

Analysis of Questions in Chemistry Textbook Based on Critical Thinking Ability

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Abstract

Chemistry textbooks' questions are important in improving students' thinking skills. Various types of questions are developed, but the effectiveness of these questions in supporting student success is something that is not expressed enough. This study aims to determine aspects of critical thinking skills developed in questions in the Chemistry High School textbook. The research method used is a descriptive method and multistage sampling technique. There are six books analyzed. The research instrument used was in the form of observation sheets classifying questions based on indicators of critical thinking skills. The results showed that the questions developed in Chemistry textbooks were analyzed based on critical thinking skills, including aspects of making simple explanations with a percentage of 28.8%, building basic skills of 20.3%, concluding at 45.8%, giving further explanations of 3.4%, and set strategy and tactics of 1.7%. The questions developed are dominated by concluding questions. Thus, it can be concluded that the questions in the Chemistry High School textbook have not been developed evenly on the five aspects of critical thinking.

Keywords: chemistry textbook, critical thinking ability, question analysis

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1. Introduction

In improving the quality of education there are two approaches that can be taken, namely through standard reform (standard reform) and curriculum-based reform (curriculum reform). Standard reform is the authority of the National Education Standards Agency (BSNP) as an independent and professional institution. Meanwhile, curriculum reform is under the authority of the Ministry of Education and Culture. Curriculum reform continues to be developed according to developments and times. The curriculum currently applied, namely Curriculum 2013 or better known as K-13 is a follow-up step from the Competency-Based Curriculum (KBK) which was initiated in 2004 and the Education Unit Level Curriculum (KTSP) in 2006 which

includes attitudes of competence, knowledge, and skills (Mukminin, et al., 2019).

In the 2013 curriculum, the skills that are expected to be mastered by students after participating in the learning process are higher-order thinking skills. Higher order thinking skills include critical thinking, creative thinking, problem solving, and decision making (Anderson et al., 2001). Critical thinking is an important part that must exist in a person, considering that the future of life will be more competitive and supported by the rapid development of technology and science.

According to Che (2002), critical thinking is important for a person to meet the daily personal, social, and professional demands of an ever-changing society. Success in work also depends on thinking skills. Having this ability

will lead a person to think more carefully, help to sort out information that is relevant or not, and evaluate policies that are useful for solving various problems (Hatcher & Spencer, 2005). Therefore, in an effort to present a generation that is superior and able to compete globally, one of the graduate competencies that students are expected to master after participating in the learning process is critical thinking skills.

There have been many studies related to students' critical thinking skills. Khoirunnisa & Sabekti (2020) found that the critical thinking skills of high school students in the Chemical Bond material were low. The results of the same study conducted by Haryati, Andayani, & Al Idrus (2019) found that the initial ability of students' critical thinking skills on Petroleum material was in the very low category. The low critical thinking skills of students. The research findings above indicate the low critical thinking skills of students in Chemistry. In fact, critical thinking skills are needed by students to solve problems in everyday life (Cahyono, 2017). Several studies above indicate that students' critical thinking skills in Chemistry are low and need to be a concern for teachers.

The ability to think critically does not necessarily exist in a person, it can be trained and developed. Critical thinking skills in students need to be developed so that students can generate and evaluate ideas and make decisions independently of the problems at hand. Through critical thinking students can compare, evaluate, and then make an assessment (Aslan, 2011). Ennis (2011) argues that critical thinking is reasonable and reflective thinking that focuses on deciding what to believe or do. Furthermore, Ennis argues that critical thinking basically depends on two dispositions, namely being able to do it correctly and depending on the evaluation process (applying criteria to assess possible answers), either implicitly or explicitly.

In developing students' critical thinking skills, a teacher's strategy is needed in asking questions in class and choosing quality textbooks that contain questions that can

stimulate students' critical thinking skills (Sula et al., 2011). One of the criteria for a quality textbook is to contain questions that can stimulate students' critical thinking skills.

Chemistry textbooks that are used as the main source in learning should contain questions that can improve students' thinking processes. Various types of questions are developed in textbooks, but the critical thinking aspects developed in questions in chemistry textbooks have not been widely disclosed. In fact, students' habits in working on critical thinking questions will improve students' critical thinking skills Kartimi & Liliarsari (2012). Several studies are related to critical thinking questions in textbooks. Frandeska (2014) has conducted related research on Physics textbooks, in her research it was found that critical thinking aspects developed in questions in Physics textbooks were dominated by questions that were building basic skills. In addition, Sunardjo et al., (2016) conducted a similar study on junior high school science textbooks and found the same result that the critical thinking aspect of building basic skills had the largest percentage developed in the book.

To have an idea of the questions in the textbook and how they can help develop critical thinking skills, an analysis of the questions in the textbook needs to be done (Sula et al., 2011). The critical thinking skills used refer to the theory of Ennis (2011) with five aspects, namely: providing simple explanations, including: focusing questions, analyzing arguments, asking and answering questions; build basic skills, including: considering whether the source is reliable or not, observing, considering observation reports; conclude, include: conducting and considering the results of deductions, conducting and considering the results of inductions, making and determining the value of considerations; provide further explanation, including: defining, considering a definition, identifying assumptions; set strategies and tactics, including: determining an action, interacting with others. This research can be used as a reference for teachers, book writers

in making practice questions that train critical thinking skills.

2. Research Method

This study uses a descriptive method of documentation or content analysis. Content document analysis research is research that interprets documents or contents that are arranged systematically (Margono, 2009). The content document to be analyzed is in the form of questions in the Chemistry textbook.

The population in this study were all the questions in the Chemistry textbooks for class X 2013 curriculum used in SMA/MA Negeri in DKI Jakarta, totaling 6 books. Meanwhile, the research sample consisted of several questions in a Chemistry textbook which were chosen at random. The choice of questions to be analyzed was obtained from taking 20% of the number of chapters in each book, 20% of the number of pages in each chapter, and 20% of the questions on the page. The three stages of sample selection were carried out randomly. The sample of the selected questions was then analyzed using the question classification observation sheet based on the indicators of critical thinking ability according to Ennis. Each question is analyzed and matched with aspects of critical thinking skills (Ennis, Robert H., 1985).

The data analysis technique in this study uses descriptive qualitative analysis with investigator triangulation techniques, namely using researchers or other observers for the purpose of re-checking the degree of confidence in the data or by comparing the work of an analyst with other analysts (Moleong, 2012). The stages of data analysis in this study began with adding up the appearance of questions based on critical thinking indicators according to Ennis. The next step is to calculate the percentage of these questions using the formula:

$$\% = \frac{\sum \text{critical thinking skills}}{\sum \text{total questions}} \times 100\%$$

The last stage, determining the reliability of the observer, aims to avoid the subjectivity of

the researcher and measure the extent of the relationship between the researcher's thoughts and other observers. The next stage is determining the coefficient of observer agreement, aiming to determine the tolerance for differences in observations. The data from the calculation of the level of conformity were then recapitulated based on categories adapted from Wilkinson (1999, p. 391), namely: < 0.4, very poor category; 0.4 – 0.75, good category; and > 0.75, very good category.

3. Results and Discussion

In this study, the data analyzed were the questions contained in the chemistry textbooks for class X 2013 Curriculum State SMA/MA which were used by students in the learning process in DKI Jakarta.

3.1. Analysis Results Based on Critical Thinking Skills

Based on the results of the analysis conducted on the questions in each grade X chemistry textbook based on critical thinking skills, according to Ennis, there are differences in the distribution of aspects of critical thinking skills developed in the questions in the textbook. The overall average percentage of question analysis results based on critical thinking skills in the six class X chemistry textbooks can be seen in Figure 1.

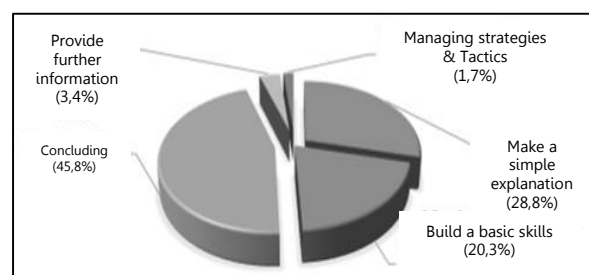


Figure 1. Critical Thinking Skills Aspect Indicators Identified in Grade X Chemical Textbook

Based on Figure 1, it can be seen that the five aspects of critical thinking skills have been developed in class X chemistry textbooks. However, these five aspects are not evenly distributed, it can be seen that the percentage of critical thinking skills

that are most developed is the critical thinking aspect concludes. Meanwhile, the least developed aspect of critical thinking skills is the critical thinking aspect which refers to managing strategies and tactics.

3.2. Analysis Results of Question in Textbook based on Critical Thinking Skills

3.2.1. Make a Simple Explanation

Questions that make simple explanations ask students to provide answers in the form of simple explanations related to the basic concepts of chemistry that have been studied. Of the total questions analyzed, there are 28.8% of questions that develop aspects of critical thinking making simple explanations. This aspect is the second most important aspect of critical thinking skills developed in questions in chemistry textbooks. This is in line with the findings obtained by Frandeska (2014) in her research which found that the critical thinking aspect of making simple explanations was the second most developed in questions in textbooks analyzed with a percentage of 18.5%. This aspect consists of three indicators, namely indicator (1.1) focusing on questions, indicator (1.2) analyzing arguments and indicator (1.3) asking and answering questions. Figure 2 shows the distribution of critical thinking aspects to make simple explanations developed in questions in each chemistry textbook.

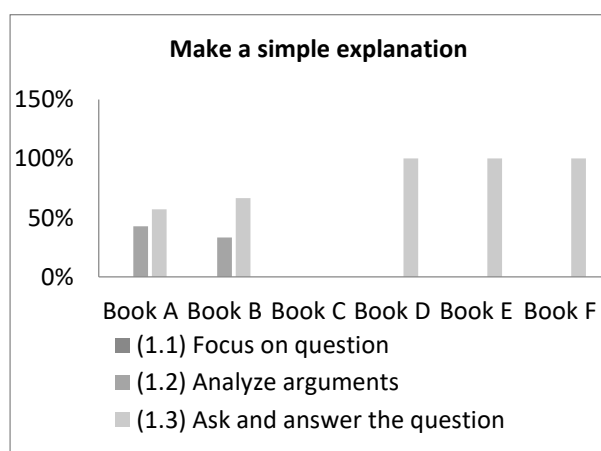


Figure 2. Percentage of Making Simple Explanation Indicators Determined in Each Chemistry Textbook

Based on Figure 2, it can be seen that the three indicators do not appear evenly in each book, but the appearance of the indicator (1.3) asking and answering questions is scattered in almost all chemistry textbooks analyzed except for book C. Indicator (1.2) analyzing arguments only appears in book A and B, while indicator (1.1) focuses on questions that do not appear in all chemistry textbooks. The interesting thing is that the three indicators do not appear in book C.

Overall, the emergence of critical thinking aspects makes simple explanations found in almost every chemistry textbook. Of the six books analyzed, only one chemistry book did not develop critical thinking aspects to make simple explanations, namely book C.

In chemistry textbooks, the questions that are analyzed in the nature of making simple explanations are spread in the indicators of analyzing arguments and asking and answering questions. Of the six chemistry textbooks analyzed, indicators for analyzing arguments were developed in questions in chemistry textbooks A and B. Figure 3 shows examples of questions that develop indicators for analyzing arguments.

- Which of the following statements about periodicity is **incorrect**? ...
- In one group, the higher the atomic number, the longer the radius
 - In one period, the higher the atomic number, the longer the radius
 - Ionization energy tends to increase in the period from left to right
 - In one group, the higher the number of atoms, the lower the ionizing energy
 - In one period, the higher the atomic number, the higher the electron affinity.

Figure 3. Sample Questions to Measure Skills in Analysing Arguments

The question above requires students to compare the information presented in each choice option to determine the accuracy or inaccuracy of a statement. Comparing and identifying which information is relevant from the amount of information presented requires

students to have skills in analyzing each of the information and be able to stimulate their thinking activities. This can train students' critical thinking skills by comparing different information using criteria that are in accordance with the basic concepts that have been obtained previously (Sharadgah, 2014).

Determining the accuracy or imprecision of a statement presented is one of the things that can be done when analyzing an argument. Based on this, the questions above are included in the category of questions that develop indicators for analyzing arguments. This is also motivated by the statement of Ennis (2011) which states that in analyzing an argument we must identify the accuracy or inaccuracy of the statements put forward.

Analyzing arguments needs to be done because someone's argument always consists of reasons to support or convince something that is considered true by him. Before accepting an argument as truth, we must check and compare the information contained in each of the reasons put forward using certain criteria, so that the decisions taken are the most accurate and valid. The intended criteria can be in the form of data, facts, and chemical concepts.

The indicators that were developed further were asking and answering questions. This indicator is developed in questions that are in almost all analyzed chemistry textbooks except chemistry textbooks C which does not develop questions on critical thinking aspects making simple explanations. Figure 4 shows an example of a question that develops indicators for asking and answering questions.

Explain the relation between the electron configuration and the position of the elements in the modern periodic system (Moseley).

Figure 4. Sample Questions to Measure Skills of Making and Answering Challenging Questions

The questions above ask students to answer questions by providing a simple explanation of the basic information that has been studied

previously. Providing a simple explanation of a question posed is a characteristic of the indicator of asking and answering questions. Based on this, the questions above are included in the category of questions that develop indicators for asking and answering questions.

Asking or answering questions has an important role in improving students' thinking skills. According to Aslan (2011), thinking activities begin with questions, quality and effective questions will motivate students to exert their intellectual efforts. In answering a question a student will be involved in the mental activities they need to gain deep understanding.

Through questions with answers in the form of simple explanations like this, it can be seen the extent to which students understand the basic concepts that have been studied previously. This type of question also brings students to recall the basic knowledge that has been learned, so that students have the capital to understand the next concept and think at a higher level (Frandeska, 2014).

3.2.2. Build a Basic Skills

Questions that develop aspects of critical thinking build basic skills. has a percentage of 20.3%. The aspect of building basic skills has two indicators, namely the indicator (2.1) considering whether the source can be trusted or not and the indicator (2.2) observing and considering the results. Figure 5 shows the distribution of critical thinking aspects to build basic skills developed in the questions in each chemistry textbook.

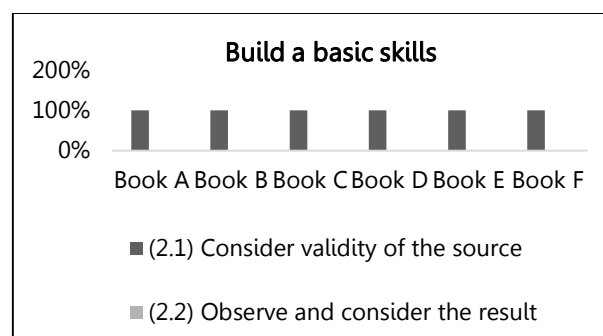


Figure 5. Percentage of Indicator of Building Basic Support in Each Chemistry Textbook

Based on Figure 5, it can be seen that the two indicators on the critical thinking aspect of building basic skills are not evenly distributed. The appearance of the indicator (2.1) considers whether the source can be trusted or not in every chemistry textbook, while the indicator (2.2) observes and considers the results that do not appear in every textbook. Overall, the emergence of critical thinking aspects to build basic skills is evenly distributed in every textbook analyzed.

In the six chemistry textbooks analyzed, questions that are building basic skills are only spread on indicators considering whether the source can be trusted or not. Considering a source used needs to be done so that the reasons used to support the arguments presented have high-quality evidence or facts so that they can be accepted. Figure 6 shows an example of a question that develops indicators considering whether a source is trustworthy or not.

<p>Ca(NO₃)₂ as known as calcium nitrate <i>Because</i> Calcium is an element from group IIA</p>

Figure 6. Sample Question to Measure Skills of Considering Credibility of Resources

The question above consists of two statement sentences connected by the word cause. From the two statement sentences presented, students consider whether the two sentences are causal, both are true but not related, one of the statement sentences is true or both are false. In determining the decision-making or choice requires students to consider the credibility of the statements submitted by providing evidence or arguments in the form of reasons in accordance with the facts of the chemical concepts that have been studied. This is so that the decisions taken are not only based on emotional perceptions (Fahim & Khatib, 2013).

In addition, in providing a reason, the evidence or argument presented must also be logical and in accordance with the context to support the choice, judgment or statement given. Giving reasons for using evidence and facts in

this case the existing theory is one of the considerations whether the source can be trusted or not (source credibility). Based on this, the questions above fall into the category of questions that develop indicators of whether the source is reliable or not.

As stated in Ennis (2011), there are several things that need to be considered in considering whether a source can be trusted or not, including: considering expertise, suitability of sources, and the ability to provide reasons. A person's ability to give reasons is based on the evidence used. Convincing evidence does not contradict the subject matter, is accurate, can be tested, and is later relevant to the conclusions to be made.

3.2.3. Concluding

The third aspect of critical thinking is concluding. This aspect of critical thinking is the most developed aspect in the questions in chemistry textbooks which are analyzed with a percentage of 45.8%. The critical thinking aspect concludes that it has three indicators, namely the indicator (3.1) deducing and considering the results of the discussion, the indicator (3.2) inducing and considering the results of the induction and the indicator (3.3) making and determining the results of the considerations. Figure 7 shows the distribution of critical thinking aspects in conclusion developed in the questions in each chemistry textbook.

Based on Figure 7, it can be seen that the three indicators do not appear evenly in every book, but the appearance of the indicator (3.3) to make and determine the results of considerations is spread in almost all textbooks except book D. The indicator (3.2) induces and considers the results of induction only in questions in books D and F, while the indicator (3.1) deduces and considers the results of the discussion does not appear in each of the books analyzed. Overall, the emergence of critical thinking aspects concludes is evenly distributed in each book analyzed and has the highest number of occurrences developed in the question.

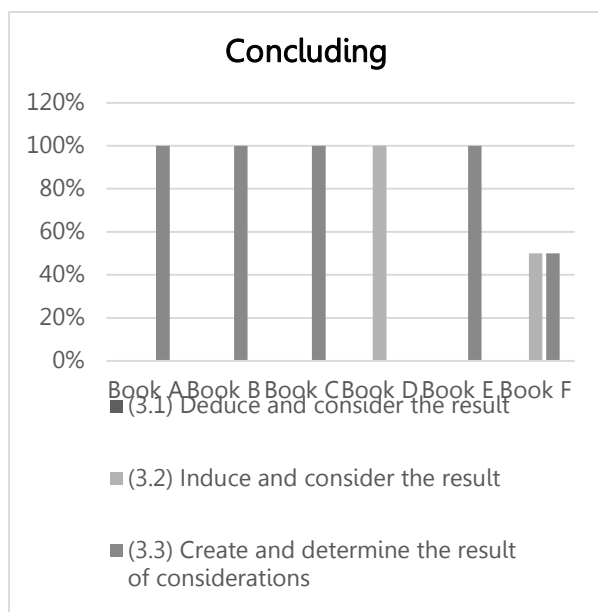
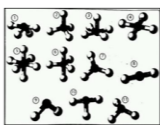


Figure 7. Percentage of Making Conclusion Indicators determined in Each Chemistry Textbook

Questions that are concluding in nature are scattered in the indicators of inducing and considering the results of the induction and making and determining the results of the considerations. Indicators of inducing and considering induction results are developed in the questions in chemistry textbooks D and F. Figure 8 shows examples of questions that develop critical thinking indicators to induce and consider induction results.

Consider some of the following molecule forms. Which molecule form is polar? Which molecular form is nonpolar?



Based on your understanding of molecular polarity, conclude the relation of polarity to molecular form.

Figure 8. Sample Question to Measure Skill of Making and Considering Induction

The question above asks students to make a conclusion, where previously there were several guiding questions to help them in making these conclusions. This guiding question serves as evidence that will support the reasons for a conclusion made. In other words, this question asks students to make

conclusions by stating specific things first. Based on this, the questions above are included in the category of questions that develop indicators of induction and consider the results of induction.

Drawing a conclusion is usually based on statements given previously or called premises. A valid argument in support of a conclusion must be drawn logically from the premises. Inductive reasoning refers to drawing a conclusion by putting forward specific premises or statements in the form of data or facts so that a conclusion is found in the form of general statements (Qing, Xiang, & Linna, 2007).

The next indicator, namely making and determining the results of considerations, is developed in the questions that exist in almost all chemistry textbooks analyzed except for book D. Figure 9 shows examples of questions that develop critical thinking indicators to make and determine the results of considerations.

Dari pengujian larutan dengan alat uji elektrolit didapatkan data sebagai berikut.

Larutan	Menghasilkan Gas	Terdapat Endapan	Elektrolit
1	✓	-	ada gelembung gas
2	✓	-	ada gelembung gas
3	-	✓	ada gelembung gas
4	-	✓	tidak ada perubahan

Larutan yang termasuk elektrolit lemah adalah

A. larutan 1 dan 2
B. larutan 2 dan 3
C. larutan 2
D. larutan 3
E. larutan 4

Figure 9. Sample Question to Measure Indicator of Making and considering the value of decision

The question above asks students to make a decision based on the data presented. This type of question is able to develop students' critical attitudes by giving students the opportunity to use their reasoning in making a decision or conclusion based on the facts that exist in this case in the form of the data presented. Making and determining the results of considerations can be done based on the background facts, including through objective data. Based on this, the questions above are included in the category of

questions that develop indicators to make and determine the results of considerations.

The same thing was stated by Visande (2014), that making conclusions not only by evaluating the text using experience and knowledge, but also involving an assessment based on direct evidence from the text. The evidence in question can be in the form of data, statements, principles, judgments, beliefs or opinions (Qing et al., 2007).

Critical thinking skills for individuals play an important role in making decisions based on the results of consideration of relevant evidence and facts. In making and determining the results of considerations students must be able to distinguish between facts and opinions (personal feelings) using the knowledge they have. When students have had critical thinking, they will assess the reasons, evidence, and facts that exist before drawing a conclusion. According to Averkieva, Chayka, and Gluskhov (2015), drawing a conclusion that refers to objective data and evidence is a high level of critical thinking.

3.2.4. Provide Further Information

The fourth aspect is to provide further explanation. Questions that develop aspects of critical thinking have a percentage of 3.4%. This aspect consists of two indicators, namely indicator (4.1) defining terms and considering a definition and (4.2) identifying assumptions. Figure 10 shows the distribution of critical thinking aspects providing further explanations developed in the questions in each chemistry textbook.

Based on Figure 10, it can be seen that both indicators appear in the textbooks analyzed, but interestingly, these indicators only appear in two chemistry books, namely, indicator (4.1) defines terms and considers a definition contained in Book D and indicator (4.2) identifies assumptions. found in book A, while in the other four books the two indicators do not appear. Overall, the emergence of critical thinking aspects providing further explanation has not been evenly distributed in every book analyzed. Of the six books analyzed, only two chemistry books that develop aspects of

critical thinking provide further explanation, namely A and D books. However, both indicators have appeared in these two books.

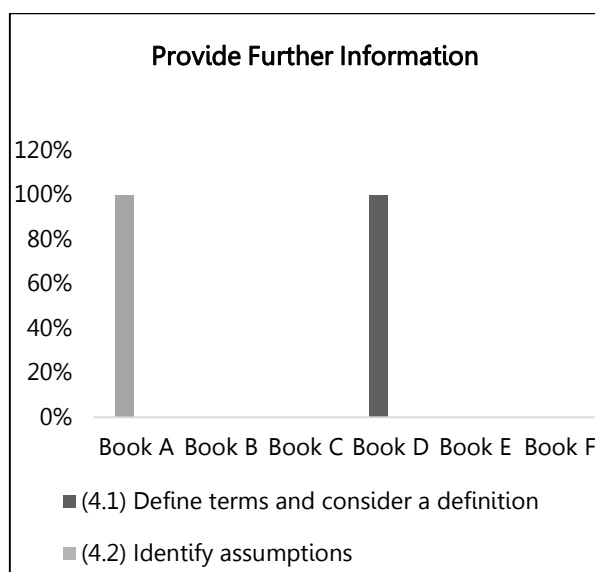


Figure 10. Percentage of Indicator of Making Advance Clarification Found in Each Chemistry Textbook

Indicator defining a term and considering a definition is developed in the questions in chemistry textbook D. Figure 11 shows an example of a question developing an indicator defining a term and considering a definition.

Oxidative reactions also occur when solid calcium is burned with gaseous oxygen. In this reaction it produces solid calcium oxide. Formulate this reaction into a balanced chemical equation.

Figure 11. Sample Question to Measure Skill of Defining Terms

The question above asks students to change a statement about a chemical reaction into a balanced chemical equation. This question requires students to explain further how to make a balanced chemical equation of a chemical reaction written descriptively. This motivates students to be able to interpret or interpret terms in existing chemical language into a reaction equation in the form of symbols of a chemical element. Based on this, the questions above fall into the category of questions that develop indicators, define terms and consider a definition.

The indicator developed next is to identify the assumptions contained in chemistry textbook A. Figure 12 shows examples of questions that develop indicators to identify assumptions.

The chloride compound of element ${}_{20}\text{X}$ has the chemical formula..	
A. X_2Cl	D. XCl_2
B. X_2Cl_2	E. XCl_3
C. XCl	

Figure 12. Question Sample to Measure indicator of Identifying Assumptions

The questions above allow students to make assumptions about the possible compounds that will be formed from the two given elements. In this case, students' reasoning is needed to solve the problem and students must be able to provide logical arguments to support the assumptions they provide. Based on this, the questions above are included in the category of questions that develop indicators to identify assumptions.

In proposing an assumption to a problem or event that occurs students must have a knowledge base, in this case the right theory to be the basis for the assumptions they provide so that it can be accepted. Because according to Visande (2014), assumptions are assumptions taken from personal opinions that are beyond the reach of facts. Someone who thinks critically is not easy to give and accept an assumption. A person's assumptions can be accepted if they are clear, logical, based on extensive experience, and supported by facts.

3.2.5. Managing strategies and tactics

This aspect is the least developed aspect of critical thinking in the questions in the analyzed chemistry textbooks, which is 1.7%. These findings are in line with the results of research obtained by Frandeska (2014), that the critical thinking aspect of managing strategies and tactics is the aspect that is least developed in questions in textbooks analyzed with a percentage of 1.9%. This aspect consists of two indicators, namely, indicator (5.1) determines an action and indicator (5.2) identifies assumptions. Figure 13 shows the distribution of critical thinking aspects

providing further explanations developed in questions in chemistry textbooks.

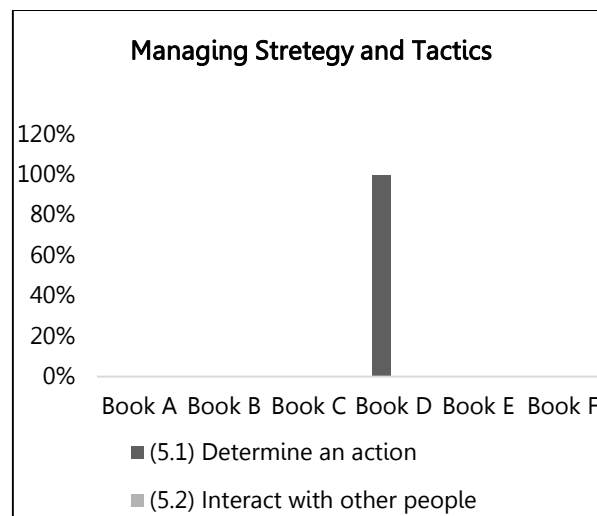


Figure 13. Percentage of Indicators of Building Strategies and Tactics in Each Chemistry Textbook

Based on Figure 13, it can be seen that only one indicator appears in the analyzed textbooks, namely indicator (5.1) determines an action, but more interestingly, this indicator only appears in one chemistry book, namely, book D. Overall, the emergence of critical thinking aspects governs strategies and tactics are not evenly distributed in every chemistry textbook. Of the six books analyzed, only one chemistry book developed the critical thinking aspect, namely book D and only one indicator appeared in that book.

Indicators that appear in chemistry textbooks are indicators that determine an action. Figure 14 shows an example of a question that develops indicators to determine an action.

Provide one apple and then peel. Watch out for the color of the apple which has been peeled. Leave to rest for 1 hour, then watch the apple again earlier. How's the color now? Identify the cause for changes in the apple. Also, learn how you can prevent changes in the apple. Then, practice the method to prove the truth and report that activity. Make documentation of this activity to be included in your report.

Figure 14. Question Sample to Measure Skill of Deciding on an Action

The question above has several steps that students must take to solve the problem. First, students are asked to reveal the causes of the phenomena that occur and then find out the steps that can be taken to prevent it from happening. After that, students are asked to apply it directly or prove the findings obtained. Based on this, the questions above are included in the category of questions that develop indicators to determine an action.

In taking a decision or action, you must first understand the problem at hand and then determine the causes of a problem or phenomenon that occurs, as well as determine the factors that can hinder and support factors in solving the problem. After that, link the various information that has been obtained to formulate various possible problem solving solutions that can be done and then test them and observe their application. Through this activity, students can construct their own solutions to the problems they face and gain meaningful experiences during the process (Birgili, 2015).

Characteristics of high-order thinking skills questions, one of which is critical thinking, requires students to explore their thinking processes by linking and constructing various information obtained to take decisions or actions in solving problems. The questions in the textbook need to be prepared in such a way as to enable students to make logical inferences, analysis, synthesis, assessment and interpretation, and contribute to the improvement of critical thinking skills.

4. Conclusion

Based on the results of the analysis and discussion, the textbooks analyzed have developed the five aspects of critical thinking into questions, which include aspects of a) making simple explanations with a percentage of 28.8%, b) building basic skills by 20.3%, c) concluding by 45.8%, d) providing further explanations at 3.4%, and e) managing strategies and tactics by 1.7%. Thus, it has represented the critical thinking aspect, but the proportion of aspects developed in the question is not balanced, only one aspect of

critical thinking dominates, namely the critical thinking aspect which concludes with a percentage of 45.8%.

Therefore, it is necessary to pay attention so that the critical thinking aspect is further developed in the questions in the textbook in order to improve students' skills and reasoning processes so that they can train their thinking skills at a higher level. Suggestions from researchers for other researchers who want to do similar research are advised to do research on other materials and focus on one or two materials that match the indicators for the question.

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