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The Effectiveness of the *Remap STAD* Learning Model on Empowering Creative Thinking Skill

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ABSTRACT

One of the 21st century thinking skills is creative thinking skills. Students as prospective educators are required to learn and develop self-actualization in solving problems scientifically. This study aims to determine the effectiveness of *Remap STAD* learning models towards the empowerment of students' creative thinking skills. This research is a quasy experimental study and uses a *Non equivalent pretest-posttest control group design*. The population is all students of class XI IPA SMAN 4 Malang, totaling 234 students. A sample of 102 students was selected based on the equality test to determine the experimental class, positive control, and negative control. The instrument used used essay tests in accordance with indicators of creative thinking skills and the results were analyzed using the one-way anacova test. The results showed that the *Remap STAD* learning model effectively empowers students' creative thinking skills. The implication of the research conducted is to train students to think metaphorically to produce unique ideas or concepts as a form of achieving creative thinking skills. It is recommended that educators integrate the Remap STAD model in biology learning to foster student engagement and stimulate higher-order thinking processes necessary for solving contextual problems in daily life.

KEYWORDS

Remap STAD,
Creative Thingking Skills,
Biology learning

1. Introduction

The implementation of education is oriented towards improving the skills of students as a whole. This can be implemented well if there is synchronization between the central government and all educational institutions (Loberg, 2019). The process of implementing education expects students to be able to master the skills needed in the 21st century (21st century skills) (Bishop 2022), which are implemented through the field of education, so that various types of efforts must be made to improve the quality of educational services (Fleischman et al, 2021). The best way that can be done is to direct the learning process in education to develop knowledge (Piffer, 2018) and skills as a guideline that can help students empower life skills to be skilled and agile in solving problems (Insa, 2020)

21st Century Skills that have a very important role for students are creative thinking skills (Bishop, 2010; Muliawati. Et al, 2023). Creative thinking skills are a sensitive attitude to problems, gaps in knowledge, so as to identify the problems faced to find solutions, make guesses, or formulate hypotheses about the obstacles faced and retest the hypothesis to modify and retest in order to communicate the results (Politis & Houtz, 2020). A creative individual is someone who regularly solves problems, always defines new questions in a particular domain scientifically and systematically, in a unique way that can be accepted by everyone (Kim, 2022), by looking for the latest meaningful alternatives by producing various problem-solving processes (from various points of view or perspectives) (Torranmce, 2020; Nugroho. et al, 2025) in detail, constructively and focuses thinking and action by organizing and analyzing solutions or deciding on certain choices (Johnson, 2020).

Creative thinking skills are the ability of individuals to generate ideas based on divergent concepts so that they can solve the problems faced (Torranc 2023). This happens because creative thinking makes someone think logically and divergently to generate ideas or concepts (Bart, 2022). Creative thinking goes through several stages include digging Deeper Ideas, the main aspect that is considered is the ability of students to map ideas into certain categories including several cognitive characteristics (Adamson 2015), and creating convergent thinking including analyzing, synthesizing, rearranging or redefining, evaluating, seeing relationships, resolving ambiguity or organizing discontinuities (Fink, 2022). They have the ability to understand complexity, so they can combine and rearrange and carry out the evaluation process to focus ideas, sort or prioritize choices (Hysa, 2014), develop and use criteria as a reference to strengthen and improve ideas, choose ideas by considering original and practical properties and coherent (Sawyer, 2020).

Creative thinking skills are built through students' awareness in generating each component and element related to the learning material, because generating ideas includes cognitive characteristics, generally referred to as divergent thinking or creative thinking skills and metaphorical thinking (metaphorical thinking) (Treffinger et al, 2008). Ideas conveyed by students fluently refer to the quantity or ability to generate a large number of ideas (Emanuel, 2021) and respond to open-ended questions or refer to a person's thinking process fluently with full confidence that the quantity of idea generation can generate or stimulate alternative problem solving (problem solving) by considering the impact that will be caused (Lucas, Claxton, & Spencer, 2021). Openness conveys ideas, this stage is greatly influenced by the curiosity of students (0bsorne 2014) to create original products and accept new ideas and information, to focus on the desired results, and always try to see mistakes and failures as learning experiences, challenging inappropriate thinking (Lai, 2020)

Openness and courage to explore ideas encompass several personality traits related to a person's interests, experiences, attitudes, and self-confidence (Insa et al., 2022). Characteristics in this category include curiosity (Emanuel, 2022) and the ability to imagine, risk taking, tenacity, openness, emotional sensitivity, adaptability, and intuition, which involves students' personal understanding including awareness of creativity, or persistence I(Boden, 2004), and self-direction of other arguments expressed by others (Piffer, 2021). Students who have creative thinking skills can change the direction of one's thinking or change one's perspective (Emanuel et al., 2022) which involves being open to testing ideas or experiences in unexpected or diverse ways, so as to find innovative ideas and tested the process of their application (Trowsdale, McKenna, & Francis, 2019). Listening to other people's opinions, which emphasizes three main aspects, including (a) openness to new experiences (b) the ability to evaluate and (c) the ability to accept new things and conduct various experiments as references and emphasizes that creative people have a total nature or are psychologically healthy individuals, so that they always reflect on the results that have been achieved (Kim, 2021).

Preliminery research conducted by Mufida, (2022); Saleh, Sulistiyono, & Saptasari, (2022); Zubaidah (2022) explained that learning empowerment activities to improve creative thinking skills are still at a very low level. Data shows that the reading interest of high school students in Malang City only reached 39.27%. In addition, related to research conducted by, Zubaidah & Mahanal (2022), Winarni (2022), and Zubaidah (2022) showed that creative thinking skills have not been empowered effectively and are classified in a fairly low category. This will have a negative impact that causes low understanding of student concepts related to essential materials learned in schools, because the learning model used in schools is still less effective in accommodating students to empower creative thinking skills (Mahanal & Zubaidah, 2022)

The main cause of low creative thinking skills is the lack of students' ability to synthesize each concept holistically, so that students are unable to provide more specific ideas by tracing each concept that they understand as an original idea that they produce and they organize according to their respective understandings (irawan, 2024).The implementation of an appropriate learning model that can empower students' creative thinking skills is the Remap-Coople learning model (Zubaidah & Corebima, 2022). This learning model requires students to first carry out reading activities, with the

aim that they obtain initial information related to the content of the learning material (Zubaidah, 2018). The information they have obtained from reading can be explored by compiling a concept map, and the learning process uses a cooperative learning model (Zubaidah, 2021). Through the cooperative learning model, students' initial ideas or concepts can be expressed, so that a dynamic information exchange process occurs and they can find ideas that have novelty (Lapoint, 2022).

An innovative solution that can be done is to use a learning model that can access students' creative thinking skills. The learning model that can be used is Remap STAD learning. The selection of STAD as cooperative learning emphasizes that students work together with other students to convey each idea obtained by students and is formed heterogeneously by looking at the different backgrounds of students. STAD syntax consists of five stages, namely: (1) class presentation; (2) group formation; (3) implementation of quizzes or tests; (4) increasing individual scores; (5) group awards (Slavin, 2020). The difference between the research conducted and previous research is the process of compiling concept maps which involves students' ability to derive each of their initial ideas into a single unit which is displayed in the form of a complete concept map and can be interpreted as information which displays the concept as a whole.

Ideas and concepts that emerge are increasingly varied, but interrelated (Javad et al., 2011) to be used as a basis for forming a concept, so that students are more creative in finding various information to solve problems (Pellegrino & Hilton, 2012) through group discussions and gain meaningful learning experiences (Slavin, 2005), so that cooperative learning is an effective learning model that can be applied in higher education (Arends, 2008). In accordance with the explanation that has been presented, the researcher conducted research to determine the effectiveness of the Remap STAD learning model on creative thinking skills

2. Method

The research was conducted using a quasi-experimental method, which was conducted in class XI of SMAN 4 Malang. The population was 234 students consisting of 9 classes of XI IPA, and a population of 102 students divided into an experimental class (Remap STAD) of 34 students, a negative control class (classes taught using conventional learning models) include of 34 students and a conventional class of 34 students. The design used was Non Equivalent Control Design. The selection of classes was based on the results of the class equivalence test. The equivalence test used multiple choice questions related to the material that had been studied by the students previously.

Class XI IPA 3 as an experimental class that was taught using the Remap STAD learning model with reading activities and compiling concept maps carried out outside of class hours (at home) and class XI IPA 2 as a positive control class and applied the STAD learning model and class XI IPA 1 as a negative control that was taught with learning strategies that were usually applied by teachers/conventional learning models. The consistency of the implementation of the learning model according to the syntax was measured using an observation sheet, and comparing the pretest and posttest values. The dependent variable measured was creative thinking skills. The study began in August - November 2024.

The instrument used to measure students' creative thinking skills was an essay test consisting of 5 questions that had been developed based on creative thinking indicators, in this case the researcher used indicators from Treffinger et al (2008) consisting of fluency, flexibility, originality, elaboration, metaphorical thinking. The criteria for assessing creative thinking skills were assessed using a rubric developed by Treffinger et al (2008) to assess each sub-competency of each indicator. The rubric is used to measure each sub-competency described against each indicator of creative thinking skills. Data analysis used Covariance Analysis with a significance level of 5%. The use of ANACOVA analysis aims to compare the average of two groups of covariate variables that can influence the results of the experiment so that precise results are obtained to ensure that the differences between groups are caused by the independent variables. The results of the Anacova analysis that had been obtained were further tested using the Least Significance Difference (LSD) test.

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3. Results and Discussion

The results of the Anacova analysis of creative thinking skills are in Table 1 and the results of further tests using LSD are in Table 1. Based on Table 1, the calculated F obtained was 41.371 with a significance level value of 0.000 which is smaller than the significance of 0.05. This shows that the hypothesis stating that "There is an influence of learning strategies on students' creative thinking skills" is accepted, so it can be concluded that there is a significant influence on the implementation of learning models on students' creative thinking skills.

Table 1. Summary of Results of Ancova Analysis of Creative Thinking Skills

Source	*Type III Sum of Square*	*df*	*MS*	*F*	*Sig.*
Corrected Model	12587.449[a]	3	4195.816	105.395	.000
Intercept	1031.198	1	1031.198	25.903	.000
X	2262.371	1	2262371	56.829	.000
EXperiment	3293.990	2	1646.995	41.371	.000
Error	3901.423	98	39.810		
Total	512795.000	102			
Corrected Total	16488873	101			

The results of the Anacova analysis of creative thinking skills are in Table 1 and the results of further tests using LSD are in Table 2. Based on Table 1, the calculated F obtained was 41.371 with a significance level value of 0.000 which is smaller than the significance of 0.05. This shows that the hypothesis stating that "There is an influence of learning strategies on students' creative thinking skills" is accepted, so it can be concluded that there is a significant influence on the implementation of learning models on students' creative thinking skills.

Table 2. Summary of Corrected Mean Results of LSD Test

Experiment Class	*XKREA*	*YKREA*	*Difference*	*KREACor*	*LSD Notation*
Remap STAD	60.187	82.235	21.147	77.385	a
STAD	56.375	721.656	16.281	71.131	b
Conventional	50.553	57.800	7.247	60.749	c

Table 2 shows that the corrected average results for the Remap STAD learning model applied to the experimental class are 18% higher than the conventional learning strategy (negative control), and a difference of 7% with the positive control class (STAD). These figures indicate that the Remap STAD learning model has a significantly different effect compared to the other 2 classes, so it is concluded that the Remap STAD learning model is very effective in empowering creative thinking skills.

Remap STAD learning provides significantly different results on empowering creative thinking skills compared to positive control classes that are taught using the STAD learning model and negative control classes that are taught conventionally (Sharif, 2019). This was achieved because through Remap STAD, each student had the opportunity to present their ideas as unique ideas, which is the main indicator of achieving creative thinking skills, namely that students are able to present each of their ideas and thoughts as the result of metaphorical thinking (Ramakrishnan, 2018).

The results of the study obtained are in accordance with previous research conducted that Remap STAD can improve students' creative thinking skills. The results of the analysis obtained show that the Remap STAD learning model has a higher corrected average value compared to positive and conventional control classes. This shows the continuity of Remap and STAD syntax to empower creative thinking skills. The collection of initial information obtained by students in reading activities trains students to evaluate ideas from various perspectives so that the best ideas are found. The accordance fprevious research conducted by Zubaidah (2022) which explains that the main advantage

of Remap STAD is the integrated syntax to train students to think scientifically and obtain a meaningful learning environment through the implementation of STAD type cooperative learning thaaccommodates each student to convey each of their ideas (Novak and Alhberg 2004).

Through reading, students involve psycholinguistic abilities to understand essential information as a result of reading and through concept maps, students' abilities can be observed objectively in high-level thinking to combine each concept from the sub-materials studied (Antoni, 2022). The concept map method effectively focuses students' attention on the learning process and creative thinking skills, developing questioning and opinion-expressing skills so that students can be more creative in solving a problem (Chien ling et all, 2014).

Cooperative learning is one of the learning strategies to teach students in certain groups whose members usually consist of 4-6 with the formation of groups carried out by the teacher randomly with certain considerations (Purwaningsih et all, 2017). In learning, each student gets the same opportunity to express their opinions. The main goal expected is to have a unified interaction (multi-way traffic communication) until information can be easily understood by students and students are able to formulate concepts which are the result of original thinking in accordance with the theory and concept of the learning material.

The results of this study indicate that concept maps are an effective tool for training. A number of studies have also examined various aspects of Mind Mapping that make it effective for cognitive tasks The results show that the advantages of concept maps are as follows (1) easy to learn and apply, (2) encourage self-expression, (3) provide a concise overview of the hierarchy (4) easy to expand and add content. In addition, Zampetakis, Tsironis, and Moustakis (2020) showed that Mind Mapping provides for a more comprehensive understanding of idea generation.

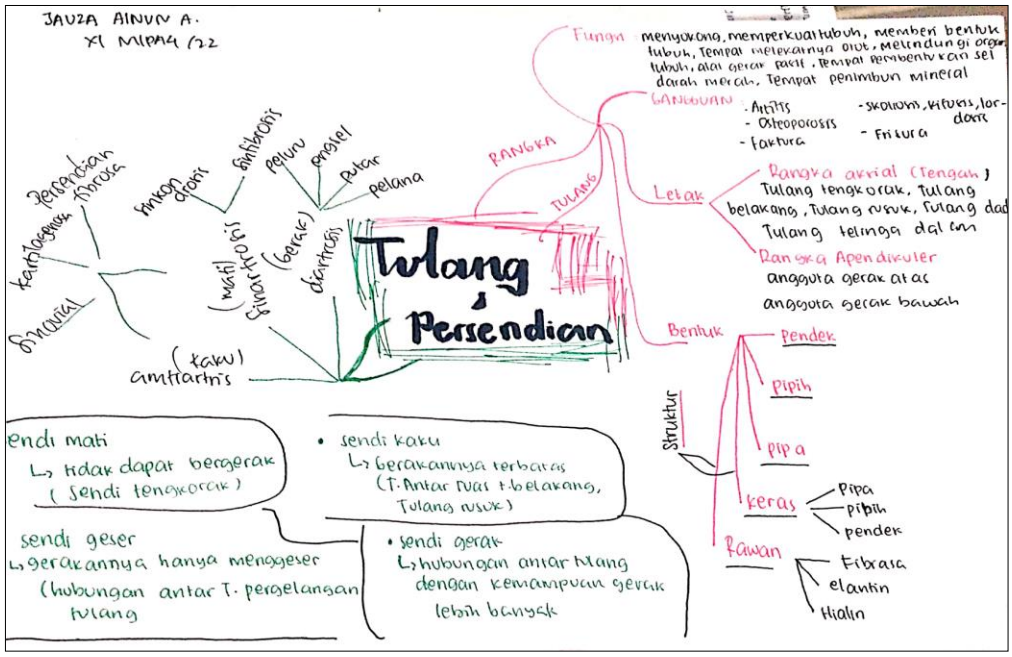

Figure 1. Concept Map by Student

Concept maps compiled by students in generating ideas that are arranged hierarchically to associate each idea they produce. Students create visual representations of their respective knowledge and also describe each concept to explore new knowledge and information that is designed in a structured manner. The mapping process is an active learning strategy to reflect on the material learned by students and how to understand the materials.

Figure 1 show students dividing parts or components to see their continuity, thus facilitating students to construct knowledge by organizing, selecting, connecting and interpreting data. The advantages of the concept maps they compile are able to describe the main concepts in their entirety

and are arranged hierarchically which are connected using arrows, and the new concepts received are associated with the concepts they previously understood, so that the concepts obtained are relatively better understood and they are able to provide explicit representations of important ideas in the learning material. The disadvantage of concept maps compiled by students is that the pattern formed resembles a mind map, so that the proposition used as a tool to express meaningful relationships between units is not visible. This will make students need more time to compile each keyword and rewrite words that are not related to memory, so that it looks more like a summary.

The preparation of concept maps can be an alternative for teachers to see the ability of students to understand concepts. Students' creative thinking skills can also be measured through the use of open and ended questions that can provide stimulus (Loberg et al., 2022) and increase students' intellectual potential and experience in the process of discovering something new . Creative thinking helps students find correlations between ideas and assess other opinions from new perspectives into a complete and generally acceptable concept.

Concept maps accustom students to think actively, and learn about individual assessment and cognitive processes to make reasonable decisions and form different ideas based on the basic theory of learning materials and ideas as a product of creative thinking . The results of concept maps compiled by students have explained the relationship between main topics combined with interrelated sub-topics and added image proportions to support the concepts they initiated. This is evidence that students have summarized information from their respective reading results.

All concepts are interpreted as the main elements of thinking and learning in a whole part, in order to have meaningful prepositions, all links between concepts have arrows to be displayed in the direction that shows the connection from one concept to another that must be read so that the arrangement is accurate and systematic. It appears that the concept maps made by students have their own differences. These differences can be observed from the way they are written, the coloring techniques and the way they are organized. The process of organizing understanding of ideas and concepts, requires them to determine the complexity of related topics (core concepts) and subtopics (which include examples and evidence related to the topic), as well as identifying the relationships and differences, or hierarchy of each subtopic.

4. Conclusion

The research conducted shows that the findings indicate that the Remap STAD model significantly enhances students' creative thinking skills, as evidenced by the ability of students to load and integrate each concept from the learning material which can be seen through concept maps compiled by students which are very varied and have uniqueness through the synchronization of each component which describes the basic understanding of students in connecting each concept. The STAD Remap Model shows a statistically significant increase in students' creative thinking skills compared to the STAD and conventional methods, as evidenced by a constant p-value of <0.05, so that in its implementation it shows a very significant value.

This enhancement is not only limited to the quantitative score improvements, but also reflected qualitatively in students' ability to generate original ideas, present them in structured ways, and establish meaningful connections between concepts, as demonstrated in the concept maps they produced. The implementation of reading activities followed by concept mapping enables students to engage actively with the learning content, stimulate metaphorical thinking, and develop critical associations between theoretical knowledge and real-world contexts. Thus, the Remap STAD model can be recommended as an innovative learning strategy that promotes higher-order thinking skills, particularly creative thinking, and supports the development of a learner-centered environment that fosters exploration, self-expression, and collaboration.

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real implications in the world of education and provide innovation in the development of learning models that are able to train 21st century skills.

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