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Content Analysis of Inquiry and Authentic Assessment in 8th Grade Science Subject Textbook

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Abstract

This study aims to determine the content of inquiry and authentic assessment components in the analyzed science textbooks. The type of research approach used in this research was qualitative research with descriptive methods in the form of document analysis of Natural Science textbooks for 8th grade Junior High School published by the Ministry of Education and Culture and another book from non-ministerial publisher. The result showed that in the aspect of inquiry, the component with the highest number of findings was in the data collecting component, namely 61 findings in book I and 59 findings in book II. Meanwhile, the the lowest number of findings was the proposing hypothesis with 0 finding in the both books. In the authentic assessment aspect, the component with the highest number of findings lies in the physical context component, namely 33 findings in book I and the assessment task component with a total of 32 findings in book II. Meanwhile, the lowest number of findings in the two books was found in the assessment criteria component with 11 findings in book I and 5 findings in book II.

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INTRODUCTION

Education is a way to increase quality and character of human being. To achieve this goal, it can be done by implementing a learning process, one of which is science learning. Science education has an important role in the process of directing students to understand phenomena based on the scientific method as applied by scientists (*National Research Council, 1996*).

In addition to being directed to be able to understand the phenomena that exist in the surrounding environment based on the scientific method, students are also expected to be able to apply learning methods where students try to find and find their own knowledge through learning experiences in the classroom. With students seeking and finding their own knowledge, students are expected to be more independent and creative in solving problems and students' mindsets will be more emphasized on critical and analytical thinking processes in order to find answers to the problems they find (Ngurah & Laksana, 2017).

One of the things that is emphasized in the implementation of the 2013 Curriculum is learning with a scientific approach (Susilana & Ihsan, 2014). Inquiry is a learning experience that refers to students' involvement in various combinations in the learning process, such as: identifying questions, collecting and interpreting evidence, formulating, and communicating their findings in accordance with scientific standards (Lee et al., 2010). Inquiry in science refers to the process carried out by a scientist to ask questions about the natural world, carry out the process of investigating phenomena and obtaining scientific knowledge (William et al., 2017). Inquiry is a learning process by way of discovery using a systematic thought process. In inquiry, knowledge is the result of self-discovery, not the result of remembering previously learned facts (Hakim et al., 2020). Inquiry has been a broadly defined construct in science education. It has been associated with a wide range of intellectual activities, including hypothesis testing, practical problem-solving, modeling, and engaging in Socratic dialogue to name just a few examples (Windschitl, 2001). Learning with inquiry is considered to be able to increase students' creativity and critical thinking patterns in thinking scientifically. Based on the results of research done by Lelasari et al. (2021), learning with inquiry also affects students' metacognitive abilities, where the metacognitive abilities of students who study with inquiry learning have a much better value when compared to students whose learning process is in traditional way.

One of the teaching media that can support the learning process with this inquiry in order to achieve maximum goals is the use of appropriate textbooks. Textbooks are a set of subject matter systematically arranged which contains the competencies that students need to master in learning as a whole (Millah, et al., 2012). In learning programs, textbooks are one of the important determining factors. Student textbooks are the dominant instructional media in a learning process in relation to the process of delivering study material (Prastowo, 2014). Textbooks in printed form can be used to help students learn directly physically and make it easier for teachers to deliver study material to students (Zulfadli et al., 2019). The existence of a textbook in the learning process can help teachers and students achieve a goal in learning (Rohmah et al., 2017). The existence of textbooks in learning activities aims to facilitate teachers or educators in the process of giving or delivering material to students in a better and more interesting way (Pradita & Lubis, 2018). Based on research by Darmayanti et al. (2014), the use of inquiry-based student textbooks is considered to be able to increase the value of student learning outcomes, where overall student learning outcomes increase from the pre-test score which has an average of 53.33 increases to an average value of 79.24 for the post-test. Another study by Sianturi, et al (2019) also stated that the use of inquiry-based integrated science textbooks also improved student learning outcomes.

There are 6 main steps in the learning process with inquiry learning strategies, including: (1) Orientation, (2) Formulating problems, (3) Proposing a Hypotheses, (4) Data Collecting, (5) Testing the Hypotheses, and (6) Formulating Conclusions (Sanjaya, 2006). A good textbook to be used in an inquiry-based learning should also be made with the content of the inquiry aspect in it, so that the learning objectives can be achieved optimally.

In line with the Ministry of Education and Culture, inquiry-based scientific learning must be accompanied by an assessment process that can measure students' actual abilities, both in the realm of knowledge, the realm of attitudes and the realm of skills. Assessment is a process of collecting data and information about the overall learning experience that students have gone through (Lotulung & Tumurang, 2018). Authentic assessment is a form of assessment that is more focused on complex or contextual assignments so that it can demonstrate the competence of students (Eriviana, 2016). Authentic assessment has a strong relevance to the implementation of learning with

a scientific approach according to the demands of the 2013 curriculum (Suwandi, 2019). Authentic assessment is a form of assessment that requires the use of the same competencies for students, or the application of a combination of knowledge, skills and attitudes in certain situations in life (Gulikers et al., 2004). Authentic assessment is a summative assessment in which students are given assignments that are similar to real-world assignments or activities rather than traditional assessments such as essays or exams (Royce et al., 2021). Authentic assessment is considered important in order to determine the competencies that have been achieved by students after carrying out the learning process in class.

The learning process of implementing the 2013 curriculum it is hoped that there will be a scientific approach, one of which is inquiry accompanied by an authentic assessment process, it is necessary to use appropriate textbooks which contain components of inquiry and authentic assessment in them so that learning outcomes and goals can be achieved to the fullest.

However, after carrying out the process of gathering information by interviewing teachers in the field on January 10, 2022 regarding the books used in student learning, in fact it is still not clear whether the science textbooks used by students at school include aspects of inquiry and have authentic assessment component in it. Seeing this, it is necessary to hold an analysis process for the textbooks used by students in the learning process. Based on this, the researcher is interested in carrying out research with the title "Analysis of Inquiry Aspects and Authentic Assessment in Class VIII Middle School Science Textbooks".

METHOD

The type of research approach used in this research was qualitative research. The type of qualitative research in this study was descriptive methods. Descriptive research is a type of research that aims to describe an event or phenomenon that occurs in the present based on facts obtained from the field (Winarno, 2013). The type of qualitative research in this study was descriptive methods in the form of document analysis/content analysis. Document analysis research is research on data sources in the form of notes or documents that is carried out systematically (Hardani et al., 2020). In this study, the documents analyzed were in the form of two Natural Science textbooks.

The sampling method in this study was using purposive sampling. This sampling techni-

que is a technique where samples are taken with a certain selection (Siyoto & Ali, 2015). In this study, the data collecting technique carried out by the researcher was documentation in the form of an analysis of the two textbook documents in order to determine the content of the inquiry and authentic assessment in it. In this documentation method, the researcher used instruments in data collecting in the form of observation sheets for the inquiry and the authentic assessment component.

Testing the validity of the research data in this study was carried out using the investigator triangulation technique. This technique is carried out by utilizing researchers or other observers to conduct research and re-check the results that have been obtained for the degree of data confidence so that in data collection there is no deviation (Moleong, 2017).

From the data research results of the two observers, a check was made on data in the form of the same view and data in the form of different views to calculate the value of the coefficient of agreement with the following formula by Arikunto (2013):

$$KK = \frac{2S}{(N1+N2)}$$

Description:

KK = Coefficient of agreement

S = Agreement of two observers

N1 = Number of codes made by observer 1

N2 = Number of codes made by observer 2

Data from the calculation of the coefficient of agreement, the results obtained are 0.63 for book I and 0.68 for book II, both of which are included in the good category based on the following categories (Wilkinson, 1999).

Table 1. Calculation Result Data Criteria

Score	Category
> 0.75	Excellent
0.40 – 0.75	Good
< 0.40	Poor

The data analysis and processing technique used by the researcher is by adding up the appearance of the inquiry and authentic assessment indicators for each component in the book being analyzed, then calculating the percentage value of the emergence of the indicator for each component of the inquiry and authentic assessment in the book which is analyzed by formula:

percentage= (indicator found for each component)/(total indicator found) x 100% (Kurnia et al., 2014)

RESULT AND DISCUSSION

The analysis was carried in purpose to knowing the emergence of inquiry and authentic assessment components in the Science Book Class VIII Semester 2 and then it would be shown in the form of a percentage. The textbooks used in this study included 2 books, namely the Natural Sciences book for SMP/MTs Class VIII published by the Ministry of Education and Culture called as Book I and a textbook from a non ministerial publisher which was later called as Book II.

An analysis was carried out on these two books to determine the component content of the inquiry aspect which includes 6 components, namely: Orientation, Formulating Problems, Proposing a Hypothesis, Data Collecting, Testing The Hypothesis, and Formulating Conclusion (Sanjaya, 2006). Components of authentic assessment include 5 components, namely: The Assessment Task, The Physical Context, The Social Context, The Assessment Results or Form, and The Assessment Criteria (Gulikers et al., 2004). The results of the analysis of the two books show various findings. The following is data on the emergence of inquiry and authentic assessment

components and their percentages.

Based on the results of research data, it can be seen that some components have a percentage that tends to be higher than the other components. In the aspect of inquiry, the overall Data Collecting component has the highest total finding value with a total of 61 findings in Book I and 59 findings in Book II which is it takes 30.5% and 42.45% percentage of each book. Meanwhile, for the lowest number of findings in the inquiry aspect, it is found in the Proposing a Hypothesis component which is not found at all in the two books. For the authentic assessment aspect, there are differences in the component that has the most number of findings where in Book I The Physical Context component has the most total number of findings with 33 findings and in book II the component with the highest number of findings is in The Assessment Task with a total of 32 findings in 1 book. And for the authentic assessment aspect, the component with the lowest average percentage value of the number of findings in each chapter is found in The Assessment Results component and The Assessment Criteria in Book I with 11 findings and 12.36% percentage, and The Assessment Criteria for Book II with 5 findings and 5.49% percentage.

The findings in the two books can be said to be fairly, almost every chapter in the two books contains the indicators, both on aspects of inquiry

Table 2. Data Finding of Inquiry Component

No.	Inquiry Component	Book I		Book II	
		Finding Number	%	Finding Number	%
1.	Orientation	33	16.5	11	7.91
2.	Formulating Problem	36	18	12	8.63
3.	Proposing a Hypothesis	0	0	0	0
4.	Data Collecting	61	30.5	59	42.45
5.	Testing The Hypothesis	39	19.5	28	20.14
6.	Formulating Conclusion	31	15.5	29	20.97
Total		200	100	139	100

Table 3. Data Finding of Authentic Assessment Component

No.	Inquiry Component	Book I		Book II	
		Finding Number	%	Finding Number	%
1.	The Assessment Task	16	17,98	32	35,17
2.	The Physical Context	33	37,08	30	32,97
3.	The Social Context	18	20,22	13	14,29
4.	The Assessment Result or Form	11	12,36	11	12,09
5.	The Assessment Criteria	11	12,36	5	5,49
Total		200	100	139	100

and authentic assessment. However, the number of findings in each component and each chapter varies, there are some components that have more findings value than other components. Like the component of Data Collecting at the stage of the inquiry aspect, this component has the most dominant finding value with the highest number of findings in both books, with 61 findings in book I and 59 findings in book II. This indicates that in both books, the component that stands out a lot is the component of Data Collecting. The book provides many forms of experiments for students, ranging from observations with the five senses to experiments using measuring instruments in the laboratory.

In contrast to the components of Data Collecting, in both books there is no component of the stages of Proposing a Hypothesis. In both books there are no stages where students propose hypothesis as temporary answers to the problems they face after formulating the problem. All forms of problem formulation found in the two books are directly confronted with activities in the form of activity sheets to obtain data to answer the formulation of the problem without formulating a hypothesis first. With this, the use of these two books will be less than optimal in guiding students in proposing hypothesis.

In the aspect of authentic assessment, in Book I The Physical Context has the highest finding value, reaching 33 findings in 1 book. The Physical Context in authentic assessment should reflect how knowledge, skills and attitudes are used in practice (Brown et al., 1989; Herrington & Oliver, 2000). So that in this textbook, the physical context can be applied in the form of data collecting both observations and experiments with measuring instruments, which is dominantly found in book I. While in Book II, the discovery of the components of The Assessment Task is superior to other components with 32 findings in total. This means that in Book II, it prioritizes the existence of an assessment task as a form of assessment from the teacher to students. Unlike in Book I, where the assessment prioritizes students' physical activities such as conducting observations and experiments, in Book II the assessment puts more emphasis on written assessment tasks ranging from multiple choice to description questions.

The component with the least number of findings has similarities in the two books, where the component of The Assessment Criteria has the least number of findings. Both books do not show the components of The Assessment Criteria which are the criteria of the assessment cha-

racteristic that will be assessed (Gulikers et al., 2004). Determining the criteria and making them explicit and transparent to students in authentic assessments is very important because by doing so students can know about what things will be assessed in an assessment. An assessment criteria should be structured according to realistic outcomes and focus on improving professional competence and criteria based on actual situations in the real world (Darling-Hammond & Snyder, 2000). The two books do not show the emergence of cognitive assessment rubrics in them, so that the assessment process of various students' cognitive assignments is less transparent, even though the assessment criteria have the aim of making students know what is being assessed and how the assessment process is given.

Overall, both the findings of the inquiry and authentic assessment are sufficient to be found in the two books. The two textbooks used in this study have their respective advantages and disadvantages. For Book I, the advantages of the book content highlight the inquiry learning strategy where this is considered a book plus value. However, even though it has covered quite a number of components of inquiry, there are still components that are lacking. While in Book II, the number of findings of the inquiry component is less than that of Book I. Similar to Book I, in Book II there are also components with a low and uneven number of findings. The difference in the number of findings that is quite far and uneven in certain components can also result in an imbalance in the application of the book as teaching material. This can result in the use of textbooks being less than optimal in achieving learning objectives. The imbalance of components, both inquiry and authentic assessment in textbooks can result in less than optimal achievement of competencies in textbooks as the main source of student learning.

In learning with the 2013 curriculum, learning by applying a scientific approach is considered relevant to an authentic assessment process. Inquiry, which is one of the learning strategies based on a scientific approach, is expected to help realize learning objectives to be more optimal. However, the contents of the book components which are not maximized with the expected competencies in accordance with the curriculum, will result in the learning objectives cannot be achieved optimally as well. So that is needed to do improvement for the learning process can run optimally with the best results, it is necessary to make changes and developments to the textbooks used in schools in the learning process in accor-

dance with educational quality standards with the applicable and being used curriculum.

CONCLUSION

Based on the data from the analysis, it was concluded that a number of indicators of inquiry and authentic assessment components were found in the two books analyzed. In the aspect of inquiry, the component with the highest number of findings and percentages lies in the component of Data Collecting with 61 findings 30.5% percentage in Book I and 59 findings with a percentage of 42.45% in Book II. Meanwhile, the inquiry component with the lowest number of findings was found in the component Proposing a Hypothesis with 0 findings in the both books analyzed. In the aspect of authentic assessment, the component with the highest number of findings and percentages lies in The Physical Context component, namely 33 findings or 37.08% percentage in Book I and The Assessment Task component with a total of 32 findings with a percentage value of 35.17% in Book II. And the lowest number of finding in Authentic Assessment component found in The Assessment Criteria in both book with 11 and 5 findings or 12.36% and 5.49% percentage.

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