Scaffolding Based Treffinger To Improve Students' Critical Thinking Skills

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ABSTRAK

Keterampilan berpikir kritis dapat mendorong dan mengembangkan pembelajaran yang dilalui siswa untuk mengamati, menemukan dan memecahkan masalah. Keterampilan berpikir kritis dapat ditingkatkan melalui kegiatan pembelajaran yang diberikan oleh guru. Kenyataannya dalam pembelajaran siswa masih sulit untuk meningkatkan kemampuan berpikir kritis. Siswa cenderung pasif dalam pembelajaran, seringkali siswa memaksakan kemampuan berpikir yang sama dengan guru yang mengakibatkan kurang berkembangnya kemampuan berpikir kritis. Tujuan penelitian ini yaitu untuk mengidentifikasi scaffolding berbasis Treffinger. Jenis penelitian ini yaitu meta analisis. Artikel ini mengkaji beberapa jurnal internasional dan nasional mengenai Treffinger, Scaffolding dan critical thinking. Kajian ilmiah yang termasuk dalam penelitian ini dipilih sesuai dengan kriteria. Artikel ini merupakan kajian dari beberapa peneliti mengenai scaffolding dan pengaruhnya terhadap kemampuan berpikir kritis siswa serta memberikan beberapa rekomendasi bagi guru dan peneliti mengenai scaffolding dan model pembelajaran. Hasil penelitian yaitu dalam pembelajaran, setelah siswa mendapatkan pemahaman yang cukup dan benar, scaffolding akan dikurangi atau bahkan dihilangkan sama sekali. Dengan demikian scaffolding berbasis Treffinger dapat memberikan manfaat bagi siswa dalam berpikir kritis dalam pembelajaran. Dapat disimpulkan Scaffolding dapat membantu siswa memecahkan masalah dan meningkatkan kemampuan berpikir kritis siswa. Model pembelajara Treffingerdapat membuat siswa mampu menyelesaikan masalah dengan ID dan ide yang dipilih siswa.

ABSTRACT

Critical thinking skills can encourage and develop students' learning to observe, find, and solve problems. Critical thinking skills can encourage and develop students' learning to observe, find, and solve problems. Thinking skills can be improved to improve the learning activities provided by the teacher. It is still challenging to improve critical thinking skills in student learning. Students tend to be passive in learning, often without the same thinking skills as the teacher, resulting in less development of critical thinking skills. The purpose of this study is to identify Treffinger-based scaffolding. This type of research is a meta-analysis. This article examines several international and national journals regarding Treffinger, Scaffolding, and critical thinking. The scientific studies included in this study were selected according to the criteria. This article is a study by several researchers regarding scaffolding and its effect on students' critical thinking skills and provides several recommendations for teachers and researchers regarding scaffolding and learning models. The result of the research is that scaffolding will be reduced or even eliminated in learning after students get a sufficient and correct understanding. Thus, Treffinger-based scaffolding can benefit students in critical thinking learning. Can Key Scaffolding help students solve problems and improve students' critical thinking skills. Treffinger's learning model can make students solve problems with ID and ideas chosen by students.

1. INTRODUCTION

Schools as teaching units are at the forefront in shaping student character because they are institutions that carry out the learning, coaching, and training process (Patterson & A.Niesa, 2018; Putri et al., 2020; Sa'pang & Purbojo, 2020). In school there is a learning process. Learning is the acquisition of new experiences by someone in the form of changes in behavior that are relatively permanent as a result of a process in the form of learning interactions with objects in the learning environment (Long & Aleven, 2017; Menon & Chang, 2021; Valverde-Berrocoso et al., 2020). With the existence of student learning can improve skills and knowledge and the learning process is useful for hone thinking skills of students. There are three terms related to thinking skills, which are actually quite different, namely high level thinking, complex thinking, and critical thinking (Arter et al., 2016; Sapeni & Said, 2020; Suardana et al., 2018). Higher order thinking is a cognitive operation that is needed in many thought processes that occur in short-term memory

(Gunada et al., 2021; Khan & Masood, 2015). If associated with Bloom's taxonomy, higher-order thinking includes evaluation, synthesis, and analysis. Complex thinking is a cognitive process that involves many stages or parts. Critical thinking is a type of convergent thinking, which is leading to a point (Pacheco & Herrera, 2021; Redifer et al., 2021).

The fact is that in student learning it is still difficult to improve critical thinking skills. Students tend to be passive in learning, often students force the same thinking skills as the teacher which results in less developing critical thinking skills (Irawaan, 2015; Redhana, 2019; Utomo et al., 2020). So far, when learning takes place, students still have difficulty thinking critically because the learning process is carried out conventionally (Fitriani et al., 2021; Muhammad et al., 2019; Widana et al., 2018). Students acquire knowledge dogmatically so that students are fixated on solving problems mechanically, not on understanding the material. Each student has a different level of understanding so that active learning and guidance from the teacher are needed (Anggraini et al., 2018; Putra et al., 2020; Redhana, 2019). Critical thinking skills are very important to be developed in schools because they have become one of the competency goals of teachers in many countries (Arter et al., 2016; Pierce et al., 2013; Sapeni & Said, 2020). Teachers are expected to be able to design lessons that activate students and develop critical thinking skills (Haviz et al., 2020; Rajagukguk & Simanjuntak, 2015). Teachers are expected to become dynamic facilitators who are able to explore potential critical thinking skills among students through the learning process in the classroom. Critical thinking skills can be trained and developed through learning that encourages students to explore, investigate, find and solve problems through learning activities in small groups (Arisoy & Aybek, 2021; Hairida, 2016; Suardana et al., 2018). Critical thinking skills must be trained through stimuli that can be given by a teacher.

With these problems, teachers can apply new innovations so that students are able to improve their critical thinking skills. Learning can be done individually or in groups so that students can discuss when they have difficulty analyzing and solving problems (Nuswowati et al., 2017; Purvis et al., 2020; Shishigu et al., 2018). One of the learning models that can be used is Treffinger. Treffinger's learning model is a learning model that seeks to invite students to solve problems in order to produce the most appropriate solutions. The Treffinger learning model consists of three components of Understanding Challenge (understanding challenges), Generating Ideas and Preparing for action which are detailed in six stages, namely: determining goals, digging data, formulating problems, generating ideas, developing solutions and building acceptance (Alhaddad et al., 2015; Kusuma et al., 2015). The teacher only guides students in the learning process. If there is difficulty in understanding the material and solving problems, it is necessary to help in order to train students' thinking patterns. To improve the mindset and understand faster can apply Scaffolding in learning (Pane et al., 2020; Sutiarso et al., 2018).

Scaffolding or scaffold or staging is a temporary structure used to support work crews and materials to assist in the construction, maintenance and repair of buildings, bridges and all other people made structures (Royanto, 2012; Zheng et al., 2019). Scaffolding in learning activities can be designed before learning the process through structuring and presenting materials / materials or problems / materials as outlined in study guides or worksheets that will be given to students (Molenaar et al., 2010; Royanto, 2012). Scaffolding can be implemented through teacher activities in managing learning activities so that students are actively involved in building and understanding the material / content and the problems / cases faced (Jones, 2018; Pane et al., 2020). Then Scaffolding can be implemented at the end of the learning process which is useful for providing reinforcement, verification and prediction of related material or materials. In the Metacognitive stage, teachers can provide scaffolding in the form of questions and encouragement to students (Alexander et al., 2015; Hanjani, 2018). Scaffolding can also be in the form of media (charts, props and visuals) which are useful for teachers as a student aid in the learning process of geometry. Scaffoldding is a supportive learning technique that is given in a structured manner (Maksić & Jošić, 2021; J. C.-Y. Sun & Hsu, 2019). Thus, teachers can take advantage of variations in scaffolding in learning so that students' critical thinking abilities can be explored, honed and improved. Based on the results of several relevant studies, it shows that scaffolding is needed so that students are more independent so that it makes students think critically in solving problems (Pane et al., 2020; Tondeur et al., 2019). The Treffinger learning method can improve students' critical abilities (Juanti et al., 2016; Rohmah et al., 2020). The purpose of this research is to identify the Treffinger based scaffolding. Scaffolding-based Treffinger is expected to be able to think critically of students. In general, meta-analysis research is expected to be helpful in education, especially for teachers, so that they can choose/use innovations in the learning process.

2. METHODS

This research study employs a meta-analysis method. Meta-analysis is defined as the grouping of apparently similar studies conducted on a particular topic according to specific criteria and combining the

quantitative findings pertaining to these studies (Fauzia, 2018; Jing et al., 2020). Meta-analysis is a study by analyzing data from the primary study. This article examines several international and national journals regarding Treffinger, Scaffolding and critical thinking. The scientific studies included within this research were selected in accordance with specific criteria. Those studies that did not meet the criteria outlined above were not included within the study. With every study included in this research, researchers were careful to ensure: summarize the topic of several studies; finding and collecting topics and selecting according to what is determined; perform calculations in accordance with the meta-analysis method; identify the presence or absence of heterogeneity; moderator variable analysis; conclusions and interpret the results of the meta-analysis research.

3. RESULT AND DISCUSSION

Results

Based on existing problems and previous research in learning mathematics, students' critical thinking skills are difficult to develop, one of which is because students tend to consider mathematics to be a difficult and difficult subject in solving problems, besides that many students find it difficult to be given questions that are not is a routine problem when learning takes place. The students' learning difficulties are certainly not the same because of the level of heterogeneity. So that learning can be done in groups. The learning process in each group is expected that students discuss actively in building and understanding the material / content and problems / cases that exist and helping other students who have not been able to understand the material or case gradually. For example, in a group, student X who does not understand better provides assistance by student Y who understands better. Then student Y was also given assistance by the teacher to understand higher material. If student X understands the material, it will provide more assistance to understand higher material by student Y who has received guidance from the teacher and is also given assistance by the teacher. And so on until all students reach the stage / ability they want to achieve. It is available in order to offer parallel assistance and collaboration between teachers and students that derives from active teamwork. Active team learning activities train skills through small group activities that allow them to encourage active learning in their own way. Teachers are expected to be able to innovate in learning in such a way that the learning process becomes active and effective and meaningful to achieve a goal. One way to support the learning process is by using learning methods / models in order to improve students' critical thinking skills. The learning model that can be used is the Treffinger learning model. The Treffinger learning model has a significant effect on students 'critical thinking skills and the Treffinger learning model has a significant effect on students' creative thinking skills, this is stated based on research (Sari & Putra, 2015). Treffinger's learning model describes the levels of learning ranging from basic elements to more complex functions. There is an influence of interaction and critical thinking skills during the learning process using the Treffinger learning model.

Furthermore, the method that can be used is Scaffolding. Scaffolding / providing assistance and guidance to students to focus more on the important things of a learning process. Some things that need to be considered by the teacher in providing scaffolding: Reducing student confusion and providing clear directions - the teacher anticipates problems faced by students, develops step-by-step instructions and explains what must be done to achieve goals. Explain purpose - the teacher explains to students to understand why they are doing work and why it is important. Provide students with assignments / practice questions - by providing a structured, scaffold / tracked research project for students. Students can make decisions about which pathway to choose or what things to explore all the way but they cannot work beyond the stipulations, which are assigned assignments. . Give students good reference sources of study - useful so that students do not experience confusion, frustration, and a long time. Then students can decide which sources are good to use. Reducing uncertainty / doubt - The teacher tests students' knowledge to determine possible problems and then corrects them to remove difficulties so that learning can be maximized. Giving Scaffolding to students according to the needs of each student. Scaffolding is done in a combination between students and teachers as well as students and students. Scaffolding-based Treffinger is expected to help students improve their critical thinking skills. Treffinger's learning model helps students solve problems based on selected ideas and ideas. In line with Scaffolding, which is providing assistance when students have difficulty solving problems.
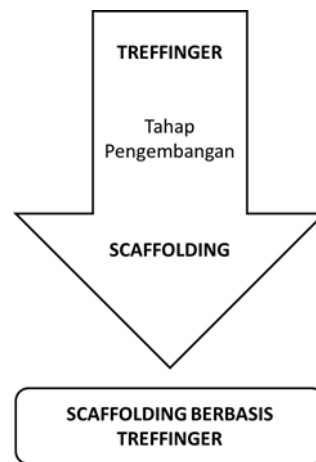
Figure 1. scaffolding based Treffinger

Discussion

　　　The studies that have been analyzed are about critical thinking skills, Treffinger and Scaffolding. Thinking skills are one of the factors for students to succeed in learning (Pierce et al., 2013; Sapeni & Said, 2020). Through thinking skills, students can train and develop their cognitive abilities (Asyari et al., 2016; Suardana et al., 2018). In learning there are students who are critical of something. Critical students can see from a different point of view. All students have critical thinking skills, but at different levels. Critical thinking skills can be improved by being trained and practicing and developing learning so that it can teach students to think critically (Jilka et al., 2019; Sudaryanti et al., 2015; Taimur & Sattar, 2018). To develop learning that can teach critical thinking, you should know indicators of critical thinking skills. Indicators of critical thinking skills are divided into five groups namely; provide simple explanations, build basic skills, conclude, make further explanations and set strategies and tactics (Kavenuke et al., 2020; McNamara et al., 2020; Taimur & Sattar, 2018). The skills in these five critical thinking groups are further detailed as follows: a). Providing simple explanations consists of the skills to focus questions, analyze arguments, ask and answer questions. b). Building basic skills consists of adjusting to sources, observing and reporting observations. c). Concluding consists of the skills to consider conclusions, generalize and evaluate. d). Making further explanations, for example interpreting terms and making definitions. e). Set strategies and tactics for example determining an action and interacting with others and communicating (Hussin et al., 2018; Polat & Aydın, 2020).

　　　Among other things, students' critical thinking skills can be trained by giving problems in the form of a variety of questions. Critical thinking skills are very important to have and develop, so that students can identify, analyze and solve problems creatively, and can think logically to produce appropriate judgments and decisions (Changwong et al., 2018; Wechsler et al., 2018). Critical thinking skills cannot develop on their own, these critical thinking skills must be trained through providing a stimulus that requires a person to think critically, involving students actively in the learning process and encouraging the self-confidence that arises in students, because they have been trained to express their arguments in class (Aufa et al., 2021; Seibert, 2020). Based on several explanations that have been written previously, it appears that increasing critical thinking skills will provide many benefits for students. Critical thinking skills will encourage self-confidence that appears in students, because they have been trained to express their arguments in class so that when interacting outside of the classroom it will be easier for them to get along with their environment (Saprudin et al., 2019; Tajvidi et al., 2014).

　　　To realize critical thinking skills, students can use Scaffolding. Scaffolding in the context of teachers is the process of providing a learning framework from teachers to students (L. Sun et al., 2021; Sutiarso et al., 2018). Scaffolding in learning is a teaching strategy that consists of teaching a new skill by inviting students to work together to complete a task that is too difficult if students complete it themselves. Teachers provide full and continuous learning assistance, in this case Scaffolding to help students build understanding of new knowledge and processes (Sari et al., 2019; Wesiak et al., 2014). After students get a sufficient and correct understanding, the scaffolding will be reduced and even completely eliminated. The form of scaffolding carried out by the teacher in helping students consists of four parts, namely: Questioning to check understanding, Prompting to facilitate students 'cognitive processes, Cueing to divert students' attention to focus on more specific information, errors or understanding partial, Explaining for students who do not have sufficient knowledge to complete the task.

Next is the Trefffinger learning model which is a revision of Creative Problem Solving. This Treffinger learning model consists of three important components, namely Understanding Challenge, Generating Ideas, and Preparing for Action, then broken down into six stages: determining goals, exploring data, formulating problems, generating ideas. , develop solutions, build acceptance. The important steps in Treffinger's learning model are 1) accommodating new ideas and seeing as many ways to solve problems as possible; using ideas that involve thinking and feeling processes; using feelings and creative thinking to solve problems (Juanti et al., 2016; Rohmah et al., 2020). The essence of this Treffinger learning model is that when students are faced with a problem, students are able to perform skills in solving problems by selecting and developing ideas and ideas. Indirectly, in solving a problem, students are required to think critically (Alhaddad et al., 2015; Kusuma et al., 2015).Then the Treffinger learning model also has a significant effect on students 'critical thinking skills and the Treffinger learning model has a significant effect on students' creative thinking abilities, this is stated based on research (Sari & Putra, 2015). Treffinger's learning model describes the levels of learning starting from the basic elements to more complex functions. Furthermore, the Treffinger learning model has an effect on students' critical thinking abilities and the ability to solve mathematical problems. When using the Treffinger learning model, there are differences using conventional learning models. This difference can be seen when students solve math problems, namely there is an influence of interaction and critical thinking skills. Based on research that has been conducted, the Treffinger learning model is a learning model that can be used by teachers to improve students' thinking abilities, both creative thinking skills and critical thinking skills and conceptual understanding. The teacher can apply the Treffinger learning model with the steps of the learning model according to the student's situation in solving problems.

4. CONCLUSION

Scaffolding can help students solve problems and improve students' critical thinking skills. Scaffolding can help students build understanding of new knowledge and processes. Meanwhile, Treffinger, there is a learning model used by the teacher so that students are able to solve problems with the IDs and ideas that students choose. So that Scaffolding based Treffinger provides positive things for improving student skills when choosing solutions to solve problems, and can improve students' critical thinking skills.

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