Application of Synectic Models in the Learning Process: A Systematic Literature Review

Salwa Rufaida[1,2,*], Husain Syam[3], Sulaiman Samad[3]

[1]*Graduate Program of Education, State University of Makassar, Makassar 90222, Indonesia*
[2]*Department of Physics Education, Muhammadiyah University of Makassar, Makassar 90222, Indonesia*
[3]*State University of Makassar, Makassar 90222, Indonesia*
[*]*Corresponding author. Email:* [*salwa@unismuh.ac.id*](mailto:salwa@unismuh.ac.id)

ABSTRACT

Synectic is a learning model that can lead students to hone higher-order thinking skills. The implementation of the Synectic learning model is identical to analogy and metaphoric thinking. The application of Synoptics is a student-centered learning model. The development of thinking skills in the learning process does not limit the exploration of varied student thinking and appreciate the various possible opinions or answers that arise in the learning process. Analogies and metaphors thinking will help students understand abstract concepts become more contextual. Thus, it is meaningful learning for students. This study uses the literature review concept through a systematic literature review technique. The systematic literature review technique applies to review articles that are previous research and followed by a more in-depth study. Based on the results of a systematic literature review, it is found that the application of the Synectic learning model is generally used to build one's creative thinking. Thinking creativity is one of the higher thinking skills needed in learning in the era of the industrial revolution 4.0. Although synoptics is generally used in language and literature learning, its application can be linked in various disciplines through thinking analogies.

Keywords: Synectic, learning process, thinking skills

1. INTRODUCTION

Learning implementation in higher education refers to the national qualification framework. The target of graduate learning outcomes is to direct students to utilize science and information technology in their field of expertise and adapt to the situations encountered in solving problems. The problem-solving ability certainly involved higher-order thinking skills considered a mindset and a person's aptitude. Higher-order thinking skills can be seen based on one's ability to analyze, evaluate, and create problem-solving. The human's aptitude in managing knowledge and skills needed today is reasoning in solving problems, making decisions, and creating an innovation [1]. Thus, the prospective learning implementation in higher education is achieving higher-order thinking skills in solving a problem.

The higher education learning design is possible for students to achieve maximum graduate learning outcomes. However, it is still necessary to pay attention to choosing the appropriate learning model based on current needs by the targeted learning outcomes of graduates. The appropriate learning model is a learning model that can focus students not only on learning outcomes but focuses more on critical and creative thinking skills in understanding a concept and applying it

to problem-solving. The reality shows that in higher education is that students' higher-order thinking skills are still relatively low based on student problem-solving ability test data in the past year. It is happening because the lack of underlying concepts or students' initial knowledge causes the low abilities to explore their thinking skills. In addition, learning is still lecturer-centered. It makes the students' thinking stage only until at the medium-level thinking stages. Learning must refer to a systematic step that can direct the learning objectives of applying an appropriate learning model. Therefore, the aim learning model needed to hone students thinking skills, especially in terms of critical creativity, one of which is through the Synectic learning model.

The synoptics learning model can direct students to practice their thinking skills through analogies and metaphor thinking. The Synectic model is student-centered learning. It is active and meaningful learning. The Synectic learning model focuses on teaching students creative processes where the direction student to think creatively in expressing ideas, ideas, opinions, and feelings [2]. The Synectic model essentially respects individual differences in the learning process by accepting all possible ideas that arise in the learning process as a form of creative thinking. Synectic is applied to help someone develop a fresh thinking way and

empathize with differences in opinion. The Synectic model justifies a logical solution and accepts the creative possibilities [3]. The Synectic learning model refers to 21st-century learning as a manifestation of the 4.0 industrial revolution. The Synectic learning models can give students the freedom to explore their skills to the thinking skills management. Students can create various ideas or solutions in solving problems in the knowledge field and everyday life. The identical Synectic learning model is analogies and metaphorical thinking that can familiarize students with higher-order thinking skills.

The Synectic model contains several main ideas, including viewing creativity as something important, creativity is not entirely something mysterious, creativity applies to all fields, and the discovery of creative thinking in principle is the same [4]. The Synectic learning model can train metaphorical thinking skills and capabilities in problem-solving and mastery of learning materials [5]. Synectic learning model has a lot applied in the learning process. The Synectic model advantages include (1) developing students new understanding about a problem so that they are aware of how to behave in certain situations; (2) developing clarity of understanding and internalization in students about new material; (3) developing creative thinking, both for students and lecturers; (4) It is carried out in an atmosphere of intellectual freedom and equal dignity between students; and (5) helping students find new ways of thinking in solving a problem. While the shortcomings of the Synectic model include: (1) It is difficult for lecturers and students who are accustomed to using the old method which emphasizes the delivery of information; (2) Focusing on reflective and imaginative thinking in certain situations, it is likely that students lack mastery of facts and implementation procedures or skills; and (3) Inadequate educational facilities and infrastructure in schools [6].

The Synectic learning model supports students in developing creative ideas and opinions. This process of creative idea develop does not limit the students learning experience. It does not scare students with the value of their learning outcomes and respects creative ideas that arise based on students' opinions [7]. However, there has been no specific literature review that discusses the appropriateness of using Synectic learning models in several fields of science. The assumed to occur because the analogy that becomes the identity of the Synectic model is sometimes difficult to achieve if its application is not appropriate with the learning material concept. In addition, it needs an in-depth study on the use of the Synectic model at the educational grade. Thinking analogies are influenced by thinking maturity based on one's cognitive stage. If the use of the Synectic model in various fields of science or at education grades is not appropriate, then sometimes the thinking skills which are the primary purpose of implementing the model cannot be achieved. In addition, an in-depth study of the advantages and disadvantages of its application in various fields of science is needed based on several previous studies. A systematic literature review reveals the Synectic model characteristics straightforwardly related to its application in the learning process at various disciplines and levels of education based on previous research over the last few years.

2. METHOD

This study uses a systematic literature review method or SLR. The SLR process is carried out by systematically identifying and synthesizing relevant research results to obtain a comprehensive assessment related to the research topic [8]. The first step of SLR is formulating research questions followed by inclusion decisions and searching for articles in databases such as journals, proceedings, and literature reviews. Subsequently, an objective analysis. The purpose of the inclusion decision was to identify and select the various reviewed literature in this step of the systematic literature review. Some of the literature criteria set out in this study are: (1) all types of research literature that apply the Synectic model in the learning process at various education levels and have been published in national and international journals; (2) research literature published in the last ten years; (3) literature that is not published in scientific journals; and (4) literature written in Indonesian or foreign languages. The next step is to identify the online database as a source for searching the literature to be reviewed. After that, the researcher selected the appropriate and linear articles on the research topic. The reviewed articles were obtained from ScienceDirect, Tandfonline, The Directory of Open Access Journals (DOAJ), IEEE, and Google Scholar. The keywords used are Synectic. The scope of the research is limited to the field of education because it will identify the application of the Synectic model in the learning process. The data analysis is descriptive based on all findings from the Systematic Review Literature.

The evaluating literature process in this study has Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) checklist methodology [9]. Systematic review aimed to determine the characteristics of the implementation of learning using the Synectic model. The research questions posed include:

RQ1: What distinguishes the Synectic learning model characteristics from conventional learning models when applied in the learning process?

RQ2: What learning topics and at what level of education are the Synectic model suitable for use in the learning process?

RQ3: Is the use of the Synectic learning model proven effective in improving higher-order thinking skills in students?

These research questions will direct the review process carried out on the literature that meets the previously defined inclusion criteria.

3. FINDINGS

3.1. Research Literature Review

Based on the protocol review, there are 1456 Synectic-themed articles on ScienceDirect, and 72 results are the social science theme, but after reading the paper thoroughly, only two articles related to the learning process. There are 606 Synectic-themed articles on Taylor & Francis Online, and 31 results are education theme, but after reading the paper thoroughly, only three articles related to the learning process. There are 606 Synectic-themed articles on Taylor & Francis Online, and 31 results are education theme, but after reading the paper thoroughly, only three articles related to the learning process. There are 26 Synectic-themed articles on DOAJ and ten results for the education theme. Ten papers will be more depth reviewed after reading the paper thoroughly. There are eight Synectic-themed articles on the IEEE, and four results are education theme, but after reading the paper thoroughly, only two articles related to the learning process. There are 17.700 Synectic-themed articles on google scholar, 141 results are education theme, but after reading the paper thoroughly, only 14 articles related to the learning process.

There are 31 articles based on the previous studies that will be more depth reviewed. Among these studies, seven are experimental designs, two are case studies, one is survey research, six are quasi-experiments, five are literature reviews, six are action studies, two are descriptive research, and one is a mixed-method. One is R&D. There are 17 research were conducted in various countries outside Indonesia, and 14 studies were conducted in various provinces in Indonesia. The articles were published in the last ten years and mainly applied to secondary and higher education.

3.2. Synectic Learning Model Characteristics

Several references have been studied that show the Synectic learning model features that distinguish it from the conventional model. This learning model is student-centered learning by activating students through the thinking process. Synectic learning model identified with the development of thinking skills through the analogies and metaphors processes. The implemented Synectic model is to generate students' thinking skills through the process of making analogies and metaphors through the stages of 1) comparing the results of different thoughts, 2) connecting irrelevant things, and 3) developing creative thinking [10]. Considerations in applying the Synectic model that helps students' thinking processes in learning for several reasons include: 1) involvement and deconvolved refer to the relationship between individuals at work; 2) procrastination which means that immediate forced problem solving will result in shallow thinking; 3) meaningful thinking that the mind should be left free to generate ideas and solutions; and 4) object autonomy, that is, humans will think creatively about the resulting solution capabilities in solving problems [11]. There are two types of strategies in Synectic learning models, those that learn to create something new and those that make the unfamiliar more familiar. These two strategies are very similar in forming a direct analogy. This strategy involves introducing a new concept and then making the analogy felt and thought through a personal analogy. Then continue with introducing a compressed conflict it contrasts the two comparisons of existing concept and independent thinking to create creative thinking in the individual [12]. Synectic as a learning model includes several meanings regarding creativity that 1) creativity is needed and efficient in everyday life and not just improvisation in life, 2) the process of creativity is not magical so that each individual can find his way to practice his creativity, 3) creativity innovation people are in all fields of science can be applied in both science, mathematics, and humanities, 4) innovation in creative thinking skills can be carried out individually or in groups [13]. Synectic learning models can also stimulate human thinking skills by training their metacognitive abilities, including problem-solving [14]. The Synectic model provides an opportunity for students to develop thinking skills through metacognition so that there is a relationship between knowledge concepts from abstract to more concrete. Thus making it easier to understand and contextualize concepts that are difficult to understand [15].

3.3. Synectic Models at Various Education Levels and Learning Topics

Based on the study results, the Synectic learning model applied to various learning topics and too many education levels. The following table analyzes lecture topics and education levels that apply the Synectic model in the learning process.

Table 1. The Analysis of Learning Topics and Education Levels that Apply the Synectic Model in the Learning Process

Education Levels	Learning Topics	Number of Papers
Primary Education	Math and Science	2
	Social	2
Middle Education	Humanities	2
	Religion	1
	Math and Science	6
	Language	4

Education Levels	Learning Topics	Number of Papers
	Education	1
Higher Education	Math and Science	4
	Technique	1
	Language	5
	Humanities	1
Training	Learning Technologies	2

The table above shows that the Synectic model is generally applied at the secondary and higher education levels and minimally at primary education. This is due to the human ability to contextualize abstract concepts that children of legal working age can perceive. Children over the age of 12 can think abstractly and manipulate ideas because they can calculate, reason, and think logically and systematically [16]. As for the primary education level, the Synectic model is only introduced for personal analogies that help and train students to open students' perspectives to imagine things that have never happened in the student's life[17]. The research result about Synectic learning models in primary education also shows positive implications in the cognitive domain. In addition, the Synectic learning models can be developed with some learning techniques to improve moral attitudes in children [18].

The Synectic model is widely applied to the learning topics, such as mathematics and science, and language in middle education. In general, in education, the Synectic model is applied at the secondary education level in various learning topics to familiarize students with training in managing the results of creative thinking [19]. The Synectic model is categorized as practical or easy to use in write learning and can explore students' writing skills [20]. As for higher education, the Synectic model is applied to develop creative thinking skills and problem-solving. Apart from one's intelligence and social status, the creative thinking process also shows one's qualities [21]. Everyone in college is encouraged to explore thinking skills, mainly to increase creativity. Differences in gender or gender do not affect a person's creativity which shows that men and women can equally develop themselves in practicing thinking skills. In addition, information obtained that the creativity score of younger students is higher than older students. It is assumed that age can affect the maturity of a person's thinking, but it cannot guarantee thinking skills, including creativity [22].

Synectic offers a learning process that can train students' creative thinking skills. The practicing creative thinking process through Synectic will instruct divergent thinking skills that allow someone to internalize their ideas and associate them with new ideas in solving problems [23]. The Synectic model reveals that the basis for the emergence of creativity is the imaginative (creative) use of existing knowledge to produce something new, unusual, and helpful products. Interpretation of a problem in a new and different way (restructuring) and incubation is an additional basis for

the emergence of creativity [24]. Synectic model used as alternative learning in language vocabulary mastery and word retention. It shows that through the Synectic model, students feel the difference in a more creative way of thinking through imagination [25]. In addition to touching cognitive aspects and writing skills, the Synectic model is also used by students to process ideas and develop creativity in drawing illustration skills in the art field [26].

3.4. The Effectiveness of the Synectic Model in the Learning Process

Based on the research results of the study conducted, the Synectic model is considered to facilitate teachers in implementing learning through the principle of making an abstract concept more familiar in the learning process using analogies and metaphors. Thus, students easily accept the material during the learning process [27]. The Synectic learning model can increase cooperation and interaction between students to create student-centered active learning [28]. In the mathematics and natural sciences fields, Synectic models most improve math problem-solving abilities compared to traditional models [29]. In addition, the application of the Synectic learning model can minimize students' misconceptions about science material, making it easier to understand concepts [30]. The Synectic model can collaborate with various learning media and technologies because it is proven to be effective mathematical literacy improvement students can understand concepts and develop creative thinking [31]. If the Synectic model collaborates with learning media, it will increase the effectiveness of its application. The results showed an increase in students' writing skills after the Synectic model application with the help of audiovisual media [32]. In the social field, the Synectic model developed can improve students' creative thinking skills [17]. In the language field, the Synectic learning model improves speaking skills in language learning effectively through metaphors and analogies. In addition, a collaborative attitude will be built, which creates an individual emotional bond through the discussion in the learning process [33]. In general, the effectiveness of Synectic learning can increase student creativity and student learning outcomes both from the cognitive, psychomotor, and attitude aspects. Post-implementation attitudes take the form of educational management such as student discipline, student attendance, curriculum and personal lesson knowledge, and professional development [34]. Implementing the Synectic learning model can improve student activity and learning

outcomes [35]. Synectic learning models are effective for learners in general even for people with disabilities. The Synectic model effectively generates new ideas by encouraging students to consider ideas from very different situations and find ways to build unique relationships that are relevant to them using analogies and metaphors. The Synectic process will develop children's imagination and creative play that supports their cognitive growth regardless of their limitations as visually impaired people [36].

4. CONCLUSION

The Synectic model is the same as the two main strategies: designing previously known ones (problems, ideas, products) and creating known and meaningful ones. Synectic learning model used at all education levels and several learning topics. The research results show that the Synectic model is used in secondary and higher education. Cognitive skills entered a concrete operational stage. In addition, metacognitive skills developed and thinking skills more systematically in this age. The Synectic model is used in mathematics and science learning topics because these two topics are closely related to metacognitive abilities and higher-order thinking skills. In learning mathematics and science, students are directed to analyze, synthesize, and create a new idea in problem-solving. Thus, students need higher-order thinking skills in the implementation of learning. The Synectic learning model is proven and facilitates the learning process by making abstract concepts more concrete principal. Therefore, Synectic models can improve understanding of concepts, minimize misunderstandings, and increase learning activity. In addition, the Synectic model is effective in improving learning outcomes both from the cognitive, affective, and psychomotor aspects. Synectic models touch the realm of metacognition and effectively improve higher thinking skills, including creativity.

ACKNOWLEDGMENT

REFERENCES

[1] R. A. Nugroho, *Higher Order Thingking Skills*. Jakarta, 2019.

[2] S. Ramadhani, "Model Pembelajaran Sinektik Dan Penguasaan Kosakata Terhadap Keterampilanmenulis Puisi Siswakelas V Sd Pangeran Antasari Medan Tahunpembelajaran 2020," *Juranal Pendidik.*, vol. 7, no. 1, pp. 12–22, 2020.

[3] S. dan A. Nurdin, *Kurikulum dan Pembelajaran*,

II. Jakarta: PT. Raja Grafindo Persada, 2016.

[4] D. J. Priansa, *Pengembangan Strategi & Model pembelajaran Inovatif, Kreatif, dan Prestatif dalam Memahami Peserta Didik*, I. Bandung: CV Pustaka Setia, 2017.

[5] M. Huda, *Model-Model Pengajaran dan Pembelajaran*, X. Yogyakarta: Pustaka Pelajar, 2019.

[6] U. Mutmainnah, "Penerapan Model Sinektik (Synectics) Terhadap Kreativitas Belajar Siswa pada Mata Pelajaran Ilmu Pengetahuan Alam Kelas V di Madrasah Ibtidaiyah Hijriyah II Palembang," *JIP J. Ilm. PGMI*, vol. 2, no. 1, pp. 69–82, 2017.

[7] Y. Pramusinta *et al.*, "Pengaruh Model Pembelajaran Sinektik Dalam Mengembangkan Kreativitas Peserta Didik Pendahuluan Sumber daya manusia yang berkembang sangat di butuhkan di Negara Indonesia sebagai penyumbang kesejahteraan bangsa pada umumnya dan juga dapat memberikan sumban," vol. 04, no. 01, pp. 47–58, 2021.

[8] A. Sulaiman and S. Azizah, "Problem-Based Learning Untuk Meningkatkan Kemampuan Berpikir Kritis Di Indonesia: Sebuah Tinjauan Literatur Sistematis," *Pedagog. J. Pendidik.*, vol. 7, no. 1, pp. 107–152, 2020, doi: 10.33650/pjp.v7i1.792.

[9] R. A. Liono, N. Amanda, A. Pratiwi, and A. A. S. Gunawan, "A Systematic Literature Review: Learning with Visual by the Help of Augmented Reality Helps Students Learn Better," *Procedia Comput. Sci.*, vol. 179, pp. 144–152, 2021, doi: 10.1016/j.procs.2020.12.019.

[10] M. Aiamy and F. Haghani, "The Effect of Synectics & Brainstorming on 3 rd Grade Students'development of Creative Thinking on Science," *Procedia - Soc. Behav. Sci.*, vol. 47, pp. 610–613, 2012, doi: 10.1016/j.sbspro.2012.06.704.

[11] T. Tajari and F. Tajari, "Comparison of effectiveness of synectics teaching methods with lecture about educational Progress and creativity in social studies lesson in Iran at 2010," *Procedia - Soc. Behav. Sci.*, vol. 28, pp. 451–454, 2011, doi: 10.1016/j.sbspro.2011.11.087.

[12] A. Amin, "Pemahaman Konsep Abstrak Ajaran Agama Islam pada Anak Melalui Pendekatan Sinektik dan Isyarat Analogi dalam Alquran," *Madania J. Kaji. Keislam.*, vol. 21, no. 2, p. 157, 2017, doi: 10.29300/madania.v21i2.608.

[13] S. Abed, A. H. M. D. Davoudi, and D. Hoseinzadeh, "The effect of synectics pattern on increasing the level of problem solving and critical thinking skills in students of Alborz province," *WALIA J.*, vol. 31, no. 1, pp. 110–118, 2015, [Online]. Available: http://waliaj.com/wp-content/2015/Special Issue 1, 2015/20 2015-31-S1-pp.110-118.pdf.

[14] N. Suhana, "Upaya Peningkatan Berpikir Kritis

Dan Berpikir Kreatif Siswa Pada Materi Aritmetika Sosial Dengan Menggunakan Model Pembelajaran Sinektik," *J. THEOREMS (The Orig. Res. Math.*, vol. 4, no. 1, p. 44, 2019.

[15] V. H. Nalini, "Cognitive Science Perspective: Synectics As a Model of Learning Metaphors," *Int. J. Sci. Res.*, vol. 2, no. 6, pp. 147–148, 2012, doi: 10.15373/22778179/june2013/47.

[16] N. I. Syar, "The Analysis of Logical Operation Ability of Senior High Schoool Students on Physics Subject at Formal Operational Phase," *J. Pedagog.*, vol. 07, no. 02, pp. 459–494, 2020.

[17] M. Z. Sari and E. Hermawati, "Pengembangan Metode Pembelajaran Berbasis Sinektik Analogi Personal Dalam Meningkatkan Kemampuan Berpikir Kreatif Siswa Sekolah Dasar Di Kabupaten Kuningan," *Attadib J. Elem. Educ.*, vol. 4, no. 2, p. 58, 2020, doi: 10.32507/attadib.v4i2.827.

[18] Munarto, "Pengembangan Model Sinektik Terpimpin Berwawasan Lingkungan Menulis Puisi Dalam Pembentukan Moral Siswa," *Seloka - J. Pendidik. Bhs. dan Sastra Indones.*, vol. 5, no. 1, pp. 12–20, 2016, doi: 10.15294/seloka.v5i1.12738.

[19] I. Suratno, Komaria, N., Yushardi, Dafik, & Wicaksono, "The Effect of Using Synectics Model on Creative Thinking and Metacognition Skills of Junior High School Students," *Int. J. Instr.*, vol. 12, no. 3, 2019, [Online]. Available: https://repository.unej.ac.id/bitstream/handle/123 456789/95172/F. KIP_Jurnal_Suratno_The Effect of Using Synectics Model on Creative Thinking.pdf?sequence=1%26isAllowed=y.

[20] M. Reza, "Pengembangan Bahan Ajar Menulis Fabel dengan Model Sinektik pada Peserta Didik Kelas VII SMP Muhammadiyah 1 Balikpapan," *Diglosia J. Kaji. Bahasa, Sastra, dan Pengajarannya*, vol. 3, no. 2, pp. 179–188, 2020, doi: 10.30872/diglosia.v3i2.45.

[21] R. Diluzio and C. B. Congdon, "Infusing the creative-thinking process into undergraduate STEM education: An overview," *ISEC 2015 - 5th IEEE Integr. STEM Educ. Conf.*, pp. 52–57, 2015, doi: 10.1109/ISECon.2015.7119945.

[22] C. Conradty and F. X. Bogner, "From STEM to STEAM: How to Monitor Creativity," *Creat. Res. J.*, vol. 30, no. 3, pp. 233–240, 2018, doi: 10.1080/10400419.2018.1488195.

[23] R. A. Hargrove and J. L. Nietfeld, "The impact of metacognitive instruction on creative problem solving," *J. Exp. Educ.*, vol. 83, no. 3, pp. 291–318, 2015, doi: 10.1080/00220973.2013.876604.

[24] T. Djudin, "S Ynectics Model : An Offer To Develops Tudents' Creativity," vol. 2, no. 1, pp. 65–70, 2017.

[25] M. Eristi, Bahadir; Polat, "The Effectiveness of Synectics Instructional Model on Foreign Language Vocabulary Teaching," *Int. J. Lang. Educ. ang Teach.*, vol. 5, no. 2, pp. 59–76, 2017,

doi: 10.18298/ijlet.1753.

[26] D. M. Sya'bani and Y. Puspita, "Implementasi Model Synectics Dalam Pembelajaran Ilustrasi Berbasis Internalisasi Nilai-Nilai Kearifan Lokal," vol. 8, no. 1, pp. 135–141, 2020.

[27] P. Kallonis and D. G. Sampson, "A 3D Virtual Classroom Simulation for supporting school teachers' training based on Synectics - 'making the strange familiar,'" *Proc. 2011 11th IEEE Int. Conf. Adv. Learn. Technol. ICALT 2011*, pp. 4–6, 2011, doi: 10.1109/ICALT.2011.9.

[28] Z. Kalantarnia, A. S. Semnani, M. H. Behzadi, and M. R. Mardanbeigi, "تاثیر مداخلات آموزشی مبتنی هندسه تحصیلی عملکرد در 5E و پردازی بدیعه های الگو بر آموزان دانش," vol. 14, no. 4, pp. 835–846, 2020.

[29] C. Saleh, H. S. Negara, P. Sinetik, and T. Kepribadian, "Analisis Kemampuan Pemecahan Masalah Matematis Sebagai Dampak Pembelajaran Sinektik Dan Tipe Kepribadian," *EduSains J. Pendidik. Sains Mat.*, vol. 8, no. 1, pp. 33–45, 2020.

[30] I. F. U. Manurung, "Analisis Miskonsepsi Siswa Menggunakan Three Tier Test Melalui Penerapan Model Pembelajaran Sinektik," *Handayani*, vol. 8, no. 1, pp. 75–83, 2017.

[31] Y. N. Hidayat and A. Rusilowati, "Analysis of Mathematics Literacy Ability Observed from Metacognition in Learning Realistic Synectics Assisted by Schoology," *Unnes J. ...*, vol. 10, no. 1, pp. 41–47, 2021, [Online]. Available: https://journal.unnes.ac.id/sju/index.php/ujmer/ar ticle/view/34606.

[32] U. Ruhama and D. I. Purwaningsih, "Improving Students' Writing Skills through the Application of Synectic Model of Teaching Using Audiovisual Media," *English Lang. Teach. Educ. J.*, vol. 1, no. 3, p. 176, 2019, doi: 10.12928/eltej.v1i3.293.

[33] T. Tumangger, Masda; Ernidawati, "The Application of Synectics Model to Improve Students' Speaking Ability in Senior High School," *English Lang. Teach. Learn. FBS UNIMED*, vol. 1, no. 2, pp. 27–38, 2012.

[34] S. C. Wibawa *et al.*, "Teaching Applied: Synectics Application using Leadership Instructional on Creative Design Subject for Upgrading Creativity," *J. Phys. Conf. Ser.*, vol. 1387, no. 1, 2019, doi: 10.1088/1742-6596/1387/1/012068.

[35] S. Purwanti, "Model Pembelajaran Synectics Untuk Peningkatan Synectics Learning Model To Increase the Activity," vol. 5, no. 2, pp. 107–112, 2020.

[36] K. A. Al-Dababneh, M. M. al-Masa'deh, and E. M. Oliemat, "The effect of a training programme in creativity on developing the creative abilities among children with visual impairment," *Early Child Dev. Care*, vol. 185, no. 2, pp. 317–339, 2015, doi: 10.1080/03004430.2014.924113.