CREATIVE THINKING PROCESS IN STUDENT'S SCIENTIFIC WORKS

Alfi Syahrin, Dawud, Heri Suwignyo, Abdul Wahid
[1]Fakultas Keguruan dan Ilmu Pendidikan, Universitas Almuslim
[2,3]Fakultas Sastra, Universitas Negeri Malang
[4]Fakultas Keguruan dan Ilmu Pendidikan, Universitas Muhammadiyah Makassar
[1,]Jl. Almuslim, Matangglumpangdua, Bireuen, Aceh
[2,3]Jl. Jalan Semarang 5, Malang, Jawa Timur
[4]Jl. Sultan Alauddin No.259, Kota Makassar, Sulawesi Selatan
alfisyahrin745@gmail.com

Article History:
Submitted: 29 November 2023; **Revised:** 15 February 2024, **Accepted:** 16 February 2024
DOI: 10.26858/retorika.v17i1.56045

ISSN: 2614-2716 (print), ISSN: 2301-4768 (online)
http://ojs.unm.ac.id/retorika

Abstract: This study aims to explain the process of creative thinking, including analytic, evaluative, applicative, and interpretative students in scientific work. The scientific works studied were in the form of Student Creativity Program, State University of Malang, Indonesia. This research uses a qualitative approach with a content analysis method. This research data in the form of paragraphs, paragraph clusters, and full text. The data source of this research is the scientific work of students. The research data collection technique was carried out by survey and documentation study. The process of data analysis is grouped into three stages, namely data reduction, data presentation, and drawing conclusions. The findings of this study indicate that the process of creative thinking in writing scientific papers can be done with four stages (1) the analytic stage in scientific work looks at the examination of arguments. (2) Evaluative in scientific work looks at the assessment of arguments in accordance with the topic of study. (3) Applicative in the work appears in arguing according to procedure. (4) Interpretations in scientific work appear in the clarification of meaning, so that the meaning conveyed is clear and directed. The findings of this study contribute to an author's understanding of the importance of using creative thinking processes in scientific writing. However, for further research it is recommended to examine the process of creative thinking with different objects.

Keywords: thought process, creative, writing, scientific work

Creative thinking is a thinking skill that must be empowered in writing scientific papers, because it is an important component in the development of science. Creative thinking is defined as mental activities that are used to develop ideas (Syahrin et al., 2019; Mumford, 2013; Gregory, 2013; Larraz-Rábanos, 2021). Creative thinking is an act of conscious and unconscious thought that underlies the process of scientific discovery, artistic originality, and inspiration, which has four standard indicators, namely smoothness, originality, flexibility, and elaboration (Sitorus & Masrayati, 2016). Creative thinking usually arises from the expansion or modification of familiar categories or concepts (Gube & Lajoie, 2020; Srikongchan et al., 2021). The ability to use what is gained in knowledge structures in making modifications

and extensions based on knowledge is one of the main processes of creative thinking. The process of creative thinking in this study has four stages, namely analytic, evaluative, applicative, and interpretative.

First, analytic. In the analytic stage the writer must examine ideas thoroughly to find suitable information. Sternberg, et al., (2011) explained that to find relevant information, the authors sought relevant information to solve problems. Second, evaluative. At this stage the writer needs carefulness to judge arguments based on facts. This stage requires mind or reasoning power to be able to filter out some relevant ideas. Third, applicative. This stage requires the accuracy of the argument as the main foundation, because this is the stage of applying the argument. The argument conveyed must be able to predict that what is conveyed can be accepted by the reader. Applicative is the application of ideas that have been concluded (Sternberg, et al., 2011). Fourth, the interpretive stage. This stage is the final process in the process of creative thinking. This stage serves to clarify the meaning or explain the meaning that is in the previous information or ideas.

Creative thinking processes involve the use of cognitive processes to engineer or carry out stored knowledge (Nevid, 2017). When thinking, there are two things that become the thoughts of a writer, namely (1) the writer represents information in the mind in the form of words and concepts, and (2) the writer manipulates the information to solve problems, make decisions, and engage in creative activities. The formation of concepts or mental categories for grouping objects, events, and ideas helps bring order and predictability to the development of science (Nevid, 2017). That information arises from the teacher's explanation that assigns students to get ideas, read relevant books, or other related references (Sitorus & Masrayati, 2016; Christmas et al., 2013; Schunk, 2012). One of the activities implicating the process of creative thinking is writing scientific papers of students. Understanding the stages of the creative thinking process in scientific work can understand the flow and organize the placement of arguments.

In writing scientific papers, mastering the knowledge of creative thinking processes is an important aspect. Because the creative thinking process can help writers develop their creative and critical thinking. This is important in scientific research, where writers need to be able to generate new ideas, analyze data, and draw logical conclusions. Writing effective scientific work certainly requires paying attention to the creative thinking process used. The scientific thinking process as a form of synergy between deductive and inductive thinking approaches is an effort to discover and develop knowledge (Mukhadis, 2015). Inductive and deductive approaches are the two main methods used in scientific reasoning. The inductive group processed the concordance lines in depth when deducing the meaning and use of words, and the deductive group processed the concordance lines in depth when looking for concordance lines that matched the meaning and use of the given words (Lee & Lin, 2019).

The process of creative thinking in students' scientific work allows providing guidance in compiling diverse ideas, thus from diverse ideas can choose the most appropriate ideas in expressing and solving problems. The step of submitting a problem as a start in writing a scientific work which includes determining the realm, identifying the problem, making a priority scale and determining the problem, as well as formulating the problem operationally (Mukhadis, 2015). In scientific work the problem must be described so that the reader knows thoroughly. Abstract problem solving requires the reader to think abstractively or to use abstract thinking in understanding the problem, but that does not mean that the problem being expressed is irrational because abstract does not mean irrational (Kusmana, 2012). The objectivity of deciphering problems in scientific work is necessary to avoid mistaken interpretations. Incorrect interpretation can hinder the delivery of information to the reader.

Scientific work presents scientific arguments based on objective information. Such general information is usually generated from observations or experiences based on scientific methods as a representation of scientific thinking. The results of this observation or experience in a scientific context are shown by indicators of concordance between pre-existing theories, and rational thought patterns and supported by empirical information. Authors of scientific papers can minimize the possibility of distortion of information about the contents of the message delivered to the reader (Mukhadis, 2015). That is, the author is able to adjust the

information conveyed to the reader by looking at the situation and conditions in the field.

The process of creative thinking is expected to organize ideas to find out the effectiveness of scientific writing with the reality faced. When the writer uses the creative thinking process, it means that the writer is using the cognitive process to manipulate the stored knowledge. At the stage of cognitive processing, there are several things that must be considered, namely (a) fluency, is the stage of generating a large number of ideas; (b) flexibility, is that it can change categories; (c) originality, that is, able to with a unique mind; and (d) elaboration, is being able to take an idea and add it (Kuswana, 2014: 84). In writing scientific papers, an author with his experience and participates in experiments by observing certain elements, bearing in mind previous information including generalizations and conclusions related to the research studies being studied. The ideal reader or writer uses critical thinking skills to evaluate and reflect information found in the text (Sultan et al., 2017). In addition, in writing scientific papers one information with other information must be integrated. The integration of ideas must be the basis for competency development (Murkatik et al., 2020).

Research on the creative thinking process was conducted by Sitorus & Masrayati (2016). The results of his research show that the creative thinking process with the application of RME occurs in 5 stages: orientation, preparation, incubation, lighting, and verification. Students' cognitive knowledge at the orientation stage reads and understands contextual problems and seeks information from contextual problems. In the preparation stage, students carry out activities such as collecting data and information. In the incubation stage, students gain cognitive knowledge by recalling previous knowledge and learning experiences. In the illumination stage, students analyze parts of an idea and synthesize them. In the verification stage, students verify the innovative solution. Next, research by Xie (2023). The results of his research revealed that the creative thinking process can be carried out through a divergent process. This research clarifies the components of divergent thinking and their interrelationships, building a cognitive model of designers' divergent thinking in design in writing scientific papers.

The difference between this research and that research can be observed in terms of the focus under study and the subject of the study. This research seeks to dig up information about the types of creative thinking in student writing. These differences indicate that this research topic is a new topic that is worth researching. Based on this context, this research study is focused on the process of creative thinking in students' scientific work.

METHOD

This study uses a qualitative approach with content analysis methods. A qualitative approach to the content analysis method is useful for gaining a deep understanding of the creative thinking process. This research approach is used to describe, explain, and explore students' creative thinking processes in scientific work. Content analysis is used to find the existence of paragraphs in texts or a series of texts. The process of creative thinking can be seen from the diversity of ideas and the integration of ideas. The activity was carried out to determine the reality of the preparation of creative thinking processes in scientific work, based on this fact the analysis was carried out so that it can be concluded that the creative thinking process of students in writing scientific papers. The use of a qualitative approach is based on its nature and characteristics, namely having a natural setting as a source to get data directly and meaning as the main concern.

The data of this research is the combination of ideas in the text of students' scientific papers. The interagency relationship is exposed in paragraphs, paragraph clusters, and texts. Therefore, the use of ideas and the preparation of paragraphs in a student's scientific work reflects the students' creative thinking in developing ideas and arranging ideas between paragraphs in the text.

In accordance with the variety of data needed, the source of this research data is the writing of student scientific papers. Scientific writing has characteristics in the form of a model of persuasion in logical reasoning that is in line with the logic of thinking the truth of science to convince The selection of scientific work needs to be done with the intention that the writing can be analyzed in accordance with the focus of the problem under study.

The subjects in this research were students at the State University of Malang, Indonesia. The number of participants in this research was 15 students from 75 people from various majors. The reason for taking 15 participants was because after verifying the data there were similarities, therefore 15 data were taken that had differences. This research examines students' creative thinking processes in scientific work. Writing researched scientific papers in the form of a Student Creativity Program on an unspecified topic. This is based on the idea that the Student Creativity Program is a form of written scientific work prepared using scientific reasoning procedures. The Student Creativity Program is the result of scientific thinking and the information used as an analytical tool is information about the characteristics of scientific thinking.

This research instrument consists of data collection instruments and data analysis guidelines. The data collection guide instrument was used to collect data about the creative thinking process in students' scientific work. The guide is prepared based on the focus of the problem being studied. When viewed from the object studied, this article actually only examines documents in the form of scientific works. To confirm the data obtained from students' writing, researchers conducted interviews with supervisors. When conducting interviews with supervisors, use an interview guide which contains questions related to the focus of the research problem.

Collecting data about the process of creative thinking in students' scientific work directs the researcher's observations regarding the forms between paragraphs or texts contained in student scientific writing. The form of the intended text includes (1) the development of ideas in paragraphs, and (2) the process of exposure of ideas in the text. Through observations focused on these two aspects, data can be obtained about various forms of paragraphs in the text that reflect the process of developing ideas in students' scientific work.

In accordance with the type of research, data, data sources, samples, instruments, and research procedures, this study uses a flow analysis model as presented by Miles & Huberman (1994) with stages (1) anticipation, this activity is carried out to prepare items which will be analyzed, (2) data reduction, this activity is carried out to sort out and classify data that is excessive or lacking, (3) data presentation, in this data presentation the results of the reduction are shown to be analyzed, and (4) drawing conclusions, steps This end is the stage of drawing conclusions temporarily related to students' creative thinking processes.

FINDING AND DISCUSSION

Finding

This section presents the results of research into creative thinking patterns in scientific work. Scientific work is written that is based on scientific procedures. In this research, the process of creative thinking in students' scientific works is explained based on four stages, namely analytic, evaluative, applicative, and interpretative.

Based on the analysis of research data, 49 creative thinking process data were obtained with data sources of 15 student scientific works. the results of grouping data about the creative thinking process can be seen in the following figure.

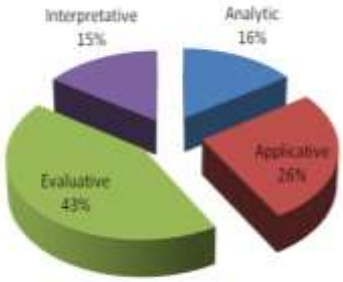

Figure 1. The Emergence of Creative Thinking Data in Student Scientific Work

Based on Figure 1 it can be seen that (a) the analytic process is 11 data or 16%, (b) the evaluative process is 13 data or 43%, (c) the applicative process is 26 data or 26%, and (d) the interpretative process is 11 data or 15%. Figure 1 is obtained based on analysis using the Nvivo application. In accordance with this percentage, the data findings of each stage appear to be unbalanced.

Based on the results of data analysis, it can be seen that the dominant creative thinking process used in student creativity programs is evaluative and applicative thinking. However, all creative thinking processes in students' scientific

writings complement each other. Therefore, the creative thought process will be described in more detail as follows.

Analytical Process

Analytic in this research is interpreted by checking information. The information used in scientific work must truly reflect the integration with the written problem. The right information reflects the objectivity of the writing. This can be seen in the following sample data.

(1) Suharsaputra (2016) which states that leadership enables an organization to move in an directed direction in achieving its stated goals. In order for a leader to be able to carry out his duties as a mobilizer in the organization well, the leader is expected to have good physical, spiritual and morality. Kusmintardjo (1989) that successful leaders are effective sources of the personality of the leader himself as a person. This proves that the most influential thing in the principal's leadership is the principal's personality. (PKM Vonny Angeli).

In the data (1) consists of two information or theories used that relate to the research topic, namely about *"leadership"*. The theory presented is information that is in accordance with student ideas. The use of appropriate theory does not exchange with other information because it is presented really has a connection with the arguments presented. Students try to provide an explanation of the information or theory used, so that readers understand the purpose of the information clearly. Clarity of information can convince the reader.

Evaluative Process

At this stage see the suitability of increasing the results of the pouring of ideas reflected in the introduction, the content section, and the closing section. All three of these scopes have integration or are appropriate and logical. This can be seen in the following example.

(2) Introduction section:
This research was conducted to facilitate teachers in conducting assessment for learning by using the web which is expected to improve time efficiency in its implementation. To facilitate the use of the web, you can use the go formative application. The application can provide results and feedback in real time to teachers and students. So students can improve their learning process and achieve specified learning goals.
Literature review section:
Assessment for learning or commonly known as formative assessment is one type of assessment that is currently very intensively discussed in the world of education. According to Sudijono (2005), the term "formative" comes from the word "form" which means "form". So, it can be seen that the formative assessment or assessment for learning is an assessment of learning outcomes that have the aim of knowing the extent to which students "have formed" after they have followed the teaching and learning activities at specific intervals. Assessment for learning is usually carried out every single subject matter ends.
The closing part:
Based on the results of data analysis and discussion, the average value of mastery of physics concepts of students who use the application of assessment for learning assisted by web go formative on simple harmonic motion material is better than students who use direct learning. This causes a significant difference between students who use assessment for learning aided by web-go formative and students who use direct learning**.** (PKM Izzah Zahrona).

Adjustments to increase the results of pouring ideas in data (2) are reflected in the introduction, literature review, and concluding accordingly and logically. The ideas presented regarding *"assessment for learning"*. In the introduction contains ideas in the form of hope. In the contents section presented the development of ideas related to *"assessment for learning"* included references in reinforcing ideas. Furthermore, the concluding section contains conclusions stating that *"the implementation of assessment for learning assisted by web go formative on simple harmonic motion material is better"*. It can be stated that, expectations, idea development, and conclusions have a cohesiveness in presenting ideas. This conformity is a part that reveals the connectivity between the arguments presented.

Applicative Process

At this stage the concept is expressed by expressing or stating an argument, stating the problem, and stating the truth of the procedure. As in the following example.

(3) Children with autism can be said to have obstacles in interacting with their environment. Autism is included in the group Pervasive Developmental Disorder (PDD), is a child who has major obstacles to communication barriers, behavioral deviations, and social interactions. Therefore, autistic children like to be alone (withdraw from the environment). One alternative problem solving is the initiator of modifying a fun game in the form of Labyrinth Box. The labyrinth is a place or road full of winding alleys, and students will find a way out (Constantina, 2015). By looking at some of the results of the study first, researchers took the initiative to modify the labyrinth game into a Labyrinth Box game into a tool that can help children with autism to improve children's interpersonal skills. (PKM Heavy Evasari).

In data (3) consists of two paragraphs. In the first paragraph consists of five sentences and the second paragraph consists of one sentence. The first sentence in paragraph (1) reveals the argument about *"autistic children",* sentence (2-3) states the problem, and sentence (4) states the solution. Furthermore, in sentence (5) the research subject uses theory as an argument reinforcer. Then in the second paragraph contains explanatory ideas that convince the previous argument, the argument used is based on the conclusions from previous research.

In these data the research subjects present a less detailed idea, not explained in varying ways. Although the flow of ideas is smooth because of the close relationship between the meaning of one idea with another, but the diversity and detail aspects are less diverse and detailed because the ideas used are less than three ideas.

Interpretive Process

At this stage is the clarification of meaning. What can be seen in clarifying meaning is the meaning contained in the argument is easily understood. Structured explanations in written language minimize errors in the meaning conveyed. As in the following example.

(4) The problem comes from Greek, which is a problem that means constraints. According to Chi, et al (1982: 6) a problem is a situation where someone tries to achieve several goals and must find a way to get it. The problem is defined as a statement that is stimulating and challenging to answer, but the answer to the problem cannot be immediately known. So it can be concluded that the problem is the gap between reality and what is expected or in other words the problem is an obstacle or problem that must be solved in order to achieve the objectives with maximum results. (PKM Nailul Muna).

In the data (4) students present the definition of theory with analysis, that is by dividing the "*problem*" breakdown into sufficiently detailed parts to clarify the definition of the reference. Decomposition in this way is a mandatory part in writing scientific papers, so it becomes clear the meaning intended by the author. However, research subjects only provide an explanation of the word "*problem*", it would be nice for the research subject to describe the other parts so that it clarifies the definition of "*problem*" that is expected. Each section is described to support the definition of "*problem*" in order to obtain a broader understanding of the reader about the definition.

Discussion

Creative thinking is one of the thinking skills needed by students to face problems in writing scientific papers. Creative problem solving strives for the information and resources they need to explore possible solutions (Nevid, 2017). That is, creative problem solving produces as many alternative solutions to a problem as possible. Creative ideas are things that are both new and highly valued. Ideas in creative thinking need to be organized according to stages. Writing scientific papers must be passed with four stages, namely analytic, evaluative, applicative, and interpreatative. These four things are the process of creative thinking.

First, the analytic stage. At this stage the writer has identified a problem that needs to be studied. To solve these problems need to gather some information or arguments that support solving the problem. Therefore, this stage is known as the argument or information examination stage. Every argument obtained needs to be examined to adjust to the related problem. Not all arguments or information obtained can be used as a source of problem solving. The author must be able to combine problems with arguments that serve as solutions. The ability to think creatively individually plays an important role in combining problems with the arguments used (Baumtrog, 2017). In this stage, it is found that much of the information conveyed is related to each other, both functionally and in a cause-and-effect relationship. The relationship can be so close or in such a complex sequence that it is difficult to recognize the relationship.

Arguments that are used as sources of problem solving in scientific work need to be analyzed critically. Analysis is the stage of identifying the relationship between statements, questions, concepts, descriptions to express judgments, reasons, or opinions, including examining ideas, and analyzing arguments (Facione, 2013). In analyzing or examining arguments, several things need to be applied, namely checking ideas, identifying ideas, and analyzing arguments. As in data (1) there are two information that is conveyed that is in accordance with the research topic, which is about "leadership". the information conveyed is information that is in accordance with the students' ideas. The information is conveyed based on the results of the identification and analysis of previous information.

Second, the evaluative stage. At this stage the collection and examination of information is stopped, the writer evaluates the analyzed arguments according to the problem being examined. The skill to judge arguments must be measured using certain standards. In Bloom's taxonomy it is said that evaluating is the highest stage of cognitive thinking (Kuswana, 2014). At the evaluation stage the author is required to be able to synergize other cognitive aspects in assessing a fact or information (Bloom, 2010). Evaluation of information in writing scientific papers must be done carefully, because the information submitted is a reference level of reader confidence. The ambiguity of the information conveyed will have a negative impact on writing.

Things that are evaluated are information (Mertes, 2013). Not all of the information obtained in writing scientific papers can be recognized, although in the first stage selection or examination of arguments has been conducted. As it is today, information becomes urgent to be clarified, because the information obtained can be hoaxed or full of personal interests. Therefore, using information in writing scientific papers needs to be considered the main source. Evaluation skills require information for relevance and consistency (Ganapathy et al., 2017). The information submitted must be consistent and more detailed to avoid misunderstandings (Suwanarak, 2018). At this stage it was found that in evaluating arguments, facts are needed, both in the introduction and discussion sections. All arguments, theories or facts must be used to defend the statement that has been expressed.

Third, the applicative stage. At this stage is the stage of arguing based on the results of the assessment. It should be noted that this stage involves revisiting the analytic and evaluative stages. This is related to efforts to strengthen confidence whether the arguments used are in accordance with reality. Therefore, the writer must truly understand what is conveyed in accordance with reality in the field. The writer needs to know that the argument put forward is true. The argument used is really able to convince the reader (Rapanta, 2019).

As in data (3), students strengthen their arguments by including theories. This was stated with the aim of convincing the reviewer. The author does not intend to make a claim, but to provide theory as a complement to the stated argument. The author wants problems about *"autistic children"* can be resolved with the arguments and theories used. As in data (3), students strengthen their arguments by including theory. This is stated with the aim of convincing reviewers. The author does not intend to make claims, but rather provides a theory as a complement to the arguments put forward. The author wants the problem of "autistic children" to be resolved with the arguments and theories used. Based on these data, it was found that the logic of scientific work will reflect the correct use of logical thinking. If the presentation of

scientific work uses logical thinking correctly, then the arguments revealed can be accepted by the reader.

The fourth stage, namely interpretive. This stage is the final stage in the process of creative thinking. Interpretative is the expression of the meaning of various situations, information, phenomena, rules and procedures. The accuracy of meaning can influence the reader in proving the truth of a statement (Syahrin et al., 2019). The interpretive phase must begin with a description of the argument. Descriptions function as markers, constraints, and interpreters of codes (Russell, 2015). In the interpretive process, the thing that must be found is the form of information. The importance of finding patterns of information at different levels is an alternative problem solving.

Perkins & Murphy (2006) said that at the interpretive stage, we must gather facts and strong information about the phenomenon. As in data (4), students use theories that are relevant to the problem. Information submitted is given a detailed explanation with the aim of the reader or reviewer can accept the arguments submitted. Each part of student theory tries to describe to support the definition of "*problem*" in order to obtain a broader understanding of the reader about the definition of "*problem*". Perkins & Murphy (2006) say that at the interpretation stage, we must collect strong facts and information about the phenomenon. As in data (4), students use theories that are relevant to the problem. The information presented is explained in detail with the aim that readers or reviewers can accept the arguments presented. Each part of the student's theory tries to explain to support the definition of "problem" so that readers gain a broader understanding of the definition of "problem". Thus at this stage it was found that in writing scientific work the integrative process is carefulness. Writing scientific papers requires carefulness in explaining and clarifying meaning, this is a basic requirement in clarifying meaning. Writing creative scientific work is never separated from the clarity of the ideas conveyed.

CONCLUSIONS

In general, the findings of this study about creative thinking processes in students' scientific work, show that creative thinking processes illustrate the diversity and detail of ideas. Writing scientific papers is one part of the process of creative thinking that prioritizes the ability of students to develop ideas, organize information, and pour it into written language. Based on research findings, the process of creative thinking is a form of thought that leads to resolution, practicality, organizing ideas, placing the use of ideas, and meaningful for problems or that lead to new ideas. The ideas are conveyed in detail. The detail is an attempt to purse various alternatives so as to gather together one correct answer to a problem.

REFERENCES

Baumtrog, M. D. (2017). Others and Imagination in Reasoning and Argumentation: Improving ur Critical Creative Capacity. *Informal Logic*, *37*(2),.

Bloom, B. S. (2010). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.

Christmas, D., Kudzai, C., & Josiah, M. (2013). Vygotsky ’ S Zone of Proximal Development Theory: What Are Its Implications for Mathematical Teaching?. *Greener Journal of Social Sciences*, *3*(7).

Facione, P. A., & Facione, N.C. (2013). Critical Thinking for Life: Valuing, Measuring, and Training Critical Thinking in All Its Forms. *Spring*, 28(1).

Ganapathy, M., Mehar Singh, M. K., Kaur, S., & Kit, L. W. (2017). Promoting Higher Order Thinking Skills via Teaching Practices. *3L The Southeast Asian Journal of English Language Studies*, *23*(1).

Gube, M., & Lajoie, S. (2020). Adaptive Expertise and Creative Thinking: A Synthetic Review and Implications for Practice. *Thinking Skills and Creativity*, *35*.

Gregory, E., Hardiman, M., Yarmolinskaya, J., Rinne, L., & Limb, C. (2013). Building Creative Thinking in The Classroom: From Research To Practice. *International Journal of Educational Research*, *62*.

Kusmana, S. (2012). *Merancang Karya Tulis Ilmiah.* Bandung: Remaja Rosdakarya.

Kuswana, W. S. (2014). *Taksonomi Kognitif: Perkembangan Ragam Berpikir*. Bandung: Remaja Rosdakarya.

Larraz-Rábanos, N. (2021). Development of Creative Thinking Skills in the Teaching-Learning Process. *Teacher education-New perspectives*, 307-322.

Lee, P., & Lin, H. (2019). The Effect of The Inductive and Deductive Data-Driven Learning (DDL) on Vocabulary Acquisition and Retention. *System, 8*.

Mertes, E.S. (2013). *A Mathematics Education Comparative Analysis of ALEKS Technology and Direct Classroom Instruction. ProQuest LLC*. Bethel University.

Mukhadis. (2015). *Kiat Menulis Karya Ilmiah.* Yogyakarta: Aditiya Media Publishing.

Mumford, M. D., Giorgini, V., Gibson, C., & Mecca, J. (2013). Creative Thinking: Processes, Strategies and Knowledge. In *Handbook of Research on Creativity*. Edward Elgar Publishing.

Miles, Matthew B. & A. Michael Huberman. (1992). *Qualitative Data Analysis.* Beverly Hills: Sage Publications.

Murkatik, K., Harapan, E., & Wardiah, D. (2020). The influence of Professional and Pedagogic Competence on Teacher's Performance. *Journal of Social Work and Science Education*, *1*(1).

Nevid, Jeffrey S. (2017). *Psychology; Concepts and Applications.* Houghton Miffin Company.

Perkins, C., & Murphy, E. (2006). Identifying and Measuring Individual Engagement in Critical Thinking in Online Discussions: An exploratory case study. *Educational Technology and Society*, 9(1).

Rapanta, C. (2019). Argumentation as Critically Oriented Pedagogical Dialogue. *Informal Logic, 39*(1).

Russell, B. (2015). Knowledge by Acquaintance and Knowledge by Description. *Proceedings of the Aristotelian Society*, 11(3): 108–128.

Schunk, D. H. (2012). *Learning Theories: An Education Perspective*. New York: The University of North Carolina at Greensboro.

Sitorus, J., & Masrayati. (2016). Students' Creative Thinking Process Atages: Implementation of Realistic Mathematics Education. *Thinking Skills and Creativity, 22.*

Srikongchan, W., Kaewkuekool, S., & Mejaleurn, S. (2021). Backward Instructional Design Based Learning Activities to Developing Students' Creative Thinking with Lateral Thinking Technique. *International Journal of Instruction*, *14*(2).

Sultan, Rofi'uddin, A., Nurhadi, & Tri Priyatni, E. (2017). Critical Responses to Texts: Reading Attitudes of University Students in Indonesian Learning Context. *KnE Social Sciences*, *1*(3).

Suwanarak, K. (2018). Self-Evaluation of Thai Adult Learners in English Writing Practice. *3L The Southeast Asian Journal of English Language Studies*, *24*(2).

Sternberg, Robert J. (2003). *Wisdom, Intelligence, and Creativity Synthesized.* New York: Cambridge University Press.

Syahrin, A., Dawud, Suwignyo, H., & Priyatni, E. T. (2019). Creative Thinking Patterns In Student's Scientific Works. *Eurasian Journal of Educational Research*, *19*(81).

Xie, X. (2023). The Cognitive Process of Creative Design: A perspective of Divergent Thinking. *Thinking Skills and Creativity*, 48, 101266.