**Journal of Education Technology**
Volume 7, Number 2, 2023 pp. 203-210
P-ISSN: 2549-4856 E-ISSN : 2549-8290
Open Access: https://ejournal.undiksha.ac.id/index.php/JET

# The Effect of Reflective-Impulsive Conceptual Thinking Style Models and Learning Models on Learning Outcomes of Complex Analysis by Controlling Students' Initial Knowledge

**I Made Sugiarta[1*]**
[1] Department of Mathematics Education, Ganesha University of Education, Singaraja, Indonesia

**A R T I C L E I N F O**

**Article history:**
Received January 10, 2023
Revised January 11, 2023
Accepted May 12, 2023
Available online May 25, 2023

***Kata Kunci:***
*Interaksi, Reflektif-Impulsif, Model Pembelajaran Generatif, Kemampuan Awal*

**Keywords:**
Interaction, Reflective-Impulsive, Generative Learning Model, Early Ability

**DOI:**
*https://doi.org/10.23887/jet.v7i2.64142*

***A B S T R A K***

*Penguasaan konsep analisis kompleks yang baik sangat perlu bagi mahasiswa Jurusan Pendidikan Matematika, mengingat konsep-konsep yang tertuang dalam mata kuliah ini sangat dibutuhkan oleh mahasiswa terutama pada pengembangan daya nalar pada materi terkait dan menyelesaikan masalah-masalah. Penelitian ini bertujuan untuk menganalisis interaksi antara model gaya berpikir konseptual reflektif-impulsif dan model pembelajaran terhadap hasil belajar analisis kompleks dengan mengontrol kemampuan awal. Penelitian ini merupakan penelitian kuasi eksperimen dengan melibatkan 92 mahasiswa Jurusan Pendidikan Matematika sebagai sampel. Teknik sampling untuk menentukan masing-masing kelompok perlakuan adalah simple random sampling. Penelitian ini menggunakan desain faktorial 2x2. Analisis data dilakukan dengan menggunakan analisis kovarians (ANKOVA). Hasil penelitian menunjukkan hasil belajar analisis kompleks kelompok mahasiswa yang mengikuti model pembelajaran generatif lebih tinggi daripada yang mengikuti model pembelajaran konvensional. Hasil belajar analisis kompleks kelompok mahasiswa yang memiliki gaya berpikir reflektif lebih tinggi daripada yang memiliki gaya impulsif, dan terdapat pengaruh interaksi antara model pembelajaran dan gaya berpikir konseptual terhadap hasil belajar analisis kompleks mahasiswa. Pembelajaran model generatif berimplikasi pada peningkatan penguasaan konsep, yang sangat terkait dengan kemampuan awal.*

**A B S T R A C T**

Concept understanding of complex analysis is very necessary for students of the Mathematics Education Department. Considering the concepts contained in Mathematics course are needed by students, especially in developing reasoning power in related material and solving problems. This study aims to analyze interactions between the reflective-impulsive conceptual thinking style model and the learning model on learning outcomes of complex analysis by controlling initial knowledge. This research is a quasi-experimental research involving 92 students of the Department of Mathematics Education as a sample. The sampling technique to determine each treatment group is simple random sampling. This study uses a 2x2 factorial design. Data analysis was performed using analysis of covariance (ANCOVA). The results showed that the learning outcomes of complex analysis of groups of students who followed the generative learning model were higher than those who followed conventional learning models. The learning outcomes of complex analysis of groups of students who had a reflective thinking style were higher than those who had an impulsive style. There was an influence of interaction between the learning model and conceptual thinking style on student complex analysis learning outcomes. Generative model learning has implications for increasing mastery of concepts, which are closely related to initial abilities.



## 1. INTRODUCTION

The curriculum of the Department of Mathematics Education at the Ganesha University of Education (Undiksha), which is contained in the 2010 Study Guidebook, is structured competency-based based on the concept that education does not only instill knowledge in students, but also produces professional, individual and social competencies. Such as listed in the four pillars of learning according to UNESCO: learning to know, learning to do, learning to be, learning to live together (Meyer et al., 2019; Muliani & Wibawa, 2019). This can be realized by carrying out reforms in education. Educational reform must be directed to learning according to the constructivism paradigm (Islamy et al., 2022; Plummer et al., 2017). This reform should be interpreted as a change in thinking and a commitment to self-development. This must mean that the learning process in class is held interactively, inspiring, fun, motivating curiosity and challenging.

Good mastery of the concept of complex analysis is essential for students of the Mathematics Education Department. Given that the concepts contained in this course are needed by students, especially in developing

** Corresponding Author: I Made Sugiarta: made.sugiarta@undiksha.ac.id*

reasoning power on related material and solving more complex problems and problems in their lives in the future (Habibullah, 2020; Pratiwi & Wiarta, 2021). Provide sufficient space for creativity, independence in accordance with talents, interests, and physical and psychological development (Nisa' & Rofiki, 2022). This can be achieved by applying the right learning model which is a factor that influences from outside while still paying attention to psychological factors that come from within. External factors by applying generative and conventional learning models and internal factors by paying attention to reflexive-impulsive conceptual thinking styles which are internal factors (A. Asdar et al., 2020; Ayu Sadewi & Wiyasa, 2020).

The learning model that fits this view is the generative model. The generative learning model has the opportunity to instill strong knowledge in students, develop students' thinking skills, and develop social aspects in students (Qonaah et al., 2019). On the other hand, the conventional learning model that has been implemented by lecturers is not in line with Law Number 12 of 2012, which instructs that learning is held student-centered by paying attention to the environment in a harmonious and balanced manner. The generative learning model is a learning model that emphasizes the learning process in class to be more lively and more meaningful so that students experience what they learn for themselves (Akmam et al., 2022; Anzar et al., 2019). Impulsive reflective conceptual thinking style which is a psychological factor from within and learning is something that cannot be separated, because conceptual thinking style shows the student's thinking style that needs to be considered towards the effectiveness of the learning process carried out (Firdaus et al., 2019; Yulisdiva et al., 2023). Another factor that contributes to student learning outcomes, either directly or indirectly, is the student's initial ability.

The findings of previous research stated that the generative learning model assisted by concrete media had an effect on knowledge competence (Ayu Sadewi & Wiyasa, 2020). The generative learning model for improving mathematical communication skills in terms of students' initial mathematical abilities (Qonaah et al., 2019). The generative learning model influences the ability to understand mathematical concepts (Anzar et al., 2019). The application of generative learning models has been widely applied. However, there is not much research that specifically examines the interaction between the reflective-impulsive conceptual thinking style model and the learning model on complex analysis learning outcomes by controlling initial abilities. This study aims to analyze the interaction between the reflective-impulsive conceptual thinking style model and the learning model on complex analysis learning outcomes by controlling initial abilities.

## 2. METHOD

This research is a quasi-experimental research, because not all variables (symptoms that appear) and experimental conditions can be strictly regulated and controlled. The time for conducting the research was from February to September 2015. The learning implementation was carried out by the researchers themselves with the help of other lecturers who were also assigned to teach complex analysis courses. The populations of the study were students of the Mathematics Education Department, Faculty of Mathematics and Natural Sciences, Undiksha in the even semester of the academic year who programmed and attended complex analysis courses. The population consists of 121 students who are distributed into 4 (four) classes with relatively homogeneous characteristics, and have conceptual, reflective and impulsive thinking styles.

The sample is part of the number and characteristics possessed by the population (Agung, 2014). Before the sample was selected, all students from the Department of Mathematics Education, Faculty of Mathematics and Natural Sciences, Undiksha, who programmed a complex analysis course of 121 students, were given a speed test. It was found that the reflective group was 64 people and the impulsive group was 57 people. Then each group was divided into the experimental group and the control group, so that there were 4 (four) classes, namely the class following the generative learning model and having a reflective thinking style of 32 people, the class following a conventional learning model and having a reflective thinking style of 32 people, the class follows a generative learning model and has an impulsive thinking style of 29 people, and a class that follows a conventional learning model and has an impulsive thinking style of 28 people. The sampling technique to determine each treatment group is simple random sampling (Dantes, 2012). Provisions for taking samples from each class, namely by selecting sample members randomly with the same number of 23 people so that the total sample is 92 people.

This study used a covariance analysis design (ANACOVA) with a 2x2 factorial design, with 2 treatments and 2 categories. This research instrument was tested empirically on 45 respondents. To measure learning outcomes, an instrument was used in the form of a complex analysis learning outcomes test developed by researchers consisting of 10 questions with 4 indicators of complex numbers, analytic functions, elementary functions, and complex integrals, as well as a scoring rubric. The results of empirical trials, the 10 items are valid with a reliability coefficient of 0.974. The instrument used to measure initial ability, with a real analysis ability test, is in the form of multiple choice with 50 with 6 indicators, namely the real number system, sequences and series, metric space, topology of cartesian space, derivatives, and Riemann-stieltjes integral. The results of the empirical test show that 45 items are valid and 5 questions fail, with a reliability coefficient of 0.970. The instrument used to determine the style of conceptual thinking is using a speed test/quick test. This reflective-impulsive thinking style is a conceptual tempo, which is categorized based on the time required to complete the problem. This test contains the basic concepts of complex analysis with 4 indicators, namely the basic concepts of complex numbers, the basic concepts of analytic functions, the basic concepts of elementary functions, and the basic concepts of complex integrals, in the form of true-false choices. Of the 40 items tested, the empirical test results showed 37 valid questions and 3 not valid with a reliability coefficient of 0.921. Furthermore, 2 items with very little validity were not used so that in this study 35 valid questions were used.

The covariance analysis prerequisite test was carried out before carrying out the hypothesis test which included: normality test, homogeneity test, regression linearity test, regression direction significance, and regression line alignment test. The normality test was carried out using the liliefors test. Homogeneity test was carried out using Fisher's test and Bartlett's test. Covariate regression linearity test (X) on the dependent variable (Y), Test the significance of the initial ability relationship (X) with learning outcomes complex analysis (Y), and the regression line alignment test was carried out using the SPSS Statistics application program for windows 16.0 (Candiasa, 2010). The hypotheses tested were the main effect hypothesis, the interaction effect hypothesis, and the simple effect hypothesis. To test the hypothesis, a two-way analysis of covariance (ANCOVA) was used, also using the SPSS Statistics application program for Windows 16.0.

## 3. RESULT AND DISCUSSION

### Result

Complete data descriptions regarding initial abilities and complex analysis learning outcomes for each group are presented in Table 1 and Table 2.

**Table 1.** Summary of Research Data

| B \ A | | $A_1$ | | $A_2$ | | Total | |
|---|---|---|---|---|---|---|---|
| | | X | Y | X | Y | X | Y |
| $B_1$ | N | 23 | 23 | 23 | 23 | 46 | 46 |
| | $\overline{X}/\overline{Y}$ | 37.435 | 82.435 | 36.609 | 73.087 | 37.022 | 77.761 |
| | SD | 3.028 | 5.115 | 2.330 | 4.327 | 2.704 | 6.654 |
| | Min | 31 | 71 | 33 | 62 | 31 | 62 |
| | Max | 43 | 90 | 42 | 83 | 43 | 90 |
| $B_2$ | N | 23 | 23 | 23 | 23 | 46 | 46 |
| | $\overline{X}/\overline{Y}$ | 37.000 | 74.652 | 37.304 | 77.870 | 37.152 | 76.261 |
| | SD | 2.393 | 4.589 | 2.324 | 4.893 | 2.338 | 4.964 |
| | Min | 32 | 66 | 33 | 65 | 32 | 65 |
| | Max | 42 | 85 | 41 | 86 | 42 | 86 |
| Total | N | 46 | 46 | 46 | 46 | 92 | 92 |
| | $\overline{X}/\overline{Y}$ | 37.217 | 78.543 | 36.957 | 75.478 | 37.087 | 77.011 |
| | SD | 2.707 | 6.210 | 2.328 | 5.167 | 2.514 | 5.886 |
| | Min | 31 | 66 | 33 | 62 | 31 | 62 |
| | Max | 43 | 90 | 42 | 86 | 43 | 90 |

**Table 2.** Corrected Average of Complex Analysis Learning Outcomes in Each Group

| Learning Model | Conceptual Learning Style | Mean | Std. Error |
|---|---|---|---|
| $A_1$ | - | 78.362 | 0.468 |
| $A_2$ | - | 75.660 | 0.468 |
| - | $B_1$ | 77.852 | 0.468 |
| - | $B_2$ | 76.170 | 0.468 |
| $A_1$ | $B_1$ | 81.950 | 0.663 |
| | $B_2$ | 74.773 | 0.662 |
| $A_2$ | $B_1$ | 73.754 | 0.665 |
| | $B_2$ | 77.566 | 0.662 |

The learning outcomes of complex analysis of groups of students who follow the generative learning model are higher than those who follow the conventional learning model, after controlling for students' initial knowledge. $F_{count}$ value = 16.615 and $F_{table}$ = 3.951. So $F_{count} > F_{table}$, therefore $H_0$ rejected. This means that there are differences in the learning outcomes of complex analysis between students who follow the generative learning model and students who follow the conventional learning model, after controlling for initial knowledge. The corrected mean of complex analysis learning outcomes for groups of students participating in generative learning was 78.362 and the corrected mean for complex analysis learning outcomes for groups of students participating in conventional learning was 75.660. Thus, the learning outcomes of complex analysis of student groups following the generative learning model are higher than the learning outcomes of complex analysis of student groups following conventional learning models, after controlling for initial knowledge.

Learning outcomes of complex analysis of groups of students who have a higher reflexive style than those who have an impulsive style, after controlling for students' initial abilities are obtained $F_{count}$ value = 6.454 and $F_{table}$ = 3.951. So $F_{count} > F_{table}$, therefore $H_0$ is rejected. This means that there are differences in complex analysis learning outcomes between students who have a reflexive style and students who have an impulsive style after controlling for initial abilities. The corrected mean of complex analysis learning outcomes for student groups that have a reflexive style of 77.852 and the corrected mean of complex analysis learning outcomes for student groups has a reflexive style of 76.170. Thus the learning outcomes of complex analysis of students have a higher reflexive style than the learning outcomes of complex analysis of students who have an impulsive style after given controlling for initial abilities.

There is an interaction effect between learning models and conceptual thinking styles on student complex analysis learning outcomes, after controlling for students' initial abilities obtained $F_{count}$ value = 68.036 dan $F_{table}$ value = 3.951. So $F_{count} > F_{table}$, therefore $H_0$ is rejected. This means that there is an interaction effect between learning models and conceptual thinking styles on student complex analysis learning outcomes, after controlling for initial abilities. There is an interaction effect between the learning model with factors A1 and A2 and conceptual thinking style with factors B1 and B2 on student complex analysis learning outcomes, after controlling for initial abilities is presented in Figure 1.

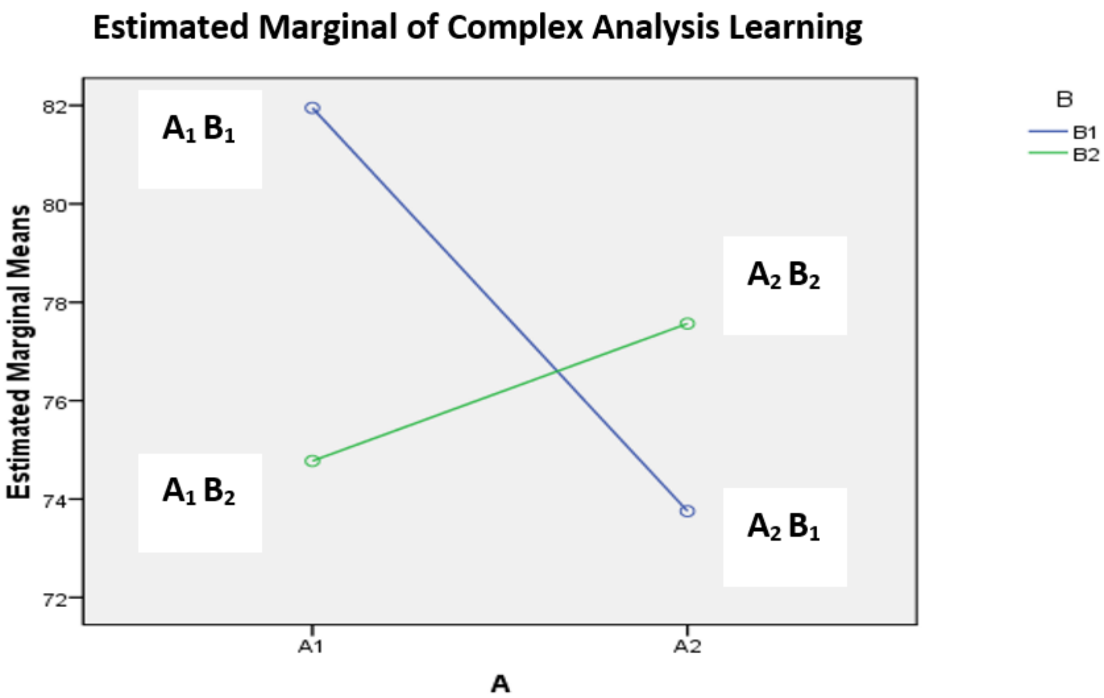


**Figure 1.** Graph of Interaction Effects Between Variables

**Discussion**

In this study initial knowledge, in this case real analytical ability is a prerequisite ability in taking complex analysis courses. It must be controlled for its influence on complex analysis learning outcomes. This is because the real analytical skills learned before are related to complex analytical skills. Initial knowledge can help students recall previous concepts that students have learned, and students can view these new ideas as an extension of previously learned concepts (Laily et al., 2019; Qonaah et al., 2019).

The first finding found learning outcomes of complex analysis of students who take generative learning are higher than those who take conventional learning. Generative learning is an innovative model that can improve student learning outcomes. The generative learning model is in line with learning theory which adheres to the view of Piaget-Vigotsy social constructivism which views mathematical truths as not absolute and identifies mathematics as a result of problem solving (Anzar et al., 2019; Ayu Sadewi & Wiyasa, 2020; Qonaah et al., 2019).. The application of generative models helps students in solving mathematical problems (questions) that are more difficult and more complex. The generative learning model is innovative and competitive learning by adhering to constructivism (Hidayat et al., 2021). Generative learning practically promises to increase the interest in learning of students from various backgrounds and increase the participation of students by actively encouraging them to explore, focus on, face challenges and apply the knowledge they have acquired. The generative learning model is meaningful learning and can be used to increase self-confidence (Ekasari et al., 2018; Fajri & Wantika, 2022). The generative learning model forms independent students who can continue the learning process in the life and career they will live. A lecturer acts more as a creative facilitator or mediator.

On the other hand the application of the conventional model, in this case direct learning is more in line with the stimulus-response learning theory which adheres to the behaviorist view. This theory views learning behavior as a close relationship between behavioral reactions and stimuli that are controlled by rewards or reinforcement. The direct learning model as a teaching model is designed to support student learning processes related to declarative knowledge and procedural knowledge (Handayani & Abadi, 2020; Ramdani, 2018). Procedural knowledge is knowledge about how to do something structured that can be taught in a gradual pattern of activities, step by step. Thinking based on direct learning, namely students learn by observing selectively, remembering and imitating the behavior of lecturers.

Reflective and impulsive thinking styles are the styles of thinking possessed by students that can influence the learning outcomes of complex analysis. Because thinking style is closely related to students' thinking skills, it will also affect student learning abilities. This influence can be individually and together with the learning model that is applied. The learning process occurs cognitive processes which also lead to student learning outcomes (Devi & Bayu, 2020; Saraswati & Agustika, 2020). Different cognitive processes occur in reflective and impulsive styles. In an effort to solve problems to produce the right decisions, learning outcomes and thinking skills are needed (Budiartini et al., 2013; Muazaroh & Surya Abadi, 2020).

The second finding, the results of this study indicate that the learning outcomes of complex analysis of groups of students who have a higher reflective style than those who have an impulsive style, after controlling for students' initial abilities. Reflective thinking style is a cognitive style possessed by students with the main characteristic being careful in solving problems (Noviyanti et al., 2021; Rahayu & Winarso, 2018). In dealing with problems students who have a reflective thinking style always reflect back on the problem to themselves continuously, and when they are sure they will then translate it into opinions, ideas or ideas in solving problems. Students who have this style will need sufficient tempo in making decisions, needed to reflect on problem solving steps and decisions taken (Armelia & Ismail, 2021). Impulsive thinking style is a cognitive style that is owned by students with the main characteristic of being fast in solving problems (Herianto & Hamid, 2020). In dealing with problems students who have an impulsive thinking style rarely reflect back on the problem to themselves continuously, but are always sure what they are doing is right. Students who have this style will react quickly and be attractive in making decisions, because they are always sure of what to do, sure of the steps used and sure that all their actions are related to the problem at hand.

The third finding, the results of the study indicate that there is an interaction effect between learning models and conceptual thinking styles on student complex analysis learning outcomes, after controlling for students' initial abilities. There is an interaction effect between learning models and reflective-impulsivity on learning outcomes. The learning model factors together with the reflective-impulsive factors work together to influence learning outcomes. The generative learning model forms independent students who can continue the learning process in the life and career they will live (Ekasari et al., 2018; Fajri & Wantika, 2022). A lecturer acts more as a resource, facilitator and does not present concepts in learning, but students will search for the concepts themselves through the problems given. Students in the generative model are required to be responsible for the education they are living, and are directed not to depend too much on the lecturer. It is the students themselves who actively build their knowledge, while the lecturers act as facilitators, co-investigators, and mediators in learning. Generative learning models can create challenges, meaningful learning experiences, ask experts and increase learning achievement (Anzar et al., 2019; Ayu Sadewi & Wiyasa, 2020).

The conventional learning model in learning complex analysis in the Mathematics Education Department of the Undiksha Faculty of Mathematics and Natural Sciences, students are given problems after the subject matter has been taught. Likewise with problem solving techniques previously taught by the lecturer. Students in solving problems, will follow the rules of solving these problems. The problems presented are well structured so that the concepts that will be used to solve these problems are clearly visible. In learning, students will use the principles or concepts that have been taught as a solution to problem solving. Students become less able to associate a principle or concept with other principles or concepts, so this will have an impact on student learning outcomes, especially when they are faced with a problem that is quite complex.

In addition to the learning model, student characteristics are seen in terms of thinking styles. Thinking styles can improve thinking processes, and this will affect learning processes and outcomes. As explained earlier, the characteristics of the generative model are very compatible with the reflective thinking style. The generative learning model and the reflective thinking style both require students to be active in learning complex analysis. Likewise by applying the generative model, learning becomes more meaningful and challenging. This means that students are required to be able to capture the relationship between learning experiences in class and challenges. This is very important, because by being able to correlate the material found with challenges, not only for students the material will function functionally, but the material they learn will be firmly embedded in the student's memory, so that it will not be easily forgotten. Besides that, learning is more productive and able to foster the strengthening of concepts in students because generative learning adheres to constructivism, a student is led to find his own knowledge. Generative and reflective learning models will be more effective in improving student learning outcomes. This happens because the generative learning model prioritizes student independence in constructing their knowledge in analyzing and solving problems which is used as the basis for learning (Anzar et al., 2019; Ayu Sadewi & Wiyasa, 2020).

This finding is reinforced by previous research stating that generative learning as a learning model for changing concepts can change the conception of science and mathematics, namely changing the initial concept of a misconception into a scientific concept. The generative learning model assisted by concrete media has an effect on knowledge competence (Ayu Sadewi & Wiyasa, 2020). The generative learning model for improving mathematical communication skills in terms of students' initial mathematical abilities (Qonaah et al., 2019). The generative learning model influences the ability to understand mathematical concepts (Anzar et al., 2019). From the discussion, students who have a reflective style are better able to organize information independently and always analyze the information obtained independently than students who have an impulsive style. Generative model learning has implications for increasing mastery of concepts, which are closely related to initial abilities.

## 4. CONCLUSION

The results showed that there was an interaction effect between learning models and conceptual thinking styles on students' complex analysis learning outcomes, after students' initial abilities were controlled. Generative learning, the learning process will take place more meaningful. Learning outcomes are felt by students in solving problems, being more explorative, paying attention to concepts or material, being used to facing challenges and being able to apply them in their daily lives and in society. Considering that this research has limitations, it is found that there is a synergistic effect between learning models and conceptual thinking styles. It is recommended for further research to uncover problems related to learning generative learning models and reflective-impulsive thinking styles in relation to student learning outcomes in the Mathematics Education Department, FMIPA Undiksha outside of complex analysis courses. The results of this study are expected to complement the findings of this study in the Mathematics Education Department, FMIPA Undiksha.

## 5. REFERENCES

A. Asdar, F., Fatimah, & Nurhidayah. (2020). Pembelajaran Generatif Media Barbek Terintegrasi PPK terhadap Pemahaman Konsep dan Komunikasi Matematis. *Sainsmat : Jurnal Ilmiah Ilmu Pengetahuan Alam*, *9*(2), 124 – 135. https://doi.org/10.35580/sainsmat92153812020.

Agung, A. A. G. (2014). *Metode Penelitian Pendidikan*. Aditya Media Publishing.

Akmam, A., Hidayat, R., Mufit, F., Jalinus, & Amran, A. (2022). Need analysis to develop a generative learning model with a cognitive conflict strategy oriented to creative thinking in the Computational Physics course. *Journal of Physics: Conference Series*, *2309*(1), 012095. https://doi.org/10.1088/1742-6596/2309/1/012095.

Anzar, Z., Arvyaty, A., Busnawir, B., & Fahinu, F. (2019). Pengaruh Model Pembelajaran Generatif Terhadap Kemampuan Pemahaman Konsep Matematis Siswa Kelas VIII SMP Negeri 12 Kendari. *Jurnal Pendidikan Matematika*, *10*(1), 43 – 54. https://doi.org/10.36709/jpm.v10i1.5643.

Armelia, M., & Ismail, I. (2021). Pengaruh Self-Regulated Learning terhadap Kemampuan Berpikir Reflektif Matematis Siswa. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(2), 1757–1768. https://doi.org/10.31004/cendekia.v5i2.687.

Ayu Sadewi, K. I., & Wiyasa, I. K. N. (2020). Model Pembelajaran Generatif Berbantuan Media Konkret Terhadap Kompetensi Pengetahuan IPA. *Journal for Lesson and Learning Studies*, *3*(2), 203–211. https://doi.org/10.23887/jlls.v3i2.26810.

Budiartini, Arcana, & Margunayasa. (2013). Pengaruh Model Pembelajaran Inquiri Terbimbing Terhadap Kemampuan Berpikir Kritis Ipa Siswa Kelas V Di SD 7 Datah. *Mimbar PGSD Undiksha*, *1*(1). https://doi.org/10.23887/jjpgsd.v1i1.891.

Candiasa, I. M. (2010). *Statistik Multivariate Disertai aplikasi SPSS*. Universirtas Pendidikan Ganesha.

Dantes, N. (2012). *Metode Penelitian*. CV ANDI OFFSET.

Devi, P. S., & Bayu, G. W. (2020). Berpikir Kritis dan Hasil Belajar IPA Melalui Pembelajaran Problem Based Learning Berbantuan Media Visual. *Mimbar PGSD Undiksha*, *8*(2), 238–252. https://doi.org/10.23887/jjpgsd.v8i2.26525.

Ekasari, N. L. P., Smara Putra, D., & Surya Abadi, I. (2018). Pengaruh Model Pembelajaran Generatif Berbasis Lingkungan Terhadap Kompetensi Pengetahuan IPA. *Jurnal Ilmiah Sekolah Dasar*, *2*(2), 201–208. https://doi.org/10.23887/jisd.v2i2.15495.

Fajri, B. L., & Wantika, R. R. (2022). Pengaruh model pembelajaran generatif terhadap hasil belajar siswa kelas X SMA Negeri 1 Driyorejo. *Journal of Mathematics Education and Science*, *5*(2), 117–120. https://doi.org/10.32665/james.v5i2.505.

Firdaus, A., Nisa, L. C., & Nadhifah, N. (2019). Kemampuan Berpikir Kritis Siswa pada Materi Barisan dan Deret Berdasarkan Gaya Berpikir. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *10*(1), 68 – 77. https://doi.org/10.15294/kreano.v10i1.17822.

Habibullah, H. (2020). Mathematical Self-Efficacy Of Students In Cooperative Learning With Two Stay Two Stray Techniques. *Jurnal Pendidikan Matematika Undiksha*, *11*(1), 38–43. https://doi.org/10.23887/jjpm.v11i1.23609.

Handayani, R., & Abadi, I. B. G. S. (2020). Pengaruh Model Pembelajaran Langsung Berbantuan Media Gambar Terhadap Kompetensi Pengetahuan Matematika Siswa Kelas IV SD. *Mimbar Ilmu Undiksha*, *25*(1), 120–131. https://doi.org/10.23887/mi.v25i1.24767.

Herianto, H., & Hamid, N. (2020). Analisis Proses Berpikir Kreatif Dalam Pemecahan Masalah Geometri Berdasarkan Gaya Kognitif Reflektif Dan Impulsif Siswa. *Pedagogy: Jurnal Pendidikan Matematika*, *5*(2), 38–49. https://doi.org/10.30605/pedagogy.v5i2.403.

Hidayat, A., Zainuddin, Z., & Misbah, M. (2021). Pengembangan Bahan Ajar Suhu dan Kalor Menggunakan Pembelajaran Generatif. *Jurnal Ilmiah Pendidikan Fisika*, *4*(3), 151–160. https://doi.org/10.20527/jipf.v4i3.2054.

Islamy, M. R. F., Sumayana, Y., & Tantowi, Y. A. (2022). Membangun Imunitas Anti Radikalisme pada Anak Usia Dini melalui Pembelajaran Berbasis Nilai-Nilai Pesantren. *Jurnal Obsesi : Journal of Early Childhood Education*, *6*(6), 7093 – 7104. https://doi.org/10.31004/obsesi.v6i6.2219.

Laily, A., Jalal, F., & Karnadi, K. (2019). Peningkatan Kemampuan Konsep Matematika Awal Anak Usia 4-5 Tahun melalui Media Papan Semat. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *3*(2), 396. https://doi.org/10.31004/obsesi.v3i2.214.

Meyer, O. A., Omdahl, M. K., & Makransky, G. (2019). Investigating the effect of pre-training when learning through immersive virtual reality and video: A media and methods experiment. *Computers and Education*, *140*, 103603. https://doi.org/10.1016/j.compedu.2019.103603.

Muazaroh, A. N., & Surya Abadi, I. B. G. (2020). Efektifitas Model Pembelajaran Open Ended Berbantuan Lembar Kerja Siswa Terhadap Kemampuan Berpikir Kreatif. *MIMBAR PGSD Undiksha*, *8*(3), 372–384. https://doi.org/10.23887/jjpgsd.v8i3.25565.

Muliani, N. K. D., & Wibawa, I. M. C. (2019). Pengaruh Model Pembelajaran Inkuiri Terbimbing Berbantuan Video Terhadap Hasil Belajar IPA. *Jurnal Ilmiah Sekolah Dasar*, *3*(1), 107–114. https://doi.org/10.23887/jisd.v3i1.17664.

Nisa', A. Z., & Rofiki, I. (2022). Exploration of the Ethnomathematics of the Bung Karno Tomb Complex in Cultural Based Mathematics Learning. *Journal Of Medives: Journal Of Mathematics Education Ikip Veteran Semarang*, *6*(1), 107 – 120. https://doi.org/10.31331/medivesveteran.v6i1.1926.

Noviyanti, E. D., Purnomo, D., & Kusumaningsih, W. (2021). Analisis Kemampuan Berpikir Reflektif dalam Pemecahan Masalah Matematika Ditinjau dari Gaya Kognitif. *Imajiner: Jurnal Matematika Dan Pendidikan Matematika*, *3*(1), 57–68. https://doi.org/10.26877/imajiner.v3i1.7097.

Plummer, R., Baird, J., Dzyundzyak, A., Armitage, D., Bodin, Ö., & Schultz, L. (2017). Is Adaptive Co-management Delivering? Examining Relationships Between Collaboration, Learning and Outcomes in UNESCO Biosphere Reserves. *Ecological Economics*, *70*, 79–88. https://doi.org/10.1016/j.ecolecon.2017.04.028.

Pratiwi, R. I. M., & Wiarta, I. W. (2021). Pengembangan Multimedia Interaktif Berbasis Pendidikan Matematika Realistik Indonesia pada Pembelajaran Matematika Kelas II SD. *Jurnal Edutech Undiksha*, *9*(1), 85–94. https://doi.org/10.23887/jeu.v9i1.32220.

Qonaah, A., Pujiastuti, H., & Fatah, A. (2019). Pengaruh Model Pembelajaran Generatif terhadap Peningkatan

Kemampuan Komunikasi Matematis Ditinjau dari Kemampuan Awal Matematis Siswa. *Edumatica : Jurnal Pendidikan Matematika*, *9*(1). https://doi.org/10.22437/edumatica.v9i1.6109.

Rahayu, Y. A., & Winarso, W. (2018). Berpikir Kritis Siswa Dalam Penyelesaian Matematika Ditinjau Dari Perbedaan Tipe Gaya Kognitif Reflektif Dan Impulsif. *Jurnal Ilmiah Pendidikan Dan Pembelajaran*, *2*(1). https://doi.org/10.23887/jipp.v2i1.13279.

Ramdani, E. (2018). Model Pembelajaran Kontekstual Berbasis Kearifan Lokal sebagai Penguatan Pendidikan Karakter. *Jupiis: Jurnal Pendidikan Ilmu-Ilmu Sosial*, *10*(1), 1. https://doi.org/10.24114/jupiis.v10i1.8264.

Saraswati, P. M. S., & Agustika, G. N. S. (2020). Kemampuan Berpikir Tingkat Tinggi Dalam Menyelesaikan Soal HOTS Mata Pelajaran Matematika. *Jurnal Ilmiah Sekolah Dasar Undiksha*, *4*(2). https://doi.org/10.23887/jisd.v4i2.25336.

Yulisdiva, A., Sodikin, C., Anggraeni, P., Info, A., Tingkat, K. B., & Pembelajaran, M. (2023). Perbandingan Model Radec Dengan Inquiry Terhadap Kemampuan Berpikir Tingkat Tinggi Pada Materi gaya. *Jesa*, *7*(1), 17. https://doi.org/10.31004/basicedu.v5i3.960.