obtain rough conclusions on the research which are then followed up carefully on the research components that influence and hinder the research objectives.

▪ RESULT AND DISSCUSSION

The data collection was compiled based on the results of observations in class, then all forms of interactions or events were recorded: The results of the interviews were then analyzed, which was then followed by data collection by interviews to obtain clear information from students and teaching lecturers. The questions discussed are still within the scope of learning such as teaching media, learning tools and learning methods used by lecturers. The findings of the data collection results obtained are the background to this research. Students in thinking to solve math problems the majority have not reached the stage of creative thinking. Learning in lectures is still limited to knowledge transfer, there is still a lack of interaction between students and lecturers. Problem solving needs to be trained so that it will have an impact on students' creative thinking in finding solutions (Eisner, 2021). The implementation of the research was carried out in 4 meetings where 3 meetings provided material then at the end of the meeting an evaluation was carried out. The details of the activities are as follows

Table 2. Research topics and expected competences

Meeting	Topics	Expected competences
1	Introduction to Linear equation system	1. Describe the general form of a system of linear equations 2. Describe solutions to solving systems of linear equations 3. Describe the method of solving a system of two-variable linear equations
2	Gauss dan Gauss – Jordan Elimination	1. Explain the difference between row echelon and reduced row echelon 2. Explain Gaussian elimination 3. Explain the Gauss – Jordan elimination
3	Homogenous Liniar Equation System	1. Explain Crammer's Rule 2. Describe a homogeneous system of linear equations 3. Distinguish between trivial and non-trivial solutions
4	Pretest	Capable to solve system equations of linear equations correctly

Learning tools that have been provided by the Department is limited to Lesson Plan. From the existing devices, research instruments were constructed to support Case Method learning strategy to improve students' creative thinking abilities such as the development of lesson plan, students' worksheets, learning modules, and test instrument for creative thinking skills. Learning tools are validated using a five-points Likert scale questionnaire for 3 colleagues in the field of Education, namely Nuril Hudha, M.Pd., Drs Mujiono, M.Pd, and Dr. Kristina, M.Pd. The validation result is presented in the following table

Table 3. Validation results

Instrumen	Score	Criteria
Lesson plan	4.19	Good
Worksheet	4.02	Good
Learning Module	4.10	Good
Test instrument	4.15	Good
Average	4.11	Good

Try-out conducted in class IF, with the type of description questions. The recapitulation of test results can be seen in the following table.

Table 4. Results of test items

Item No.	Validity	Reliability	Difficulty index	Discrimination index	Description
1	Valid		Normal	Good	Used
2	Valid		Easy	Good	Used
3	Valid	High	Normal	Good	Used
4	Not Valid		Normal	Good	Not Used
5	Valid		Difficult	Good	Not Used

From the results of the validation table above, each component of the research instrument has obtained good criteria, meaning that the feasibility of the instrument can be continued for research. There are several suggestions and input from the validator to improve the research instrument before it is used, such as choosing clear, unambiguous sentences, there is a need for instructions in an order so that students are not confused.

The implementation of learning consists of 3 material giving meetings and 1 evaluation meeting. At each student meeting at the beginning of learning it is necessary to explain the learning objectives to be achieved so that students know what will be learned. Students need to be given an overview of the problems that are encountered in everyday life and then solved with the planned learning topics, so that students know the meaning of studying mathematics. Case method is carried out in group discussions with group LKMs. The material chosen is System of Linear Equations (SPL). This discussion activity is intended to obtain various kinds of perspective information on a given problem from all members in the group. This information students can sort out which can be used as the development of creative thinking. Basically, students who

think creatively are students who are not easily satisfied with their achievements, are not used to accepting what is but always try to get the maximum, have a high sense of curiosity, are not focused on one way of solving, and always want to train themselves (Jazuli, 2009). In each study to train students are given student worksheets independently completed at home. Students are given the freedom to explore ways of solving it to obtain the easiest solution for them. The role of the lecturer in learning the Case Method as a facilitator aims to help the difficulties and confusion faced by students.

Details of the subject matter for the Linear Equation System are presented in table 2. The experimental class 1B consisted of 24 students and the control class 1A consisted of 23 students tested simultaneously with the Normality test and Homogeneity Test. The test results on the normality test using the Kolmogorov-Smirnov obtained sig = 0.200 exceeding 0.05 so that Ho is accepted, meaning that the student data in the experimental class and the control class are normally distributed, representing the sample representing the selected population. The results of the homogeneity test by looking at the Independent Sample Test obtained a value of Sig = 0785 exceeding 0.05 so that H0 was accepted meaning that the experimental class was given the Case Method with the control class which was given the expository learning treatment had the same variance. Individual Completeness Testing with $\alpha = 0{,}05$, $n = 24$, $\bar{x} = 80{,}3$, $\mu_0 = 66$, $s = 7{,}52$ obtained tcalc > ttable with H0 rejected and H1 is accepted. This statistical analysis showed that the average creative thinking ability test has exceeded the minimum completeness criteria. Learning completeness in this study indicated by the average creative thinking ability test using Case Method is higher than minimum completeness criteria and 75% of students gets the score.

Table 5. N-gain test

Groups	Initial	Final	N-gain
Control	62.0	72.25	0.269
Experiment	71.2	81.56	0.359

From the calculation results, the N-gain value is obtained at 0.359 in the medium category, meaning that the ability of students in the experimental class on students' creative thinking abilities has increased with the medium category.

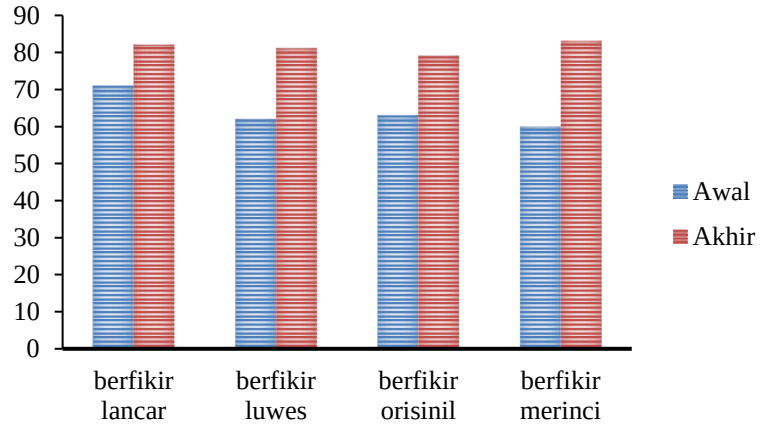

Figure 2. Results of students' creative thinking ability before and after in the experimental class

Indicators of students' creative thinking abilities in this study fluent thinking skills can be seen from students' ability to put forward various ideas, flexible thinking skills seen from students being able to provide different views/thoughts, original thinking skills such as the ability to vary answers or give different responses from various aspects, and detailing skills such as having the ability to detail in detail so that you can find ideas that are not commonly found by others. From the results of the picture above that there is an increase in each indicator of the ability to think creatively both from thinking fluently, thinking flexibly, thinking original, and thinking in detail after getting treated with the case method in learning mathematics. Critical thinking is a constructive way to find the right solution, by evaluate all criteria to answer the problem (Ridwan et al., 2021).

Learning the case method (Case Method) is the recommended learning in the Merdeka Belajar Kampus Merdeka curriculum, where this learning is student-centered by providing cases in everyday life or the field the student is engaged in. Learning mathematics has routine and non-routine cases, students need to be trained to solve non-routine cases so that they can stimulate creative thinking (Nasution et al., 2018). In case method, students are given student worksheets, both group and individual worksheets. Group worksheets are intended for discussion material to exchange information to get the correct solution with assistance by the lecturer. The existence of assignments will have a cognitive influence on students and their learning behavior (Hwang & Ham, 2021). Heterogeneous selected groups of students' cognitive level. meaningful and in-depth learning can be obtained by studying in groups so as to train for independent learning (Sari & Wulanda, 2019). Individual worksheets as homework that must be completed personally to train students' creative thinking skills. The questions given on the worksheet are open ended, meaning that students are given the freedom to solve the problem in their own way. The book is made for self-study student assistants which contains a summary of the material and exercises to practice problem solving (Kusuma, Ardani, Trisnawati, & Huda, 2023). Having a book can improve students' thinking skills, without a book as a study guide, learning difficulties occur if the lecturer is not present at the lecture (Qurohman et al., 2023). Given that creative thinking needs to be owned by students in solving problems. That not all problems can be solved with pre-existing solutions (Rasnawati et al., 2019). The success of learning mathematics obtained by each student is different because there are many factors that influence it both internally and externally (Borba et al., 2016).

This research is in line with research (Andayani et al., 2022) with the results of the study showing 87% of lecturers stated that Case Method more effective in increasing student learning motivation. Research (Vahlepi & Tersta, 2021) shows that Case Method learning is learning that can train high-level abilities by forming groups to obtain active learning. Research (Noer, 2011) shows the average difference in increasing students' creative thinking abilities in the control class and the experimental

class. Research (Auliah et al., 2020) shows an increase in students' creative thinking abilities of 0.55 with the N-gain test using an open ended. Research (Noer, 2011) shows the average difference in increasing the ability to think creatively between students in the experimental class using open ended and the control class. It can be concluded that research on the application of the case method to learning mathematics can improve the critical thinking skills of D4 electronics engineering students

▪ CONCLUSION

Lecturers have an important role in designing learning in their class in achieving the desired learning objectives. A strategy is needed in teaching to increase student participation in learning so as to create an active and fun atmosphere. This study discusses Case Method learning to improve students' creative thinking skills in solving mathematical problems. The experimental class is a class that is given the Case Method learning treatment which can show student completeness exceeding the minimum completeness criteria as much as 75%, the ability to think creatively is higher than the control class, there is an increase in the ability to think creatively by 0.359 in the medium category. from the indicator of the ability to think creatively students have a little difficulty regarding detailing skills such as having the ability to detail in detail so that they can find ideas that are not commonly found by others. It is hoped that future research can be carried out qualitatively further research on the ability to think creatively. This research can be used as an alternative for lecturers in developing learning models or strategies in lectures.

▪ REFERENCES

Kusuma. A. C. (2020). Peningkatan keterampilan membuat alat peraga matematika pada mahasiswa prodi pgsd universitas peradaban. *Dinamisia : jurnal pengabdian kepada masyarakat*, 4(4), 715–722. https://doi.org/10.31849/dinamisia.v4i4.4128

Andayani, E., Mustikowati, R. I., & Wahyu, S. (2022). Case method : mengoptimalkan critical thinking , creativity communication skills dan collaboratively mahasiswa sesuai mbkm di era abad 21. 16(1), 52–60.

Auliah, L., Syaiful, S., & Syamsurizal, S. (2020). Pengembangan modul digital pembelajaran matematika berbasis pendekatan open ended untuk meningkatkan kemampuan berpikir kreatif matematis. *Jurnal pendidikan matematika*, 11(1), 13. https://doi.org/10.36709/jpm.v11i1.9885

Belakang, A. L. (2006). Pengembangan perangkat pembelajaran matematika dengan menggunakan pendekatan saintifik berbasis problem based learning. 4, 102–114.

Borba, M. C., Askar, P., Engelbrecht, J., Gadanidis, G., Llinares, S., & Aguilar, M. S. (2016). Blended learning, e-learning and mobile learning in mathematics education. *ZDM - Mathematics Education*, 48(5), 589–610. https://doi.org/10.1007/s11858-016-0798-4

Cortez, C. P. (2020). Blended, distance, electronic and virtual-learning for the new normal of mathematics education: a senior high school student's perception. *European Journal Of Interactive Multimedia And Education*, 1(1), e02001. https://doi.org/10.30935/ejimed/8276

Eisner, H. (2021). The nature of problem-solving. in problem-solving. https://doi.org/10.1201/9781003160618-1

Febrianti, Y., Djahir, Y., & Fatimah, S. (2016). Analisis kemampuan berpikir kreatif peserta didik dengan memanfaatkan lingkungan pada mata pelajaran ekonomi di sma negeri 6 palembang. *Jurnal Profit*, 3(1), 121–127. http;//ejournal.unsri.ac.id/index.php/jp/issue/view/591

Gebze, D. A., Jumadi, & Perwati, S. (2020). Improving problem-solving ability in physics through android-based mobile learning application. *Journal of Physics: Conference Series*, 1440(1). https://doi.org/10.1088/1742-6596/1440/1/012022

Harahap, E. P., & Yusra, H. (2022). Implementasi pembelajaran case method melalui observasi-investigasi sebagai pengembangan bahan ajar dialogika di forum kelas. *Jurnal Bahasa Indonesia Prima* (JBIP), 4(1), 26–34.

Hasan, I. (2023). Online learning how do accounting teachers feel ? (Issue March 2020). *Atlantis Press SARL*. https://doi.org/10.2991/978-2-494069-09-1

Hoq, M. Z. (2020). E-learning during the period of pandemic (covid-19) in the kingdom of saudi arabia: an empirical study. *American Journal Of Educational Research*, 8(7), 457–464. https://doi.org/10.12691/education-8-7-2

Hwang, J., & Ham, Y. (2021). Relationship between mathematical literacy and opportunity to learn with different types of mathematical tasks. *Journal on Mathematics Education*, 12(2), 199–222. https://doi.org/10.22342/JME.12.2.13625.199-222

Jazuli, A. (2009). Berpikir kreatif dalam kemampuan komunikasi matematika. *Prosiding Seminar Nasional Matematika Dan Pendidikan Matematika*, 209–220. https://eprints.uny.ac.id/7025/1/P11-Akhmad Jazuli.pdf

Kim, J. Y., Choi, D. S., Sung, C. S., & Park, J. Y. (2018). The role of problem solving ability on innovative behavior and opportunity recognition in university students. *Journal of Open Innovation: Technology, Market, and Complexity*, 4(1). https://doi.org/10.1186/s40852-018-0085-4

Kusuma, C. A., Ardani, A., Trisnawati, E., & Huda, N. (2023). Cooperative learning uses e-learning materials to improve students ' math problem-solving ability (Vol. 1). *Atlantis Press SARL*. https://doi.org/10.2991/978-2-494069-09-1

Kusuma, A. C., & Afriliana, I. (2018). Efektifitas pembelajaran guided teaching dengan e-learning untuk meningkatkan kemampuan komunikasi matematik mahasiswa. desimal: *Jurnal Matematika*, 1(3), 315–327. https://doi.org/10.24042/djm.v1i3.2962

Kusuma, A. C., & M Junus. (2022). Pendekatan problem based learning. *Jurnal Pendidikan Matematika (JPM)*, 8(1), 37–46. http://riset.unisma.ac.id/index.php/jpm/article/view/14367

Kusuma, A. C., & Mujiono, D. S. (2019). Efektifitas problem based learning dengan pendekatan saintifik untuk meningkatkan kemampuan keterampilan berfikir kritis mahasiswa. *Jurnal Pendidikan Glasser*, 3(2), 148. https://doi.org/10.32529/glasser.v3i2.332

Nurlaela, L., Ismayati, E. (2015). 2018-09-27_Strategi Belajar Berpikir Kreatif.pdf (pp. 1–85). http://repository.unesa.ac.id/sysop/files/2018-09-27_Strategi Belajar Berpikir Kreatif.pdf

Mulenga, E. M., & Marbán, J. M. (2020). Is covid-19 the gateway for digital learning in mathematics education? *Contemporary Educational Technology,* 12(2), 1–11. https://doi.org/10.30935/cedtech/7949

Mustofa, B., Mardiyana, & Slamet, I. (2020). An analysis of problem solving ability in linear equation systems with two variables. *Journal of Physics: Conference Series,* 1538(1). https://doi.org/10.1088/1742-6596/1538/1/012099

Nasution, M. L., Yerizon, Y., & Gusmiyanti, R. (2018). Students' mathematical problem-solving abilities through the application of learning models problem based learning. *Iop Conference Series: Materials Science And Engineering*, 335(1). https://doi.org/10.1088/1757-899X/335/1/012117

Noer, S. H. (2011). Kemampuan berfikir kreatif matematis pembelajaran matematika berbsis masalah. *Jurnal Pendidikan Matematika,* 5(1), 100.

Rasnawati, A., Rahmawati, W., Akbar, P., & Putra, H. D. (2019). Analisis kemampuan berfikir kreatif matematis siswa smk pada materi sistem persamaan linier dua variabel (spldv) di kota cimahi. *Jurnal Cendekia : Jurnal Pendidikan Matematika,* 3(1), 164–177. https://doi.org/10.31004/cendekia.v3i1.87

Ridwan, M. R., Retnawati, H., Hadi, S., & Jailani, J. (2021). The effectiveness of innovative learning on mathematical problem-solving ability: a meta-analysis. international journal of research in education and science, 7(3), 910–932. https://doi.org/10.46328/ijres.2287

Safitri, P. T., & Purbaningrum, K. A. (2020). Pengembangan buku ajar berbasis kasus (case based) pada mata kuliah statistika pendidikan. *Jurnal Penelitian Pembelajaran Matematika,* Volume 13, 256–267.

Sari, D. S., & Wulanda, M. N. (2019). Pengembangan lembar kerja mahasiswa berbasis proyek dalam meningkatkan kemampuan berfikir kreatif mahasiswa. Natural: *Jurnal Ilmiah Pendidikan IPA,* 6(1), 20. https://doi.org/10.30738/natural.v6i1.4073

Taufiq, M., Almuslim, U., Method, C., & Meeting, Z., Konsep, P., Pendahuluan, I., & Taufiq, M. (2022). Pembelajaran berbasis case method melalui aplikasi zoom meeting terhadap pemahaman. 3(1).

Tholibon, D. A., Md Nujid, M., Mokhtar, H., Abd Rahim, J., Rashid, S. S., Saadon, A., Tholibon, D., & Salam, R. (2022). The factors of students' involvement on student-centered learning method. *International Journal of Evaluation and Research in Education (IJERE),* 11(4), 1637. https://doi.org/10.11591/ijere.v11i4.22314

Uloli, R., Probowo, & Prastowo, T. (2016). Kajian konseptual proses berpikir kreatif dan pemecahan masalah. *Seminar Nasional Pendidikan Dan Saintek,* 644–647.

Vahlepi, S., & Tersta, F. W. (2021). Implementasi model pembelaaran berbasis case method dan project based learning dalam rangka mengakomodir higher order thinking skill mahasiswa dalam mata kuliah psikologi pendidikan bahasa arab di masa pandemi. 5, 10153–10159.

Velazco, D. J. M., Hinostroza, E. M. F., Martínez, M. F. C., & Liccione, E. J. (2021). Mathematics anxiety and its effects on engineering students' performance during the covid 19 pandemic. *Journal on Mathematics Education,* 12(3), 547–562. https://doi.org/10.22342/JME.12.3.13205.547-562

Vlasenko, K., Chumak, O., Achkan, V., Lovianova, I., & Kondratyeva, O. (2020). Personal e-learning environment of a mathematics teacher. *Universal Journal of Educational Research*, 8(8), 3527–3535. https://doi.org/10.13189/ujer.2020.080828

Qurohman, M. T., Danuri, D., & Nuryadi, N. (2023). The influence of savi problem based and mathematical disposition on the student achievement of smk dinamika tegal city. *Atlantis Press SARL*. https://doi.org/10.2991/978-2-494069-09-1