Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

Development of Creative Mathematics Learning Model Based on Mathematical Disposition and Character Value

Yulis Jamiah[1]

Abstract

Mathematics, as one of the fundamental disciplines, has an important role in shaping the ability to think critically, logically, and systematically. This research aims to develop a creative mathematics learning model based on character values and examine the mathematical disposition of students in the Mathematics Education Study Program at FKIP Untan. This study used Borg & Gall's Developmental Research approach, which involves a cyclical process from conceptual model development to implementation and evaluation. The research participants used one class with a total of 30 students who were sampled in the study. The research procedure includes theoretical analysis of character values and mathematical disposition, exploration of student characteristics, identification of field problems, development and validation of learning models, and model implementation through real action research. The developed model focused on creating an effective, fun, and learning atmosphere centered on internalizing character values such as confidence, creativity, flexibility, and curiosity. The results showed that this learning model was effective in improving students' mathematical thinking ability, mathematical power, and mathematical disposition. This can be seen from the students' positive responses, where 53% responded very positively and 47% positively to the learning. In addition, the model validation showed excellent results, with an average score of 3.73 and 3.74 out of a maximum score of 4. In conclusion, the creative mathematics learning model based on character values is feasible to be applied in mathematics learning to support the development of students' thinking skills and attitudes optimally. Further research is recommended to further explore the development of character values that support the generation of active, creative, and responsible students..

Keywords: *Mathematical Disposition, Creative Learning Model, Character Values, Learning Development.*

Introduction

The development of science and technology (IPTEK) in the era of globalization has a significant impact on various aspects of life, including education (Harianto et al., 2023). On the one hand, this development brings many benefits, such as easy access to information and increased learning efficiency (Kamalov et al., 2023). However, globalization also raises serious challenges, such as the decline in national character values due to the negative impact of technology that is not balanced with strong morals and ethics (Hartoyo et al., 2024; Nazua Ajahra, 2024). In this context, education has a strategic role to instill character values that can become a fortress in facing the challenges of globalization.

Mathematics, as one of the fundamental scientific disciplines, has an important role in shaping the ability to think critically, logically, and systematically (Ibrahim et al., 2024). These abilities are the basic capital needed in everyday life and in solving various problems. However, learning mathematics is often considered boring and difficult, so many students or college students are less motivated to learn it (Darmayanti et al., 2023; DiNapoli, 2023) . In this case, a creative and character value-based learning approach can be a solution to increase students' motivation and mathematical disposition.

Mathematical dispositions, which include beliefs, attitudes and inclinations towards mathematics, are important aspects that support successful mathematics learning(Ibrahim et al., 2024). These dispositions include self-confidence, perseverance, flexibility, and interest in mathematics. Based on the views of several studies by (Kusmaryono et al., 2019; Putra et al., 2017), mathematical disposition has a major influence on individual success in understanding and applying mathematics. However, the reality in the field shows that many students have low mathematical disposition, thus affecting the quality of their mathematics learning.

[1] Universitas Tanjungpura, Pontianak, Indonesia; yulis.jamiah@fkip.untan.ac.id (Corresponding Author)

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

Character value-based mathematics learning is one of the innovative approaches to improve students' mathematical disposition. Character values, such as honesty, responsibility, cooperation, and positive attitude, can be internalized through a creative learning process. Thus, in addition to improving cognitive abilities, this learning also contributes to the formation of superior student character(Mawardin Mawardin et al., 2023). Based on the results of previous studies, such as those conducted by(Kamid et al., 2021), mathematics learning that integrates character values can improve students' mathematical disposition and form a strong attitude of integrity.

A fact reveals that there is still a need to develop a more structured and directed creative mathematics learning model (Smith et al., 2022). This model should be able to accommodate students' needs, create a fun learning atmosphere, and effectively integrate character values. Thus, learning mathematics is not only a means to improve academic ability, but also to form a superior personality. The low mathematical disposition of students has an impact on the suboptimal learning of mathematics at the university level (Apriadi Adiansha & Syarif Sumantri, 2017; Nilimaa, 2023; Suwito et al., 2023). Although many approaches have been developed, most still focus on cognitive aspects without paying attention to the importance of attitudes, beliefs, and character values that underlie successful learning.

In addition, there is no learning model that specifically integrates creativity and character values to improve students' mathematical disposition. Therefore, this research aims to fill the void by developing a character value-based creative mathematics learning model that can increase students' motivation, mathematical disposition, and character building as a whole. This research has novelty in several aspects, namely an integrated approach that integrates character values into a creative mathematics learning model to improve students' mathematical disposition, a focus on mathematical disposition that is different from previous research that emphasizes more on cognitive aspects, and the development of a new model based on character values with a structured approach, fun, and in accordance with student characteristics. Thus, this research is expected to make a significant contribution in improving the quality of mathematics learning, as well as shaping the character of students who are superior and competitive in the era of globalization.

Methods

Participants

The research was conducted in the Mathematics Education Study Program of FKIP Untan. The sample determination in this study used one class with a total of 30 students who were sampled in the study.

Research Design

This research is a development of a creative mathematics learning model based on character values and assessment of mathematical disposition for Mathematics Education students. The research approach used is Borg & Gall's Developmental Research in the form of a cycle that begins with the development of a conceptual learning model and continues with the implementation stage.

Procedure

This research was carried out in several steps. The steps taken are described as follows: 1) analyzing theoretical mathematics in higher education, character values, and mathematical disposition; 2) exploring character values and mathematical disposition; 3) identifying problems in the field regarding the gap between the learning model and its application, the curriculum and the mathematics learning model that is being used; 4) examining the problems found in step 3 and reviewing them from the aspect of student cognitive development and the usefulness of mathematics learning; 5) developing a learning model; 6) validate the learning model; 7) implement or test it in the form of action research with real actions in courses

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

taught by the research team; 8) evaluate and improve the learning model based on step 7; 9) reveal the effectiveness and weaknesses of the application of the resulting mathematics learning model and compare it with the commonly used learning model; and 10) determine the resulting mathematics learning model as the final model that can be recommended to the Mathematics Education Study Program. The effectiveness value of the results of the development of this research is in the form of a creative product, namely the formation of a creative mathematics learning model.

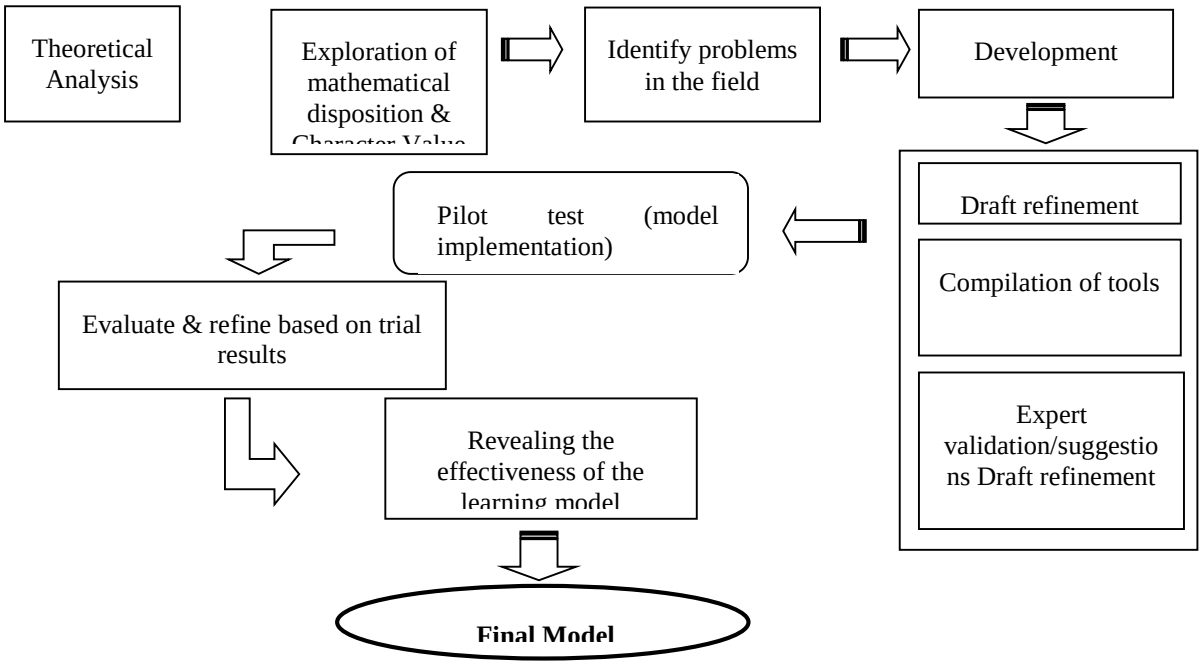

Figure 1. Research and Development Phase of Creative Mathematics Learning Model

Data Analysis

Data collection was carried out in various ways, both tests and non-tests through: verbal tests (demonstrations) of students, documentation, observation, questionnaires, and interviews. While the data analysis techniques used were carried out qualitatively and quantitatively to complement each other. Data analysis was assisted using the SPSS 26 application.

Results

There are several sections of assessment in the development of this learning model, first on the description / content of the introduction in the learning model (table 2); second, the content of the learning concept (table 3); third on the description / content of learning advantages (table 4); fourth, description / content of learning objectives (table 5); fifth, description / content of learning characteristics (table 6). The assessment team gave an assessment with the criteria "very good with a score of 5", "good with a score of 4", "quite good with a score of 3", "less good with a score of 2", and "not good with a score of 1".

In the development, four (4) judges were used from mathematics education lecturers, both those with bases in undergraduate or graduate mathematics education. The judges are in the following table:

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

Table 1. List of lecturer members as validation experts

1. No	2. Name	3. Lecturer Home base
4. 1	5. Dr. H. Ahmad Yani M.Pd	6. Master of mathematics education
7. 2	8. Drs. Edy Yusmin, M.Pd	9. S1 Methematics Education
10. 3	11. Dr. Agung Hartoyo, M.Pd	12. Master of mathematics education
13. 4	14. Dr. Dede Suratman, M.Si	15. Master of mathematics education

A number of lecturers in the table 1 are lecturers in mathematics education both in undergraduate and postgraduate study programs, with competencies and skills in learning, especially mathematics education.

Table 2: Results of the Validator Team's Assessment of the Introduction to Creative Mathematics Learning Based on Character Values

Assessment Aspect	Score From				Description
	V-1	V-2	V-3	V-4	
The introductory section has briefly informed the importance of developing a mathematics learning model based on character values.	4	3	4	4	Average score = 3.75 (=4) Good criteria

Description: V-1 : 1st Validator/Rater V-2 : 2nd Validator/Rater

V-3 : 3rd Validator/Rater V-4 : 4th Validator/Rater

Table 3. Results of the Validator Team's Assessment of Creative Mathematics Learning Concepts Based on Character Values

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

Assessment Aspect	Score From				Description
	V-1	V-2	V-3	V-4	
The "concept of creative math learning based on character values" section has explained the goals and objectives of math learning and character values.	4	4	3	4	Average score = 3.75 (=4) Good criteria

Table 4. Results of the Validator Team's Assessment of the Advantages of Creative Mathematics Learning Based on Character Values

Assessment Aspect	Score From				Description
	V-1	V-2	V-3	V-4	
The section "The advantages of creative mathematics learning based on character values" already implies informing about the advantages of the mathematics learning model developed by actualizing character values.	3	3	5	3	Average score = 3.66 (=4) Good criteria

Table 5. Results of the Validator Team's Assessment of Character Value-Based Creative Mathematics Learning Objectives

Assessment Aspect	Score From				Description
	V-1	V-2	V-3	V-4	
The section "Objectives of creative mathematics learning based on character values" has included objectives related to information on the process of actualizing character values in the developed mathematics learning model.	2	4	5	4	Average score = 3.75 (=4) Good criteria

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

Table 6: Results of the Validator Team's Assessment of Character Value-Based Creative Mathematics Learning Characteristics

Assessment Aspect	Score From				Description
	V-1	V-2	V-3	V-4	
The section "Characteristics of Character Value-Based Creative Mathematics Learning" already briefly informs the characteristics of the developed mathematics learning model.	4	4	4	3	Average score = 3.75 (=4) Good criteria

Table 7. Results of the Validator Team's Assessment of the Implementation of Creative Mathematics Learning Based on Character Values

Assessment Aspect	Score From				Description
	V-1	V-2	V-3	V-4	
Implementation of Character Value-Based Creative Mathematics Learning					
1. The implementation of learning begins with a description of the course description, and the competencies achieved.	4	4	4	4	Average score = 4.00 (=4) Good criteria
2. The details of learning implementation already contain the stages of activities	4	4	4	5	Average score = 4.25 (=4) Good criteria
3. Each stage of the activity has poured the equivalent / synergy between learning	4	4	2	4	Average score = 3.50 (=4)

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

activities and the activation of character values.					Good criteria
4. Implementation of learning there is information on the use of media & learning resources, and learning assessment techniques and procedures.	4	4	5	4	Average score = 4.25 (=4) Good criteria

Based on the assessment of the assessment team contained in table 2 to table 7 in general, the assessment team gave a general assessment of the learning model developed, with an assessment: very feasible; feasible; feasible and revised; less feasible; and very less feasible. The recapitulation of the assessment results is presented in table 8.

Table 8. Results of the Validator / Appraiser Team's Assessment of the Feasibility of Character Value-Based Creative Mathematics Learning Model

No. Order	Data Source	Total Score	Value	Eligibility Criteria	Validator comments/suggestions
1	Validator 1	42	70	FR	1. Needs to be tested in learning for 2 or 3 meetings 2. Add universal character values only
2	Validator 2	45	75	L	Need to pay attention to repetitive sentences/words and consistent use of terminology
3	Validator 3	51	85	L	There are nine groups that will be carried out / assigned in learning, so it is necessary to pay attention to the personnel / observers to get the data contained in the observation aspects.

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

4	Validator 4	49	81,7	L	Criteria shown on the observation sheet

Description: Model Eligibility Criteria.

Score 85 < SL ≤ 100: Very Feasible (VF)

Value 70 < SL ≤ 85: Feasible (L)

Score 55 < LR ≤ 70: Feasible and Revised (FR)

Value 30 < KL ≤ 55: Less Feasible (LF)

SKL score < 30 : Very Less Feasible (VLF)

Mathematical disposition results

The questionnaire to reveal student responses contains 54 statements (grids and questionnaires of mathematical disposition are attached). The characteristics of the statements expressed refer to the matching of character values indicators and mathematical disposition indicators. The indicators of character values, namely: religion, honesty, discipline, hard work, independence, responsibility, creativity, tolerance, love of reading, democracy, curiosity, respect for achievement, friendship/communication, and love of peace. While the indicators of mathematical disposition are: 1) confident in learning mathematics; 2) flexible in doing mathematical work; 3) persistent and tenacious in doing mathematical tasks; 4) have curiosity in mathematics; 5) reflect on ways of thinking; 6) appreciate the application of mathematics; and 7) appreciate the role of mathematics.

From the attitude table of each respondent, the frequency distribution and percentage of student responses to learning mathematics can be made as follows:

Table 9: Student Response to Mathematics Learning

Attitude	Frekwency	Percentation
SN	0	**0 %**

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

N	0	**0 %**
R	0	**0 %**
P	14	**47 %**
SP	16	**53 %**
Amount	**30**	**100 %**

Description: SN: Strongly Negative, N: Negative, U: Undecided, P: Positive, VP: Very Positive

From the presentation results in the table above, 16 students (53%) responded very positively, and 14 students (47%) responded positively. It can be stated that in general, student responses show positive and very positive attitudes. This means that creative mathematics learning based on character values which is a pillar of student learning constructs its own experience to solve certain problems. It can also be interpreted that in creative mathematics learning based on character values, students are given the widest possible freedom to express their opinions on a mathematical problem given by the lecturer in the learning. This is what causes students to tend to think and act positively in learning mathematics. The formation of high mathematical disposition or the tendency of students to think and behave positively towards mathematics, and act positively when learning mathematics, then students will be more confident in using mathematics, flexible, persistent, and resilient in solving mathematical problems, have curiosity to discover something new, tendency to reflect on the thinking process, and appreciate the role of mathematics, and appreciate the role of mathematics.

Discussion

This study validated five main components of the learning model, namely: (1) the content of the introduction in the learning model, (2) the content of learning concepts, (3) the description/content of learning advantages, (4) the description/content of learning objectives, and (5) the content of learning characteristics. The validation results show an average score of between 3.66 to 3.75 on a scale of 4, which indicates that the developed learning model falls into the category of "very good." In addition, the learning implementation obtained a score of 4 out of 5 as the maximum score, and the results of the assessment of feasibility showed a score between 70-85, which states that this model is suitable for use. In the analysis of mathematical disposition, 53% of students responded very positively, while 47% responded positively. This indicates that the learning model developed is able to foster positive attitudes towards mathematics, including curiosity, critical thinking, and problem-solving skills.

The importance of curiosity in mathematical disposition is one of the aspects developed in this learning (Palinussa et al., 2023; Sari et al., 2021) . Mathematics learning not only relies on conceptual and procedural understanding, but also includes the development of mathematical power, such as reasoning, connection, communication, and representation (Linda & Asyura, 2021). The application of the character value-based creative mathematics learning model has a significant impact on improving students' mathematical abilities and power (Wulandari, 2021). This can be seen from the enthusiasm of students during the learning process, as well as better understanding when learning is done in groups. Thus, this model is more effective than conventional learning (Hartoyo et al., 2024)

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

One of the main findings in this study is the increase in students' learning awareness. Students became more active in thinking and having a positive attitude towards mathematics, which had an impact on their courage in expressing opinions and arguing. In the learning process, groups that initially dominated in speaking showed increased tolerance, giving opportunities to groups that were previously less active (Yusroni, 2024). Lecturer intervention also played a role in ensuring that every student had an equal opportunity to participate. However, there are limitations in information sharing, where increased confidence is more dominant for students with good mathematical abilities (Hsu, 2021; Khusaini et al., 2020). In contrast, students with lower abilities still show barriers to active participation.

Character value-based creative mathematics learning encourages students to build their own understanding in solving problems (Selvy et al., 2020). Students are given the freedom to express their ideas in learning, which ultimately forms a higher mathematical disposition (Daher et al., 2023; Jebur, 2020; Subanji & Nusantara, 2022). Students become more confident, flexible, persistent, and curious in exploring new concepts. This is in accordance with the opinion of (Rahmawati et al., 2022), which states that mathematical disposition is a major factor in determining success in learning mathematics.

In addition, this learning model also supports the strengthening of collaboration between students. Group-based learning allows students to discuss, share ideas, and help each other understand more complex material (Rahmadi et al., 2023). Thus, the classroom atmosphere becomes more dynamic and interactive, creating a more enjoyable learning environment. However, a more structured strategy is needed to ensure that each group member contributes equally to the learning process (Arifin et al., 2020)

Furthermore, the application of this learning model shows potential in improving students' reflective thinking skills (Wahyuningsih et al., 2021). Students who are accustomed to expressing opinions and discussing critically tend to be better able to reflect on their understanding of mathematical concepts. This ability is very important in developing an analytical mindset that will be useful in various aspects of their academic and professional lives (Agusta et al., 2022; Bachore, 2021). The main factors in successful learning of mathematics are positive thinking tendencies, flexibility, and tenacity in solving problems.

The weakness of the study is that the success of learning is still highly dependent on lecturer intervention in encouraging active student participation. In addition, this research was only conducted on certain groups of students, so further studies need to be conducted to test the effectiveness of this model in various learning contexts.

Conclusion

This study shows that students' mathematical disposition can be improved through the application of character values-based creative mathematics learning models designed to create an effective, fun learning atmosphere and build positive mental attitudes such as creativity, innovation, commitment, patience, and openness. Most lecturers encourage the development of students' mathematical abilities by paying attention to aspects of self-confidence, flexibility of thinking, perseverance, curiosity, and reflection, and appreciate the usefulness of mathematics in everyday life. This model proved to be effective based on the results of validation and field implementation, where students were able to develop problem-solving strategies,

Journal of Ecohumanism
2025
Volume: 4, No: 1, pp. 4534 – 4545
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v4i1.6352

communicate creatively, and solve problems according to individual abilities. However, some obstacles such as students' dependence on lecturers' examples and lack of habit of facing open-ended tasks need to be overcome. Overall, this learning model is feasible to be implemented to support the development of students' thinking skills and attitudes optimally, in accordance with the vision and mission of the study program.

References

Agusta, F. R., Kartono, K., & Zulaeha, I. (2022). Creative Thinking Skill in Solving Mathematics Story Questions for Eight Graders. Journal of Educational Research and Evaluation. https://doi.org/10.15294/jere.v11i1.55422

Apriadi Adiansha, A., & Syarif Sumantri, M. (2017). The Effect of Brain Based Learning Model and Creative Thinking about the Ability of Mathematics Concept of Elementary Students. American Journal of Educational Research.

Arifin, M., Suyitno, H., & Dewi (Nino Adhi), N. R. (2020). Mathematics Creative Thinking Skills in Problem-Based Learning Model Reviewed from Learners' Curiosity and Gender. Journal of Primary Education. https://doi.org/10.15294/jpe.v9i5.43223

Bachore, M. M. (2021). The Influence Of Learning Mathematics Software Geogebra On The Ability Of Creative Thinking Of Students. International Journal Of Humanities Education and Social Sciences (IJHESS). https://doi.org/10.55227/ijhess.v1i1.35

Daher, W., Baya'a, N., & Jaber, O. (2023). Mathematics Preservice Teachers' Preparation in Designing Mathematics-Based Programming Activities Rich in Metacognitive Skills. International Journal of Emerging Technologies in Learning. https://doi.org/10.3991/ijet.v18i06.36965

Darmayanti, R., Laila, A. R. N., Khan, S., Fitriyah, I. D., Bausir, U., Setio, A., & Usmiyatun, U. (2023). Students' Attitudes Towards Learning Mathematics: "Too Soft Attitudes-Very Difficult-Boring-In A Good Way." Indonesian Journal of Learning and Educational Studies, 1(1), 29–50. https://doi.org/10.62385/ijles.v1i1.11

DiNapoli, J. (2023). Distinguishing between Grit, Persistence, and Perseverance for Learning Mathematics with Understanding. In Education Sciences (Vol. 13, Issue 4). https://doi.org/10.3390/educsci13040402

Harianto, E., Gustian, U., Supriatna, E., Shalaby, M. N., & Taiar, R. (2023). Stimulating game performance skills in students: experimental studies using net games. Tanjungpura Journal of Coaching Research, 1(2), 63–70. https://doi.org/10.26418/tajor.v1i2.65009

Hartoyo, A., Samodra, Y. T. J., Suryadi, D., Hidayat, S., Syam, A., & Sinulingga, A. (2024). What are the trends in shared leadership development and leadership life skills formation through sport activities: a literature review. Retos, 58(SE-Revisiones teóricas sistemáticas y/o metaanálisis), 450–461. https://doi.org/10.47197/retos.v58.107445

Hsu, P. Y. (2021). Academic use of Social Networking Technology for English Learning: Implementing Videotaped Peer Evaluation into English Speech Class. ACM International Conference Proceeding Series. https://doi.org/10.1145/3450148.3450159

Ibrahim, Khalil, I. A., & Indra Prahmana, R. C. (2024). Mathematics learning orientation: Mathematical creative thinking ability or creative disposition? Journal on Mathematics Education. https://doi.org/10.22342/jme.v15i1.pp253-276

Jebur, A. M. (2020). Identification of instructional learning design by Alan Hoffer's model and its effect on students' creative thinking in mathematics. Journal for the Education of Gifted Young Scientists. https://doi.org/10.17478/jegys.703766

Kamalov, F., Santandreu Calonge, D., & Gurrib, I. (2023). New Era of Artificial Intelligence in Education: Towards a Sustainable Multifaceted Revolution. In Sustainability (Vol. 15, Issue 16, p. 12451). https://doi.org/10.3390/su151612451

Kamid, K., Huda, N., Syafmen, W., Sufri, S., & Sofnidar, S. (2021). The relationship between students' mathematical disposition and their learning outcomes. Journal of Education and Learning (EduLearn). https://doi.org/10.11591/edulearn.v15i3.17604

Khusaini, N. B. A., Daud, M. S. Bin, Asari, S. I. I. B. S., & Selamat, N. B. (2020). Knowledge café: New approach to teaching and learning in higher learning institutions. Proceedings of the European Conference on Knowledge Management, ECKM. https://doi.org/10.34190/EKM.20.053

Kusmaryono, I., Suyitno, H., Dwijanto, D., & Dwidayati, N. (2019). The effect of mathematical disposition on mathematical power formation: Review of dispositional mental functions. International Journal of Instruction, 12(1), 343–356. https://doi.org/10.29333/iji.2019.12123a

Linda, L., & Asyura, I. (2021). Students' mathematical reasoning ability in solving post-Covid-19 PISA model math problems. Jurnal Riset Pendidikan Matematika. https://doi.org/10.21831/jrpm.v8i2.44739

Mawardin Mawardin, Adi Apriadi Adiansha, Mulyadin Mulyadin, & Anita Nurgufriani. (2023). Correlation Study: Self-Concept and Mathematical Disposition on Learning Outcomes of Elementary School Students. Journal of Insan Mulia Education. https://doi.org/10.59923/joinme.v1i1.6

Nazua Ajahra. (2024). Implementation of Citizenship Education for Increase Character in the Era of Globalization. International Journal of Students Education, 2(1 SE-Articles), 469–474. https://doi.org/10.62966/ijose.v2i1.693

Nilimaa, J. (2023). New Examination Approach for Real-World Creativity and Problem-Solving Skills in Mathematics. Trends in Higher Education. https://doi.org/10.3390/higheredu2030028

Palinussa, A. L., Lakusa, J. S., & Moma, L. (2023). Comparison of Problem-Based Learning and Discovery Learning To Improve Students' Mathematical Critical Thinking Skills. Formatif: Jurnal Ilmiah Pendidikan MIPA. https://doi.org/10.30998/formatif.v13i1.15205

Putra, A. K., Budiyono, & Slamet, I. (2017). Mathematical disposition of junior high school students viewed from learning styles. AIP Conference Proceedings. https://doi.org/10.1063/1.4995152

Rahmadi, Hardinata, R., Ahwan, M. T. R., Rubiyatno, & Suryadi, D. (2023). Enhancing 21st century collaboration skills in physical education through the problem-based learning model. Edu Sportivo: Indonesian Journal of Physical Education, 4(3), 270–282. https://doi.org/10.25299/esijope.2023.vol4(3).14112

Rahmawati, Zaenuri, Mulyono, & Cahyono, A. N. (2022). Profile of Mathematical Disposition of Junior High School Students in Mathematics Learning. ISET: International Conference on Science, Education, and Technology (2022), 829–833. https://proceeding.unnes.ac.id/index.php/iset

Sari, S. M., Nindiasari, H., & Santosa, C. A. H. F. (2021). The Influence of Contextual Approach on the Mathematical Understanding and Communication Abilities as Seen from Students' Initial Mathematical Abilities. Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang. https://doi.org/10.31331/medivesveteran.v5i1.1289

Selvy, Y., Ikhsan, M., Johar, R., & Saminan. (2020). Improving students' mathematical creative thinking and motivation through GeoGebra assisted problem based learning. Journal of Physics: Conference Series. https://doi.org/10.1088/1742-6596/1460/1/012004

Smith, K., Maynard, N., Berry, A., Stephenson, T., Spiteri, T., Corrigan, D., Mansfield, J., Ellerton, P., & Smith, T. (2022). Principles of Problem-Based Learning (PBL) in STEM Education: Using Expert Wisdom and Research to Frame Educational Practice. Education Sciences. https://doi.org/10.3390/educsci12100728

Subanji, S., & Nusantara, T. (2022). Mathematical Creative Model: Theory Framework and Application in Mathematics Learning Activities. https://doi.org/10.5772/intechopen.106187

Suwito, D., Perdana, R., Hadiana, D., & Sunyono, S. (2023). Development of LKPD Based on ExCluSiVE Learning Model to Improve Creative Thinking Skills in Mathematics Learning in Grade IV Elementary School. International Journal of Current Science Research and Review. https://doi.org/10.47191/ijcsrr/v6-i10-33

Wahyuningsih, S., Qohar, A., Satyananda, D., & Atan, N. A. (2021). The Effect of Online Project-Based Learning Application on Mathematics Students' Visual Thinking Continuum in Covid-19 Pandemic. International Journal of Interactive Mobile Technologies. https://doi.org/10.3991/ijim.v15i08.21565

Wulandari, A. (2021). The Effectiveness of the Application of Learning Models Creative Problem Solving and Problem Based Instruction: The Impact on Students Mathematics Learning Interest. Proceedings of the 2nd International Conference on Technology and Educational Science (ICTES 2020). https://doi.org/10.2991/assehr.k.210407.229

Yusroni, M. (2024). Game model to improve motor skills through traditional sports: Development study on elementary school students. Tanjungpura Journal of Coaching Research, 2(2), 71–79. https://doi.org/10.26418/tajor.v2i2.79872