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Development of Local Wisdom-Based Discovery Learning Models to Improve Critical Thinking Skills on Theme Growth and Development of Life

Fadilah, Santi[1*], Su'ad[2] & Murtono[3]

[1]Master of Basic Education Program, Faculty of Teacher Training and Education, Universitas Muria Kudus, 59327 Central Java, Indonesia

*Corresponding author email: santi2657@gmail.com

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Abstract: Students and teachers need the development of learning methods on the theme of growth and development of living things to improve students' critical thinking skills the theme of growth and development of living things. The development of discovery learning models based on local wisdom is one of the appropriate learning methods, 2) Development of teaching materials based on local wisdom to improve critical thinking skills on the theme of growth and development of living creatures for class III in Elementary Schools starts from module design, then is validated by media experts, material experts and practitioners. At the final stage, the validation results are revised, and 3) The feasibility of developing teaching materials based on local wisdom for the theme of growth and development of living things class III in elementary schools based on the average value of critical thinking skills after using teaching materials for experimental class 1 of 88%, the average value of critical thinking skills after using materials experimental class teaching 2 is 77%, and the average value of critical thinking ability of control class students is 63%, this shows that there is a considerable difference between the control class that does not use local wisdom-based teaching materials and the experimental class that uses wisdom-based teaching materials.

Keywords: Development, local wisdom, discovery learning, critical thinking skill, growth of life

1. Introduction

Law Number 20 of 2003 concerning the National Education System in Khunaifi & Matlani (2019) states that the curriculum is a set of plans and arrangements regarding the objectives, content, and learning materials, as well as the methods used as guidelines for the implementation of learning activities to achieve specific educational goals. While specifically, in Chapter X Article 36, it is stated that curriculum development is carried out regarding national education standards to realize national education goals; curriculum at all levels and types of education is developed with the principle of diversification according to the education unit, regional potential, and students. The curriculum is structured according to the level of education within the framework of the Unitary State of the Republic of Indonesia.

When the National Education System Law demands in curriculum development are linked to local interests, education should respond to regional needs. This is what is then called education with the face of local wisdom. In other words, because each region has its characteristics, the learning practice must then be adapted to the region's needs (Suprapto, Prahani, & Cheng, 2021). For example, the Demak Regency in the 1900s was famous for its sweet star fruit as a superior fruit. Until now, the taste and popularity are still the same, and it's just that now there is one more fruit, namely guava.

Based on data from the Demak Regency Agriculture Service, there are not many archives that record detailed data on the existence of star fruit in Demak in the past. However, several records view that the peak of the Demak starfruit was in the 1980s. People in Demak grow starfruit around their homes, yards and other lands. Betokan is one of the villages in Demak, which is the centre of the Demak starfruit plant.

In the context of this research, researchers will focus more on the local cultural wisdom of the Demak district, namely star fruit. The consideration is that education should participate in raising and introducing the natural wealth of the Demak district and local cultural wisdom to students, combined with discovery learning models to improve students' critical thinking skills, especially on the theme of growth and development of living things.

**Corresponding author: santi2657@gmail.com*

2. Literature Review

The application of the discovery learning model is that the teacher acts as a mentor by providing opportunities for students to learn actively, as the teacher's opinion must be able to guide and direct student learning activities following the objectives (Saptarini, Sukirman, & Santoso, 2022). Conditions like this want to change teaching and learning activities that are teacher oriented to become student-oriented. In Bruner's opinion, the exciting thing is that teachers should give their students opportunities to become problem solvers, scientists, historians, or thinkers. Although in the discovery learning model, teaching materials are not presented in the final form, students must carry out various activities to collect information, compare, categorize, analyze, integrate, reorganize the material and make conclusions so that children can think critically.

Critical thinking ability is a person's intellectual ability to understand problems. They can analyze these problems and decide on appropriate solutions to them (Krupat et al., 2011). Critical thinking can also be defined as the ability to think logically and reflectively, which focuses on how to make decisions that can be trusted (Alsaleh, 2020). According to Cottrell (2017), there are several indicators to assess critical thinking skills, such as 1) interpretation is the ability to understand and explain the meaning of information, 2) analysis is the ability to identify the relationship of information used to express thoughts or opinions, 3) evaluation is the ability to use appropriate strategies to solve problems, and 4) Inference is the ability to identify and obtain the elements needed to make reasonable conclusions.

Students' low critical thinking ability can be caused because the strategies teachers apply in learning are not oriented to empowering higher-order thinking and only emphasize understanding concepts. Another reason is suspected is that, in general, schools still use conventional learning. Conventional learning, referred to in this case, is teacher-centred learning which is carried out with a combination of lecture methods, question and answer, and assignments. In conventional learning, the teacher only explains the theme, then gives examples of questions and provides practice questions whose solutions are similar to the sample questions and then gives homework at the end of the lesson so that students are only trained to solve routine questions, their abilities are not honed, especially critical thinking skills.

In responding to these problems, the teacher must choose a suitable learning model to improve critical thinking skills. Among them, the learning model that can enhance critical thinking skills in science learning is the discovery learning model. Discovery learning is a learning model with a character because it always starts and is centred on a problem. Students can learn by identifying what they know and don't know and must learn to solve a problem to find a pattern or concept of understanding (Fuad et al., 2017). In the learning process, students are trained to solve the issues and find them by interpreting the ideas they have using critical thinking skills.

Subali et al. (2019) argues that science subjects must be given to all students from elementary school to equip students to develop rational thoughts that can change both cognitive and affective. The research results by Kristin & Rahayu (2016) show that one of the teacher's decisions to be considered regarding learning is the selection of the learning model used. Until now, applied mathematics learning tends to be teacher-centred in conveying the theme, which resulted in students' lack of involvement during the learning process; only a few students seemed active, and some were passive.

Therefore, research will be carried out using a discovery learning model to improve students' critical thinking skills. Amin et al. (2021) found that the discovery learning model significantly affected students' critical thinking skills. In line with Fahmi et al. (2019), which suggests that the discovery learning model significantly affects students' critical thinking skills. Therefore, researchers are interested in researching discovery learning on critical thinking in terms of students.

3. Methodology

This type of research is development research that leads to educational products. This research uses the Research and Development (R&D) method, or in Indonesian, it is called the research and development method. According to Sugiyono (2015), development research is a method used to produce specific products and test the effectiveness of these products.

The stages of Research and Development research according to Sugiyono (2017) include potential problems, data collection, product design, design validation, design revision, product trial and product revision.

The instruments used in this study include instruments to assess product quality, including aspects of validity, practicality and effectiveness. Before the instrument is used to evaluate the validity, usefulness and effectiveness of the product, it is necessary to validate the instrument to be used by asking for expert judgment to provide an assessment and provide suggestions for improvement directly on the instrument text.

4. Results and Discussion

4.1 The Need for Discovery Learning Models Based on Local Wisdom with The Theme of Growth of Living Things

Using teaching materials that have not optimized student participation is one of the causes of not maximizing critical thinking skills. In addition, it makes students feel bored following the learning process, so the learning process becomes ineffective and inefficient (Prastowo, 2017).

Based on the analysis, it is known that the questionnaire results on student needs are obtained on average students learn by rote while the learning strategies teachers use are less attractive. The development of living things is not an example in the city of Demak, so the cultural knowledge of local wisdom is deficient. Based on the results of observations carried out in general, students participated in learning activities quite well. However, learning that uses the lecture method makes students less active, and their critical thinking skills are also deficient. The teacher's efforts are to provide questions from the learning modules and appoint students to work on the questions to improve students critical thinking skills.

The researcher saw that many students who were initially less active became active when the teacher gave the assignment. Based on the results of these observations, students must have a motivator to be involved in learning and grow their critical thinking skills. For that, we need a learning model that has an innovative approach to empower students' critical thinking, can foster student learning enthusiasm independently and with teachers and can increase local cultural insight.

The results of the analysis above can be concluded that many students have low critical thinking skills. Furthermore, the learning materials used in the teaching and learning process are also less effective in achieving learning objectives so that they require learning models such as discovery learning models that are deliberately explicitly designed by combining examples of the development and growth of living things around Demak by utilizing available resources the environment can be utilized.

The results of the teacher need questionnaire stated that teachers had not used special methods in learning, did not develop books or teaching materials or learning models used but bought on the market or guidebooks from the National Education Office. So then, the teacher has never used a learning model and needs a more innovative learning model that involves the active participation of students so that students critical thinking power can be awakened.

Likewise, the results of observations made that teachers carry out learning with conventional models and even the handbooks used are also old and less attractive. Moreover, learning is carried out only as a formality to complete the educational process, so student understanding is not optimal. Learning seems tedious because it is only focused on the teacher as the centre of learning. The students sit and listen, while the manual from the National Education Office does not offer any examples from the local wisdom of Demak.

Therefore, we need a learning method that is applied so that science learning can be more meaningful and make students develop thinking skills. The learning model that is creative, innovative, and uses science learning is learning based on discovery or Discovery Learning. Discovery Learning will be able to stimulate students to analyze a problem encountered in the learning process.

When there is a problem, the ability to solve a problem is an indication of thinking maturity. Through the Discovery Learning method, which involves maximally the ability to think in discovering concepts for themselves, students can better understand and not readily believe in what has not been proven true. Not easy to believe in what has not been proven true is one of the characteristics of someone who thinks critically (Rahman, 2017).

The discovery learning model can help students eliminate doubts about a concept because it leads to a final and definite truth. Martaida, Bukit, & Ginting's research (2021) results show that applying the Discovery Learning model can improve students' critical thinking skills. Chusni, Saputro, & Rahardjo 's research (2019) shows that improving students' critical thinking skills are more significant using the Discovery Learning method than other learning methods.

4.2 Product Development Theme of Growth of Living Things Based on Demak Local Wisdom

At this process stage, the researcher started by integrating thematic learning materials in discovery-based modules. At this stage, the researcher compiles the components of teaching materials adapted to the essential competencies of learning materials. Next, the researchers make cover designs, text designs and visual designs. In the content component, the concept of material is made only to focus on the growth and development of living things and the sub-themes of the characteristics of living things. More specifically, later, he will use examples of material based on local Demak art, namely, star fruit and owls, as the characteristics of Demak. The learning syntax of the module is still adapted to the discovery model. This follows Batubara's research (2019) about efforts to increase students' critical thinking power through the application of discovery learning models.

The cover of the discovery learning module chose illustrations of star fruit and owl symbols from Demak because star fruit is a characteristic fruit of Demak, which in national literature has been recognized as a local culture of Demak. Then the farmers used the owls, despite their new presence in Tlogoweru Village, to exterminate rats in the rice fields.

However, the cultivation of the type owl (Tyto Alba) has been recognized by the Department of Agriculture as an innovation in eradicating rice pests. The cover with a combination of white, black and red is part of an effort to attract students' attention so that the first impression of the visualization of the cover appears more attractive.

The discovery learning model is arranged in a physical form of a module with a more attractive physical appearance and full colour. For the product size, the module developed is 14 x 20 cm to be practical, easy to carry, and easy to use. For the font size and type used in the development product, namely the module title, choose a font size of 28 points with the Arial typeface. The text size for the subtitles on teaching materials is 14 points. The text size for the content of teaching materials is 14 points. In the text of this module, an image of star fruit is presented, so star fruit is a representative example of plant growth and development. At the same time, an owl represents animal growth and development. So the two examples are star fruit and owls, as examples of Demak's local wisdom combined with a discovery learning approach. Then on the page number below, there is also a tiny owl.

The next stage is that the researcher validates the learning module with a discovery learning approach and Demak's local wisdom to the first expert lecturer on Tuesday, August 31, 2021, to Mr Rismiyanto. Aspects assessed from the resulting product include content feasibility, presentation feasibility, and language feasibility. The expert lecturer concluded that the media was feasible to use without revision. However, expert lecturers gave suggestions so that the media produced was even better, including 1) the examples developed to refer to the local wisdom of Demak, star fruit, and other local wisdom. Finally, the researchers added a Tyto Alba owl. It is a type of owl bred in the city of Demak as a rat exterminator by farmers, 2) the language used is more straightforward and transparent. It does not cause multiple interpretations, making it easier for children to understand the intended reading, 3) the practice questions developed are more observational, analyzing an experiment as a characteristic of discovery learning so students' critical thinking power will work optimally.

The researcher validated the learning module with a discovery learning approach and Demak's local wisdom to the second expert lecturer on Tuesday, September 13, 2021, to Mrs Fina Fakhriyah. Aspects assessed from the resulting product include content feasibility, presentation feasibility, and language feasibility. The expert lecturer concluded that the media was feasible to use without revision. However, expert lecturers provide suggestions so that the media produced is even better, including 1) the title is added with the conjunction "and" so that the title changes (Growth and Development of Living Things, 2) the colour design of the module was developed to suit better the needs of children, where children are more inclined to more innovative colours with full-colour combinations, and 3) the cover design must be changed because there is an addition to the sample material that is relevant to the local wisdom of Demak. 4) The layout of the writing so that in chapter III, the growth and development of living things are moved to chapter II.

The researcher validated the third-grade teacher, Mrs Siti Maemunah, so that the teacher could assess the developed module. Implementation of product validation on Tuesday, September 15, 2021. Aspects considered from the resulting product include content feasibility, presentation feasibility, and language feasibility. The third-grade teacher, as a practitioner, concluded that the media was feasible to use without revision. However, the third-grade teacher gave suggestions so that the media produced was even better, including 1) the modules developed were simpler. In addition, considering that the third graders are still in a small category, the language and examples presented are more straightforward to understand, and 2) the colour design on the cover was developed to suit better the needs of children, where children are more inclined to colours that attract attention and foster enthusiasm for reading in the book.

At the product revision stage, researchers get some suggestions or input on the product development that researchers produce. The researchers used these suggestions to revise the resulting product. Thus, the resulting product can have better quality. The product revision is a follow-up to the validation test. For example, before the revision, the cover only presented a picture of star fruit. Still, after a revision by an expert validator, the image was added with an owl of the Tyto Alba species as an owl cultivated by farmers in Demak.

At first, the sub-chapter on growth and development of living things was in chapter three, then based on expert lecturer revisions, it was moved to chapter two. In contrast, in the table of contents before the revision, there was only a chapter on star fruit at the revision stage, plus the owl sub-chapter. As for the text design, initially, the image variation was only a star fruit image as an example after revision, it changed to star fruit and owl.

Changes also occurred in the number of pages where initially there were only 35 copies. Still, after the revision, the number of pages became 46, and there was also a change to a more full-colour, so that it was more visually attractive and fostered student interest in learning as well as the characteristics of the assignments on the subject. In addition, the end of each chapter, which requires students to observe and analyze the growth and development of living things, increases students' critical thinking power and ability.

The validation and revision stages have been carried out following the preparation of modules that refer to the syllabus, lesson plans, and question grids. It is known that the overall assessment scores obtained are in the good and very good categories and are suitable for use. This learning module is feasible based on validation by a team of experts. The feasibility of the characteristics of this module cannot be separated from the experts' guidance, input and advice.

4.3 The Effectiveness of Discovery Learning Model Based on Local Wisdom to Improve Critical Thinking Ability Themes of Growth of Living Things Class III in Elementary Schools

Improving students' critical thinking skills to develop a local wisdom-based discovery learning model will be sought through two types of improvements, namely 1) increasing students' critical thinking skills on each indicator and 2) increasing students' individual critical thinking skills. Based on the calculation of scores from 5 indicators of students' critical thinking skills at Public Elementary School No. 2 Kalianyar, the indicator providing arguments obtains an achievement score of 80 or 86%, including very good criteria. The indicator-making deduction gets an achievement score of 81 or 87%, including very good criteria. On the indicator doing induction, the achievement score of 89 or 96% is included in the very good criteria, the indicator evaluating gets an achievement score of 84 or 90% is included in the criteria very good, the indicator for making decisions and determining actions gets an achievement score of 73 or 78% including good criteria. Based on this, it can be concluded that all indicators are included in the very good category.

The critical thinking ability of students at Public Elementary School No. 1 Kalianyar, on each indicator shows that the indicator provides an argument with an achievement score of 65 or 77% including good criteria. The indicator-making deduction gets an achievement score of 63 or 75%, including good criteria. On the indicator doing induction, the achievement score of 68 or 81% is included in very good criteria, the indicator evaluating gets an achievement score of 66 or 79%, including good criteria, the indicator of making decisions and determining actions gets an achievement score of 63 or 75% including good criteria. Based on this, it can be concluded that all indicators are included in the good category.

This shows that the purpose of the learning media developed in this study was achieved because it could improve students' communication skills. This goal follows the opinion of Muhali et al. (2021), which states that applying the Discovery Learning model can improve students' critical thinking skills.

The results of the achievement of critical thinking skills of individual students at Public Elementary School No. 2 Kalianyar, of 31 students, three students (9.7%) are included in the good criteria, and 28 students (90.3%) are included in the very good criteria. No students (0%) fall into the requirements of sufficient, less and less. The results of the achievement of critical thinking skills of individual students in Public Elementary School No. 1 Kalianyar, out of 28 students, 14 students (50%) are included in the good criteria, and 14 students (50%) are included in the very good criteria. No students (0%) are included in the criteria for enough, less.

The success of the Discovery Learning model based on local wisdom in improving students' critical thinking skills is in line with the opinion of Kurniawati, Oktradiksa, & Shalikhah (2021) that the discovery learning model is a series of learning activities that maximally involve all students' abilities to search and investigate systematically, critically, logically, analysis so that they can formulate their findings. Furthermore, knowledge gained by discovery learning shows several advantages, namely, it lasts longer or is easier to remember when compared to knowledge learned in other ways.

Next, to determine the effectiveness of the local wisdom-based Discovery Learning model in improving the critical thinking skills of third-grade students on the theme of growth and development of living things through the paired sample test analysis. Based on the Pair 1 output in the paired samples test, the Sig value is obtained. (2-tailed) obtained 0.000 < 0.05, or t-count 14.016 > t-table 2.05183, it can be concluded that there is a difference in the average critical thinking ability of students before and after the experimental class with the discovery learning model based on local wisdom on the ability to think critically on the theme of growth and development of living things in class III of Public Elementary School No. 1 Kalianyar, Wonosalam Demak.

Based on the Pair 2 output in the paired samples test, the Sig value is obtained. (2-tailed) obtained 0.000 <0.05 or t-count 18.785 > t-table 2.04227, it can be concluded that there is a difference in the average critical thinking ability of students before and after the experimental class with discovery learning models based on local wisdom on critical thinking skills the theme of growth and development of living things for class III Public Elementary School No. 2 Kalianyar, Wonosalam Demak.

Based on the paired samples test results, it is known that the experimental class using the discovery learning model based on local wisdom improves critical thinking skills on the theme of growth and development of living things better than the control class using conventional learning models.

Then to find out the difference in the level of critical thinking ability after the discovery learning model based on local wisdom using the gain index calculation is known that the gain index increases the critical thinking ability of control class students at Public Elementary School Bunderan, which is included in the high category as many as 0 (0%) students, which including the category of increasing the critical thinking ability of moderate students as many as 0 (0%) students and those belonging to the category of experiencing an increase in the critical thinking ability of low students as many as 29 (100%) students.

The gain index for increasing critical thinking skills of experimental class students using discovery learning models based on local wisdom at Public Elementary School No. 1 Kalianyar, which is included in the high category, is 5 (17.9%) students, which provides for the category of increasing critical thinking skills of moderate students as many

as 15 (53,6%) students and those who were included in the category experienced an increase in the critical thinking ability of low students as many as 8 (28.5%) students.

The results of the gain index calculation can be concluded that the increase in students' critical thinking skills on the theme of growth and development of living creatures in class III using discovery learning methods based on local wisdom is higher in Public Elementary School No. 2 Kalianyar, compared to Public Elementary School No. 1 Kalianyar, Wonosalam Demak. However, at Public Elementary School No. 1 Kalianyar, Wonosalam Demak, the increase in students' critical thinking skills is higher than at Public Elementary School Bunderan, which uses conventional methods.

The use of learning models in thematic learning must use a suitable learning model, the right learning model to use, one of which is the discovery learning model developed with local wisdom. This discovery learning model is a learning model that develops active student learning, in which students search for and find their learning concepts being studied so that the learning outcomes obtained will be easily captured in students' memories, and learning becomes more meaningful and will not be easily forgotten by students (Setianingrum & Wardani, 2018).

The elementary school level currently uses the 2013 curriculum, which applies thematic learning. Thematic learning is learning that combines several learning materials from several lesson content into a theme. According to Nurlaela et al. (2018) integrated thematic learning is a form of learning that emphasizes a theme with an integrated pattern of organizing material.

The ability to think critically is very important for students because students in learning activities and daily life need critical thinking skills. In thematic learning, learning is student-centred. That is, students in integrated thematic learning require students who have relatively good abilities in critical thinking. As Pursitasari, Nuryanti, & Rede (2015) state, students in integrated thematic learning need students with critical thinking skills in the relatively good category. Integrated thematic learning emphasizes students' ability to parse/analyze, connect/associate, find/explorative, and elaborative.

5. Conclusion

Based on the data analysis results on the needs of students and teachers to improve student's critical thinking skills, it is necessary to develop learning methods on the theme of growth and development of living things. The development of discovery learning models based on local wisdom is one of the learning methods according to the needs and problems teachers and students face to improve students' critical thinking skills on the theme of growth and development of living things.

Developing discovery learning models based on local wisdom to improve critical thinking skills on the theme of growth and development of class III living things in elementary schools starts from the module design. The module design was then tested for validation by media expert validation, material expert validation and practitioner expert validation. Then the validation results were revised at the final stage of the discovery learning module based on local wisdom.

The feasibility of developing a discovery learning model based on local wisdom to improve critical thinking skills on the theme of growth and development of living creatures in class III in elementary schools based on the average value of critical thinking skills after using teaching materials for experimental class 1 of 88%, the average value of thinking skills critical thinking skills after using experimental class 2 teaching materials was 77% and the average value of critical thinking abilities of control class students was 63%, this shows that there is a considerable difference between the control class that does not use local wisdom-based teaching materials and the experimental class that uses teaching materials based on local wisdom.

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