JPPIPA 9(10) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

The Development of an Integrated Modified Free Inquiry (MFI) Biology Textbook: Preliminary Study

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Received: August 30, 2023
Revised: October 19, 2023
Accepted: October 25, 2023
Published: October 31, 2023

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DOI: 10.29303/jppipa.v9i10.5124

Abstract: This research is preliminary research from development research. The aim of this research is to gather information from teachers and students regarding biology learning, which includes the extent to which the inquiry model or more specifically modified free inquiry is implemented. The research method is a survey through questionnaires and interviews. The respondents involved were 711 students and 20 teachers from 14 public high schools in 3 (three) Lombok districts. Data was collected through questionnaires and interview guides and then analyzed descriptively. The results of the research showed that 2.1% of students stated that they had studied using modified free inquiry. Textbooks with attractive presentations, simple and easy-to-understand language, and detailed practical guidelines were needed. These findings will become a reference for researchers to conduct further research.

Keywords: Modified Free Inquiry; Preliminary Studies; Textbook Development

Introduction

One of the important factors that supports success in learning is the availability of media and/or learning resources that are easy and proportional to use. The student learning process at school can occur directly or indirectly. Direct learning means students interact with the teacher. Meanwhile, indirect learning means that students interact with media or other learning resources that support their learning process. Psychologically, learning media really helps children's psychological development in learning (Supriyono, 2018).

Books are visual media as a means of conveying messages so that they can foster interest and memory in those who use them. Istiqlal (2018) states that media can facilitate the interaction process between teachers and students and help students learn optimally. According to Zaini (2017), with learning media, a student needs an intermediary or what is usually called learning media, where with learning media, teachers can divert students' attention, so they don't get bored and fed up quickly in the teaching and learning process. According to Miftah (2013), considering its position in learning, media is a very important part, this component needs to get attention from teachers, teachers must be aware of the importance of media in facilitating the teaching and learning process which will help students learn.

The urgency of textbooks as a medium in the learning process when viewed from the learner's perspective can be seen from their functions and benefits. Regarding the function and benefits of textbooks, Prastowo (2013) stated that the function of textbooks is that students can: study independently, learn anytime and anywhere, learn at their own pace, study material according to their choice and direct learning activities according to competency. The benefits of textbooks include making learning more interesting, providing opportunities for independent learning under the guidance of students and making it easier to learn each competency that must be mastered. The characteristics of textbooks are different from textbooks. Dwiyogo (in Febrianto, 2020) stated that textbooks are specifically intended for students to be able to develop learning abilities, because: textbooks are arranged according to a systematic structure and content, textbooks explain learning objectives, foster learning

How to Cite:
Masiah, M., Fajri, S. R., & Sucilestari, R. (2023). The Development of an Integrated Modified Free Inquiry (MFI) Biology Textbook: Preliminary Study. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 939–946. https://doi.org/10.29303/jppipa.v9i10.5124

motivation, textbooks anticipate student difficulties and provide summaries and feedback. This view shows that textbooks have an important role according to their existence in supporting the success of learning. Thus, the teaching materials used are of high quality and in accordance with learning standards. Apart from supporting successful learning, textbooks can also be used as a forum for exploring approaches and strategies in learning to make it easier to achieve certain goals in learning.

Developing textbooks is a necessity to accommodate various learning approaches. Rohmah, et al., (2017) stated that the development of textbooks that are used as media and/or learning resources can improve student learning outcomes. The same thing was also expressed by Solehun, et al., (2017) that there was a significant increase in learning outcomes with the use of textbooks that were developed according to student needs and characteristics. Thus, a common thread can be drawn that the development of textbooks is not random but requires systematic design referring to the learning system, message design, methods or strategies, and paying attention to learner characteristics. Looking at the results of development in the form of products for learning activities, it can be said that textbooks were specifically developed for learning activities. One approach that can be integrated is the modified free inquiry approach. There are excellent learning outcomes after implementing modified free inquiry learning (Depari et al., 2019). Modified free inquiry is a form of mixed inquiry between guided inquiry and free inquiry. Guided inquiry and free inquiry have the same syntax, the difference is the role of the teacher. In guided inquiry, all inquiry syntax is under the teacher's direction, whereas in free inquiry, all inquiry learning syntax does not receive direction from the teacher. There is no relationship between critical thinking skills between guided inquiry and free inquiry learning models (Indrawati et al., 2023). However, here the researcher will combine the two, namely guided inquiry and free inquiry. Modified free inquiry is very effective in bringing out students' scientific attitudes and work skills (Nurhadi, et al., 2023; Doyan et al., 2021). Inquiry learning can give rise to a high level of curiosity, and students' creativity can develop through discovery learning and meaningful learning (Fadilla et al., 2019; Juliantine et al., 2022). Furthermore, Puspitasai et al., (2018) stated that one way to develop student creativity is by asking questions that sharpen the mind, where students will find it easier to think creatively when we ask higher level questions, namely questions that require students to use previously learned information in new ways. Inquiry-based learning is very important, especially in biology learning, which requires students to be competent in carrying out discoveries and scientific work. The use of inquiry in the learning process can also train students to carry out various activities, namely observation, investigation, experimentation, and comparing findings with each other (Ramadani et al., 2021).

The integration of modified free inquiry into biology textbooks is very important to form student independence. One of the characteristics of MFI is that it strives for student independence (Putri, 2017). Modified free inquiry triggers students to develop the ideas they have into new experiences that are explored in the form of performance in a learning activity (Marta et al., 2018). Inquiry learning is also effective in improving students' cognitive learning outcomes (Hikmawati et al., 2020). Apart from that, according to Potvin et al., (2017), inquiry has the potential to increase students' interest in science. Learning science, especially biology, is very close to inquiry learning. These forms of ability are really needed by students, especially when they are currently in conditions with a very high level of competition. In line with this, many researchers suggest that modified free inquiry can optimize student independence, because students are given the freedom to develop the skills of hypothesizing, observing, conducting investigations, managing data, and drawing conclusions (Dwijono, 2016; Hadi et al., 2018 and Shofiyah, 2017). When students can be directly involved in inquiry learning, it will help improve analytical and critical thinking skills (Smallhorn et al., 2015). Answering problems creatively and having original ideas (Dewi, et al., 2017).

This research is preliminary research which aims to gather information from teachers and students regarding their needs for textbooks and identify the application of modified free inquiry. The preliminary study is intended to find a theoretical basis that strengthens the product to be developed, determine the correct development steps, and describe the results of previous research which can be used as comparison material in developing teaching material products (Musanni et al., 2015). The findings in this research will become a reference for researchers to conduct further research.

Method

This research uses a survey method. The instruments used were questionnaires and interviews. The questionnaire instrument was aimed at students, while the interview instrument was aimed at biology teachers. The respondents involved in this research were 711 students and 20 biology teachers from 14 public high schools in 3 Lombok districts, namely Lombok X,

Lombok Y and Lombok Z. The research data were then analyzed using qualitative descriptive analysis.

Result and Discussion

Interview data was conducted with 20 teachers with 19 questions. After going through data reduction, the following are the results of interviews with public high school biology teachers in Lombok.

Table 1. Answers from high school teachers in Lombok regarding biology learning

Question Indicator	Respondents Answer Lombok X	Lombok Y	Lombok Z
Years of Service	5-23 years	1-30 years	5-34 years
Difficulties/obstacles in teaching biology	There is a lack of learning media, especially textbooks, there are companion books but they are very limited in number, apart from that there is a lack of LCDs. Difficulty dealing with students with low motivation	Regarding teaching tools and materials, especially now using the independent curriculum, students are required to be independent, so schools should give students the freedom to bring cellphones for them to use to search for material freely.	Difficult to control noisy students in class, only 1 LCD, insufficient practical equipment
Biology material that students don't like and the reasons	Classification of living things, Coordination systems, metabolism. Because it is considered that there are many terms that must be memorized and they are abstract in nature	Classification of living things; kingdom level, Metabolism. Difficult to put into practice, there are many terms that have to be memorized	Classification of living things, coordination systems, metabolism. Abstract
Percentage of learning with practicum	31.66%	36,25%	56,25%
Approaches/models that are often applied	Lectures and discussion	Discussion and question-answer	Discussion and question-answer
Inquiry categories that have been applied	Guided inquiry	Guided and mixed inquiry	Guided inquiry
Is the textbook complete?	Not complete in one book, but complementary to another	Not complete	Complement each other
These books need to be revised	Very necessary	Very necessary	Very necessary
Parts of the book that need attention	Presentation section (images are more attractive, use simpler terms)	The presentation and content of the material, the completeness of the content and explanations as well as the questions for referencing students' knowledge must also be more complete, the steps in the practical guide must be more detailed	Expand the study of the material, the presentation is interesting, the practical guidance is more detailed because so far in the practical guidance there are some things that are not well understood

The first indicator in Table 1 above shows that the high school teachers sampled are senior teachers and have experience in teaching, so it is very appropriate to ask for their responses to biology learning. Based on the respondents' answers in Table 1 above regarding the application of the inquiry approach, on average high school teachers in Lombok have taught their students using an inquiry approach. The form of inquiry that has been applied is guided inquiry. Only a few have tried to apply a mixed form of inquiry or modified free inquiry. This finding is very meaningful for researchers because it means that high school students in Lombok are no longer unfamiliar with how to learn by finding their own answers to questions given by the teacher and then the answers to these questions will be reached through an investigation process. However, the challenge is if the procedure is slightly changed. Previously, students were familiar with learning using the guided inquiry model, which means that each step in the process received guidance and direction from the teacher, but the situation would be different if not all steps received direction or guidance. Transitioning from previous habits to new habits is not easy, but requires maximum effort to achieve goals that meet expectations. One of the

efforts in question is the integration of modified free inquiry into textbooks.

From the teacher's point of view, the need for textbooks is very necessary to make it easier for students to understand each lesson material so that it is easy for students to digest. The obstacles that teachers have been facing in teaching biology are the lack of learning media, limited textbooks for students, lack of tools and practical materials available in the laboratory, difficulty controlling students who are noisy and have low learning motivation, and very limited LCDs as delivery intermediaries. learning. Inquiry learning can increase student motivation (Dani et al., 2021). Some disorders that often arise in the learning process include students not having self-motivation, and a learning environment that is not conducive (Arianti, 2019). Instructing active learning can be through inquiry learning (Dostal 2015). However, of course, there are many ways that can be done to increase students' focus and concentration, such as by providing variations during the learning process, not just using the lecture method to students (Pujiasih, 2020). If we examine all the obstacles teachers face in teaching, almost all of them require the teacher's role in varying learning. The obstacles that arise can actually be predicted because the learning methods most often applied by teachers based on Table 1 are lecture and discussion methods. In fact, this will not happen if inquiry learning is intensified in learning. Inquiry learning produces better conceptual knowledge than lectures (Jong et al., 2023)

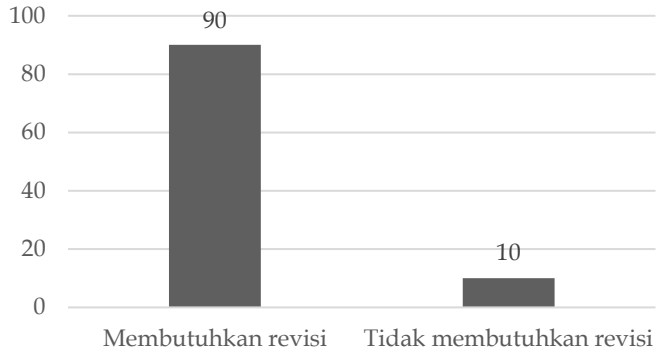

Figure 1. Percentage of teachers who need textbooks revised

The urgency of textbooks that can train students' independence at this time is very urgent, based on the results of teacher interviews, 90% (18) of teachers stated that they really need textbooks that train students' independence in learning, especially in 2024, the independent learning curriculum will be implemented. The independent learning curriculum places greater emphasis on providing freedom in learning both in terms of students' interests and talents. Students who have freedom in learning will be even more effective if these students have independence in learning, and practicing this independence is what researchers will try to do by developing an integrated modified free inquiry textbook. One of the characteristics of modified free inquiry is that it can train students' independence (Putri, 2017). Students' independence will emerge if we provide sufficient space to explore their potential. In achieving learning goals, students are required to go through certain phases or syntax (Ichsan et al., 2019). So that as students go through the required phases, independence will automatically emerge in students.

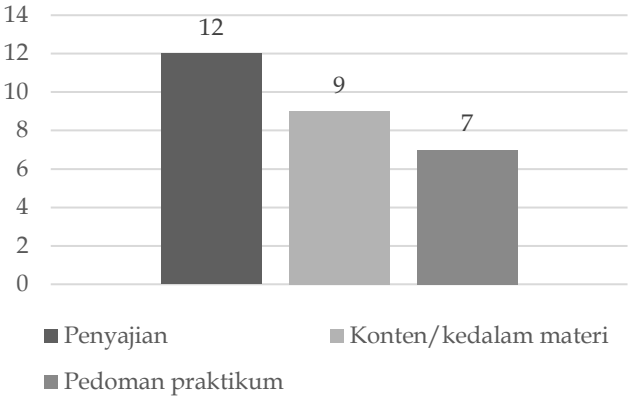

Figure 2. Parts that need repair

According to biology teachers, there are several things that need attention in textbooks, including making the presentation more attractive (pictures, using language that is easy to understand), the depth of the material, and the practical guidelines being more detailed and detailed. The depth of teaching materials must be adjusted to the learning sequence so that the learning process becomes more effective in achieving mastery of the expected competencies (Muallimin et al., 2023). It is undeniable that the attractiveness of textbooks will be an incentive for students to read them, as many as 12 teachers hope that in textbooks they will pay attention to the attractiveness of the textbook in its presentation, because students will be interested in reading and studying the contents if the textbook looks good in terms of pictures, is complete and detailed. Simple and easy-to-digest language in textbooks will help the book gain readers, because even though it looks attractive in appearance, if it uses language that is difficult to understand, the interest of students who previously wanted to learn it will be stopped. Not only is it attractive in appearance, the textbook content must also contain the material in its entirety so that students' understanding is not interrupted. A total of 9 teachers really hope that this section will be paid attention to in the future. Biology lessons cannot be separated from practical work to prove or discover the theory being studied. Practicum allows students to practice empirically in biology learning, integrating cognitive,

affective and psychomotor abilities. Practicum can support students' understanding of learning material. Practicum implementation should use modified free inquiry (Hofer & Lembens, 2019). Through practical activities, students are invited to interact directly with what is being studied. Practical activities are very suitable to facilitate students learning through direct experience. Thus, it is very important in textbooks to pay attention to practical guidelines so that they are easy to understand and have detailed steps.

The questionnaire instrument aimed at students seeks to gather information about their views on biology lessons. This aims to see the extent of students' interest in biology lessons. Below are presented students' responses to biology lessons.

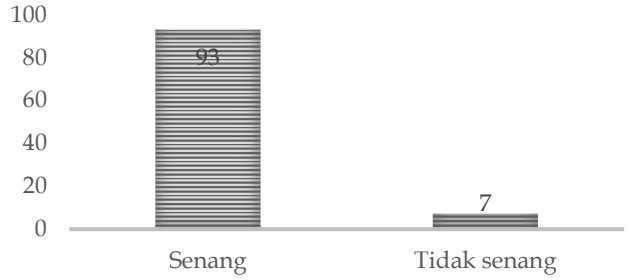

Figure 3. Student responses to biology learning

The data in Figure 3 above illustrates the response of public high school students in Lombok to biology lessons, namely 93% (661) of students said they were very happy with biology lessons and 7% (50) students said they were not happy with biology lessons. Biology is a science that studies living things and their environment (Khoirudin, 2019; Tammu, 2018), this is the background for most students stating that they enjoy biology lessons, the material in biology lessons is very close to life and its environment, so it is easy for them to study biology. students to implement the knowledge gained. As for students who think that biology lessons are not fun, this may be because in biology there is some material that requires structural and systematic knowledge so it seems that they have to be memorized. Biology is a lesson that tends to be rote (Suryanti et al., 2019). This could be the reason why students find it difficult to understand biology lessons because basically studying biology is not about memorizing all aspects of the material, but rather understanding the concepts contained in it (Yusup, 2018). Understanding the concept of biological material is a must to support comprehensive understanding.

Based on Table 1. The fourth indicator is that some material in biology lessons is considered difficult for students to understand because it is considered abstract. Biological material is not only related to concepts from concrete scientific facts but also concepts from abstract objects (Aisyiyah & Amrizal, 2020; Pratiwi et al., 2019; Rahmadani et al., 2017). Biology challenges students to form an integrated understanding from the microscopic to the macroscopic scale (Noviati, 2020; Tamba et al., 2020). Basically, these abstract material concepts are the basis for understanding biology as a whole. At this stage, the researcher also gathered information from students regarding the application of the inquiry model in their respective schools. In this section, the researcher provides a narrative that describes the learning process using the guided inquiry and modified free inquiry models. Then the researcher asked respondents to choose which learning processes had been implemented by their respective teachers. Below are presented the responses of students who have and have never studied using guided inquiry and modified free inquiry.

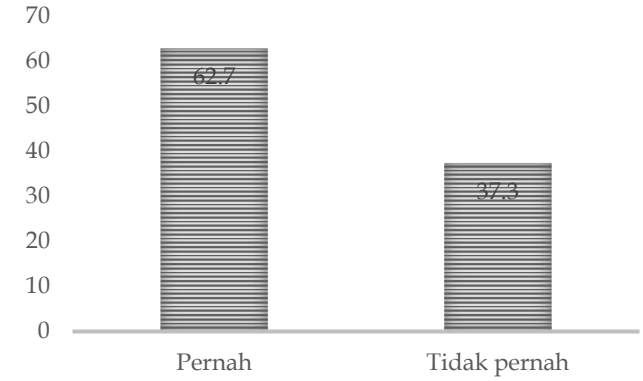

Figure 4. Percentage of students taught using guided inquiry

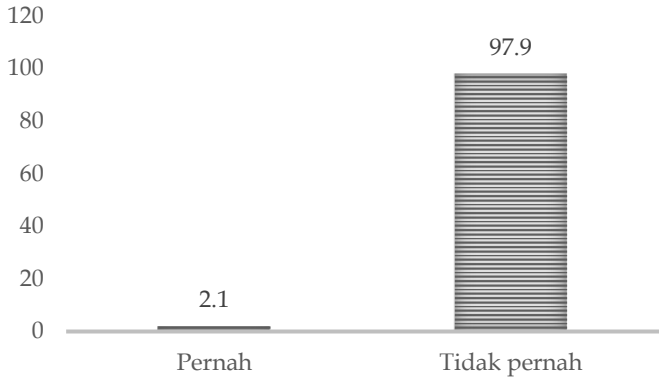

Figure 5. Percentage of students taught with modified free inquiry

Data in Figure 4 shows that 62.7% of students stated that they had been taught using a guided inquiry approach and 2.1% of students stated that they had been taught using modified free inquiry. Through this data,

the researcher actually wants to see the extent of high school students' potential if taught using the modified free inquiry approach. This finding suggests that high school students in Lombok already have a foundation for learning using modified free inquiry, this is also confirmed by the results of interviews with high school teachers (Table 1. Indicators for the sixth question). Based on this data, it shows that on average state high school teachers in Lombok have implemented an inquiry approach and this data can also be seen in the percentage of practicum implementation carried out because the inquiry approach is identical to practicum activities as a step-in investigation.

Conclusion

Based on the results of the research that has been carried out, a description of the implementation of modified free inquiry in public high schools in Lombok has been identified. In terms of teachers' need for textbooks, 90% of teachers stated that they really need textbooks with an attractive appearance, and have detailed and detailed practical guidelines so that students can understand them more easily when trying to do practical work.

Acknowledgments
Thanks to DRTPM Kemdikbudristek for financial support in completing this research.

Author Contributions
All author contributes to the research article with their respective responsibilities namely Masiah Conceptualization, methodology, validation, Masiah; formal analysis, investigation, resources, Laras Firdaus.; data curation, writing—original draft preparation, Siti Rabiatul Fajri; writing—review and editing, Ramdhani Sucilestari; visualization, supervision, funding acquisition.

Funding
This research was funded by DRTPM Kemendikbudristek, grant number 0536/E5/PG.02.00/2023.

Conflicts of Interest
The authors declare no conflict of interest

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