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Page 128-139

Analysis of Guided Inquiry Learning Devices to Improve Students' Creative Thinking Skills

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ABSTRACT

Objective: This study aims to produce a science learning tool validity using the guided inquiry model to improve the creative thinking skills of 8th-grade students. This research is descriptive and quantitative. **Method**: The research method is developed with Four-D (4D) stages. This research will validate the learning tool consisting of a syllabus, lesson plans, student worksheets, teaching materials, and student creative thinking ability test sheets. Moreover, the object of this study is the learning device's validity level. The data analysis technique was qualitative and descriptive based on assessing the three validators. **Results**: The results of the three validators concluded that the syllabus has an average score of 3.55 with valid criteria, and the lesson plan with an average score of 3.70. with valid criteria. Student worksheets have an average score of 3.49 with good standards, student teaching materials have an average score of 3.49 with very proper measures, and student teaching materials have an average score of 3.67 with valid criteria. The student's creative thinking ability test sheet has an average score of 3.64 with a correct category. Thus, the learning tools developed can be used in the learning process to improve students' creative thinking skills. **Novelty**: The use of guided inquiry learning tools is an effective tool in the learning process to improve students' creative thinking skills with the hope that this learning experience will be applied in dealing with various problems in everyday life.

INTRODUCTION

In this 21st century, education has developed rapidly, as seen from the fundamental changes covering technology, economics, industry, and other fields (Janatul, 2018). The development of human resources can be seen in students' ability to think innovatively, actively, and critically. Changes that occur can also create uncertainty about the future so that it can instantly change people's way of life. For this reason, students, as the next generation and human resources are the hope of Indonesians, need to prepare themselves for facing various life challenges in the era of the Industrial Revolution 4.0 (Putu et al., 2020). One of the critical competencies of 21st-century skills is creative thinking skills (Ghafar, 2020; Mutohhari et al., 2021; Nurlenasari et al., 2019; Peschl et al., 2021; Pujiastuti et al., 2020; Rahmawati et al., 2019). Creative thinking skills show one's creativity. Creativity is an essential aspect of the development of human resources (Kurniati, 2018).

There are many ways to train and improve students' creative thinking skills, especially in science subjects. Based on the results of previous research studies, the application of learning models is a way that can be chosen to train students' creative thinking skills. In fact, in the 2013 Curriculum, some learning standards have been established that require teachers to design, implement, and evaluate learning processes

that can empower students' higher-order thinking skills. Explicitly, creative thinking skills are also one of the standards for the skills dimension. Students are expected to have the ability to think and act effectively and creatively in abstract and concrete realms as a development of what they have learned in school independently (Bicer, 2021; Irwandi et al., 2020; Maslihah et al., 2020; North et al., 2023; Sulistiani & Yulianto, 2020).

The creative thinking ability of students in Indonesia needs to be improved. The results of the 2015 Program for International Student Assessment (PISA) study showed that Indonesia ranked 69th out of 76 countries. The Trends in International Mathematics and Science Study (TIMSS) results show that Indonesian students are ranked 36th out of 49 countries in terms of carrying out scientific procedures (Dewi et al., 2023; Musaddat et al., 2021; Parwati et al., 2019; Prayogi et al., 2020; Suastra & Arjana, 2021; Yulian & Wahyudin, 2019). Students in Indonesia have a low ability to think creatively. Thus, they must be more optimally prepared to compete in the 21st century to improve their thinking skills. The students often depend on teachers and textbooks as their learning resources. Moreover, they tend to memorize information and are forced to remember or store various information without being involved in understanding the information (Nirmala, 2022).

The low ability of students' creative thinking is due to the need for more participation of students during the learning process. When the learning process is more likely in the form of lectures delivered by educators, there is no learning device with a suitable model to make students active in the learning process (Asriani, 2021). To overcome the problems that occur in the learning process, a solution is needed by choosing a learning model to develop a learning tool that can make students active and understand the subject matter so that they can try to improve their creative thinking abilities, one of the learning model efforts that can be used appropriately, namely the guided inquiry learning model. the guided inquiry model is an alternative learning model that can be applied in learning activities (Ruqoyyah, 2020).

Based on the research done by Nunik (2021), Doyan et al. (2021), Oktavia et al. (2019), Shabila et al. (2023) stated that guided inquiry learning media which have been developed can train students' creative thinking skills. The research that has been done by Maulidiah & Novita (2021), Endela et al. (2021), Hafidhon et al. (2021), and Yulisara et al. (2022) stated that the effectiveness of the student worksheets with guided inquiry could improve students' creative thinking skills. Students' worksheet that has been developed can get the students to become more active and get involved in the learning activity. They could get involved in every stage of inquiry learning, such as fluency, flexibility, originality, and elaboration. Moreover, Raka et al. (2020) also stated that physics classes with virtual laboratory-assisted guided inquiry models could help students enhance their creative thinking skills. This is in line with the research done by Redza et al. (2016), which showed that guided inquiry learning can effectively give students a chance to be more active and get involved in learning activities. Vina et al. (2018) and Nerru et al. (2019) also stated that learning tools developed with guided inquiry that contain indicators of creative thinking can improve students' creative thinking skills. Research conducted by Syadzili et al. (2018) and Susanti et al. (2018)

summarized that applying guided inquiry learning using the topic in daily life can help to solve each problem quickly.

Previous research done by Susilawati et al. (2021) also stated that guided inquiry learning could enhance students' creative thinking skills. However, the research only covers some of the indicators. It only discussed fluency in guided inquiry learning. In that case, this research will examine all the indicators in guided inquiry learning, such as fluency, flexibility, originality, and elaboration. It is in line with the study's objective, which aims to develop the student's creative thinking skills. This research will mainly discuss the topic of Work and Energy in junior high school students. The researcher chose this material because it has the syntax of guided inquiry learning that can increase students' creative thinking skills in making a hypothesis Guritno et al. (2019). In this syntax, the student will be given a problem and asked to make a hypothesis to solve the problem. In making the hypothesis, the student's creative thinking will be enhanced. It will raise their fluency in the teaching and learning process. The following syntax is designing an experiment. The student will do an experiment based on their hypothesis. It will develop the ability of the students to develop their originality in guided inquiry learning. The next step after experimenting, the students will gain the data. In this stage, the students will learn how to gain and analyze the data. It can help the students to enhance their flexibility. The following syntax will help the student to enhance their elaboration skill. In this stage, the students will learn how to summarize from the experiment that they have done before.

RESEARCH METHOD

This research is descriptive quantitative research. This research instrument has been validated with the 4D model (Define, Design, and Development), which has been adapted from Thiagarajan et al. (1974).

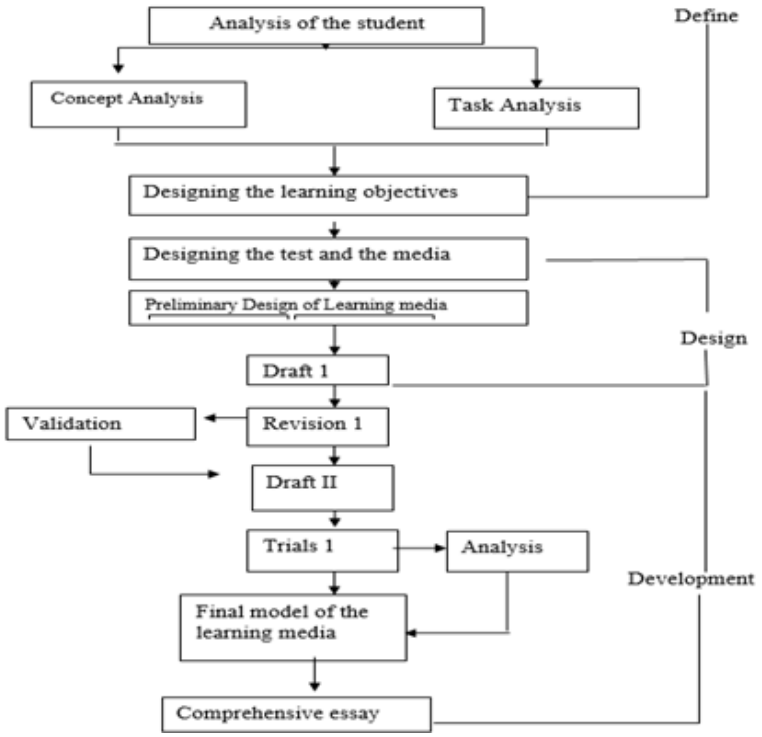

Figure 1. Learning media development diagram (adopted by Thiagarajan et al., 1974).

Instrument and Procedures

The research instrument is a measuring instrument used in research to obtain data. The research instrument refers to the objectives that must be achieved to obtain precise and accurate data. The instrument used in this study is a learning media with a guided inquiry model to improve students' creative thinking skills. Learning device validation aims to assess whether or not experts or the validator carry out several aspects before it can be implemented for the students (Naila & Sadida, 2020). The validation of the learning media consists of the syllabus, lesson plans, student worksheets, student teaching materials, and student creative thinking skills test sheets. The instrument developed is validated by three validators consisting of three lecturers. An instrument device is valid if the expert team has accepted both format contents for further improvement. The validator has the right to provide opinions and input on instruments made by researchers that refer to Likert scale assessments (Sugiyono, 2017).

Data Analysis

The analytical data obtained from the validator were analyzed qualitatively descriptively by calculating the average score of the validator's assessment. The following rules will average the validation data obtained from three validators:

$$average = \frac{v1 + v2 + v3}{3}$$

Information:

V1 : Validator score 1
V2 : Validator score 2
V3 : Validator score 3

Table 1. Criteria for categorizing assessment sheet.

Score Intervals	Category	Information
1.00 ≤ SVP ≤ 1.59	Not Valid	It cannot be used and needs more revision
1.60 ≤ SVP ≤ 2.59	Less Valid	It can be used with many revisions
2.60 ≤ SVP ≤ 3.59	Valid	It can be used with less revision
3.60 ≤ SVP ≤ 4.00	Above Average	It can be used without the revision

The average score will be converted in Table 1. Researchers followed up on the results of the validator's assessment according to suggestions and comments from the validator. Then, it will be analyzed using the percentage of agreement statistical analysis. This percentage of agreement is the match value between observers in determining a cause or event. Categories and descriptions must be divided by the number of matches and non-matches, then multiplied by 100.00 to produce a percentage. The instrument cannot be used if it has a percentage of agreement of 75.00%.

$$R = [1-\frac{A-B}{A+B}] \times 100\%$$

Information :

R = percentage of agreement
A = frequency of combability between the experts
B = frequency of incompatibility between the experts

RESULTS AND DISCUSSION

Results

This research produced a learning tool with a guided inquiry model to improve students' creative thinking skills. Learning tools that have been developed consist of the syllabus, lesson plans, worksheets, student teaching materials, and creative thinking skills test sheets. In the early stages, an analysis of the needs of students was carried out according to the conditions found, preparing the initial design of the learning device, which the supervisor reviewed as an initial draft of the research—then checked and validated by three validators to get suggestions and input so that the learning tools developed can produce good categories. The validity of learning tools is assessed on a scale from 1 to 4. The validator for the assessment is a checklist (√) in the score column using a Likert scale in the range of 1-4. The scoring system will be four is good, three is good enough, two is not good, and one is not good. The purpose of validating learning tools is to assess whether the aspects that will be carried out are good before being used in the teaching and learning process, then revising the learning material that has been implemented according to suggestions and input from the validator (Naila & Sadida, 2020). The validation results from the validator are then processed, and the following analysis is obtained likely in Table 2.

Table 2. 3 expert lecturers did the results of the validations.

No	Aspect	Score	Information	Reliability Score	Information
1	Syllabus	88.69	Very valid	89.79	Reliable
2	Lesson Plan	92.50	Very valid	90.00	Reliable
3	Student Worksheet	87.22	Very valid	88.57	Reliable
4	Learning material	91.67	Very valid	93.65	Reliable
5	Creative thinking instrument	91.11	Very valid	96.19	Reliable

Discussion

The syllabus is an important learning tool to ensure a smooth learning process. A good syllabus must contain complete and transparent information regarding learning objectives, learning materials, learning methods, assessments, and the time required to achieve these learning objectives. According to Nuzula et al. (2023), the validation test for developing learning tools can be assessed through a validation sheet filled in by the validator. The assessment carried out by the validator on the syllabus that has been developed includes identity, learning activities, time, teaching tools and materials, as well as assessment. From Table 2, the syllabus that has been validated has an average score of 88.69, with a very valid category. Three expert lecturers have validated the syllabus and the assessment. (1) The syllabus components have a total average score of 3.83 in a very valid category; (2) The designing process has a total score of 3.48 in a very valid category. (3) Development of subject matter with a total score of 3.55, a very valid category. The lowest score is the designing process, with an average score of 3.48. Based on the suggestion from the examiner, the researcher added the inquiry stage to a learning activity. The stages added to the activity are based on the new reference 2022. The learning activity is adjusted with the objectives of the learning activity. Hence, the guided inquiry stages must be added to every learning activity. Implementing guided inquiry learning to enhance creative thinking skills is in line with the research done by

Kintan (2021). She stated in her research that students' creative thinking skills could be increased because of the stages in guided inquiry learning, such as making hypotheses, designing and conducting the experiments, and collecting, analyzing, formulating, and summarizing the data. It is also stated by Firdaus (2018) showed that the learning media developed with guided inquiry learning can help the student to think creatively in the class.

In the learning process at school, the learning implementation plan has a vital role as a tool. This study's learning implementation plan was adapted according to the 2013 curriculum format and the guided inquiry model. The learning implementation plan was developed for two meetings focusing on Business and Energy for Junior High School students. The Learning Implementation Plan is prepared by considering the characteristics of students, as well as accommodating the needs, learning styles, and level of understanding of students in following class lessons (Algiani et al., 2023). Table 2 shows that the lesson plan is in the very valid category, with a validation score of 92.50. The validation of the lesson plan includes some aspects, such as (1) subject identity with a total score of 3.67 in a very valid category, (2) Competence with a total score of 3.75 with a very valid category, (3) designing the learning objective with a total score of 3,83 in a very valid category. (4) selection of teaching materials with a total score of 3.55 in a very valid category, (5) the selection of the learning sources with a total score of 3,55 in a very valid category, (6) Learning scenario with a total score of 3.85 with a very valid category, (7) assessment with total score 3,60 in the very valid category. The lecturer suggested adding an appreciation activity. Furthermore, the lecturer also suggests clarifying the lesson plan's motivation. The lecturer suggests giving some motivation so the students can be more creative in giving their opinions. It is supported by the research done by Susilawati et al. (2022), which states that lesson plans with motivation at the beginning of the lesson can help the student think creatively.

The student worksheet is a learning instrument that guides students in understanding and studying learning content. Utilizing student worksheets in the teaching and learning process can improve the skills and competence of students in understanding and mastering subject matter. Based on Table 2, the validation score of the student worksheet is 87.22 in very valid category. The lecturer also gives some suggestions to match the motivation with the picture in the phenomenon of the student worksheet. The particular image in the student worksheet can help students develop their creative thinking skills. It is in line with the research done by Rahayu & Imran (2017). Ni'mah et al. (2018) showed that the pictures in student worksheets can help students think clearly. It can help the student form a hypothesis about the given phenomena. The research done by Hilmi et al. (2021) also stated that the worksheet, developed with the guided inquiry method, can help student solve problems in their daily life. Student worksheets are designed in an attractive way to increase student creativity in completing experiments related to the material to be studied. Fida (2023) states that attractively designed student worksheets can encourage students to think creatively and develop innovative solutions to existing problems. Learners can participate in practical projects that require facing challenges and finding solutions creatively. This helps increase students' thinking power and creativity and helps them develop problem-solving skills that are essential in the real world (Ali, 2019; Apriyani et al., 2019; Gunawan et al., 2019; Szabo et al., 2020). These are the examples of the pictures shown in the student worksheet, as shown in Figure 2.

Figure 2. Student worksheets and initial steps in experimental activities

Based on Table 2, the teaching materials have a validation score in the average of 91.67%. There are some aspects in this teaching material, such as (1) content feasibility has a total score of 3.60 with a very valid category, (2) linguistics has a total score of 3.41 with a very valid category, (3) the presentation has a total score of 3.55 with a very valid category, (4) graphics with a total score of 3.33 with a very valid category. The suggestion from the lecturers is to add the basic competence and the learning objective at the beginning of the teaching materials. In that case, it can help the teacher or the students know the learning goals. It aligns with M Nizar et al. (2018) research, which stated that knowing the learning objective can maximize the teaching and learning process. According to research conducted by Rossanita et al. (2023), it is known that the teaching materials developed need to include the phases of guided inquiry, with additional indicators of creative thinking such as fluency, flexibility, originality, and elaboration). In assessing fluency, students must smoothly produce the right ideas about work and energy material (Algiani et al., 2023). Applying an interactive learning approach and educational technology was identified as an essential factor that positively impacts creating an engaging, inspiring learning environment and encouraging students to become competitive, creative thinkers.

Based on Table 2, the validation score of the assessment test is 91,11 in the very valid category. There are some aspects in the assessment test, such as (1) material with a total score of 3.27 in a very valid category, (2) Construction has a total score of 4 in a very valid category, (3) Language with a total score of 3.80 in a very valid category. There are some suggestions in material aspects, such as adding the newest reference, the critical answer, and the assessment rubric. Furthermore, sorting out the knowledge based on the Bloom taxonomy can help the student enhance their creative thinking skill. This is in line with the research done by Sri et al. (2019), which stated that an assessment test with the arrangement and the fundamental answer of the test can ease the research.

CONCLUSION

Fundamental Finding: Based on the results of data analysis and discussion of the validation of learning tools, the learning tools developed as a whole are stated to be very valid. **Implication:** The developed learning tools can be applied in junior high schools to improve students' creative thinking skills. **Limitation:** The guided inquiry learning tools developed are improved following input and suggestions from the validator.

Future Research: For further researchers to develop a learning tool, consider the type of inquiry used in training students' creative thinking skills.

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