The Use of Mind-Mapping in Paragraph Writing Learning with Critical Thinking Stimulus for Students

Vera Krisnawati ✉, Nila Mega Marahayu, Shofi Mahmudah Budi Utami, Nia Ulfa Martha

Universitas Jenderal Soedirman, Indonesia

Article Info	Abstract
	This classroom action research aims to (1) improve the quality of the learning process to write paragraphs with a critical thinking stimulus using the mind mapping method and (2) improve the ability to write paragraphs with a critical thinking stimulus using the mind mapping method. The research subjects are students taking Indonesian courses in science and social science majors at Universitas Jenderal Soedirman. Data sources include lesson plans, photos, test results, a list of scores, field notes, and notes on interview results. Data collection techniques were conducted through observation, interviews, tests, and documents. The achievement indicator is 75%. The research procedure includes preparation, initial survey, cycle implementation, observation, and reporting. Mastery of critical thinking skills in writing paragraphs is also reflected through a long continuous process starting from the ability of students to build references and social relationships such as cooperation with other students, communicating with others, tolerance, respecting the opinions of others, and being open to criticism from others. Other aspects observed encompass the ability of students to acquire confidence that is essential to possess the ability and capability to complete learning tasks. Furthermore, students can master the teaching materials that they have studied at least 75% of what should be achieved per the specific instructional objectives intended.

✉ Correspondence address:
Jl. Prof. Dr. HR. Boenjamin 708 Kotak Pos 115 - Grendeng
Purwokerto 53122
E-mail: vera.krisnawati@unsoed.ac.id

INTRODUCTION

Global needs continue to demand the younger generation to have competence in analyzing and conveying scientific ideas through language that is easy to understand, communicative, acceptable, and valid. As a thought process, each idea generated is an authentic thought that is constructed continuously so that a continuous improvement process occurs. The competencies possessed by the younger generation are implemented concretely into daily activities, both soft and hard skills, so that the learning process is not only in the cognitive realm (Bruce et al., 1991; Wagner & Kozma, 2005). The young age represents the demographic bonus in Indonesia, which not only means the country's future but is also the prior agent of change and progress of society, especially in responding to global challenges and needs.

The conditions broke these global challenges and needs of the corona pandemic, which worsened the education system in various regions. Over the past three years, Indonesia has changed the management system and curriculum to be oriented towards digital development, freedom of learning, and the flexibility of each education unit in designing learning outcomes according to regional characteristics. The system's openness makes the government create new policies by implementing a learning system from home through various platforms ranging from zoom applications, google meet, e-learning, e-students, and other learning media. Learning conventionally completed face-to-face in the classroom has also been shifted to face-to-face learning (Arora & Srinivasan, 2020; Dubey & Pandey, 2020). Teachers must follow the disclosure of information through various platforms even though a balanced competence does not follow it. The first semester of the pandemic is the most challenging time for teachers and students to adapt.

The ability to write is one of the essential provisions for students as the basis for scientific thinking. As one of the language skills, writing is a competency that must be continuously trained so that a person can convey his ideas scientifically, properly, and correctly. In learning Indonesian language, writing is an activity that requires creativity and imagination to explore and express ideas, thoughts, feelings, and experiences. A paragraph writing activity is an active and productive activity incorporating a thought process (Adas & Bakir, 2013). It is effective because someone who writes paragraphs will produce an article that others can read. It needs careful consideration for the author to convey ideas straightforwardly according to the listener's age, the context of the situation, social circumstances, and time so that the concept can be accepted in the same condition.

One characteristic of writing worth reading is the coherence between ideas in a discourse, which is the pattern of linkages between one part and another so that the sentence has a whole unified meaning. The ability of students to express their ideas as a whole continuously requires continuous practice (Graham & Harris, 2005). Not only is writing ability to develop ideas, but students are also needed to convey ideas in written form so that they remain public-oriented by considering their readers. An article can reflect the cognitive intelligence of the author through the structure and delivery of good ideas, frequently referred to as creative thinking.

In reality, the student's ability to write paragraphs is not in accordance with the expected conditions. Most students find it challenging to write paragraphs. It is per the situation experienced by students taking Indonesian language courses. The ability to write paragraphs is still low, as seen from the learning process and student abilities (Woodrich & Fan, 2017). The common knowledge of students to write paragraphs can be caused by several things, which are (1) difficulty in determining and designing the topic or project idea that will be initiated, (2) not yet optimal development of the topic or idea selected into a complete paragraph, (3) the selection of academic diction and according to the topic or

idea that has been selected, and (4) the technique of connecting the selected words into sentences that will form a complete paragraph. On the other hand, Indonesian language study materials are considered boring, particularly in learning to write paragraphs, due to the choice of the lecture method. In the end, one of the problems in writing experienced by students is the preparation of coherent and cohesive paragraphs.

Critical thinking competence is a provision in building a framework and conveying ideas in writing. The framework is structured systematically, procedurally, and well structured. Critical thinking in this perspective is the ability of students to generate logical and well-thought-out reasoned judgments (Settle, 2018). This thinking ability is not only performed by accepting all arguments and drawing conclusions by paraphrasing but by having an attitude that fosters a critical attitude by questioning the arguments and conclusions. Through language skills, critical thinking skills can impact the way of thinking because it allows each student to conceptualize and understand information precisely but accurately generalized so that it allows students to solve problems and make decisions.

Critical thinking skills can help in actualizing good language and communication skills. By thinking critically, students can present their thoughts in an organized manner, analyze data logically, and help express ideas more variedly. Critical thinking encourages creativity and innovation in concrete forms, particularly in writing. Therefore, writing ideas by prioritizing critical thinking skills requires an interesting learning approach. In teaching language skills, the determination of methods to train and explore ideas also affects the achievement of these competencies. One method that provides a stimulus for writing is mind mapping.

Mind-mapping is one of the methods employed to translate critical thinking into a flow of ideas that is directed and easier to understand. Mind mapping is an excellent way to generate and organize thoughts before writing. The most challenging part is knowing what to write about, the theme, and how to start. With mind mapping, an article is translated into branches of other pieces, hence, it becomes a developer of ideas in writing (Vijayavalsalan, 2016). Mind mapping can help students utilize the potential of both sides of their brain (Nurlaila, 2013). The interaction between the two hemispheres of the brain can trigger creativity, providing convenience in writing paragraphs. The application of this method to students can also start student creativity. Creativity has also been associated with achievement levels in second language learning. Much language learning leads to contemporary language teaching methods that can stimulate creativity in learners—particularly those that involve student-centered, interaction-based, and open-ended elements. Therefore, in principle, the use of mind-mapping methods, critical thinking skills, and the writing process are compatible in encouraging creative thinking and behavior in learning.

In language learning, the stimulus provided during the teaching process is expected to help students change their thoughts into language that can be heard or seen. On the other hand, students must produce effective sentences and texts that are not boring and can increase the stimulus for critical thinking. By studying various references and continuous practice, students can get accustomed to practicing an important sub-skill in using language, namely language logic(van Benthem & Ter Meulen, 1996). Through necessary thinking skills, students can identify each of the most effective solutions to reduce errors in identifying the problems they encounter. The use of procedural mind-mapping methods can streamline learning in accordance with the achievements to be measured by the teacher through paragraph writing activities in class. Mind mapping as an innovative learning method can be an active stimulus in critical thinking for students so that every learning process can be meaningful.

METHODOLOGY

Classroom action research as a reflective study is employed and conducted to enhance rational stability and actions in learning, deepen understanding of the actions taken, and apply the most effective solutions in learning. Classroom action research conducted by teacher-researchers has a dual function: improving the quality of learning in the classroom (as a teacher) and sharing experiences of success in solving these problems (as a researcher) through innovative learning scientific works (Sudaryanto et al., 2020). The sources of data in this study are (1) learning Indonesian language in Indonesian general courses in the International Relations Study Program, Development Economics, Management, Marine Science, Water Resources Management, Accounting, and Animal Husbandry; (2) Indonesian language learning resources; and (3) the results of measuring students' ability in writing paragraphs. The study subjects were students who took MKU or General Course of Indonesian Language in Science and Technology and Social-Humanities majors. The qualitative method was employed to examine the results of observations, interviews, and learning tools documents, hence, the success factors are identified and the actions to be taken as learning solutions (Sudaryanto et al., 2021). The quantitative method was administered to calculate the improvement and the degree of success of the actions taken through the mind-mapping method to enhance students' paragraph writing skills. The two approaches are combined to conclude. The instruments used in this study can be summarized in the table below.

Qualitative	Observation instrument	Methods, Attention, Motivation, Student Engagement, and Classroom Activities
	Instrumental checklist of learning devices	Availability of Media, Questions, Learning Resources, Worksheets
	Interview instrument	Interview of lecturers and students
	Attendance instrument	Attendance and time spent learning
Quantitative	Paragraph writing test and performance	Students' ability to write paragraph text
	Paragraph text grading rubric	Scoring grids and indicators
	Paragraph text grading guide	Assessment guide used by lecturers in scoring

The instruments compiled were validated through expert judgment from Indonesian language lecturers, particularly in research and linguistics. Furthermore, triangulation is performed to validate data sources and methods to measure each process to obtain correct data (Duff, 2012). The data analysis technique in this action research incorporates four processes: data collection, condensation, data presentation, and concluding.

RESULTS AND DISCUSSION

This research was conducted at Universitas Jenderal Sudirman, which consists of the department of science and technology and the department of social humanities. The data subjects were 300 students according to the characteristics of the data, which are students who took the Indonesian Language Course teaching material. Student's ability to write paragraphs must be supported by fun and meaningful learning techniques. Mind-mapping is recommended as an excellent technique to absorb the information presented in the text to identify, find, and present keywords and link one keyword to another. Not just keywords, but mind-mapping is applied to connect one idea to another to obtain the main idea or big idea from a text, get specific information, and store that information. That is why students will possess an excellent ability to write data. Consequently, they have good reading skills and process references as new discourses. Mind-mapping is a

good technique for solving students' reading problems.

A. Result

1. Use of Mind-Mapping

Mind-mapping as a method of constructive writing provides an open space for writers to develop information based on their frame of mind. Moreover, writers can find new details about constructions built through reference construction. Concept development in writing is determined by several factors, encompassing (1) stimulus, (2) media, (3) references, (4) time, and (5) writing management. Each of these factors determines the quality of writing so that a writer can complete a paper comprehensively and cohesively according to a topic that has been selected from the start. A good writing framework certainly supports a good framework.

An idea always begins with developing a cohesive topic and paragraph, i.e., having a solid relationship between ideas to build a sustainable construction.

Mind maps are creative stimuli that can be optimized and enriched with colors, images, codes, and dimensions to add interest, beauty, and individuality. Mind-Mapping can assist students in finding and creating differentiation for each factor characteristic in an article to construct data efficiently.

a. Stimulus

Stimulus theory in learning is a foundation that is built behavioristic. The stimulus implemented in an article indicates the response that will be obtained; hence, learning can achieve a maximum score for the measurements taken. Stimulation in the study was performed through serial images. The procedures administered in learning include the following processes.

Students look at stimulus 1 and describe the 6 pictures presented. Students look at the picture markers to develop the main idea according to the picture presented.
Students draw a common thread between the role of picture 1, which is adjusted to the role of picture 2 to be analogous to a coherent paragraph.
Students develop ideas for role 3 pictures in accordance with the initial description in picture roles 1 and 2 so that there is a relationship between pictures.
Students develop conflict paragraphs and identify the most appropriate alternative solution to describe the content of the main topic raised.
Students conclude.

The stimulus used is a series of pictures with role characteristics with the same topic, which are (1) pictures with the same theme through attractive designs; (2) pictures have semiotic and semantic conflicts; (3) pictures evoke sensitivity for writers in extracting information and data; (4) the picture creates an open mindset for the author; (5) the picture contains the uniqueness of Indonesia, particularly triggering the creativity of ideas that exist in Indonesia; (6) has current issues; and (7) the theme consists of problems, potential, and culture. The media's controllability of a stimulus is due to the expected response design. Teachers in designing incentives have several general descriptions of the stimulus-response approach that causes physical and psychological reactions.

Picture 1 Stimulus 1

In the first stimulus, students were asked to explore Indonesia's natural potential in the form of marine ecosystems in it. These natural resources need to be dug into a coherent paragraph. The four pictures have different descriptions, which are (1) damage to marine ecosystems; (2) livelihood in the form of seaweed cultivation; (3) fish harvest received by fishermen; and (4) renewable technology that can be used to manage marine resources in Indonesia. The four pictures own unique characteristics but have a common thread related to the potential of the sea in Indonesia.

Picture 2 Stimulus 2

One of the challenges to critically thinking about the two images was that students were instructed to relate and identify the relationship between the pictures so that the resulting writing can role picture 1. Mind-map becomes an effective learning technique when applied to writing skills; in the context of this research is to write paragraphs that are given a critical thinking stimulus. However, before mind maps are generally adopted as a method of learning to write paragraphs, interviews with teachers were conducted regarding the primary considerations that must be given to increase student motivation.

b.   Critical Response

A mind map is frequently composed of a single word or text, placed in the middle, in which related ideas, terms, and concepts are

added. Mind-maps have many applications in personal, family, educational, and business situations, including note-taking, brainstorming (in which ideas are entered into maps directly around a central node, without the implicit priority that comes from hierarchies or sequential arrangements, and where grouping and organizing are reserved for later stages), summarizing, revising, and general clarification of thoughts.

Response Aspect Mind map	I	II	III
Problem solving	66	80	84
Mind-map design outline/framework	68	80	86
Relationship between lines	70	80	86
Word and visual synchronization	72	82	84
Symbolization and individual creativity	78	84	82
Simplicity of material and easy to remember	74	82	86
Motivation to work and complete tasks	74	80	86

Each response from each student has different characteristics, which consist of the ability of students to respond to stimuli, the ability to describe problems and provide critical conclusions on the topics selected and constructed by each student. Subjects are expected to be able to tell the sources of knowledge acquisition about controversial issues from the cases presented by the teacher. Intensive involvement in acquiring knowledge of these issues shows participation in accessing information related to data on the latest issues in the social environment, which are presented in pictures and formulated in mind-maps developed by students (Gottlieb, 2015; Settle, 2018). Critical reflection and problem solving occur because, through active learning methods, students can compare theories and facts in the field, study independently, be internally motivated, open to new perspectives on a phenomenon, formulate problems associated with controversial phenomena, and conduct the process of collecting data through reliable sources.
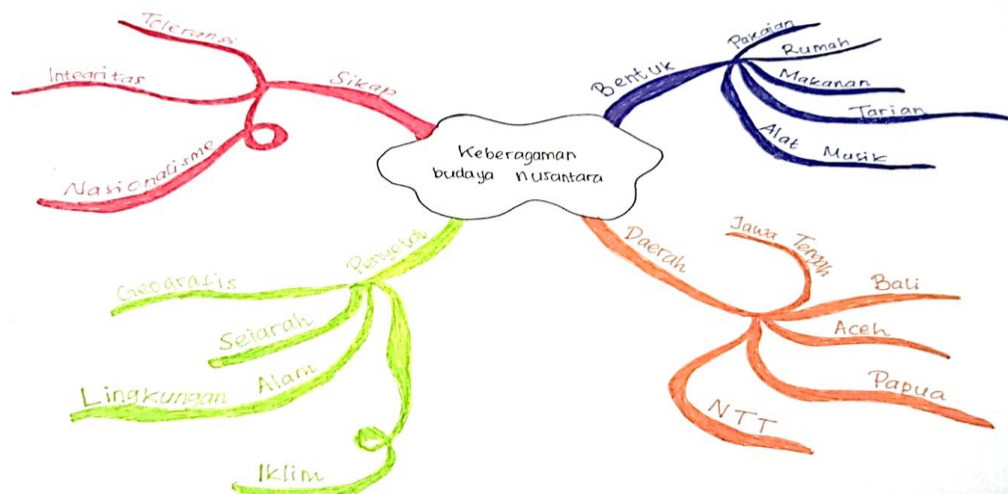
Picture 3 Mind Map of Student Work

Through the stimulus received, students can assemble a mind map through keywords obtained from observations of learning media presented by the teacher. Students can strengthen their arguments through discussion and looking for references. Adding issues/ideas

has an impact on adding branches to the planned concept map so that more studies possessed can strengthen students' arguments.

Discussion of controversial issues helps the problem-solving process or at least leads to problem-solving efforts. The problem-solving process occurs as a consequence of the exchange of opinions, arguments, evidence, and information between discussion participants (Rahimi & Katal, 2012). One student stated that discussions do not always involve an agreement on problem-solving. Still, that disagreement can also provide a stimulus for students to perform critical reflection on an ongoing basis on the essential problem-solving goals post-discussion. The discussion process leads to problem-solving in accordance with the main principles of critical thinking, which are obtaining and accessing information to objectively analyze information or an argument, develop a clear and disaggregated statement, develop rational arguments, and generate the conclusion as a solution of a problem.

2. Paragraph Writing Ability

Internal and external factors influence scientific writing ability. Based on the facts in the field, the internal aspects of the scientific writing ability of Universitas Jenderal Soedirman students are affected by students' critical thinking skills that have not run optimally, the ability to understand reading to the complete, inadequate vocabulary mastery, mechanical skills in Indonesian spelling, insufficient grammatical talent, knowledge of scientific terms, knowledge of the systematics of scientific writing, and psychological factors. External factors include socio-cultural and teaching aspects.

Students have not thoroughly understood writing as habituation even though they have received quite a number of assignments (Javed et al., 2013; Rohmadi et al., 2020). Teachers require to provide the habit of writing in a fun way, incorporate (1) instructing assignments to students to hone their abilities by analyzing, concluding, synthesizing, and evaluating reading materials for scientific writing activities; (2) providing learning methods with problem-solving, for instance through group discussions to discuss reading material, and (3) providing assignments to students to be sensitive to seeing and analyzing problems which are around them, on campus or at home, or through the media that the teacher has provided.

Writing structure and logic	The language logic of the data displays (1) The sentence has properly described an event by containing a logical meaning according to the rules of reasoning; (2) writing can explain the flow of thinking coherently; (3) the selection of ideas departs from daily activities.
Depth and breadth of study	Mastery of study materials is balanced with the number of references students use. Furthermore, the construction of writing has examined various aspects required by students, hence, there is a breadth of study in accordance with the latest references.
Selection of topic and supporting sentences	Students can (1) adjust their field of study according to the topic; (2) provide a good description of the objectives; (3) the selected reference has an inter-ideal novelty and coherence; (4) be reachable; and (5) can be developed further.
Originality and validity	The writing has a good paraphrase through unique and specific synonyms so that the paper has originality and is validated with other similar concept.
Analysis and point of view	The point of view in conveying ideas is balanced and impartial. The author tells thoughts in a procedural direction so that it does not seem subjective to the object of the idea.
Grammar and writing	The grammar in paragraphs has fulfilled three criteria, writing letters, writing words, and using punctuation marks. Therefore, writing does not create ambiguity and waste.

The material taught in writing paragraphs is spelling. This material can be presented. Discussion of language errors is associated with words, sentences, reasoning, spelling, paragraphs, and language errors in writing coherent and continuous paragraphs. Some spelling errors include not using a complete stop at the end of a sentence, not using a capital letter at the beginning of a sentence, not using a capital letter in people's names, or geographical names, using capital letters without rules, and others. Even though the majority of student errors are at that level, the scope of spelling is more extensive, covering the use of letters, writing words, punctuation marks, and writing absorption elements (Kharizmi, 2015; Settle, 2018). Each error in the use of language can be grouped as an effort to enhance the learning process. In a piece of writing, ideas should be conveyed straightforwardly and acceptably, manifested through selecting appropriate and concrete words.

B. Discussion

To identify whether learning outcomes have increased, a teacher must conduct an assessment of the teaching and learning process. This study employs assessment with various techniques, consisting of (1) finding ideas; (2) building issues; (3) visualizing ideas; (4) validating the ideas; and (5) presenting the results of the idea. Therefore, the assessment in this classroom action research does not only assess attitudes, knowledge, and skills but also efforts or actions to perceive the extent to which the goals formulated in the learning process are achieved or not (Pianta & Hamre, 2009).

With a significant increase in student learning outcomes and students achieving scores above the average, student participation in the learning process also increased, which is used as the basis for sufficient classroom action research (Krisnawati & Marahayu, 2020). The pre-cycle and cycle learning results show early signs of observing, trying, asking, reasoning, and presenting behavior. Students being able to identify and determine scientific steps, which are observing activities, questioning activities, trying activities (gathering information), reasoning activities (processing information), and finally presenting (communicating) activities, that is, being able to convey the results of observations in reasonable and appropriate language use (Fisher, 2011).

Researchers and observers generated direct observations of the learning process in this stage. This observation employed field notes. The observation aims to record all activities during the learning process in class (Pekuwali et al., n.d.). The data obtained from the observations were then analyzed for reflection (Nuryani, 2015). Reflection was performed in a discussion between the researcher and the supervising teacher. Reflection was administered to evaluate the results of actions conducted by assessing the processes, problems that arise, and everything related to the actions taken. Teachers and researchers solve issues that arise; hence, they can be used as improvements in the next cycle.

The data analysis used in this research is descriptive and quantitative in the form of the value of the achievement of writing paragraphs based on constructing a mind-map made of illustrated critical stimulus (Kemala et al., 2015; Prasetyo & Baehaqie, 2017). Quantitative data analysis was employed to process the learning outcomes of students' cognitive domains obtained from the post-test scores. Quantitative data represent the average increase in paragraph writing skills.

	Pre-cycle/ percentage	Cycle 1/ percentage	Cycle 2/ percentage
Mean cognitive score	68	78	84
	82%	84%	96%
Average attitude score	72	74	88
	70%	74%	82%
Average skill score	64	80	88

	80%	80%	90%

The quantitative assessment calculates the average and percentage of students who acquire the limit of completeness at the rate of the average value of both knowledge, attitudes, and aspects of skills. In these three aspects, students' ability to represent the achievement of the results of measurements, observations, and interviews according to the instruments provided. In accordance with the theory of Mulyasa, in terms of results, the learning process is considered to be successful if there is a positive change in behavior of all students or at least most of them (75%). Therefore, efforts to enhance learning outcomes develop through the process of (1) students being able to remember facts, principles, and concepts that they have learned over a long period; (2) students can provide examples of the concepts and principles they have learned; (3) students can apply or use the concepts, principles they have learned in other similar situations, both about learning materials and in the practice of everyday life; (4) students have a strong urge to study different subject matter and can learn on their own using the principles and concepts that have been mastered (Mulyasa, 2007).

Mastery of critical thinking skills in writing paragraphs is also reflected through a long continuous process starting from the ability of students to build references and social relationships such as cooperation with other students, communicating with others, tolerance, respecting the opinions of others, and being open to criticism from others. Other aspects observed include the ability of students to gain confidence that it is essential to have the knowledge and capability to complete learning tasks. Furthermore, students can master the teaching materials that they have studied at least 75% of what should have been achieved per the specific instructional objectives.

CONCLUSION

The success of students in participating in learning is significantly determined by their ability to write. Therefore, learning to write has a very strategic position in education and teaching. In reality, the student's ability to write paragraphs is not in accordance with the expected conditions. Most of the students find it challenging to write paragraphs. It is per the situation experienced by students taking Indonesian language courses. Through the stimulus of critical thinking, raising the latest issues that arouse critical thinking, students can obtain a new picture and leap in writing. Furthermore, this classroom action research can unveil the effectiveness of learning through mind-maps before students construct their papers. Four factors of difficulty in writing paragraphs were resolved, among others, (1) determination of ideas; (2) developing topics/issues; (3) determining scientific diction; and (4) connecting words and paragraphs, hence, they are cohesive and coherent.

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