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Critical thinking assessment in the teaching of writing Indonesian scientific texts in high school

Rustam; Priyanto*
Universitas Jambi, Indonesia
*Corresponding Author. E-mail: priyanto@unja.ac.id

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ABSTRACT

The assessment of critical thinking in the teaching of Bahasa Indonesia is an essential part of teaching syntax because most Bahasa Indonesia teachers of high schools in Jambi still use objective test assessments or low-order thinking skills (LOTS). In fact, there are still many Bahasa Indonesia teachers of high schools in Jambi who have not implemented HOTS-based assessment, so the teaching process and learning outcomes of writing HOTS-based scientific texts are still low. To overcome this problem, it is necessary to study the critical thinking assessments in writing Indonesian scientific texts in high school to find authentic and contextual assessment designs to achieve learning objectives. The research method used is a mixed method of the concurrent embedded design. The qualitative data were collected through interviews, observation, and documentation, while the quantitative data were collected by using an essay test. The results of the study indicate that Indonesian language teachers have designed critical thinking assessments in writing scientific texts by conducting basic competency (BC) analysis, analyzing competency achievement indicators (CAI) by considering action verbs (AV), making stimuli, making question grids, constructing question criteria, and scoring by considering critical thinking aspects, including (1) focus, (2) supporting reasons, (3) organization, (4) conventions, and (5) integration. Student learning outcomes in writing scientific texts show good critical thinking competence in accordance with learning objectives.

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INTRODUCTION

Curriculum 2013 has undergone developments and improvements since its rolling out in 2013. The improvement is based on the Regulation of the Minister of Education and Culture of Republic of Indonesia No. 160 of 2014 concerning the implementation of Curriculum 2013 aimed at the alignment of ideas, designs, documents, and their implementation. Improvements to Curriculum 2013 include the competencies that students learn are measurable through indicators that are easy to formulate and feasible to implement. Furthermore, Regulation of the Minister of Education and Culture of Republic of Indonesia No. 36 of 2018 concerning the changes to Minister of Education and Culture Regulation No. 59 of 2014 on Curriculum 2013 for high school is in terms of improving mindsets, including strengthening critical learning patterns. The critical learning pattern is strengthened by the efforts made by the Directorate General of Teachers and Education Personnel (Ariyana et al., 2018) referring to strengthening character education and learning oriented to higher-order thinking skills (HOTS).

HOTS-oriented teaching requires critical thinking competence in text-based Indonesian language teaching. Texts in teaching mean that through texts students' thinking abilities can be developed and texts are also relevant to achieving cognitive, affective, and psychomotor com-

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petencies (Mahsun, 2014). To measure students' thinking competence in text learning, it is necessary to design a critical thinking assessment through text teaching design.

A research conducted by Rustam (2020) reported that teaching to write texts (producing non-fiction/scientific texts) in Bahasa Indonesia subject in Jambi has not been maximum. Teachers still use objective and short-answer tests for assessing student learning outcomes.

Critical thinking assessment in writing Indonesian scientific texts in high school needs to be done because some teachers still use multiple-choice item tests or objective assessments, which only measure student learning outcomes at stages of C1, C2, and C3, which are LOTS-oriented or low level. This is based on the results of research by Attamimi and Setiadi (2020) which reported that the assessment based on higher-order thinking skills (HOTS) in the assessment instrument for Indonesian language learning in high school still uses multiple-choice tests at a low level, which is below the C4 level (analysis) because designing HOTS questions requires professional teachers who are competent at the cognitive domain, especially in writing scientific/non-fiction texts. Furthermore, Suparman (2020) mentions that 70% of the critical thinking test items in cognitive assessment of writing nonfiction/scientific texts made by high school teachers in lesson plans are still at cognitive level 2 and level 3 of Bloom Taxonomy (Bloom & Anderson) or they measure LOTS and do not measure student learning outcomes at high cognitive levels (C4, C5, and C6) that are HOTS-oriented (Airasian et al., 2001). To measure students' competence in writing scientific texts, authentic and contextual assessment instruments are needed, oriented to critical thinking competencies.

Critical thinking is needed in learning activities because critical thinking competencies must be mastered by teachers and students. Mastery of critical thinking in depth will form the concept of reasoning critically, making decisions, thinking creatively, drawing logical conclusions, and being able to solve problems (Zakiah & Lestari, 2019). If critical thinking is used in teaching-learning activities, then the brain (reason) of students can organize information to achieve the demands of basic competence (BC). Critical thinking also generates reflective and productive thinking and involves authentic assessment. Critical thinking means an effective mental process that can be used by teachers and students in mastering knowledge related to students' real-world lives (Kumar & James, 2015; Ordem, 2016; Rustam et al., 2020).

Jenicek (2006) explains that critical thinking can identify problems, ask questions, give answers or arguments, and find other information.

> *"Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication as a guide assessment to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness. It entails the examination of those structures or elements of thought implicit in all reasoning: purpose, problem, or question at issue, assumptions, concepts, empirical grounding; reasoning leading to conclusions, implication, and consequences, objection from alternative viewpoints, and frame of reference".*

Critical thinking in learning to write Indonesian scientific texts requires better special skills and must meet intellectual references, such as clarity, relevance, adequacy, and coherence. Students' critical thinking cannot be separated from the ability to observe and communicate sources of information so that they can carry out interpretation and evaluation correctly. Critical thinking competence consists of at least a problem-solving process in the context of oneself, others, and the surroundings. Thus, critical thinking is the result or point of achievement of thinking which is a natural way to interact by generating ideas based on the information received so that critical thinking skills cannot be separated from writing skills (Kostelnik, 2007). Furthermore, Sumarni et al. (2018) write that the instrument for assessing critical thinking skills was developed as an alternative for teachers to reveal students' critical thinking skills and to evaluate students' conceptual understanding and critical thinking skills.

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Aspects of critical thinking in writing scientific texts also pay attention to several things, namely (1) drawing conclusions by analogy, (2) drawing conclusions using a hypothetical syllogism, (3) drawing conclusions using a categorical syllogism, (4) drawing conclusions using an enthymeme syllogism, (5) drawing conclusions with alternative syllogisms, (6) drawing logical and valid relationships between problems, (7) identifying implied statements, (8) drawing conclusions and similarities based on appropriate generalizations, (9) avoiding misunderstanding due to wrong causal relationships (cause consequences), (10) using appropriate, clear, and distinctive language, (11) assessing facts and evaluating statements, and (12) drawing conclusions based on relevant evidence and information (Ennis, 1993; Sani, 2019).

To optimize students' critical thinking skills towards scientific text materials, the use of language using logical thinking structures which test the truth of science and experience from various aspects will have an impact on them to become independent students. Intellectual independence will increase courage, decency, and faith, and it will make students become intelligent and responsible human beings. Practicing critical thinking is very important because it can develop attitudes and perceptions that support the creation of conducive classroom conditions, integrate abilities, broaden knowledge horizons, actualize the meaning of knowledge, and develop critical thinking behavior. Critical thinking assessments can be constructed in an open-ended test format because this test is more objective to measure the student learning outcomes (Ennis, 2011).

To measure or assess students' learning outcomes or abilities in writing scientific texts, the "Illinois Critical Thinking Essay Test" scoring concept by Ennis (1993) and Facione (1990) is used. This scoring concept consists of six assessment components: focus, supporting reasons, reasoning, organization, conventions, and integration. Focus means measuring the level of the truth and clarity of a topic's main idea or theme in scientific writings or texts. The focus component is more than one statement or there are sub-topics of scientific texts. Supporting reasons mean measuring the level of truth, clarity, trustworthiness, and credibility of supporting reasons or evidence or other supporting sources. This section measures the strengths or weaknesses of scientific texts with concrete examples in the form of plausible facts. Reasoning means measuring the level of truth and clarity of conclusions supported by strong reasons and evidence by showing generalizing (inferred from examples and evidence), best-explanation inferring (reasonable and consistent with stated facts), and value judging (statements for assessing something). Organization means measuring the level of clarity and interrelationship between the flow of thought and the firmness of the initial plan to write scientific texts. Does the composition of the text show a clear structure? Are the answers related to each other? Conventions mean measuring or assessing the use of scientific text grammar (characteristics of scientific texts). Integration means measuring or assessing the clarity or correctness of writing in accordance with the type of text, purpose, and function of the written text.

The Indonesian texts studied by high school students are scientific texts and non-scientific texts. Scientific texts are fact-based texts or factual texts such as reports on observations, expositions, negotiations, debates, biographies, procedures, explanations, lectures, proposals, scientific works, reviews, job applications, editorials, articles, and literary criticism. In terms of the aspects of function, scientific texts convey factual information and broaden scientific knowledge. In terms of structure, they start from general statements/problem introductions, details, and conclusions and are relatively fixed in nature. In terms of language, they are standard and standardized, denoted, and use technical terms (Kosasih & Kurniawan, 2019).

The characteristics of scientific texts used as references are as follows: (a) simple structure; (b) containing lexical and information-dense words; (c) using the form of nominalization; (d) using grammatical metaphors through incongruent expressions; (e) using technical terms; (f) taxonomic and abstract; (g) using an exophoric reference system; (h) using identifiable relational processes and attributive relational processes; (i) using indicative-declarative sentences; and (l) not using minor sentences (Wiratno, 2009).

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Research on critical thinking assessment in the teaching of scientific text writing needs to be done to reveal the Indonesian language teachers' competence in understanding texts as a form of implementing students' thinking patterns in conveying information in accordance with instructional objectives. How the teacher's competence in designing critical thinking-oriented assessments is reflected in the teacher's ability to analyze basic competencies (BC) by reducing it to competency achievement indicators (CAI) using action verbs (AO) (Bloom & Anderson's Taxonomy), making question grids, and by making scoring using the Critical Thinking Essay Test indicator with aspects including (1) focus, (2) supporting reasons, (3) organization, (4) conventions, and (5) integration.

Previous research related to text assessment carried out by Sari et al. (2019) reported that there was a significant positive relationship between critical thinking skills and the ability to write texts with the gain score of 0.855 ($p = 0.00$). Based on the results of the analysis in the study, it can be stated that if students get high scores in critical thinking, they also get high scores in writing editorial texts. On the other hand, if they get a low score in critical thinking, they will also get a low score in writing texts. Thereofre, there is a positive correlation between the ability to think critically and the ability to write texts. The research by Tustiningsih and Kuntoro (2020), based on the product-moment correlation analysis of 0.729, shows that there is a positive and significant relationship between students' critical thinking skills and their ability to write argumentative texts. This is also shown in the results of research by Cahyanto et al. (2016) related to critical thinking assessments which can help explore and develop students' critical thinking skills in critical reading.

Thus, this study focuses on the competence of Indonesian high school teachers in Jambi to understand and design critical thinking assessments in the assessment instrument for writing Indonesian scientific texts in high school. The design of the assessment of writing scientific texts by the teacher refers to the syntax of writing essays and determining scores with indicators of critical thinking in writing scientific texts. This research has differences from the relevant research, especially in the study of the text as an instrument to see students' critical thinking competence in learning critical reading and to see assessments with higher-order thinking skills (HOTS) by paying attention to the cognitive level. Meanwhile, this research was to look at the teacher's syntax in studying the components of compiling assessments and implementing the results of learning to write scientific texts by using critical thinking indicators.

RESEARCH METHOD

The research design uses a combination of mixed methods with a concurrent embedded design which is defined as a combination with an unbalanced mixed design, which is the research method that combines qualitative research and quantitative research by mixing the methods in an unbalanced manner (Creswell & Creswell, 2018; Sugiyono, 2016). This combination method can describe and compare the findings from the interviews of teachers and students about learning to think critically in writing scientific texts and is also able to optimize findings on the student learning outcomes in writing scientific texts.

The research was conducted at six public and private high schools in the city of Jambi, involving six teachers and 18 students of grades X, XI, and XII. Data were collected using the concurrent sampling technique, in which quantitative probabilities and qualitative sampling are combined into independent procedures or applied simultaneously like open responses and written test instruments (Creswell & Creswell, 2018). This means that the qualitative data were collected through interviews and focus group discussions. Likewise, the researchers also used in-depth observation techniques as well as written evidence that can save researchers time in transcribing. Meanwhile, the quantitative data were collected by using a description or essay test about scientific texts using the Critical Thinking Essay Test indicator which was modified from Ennis (1993).

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Referring to Ariyana et al. (2018) on the Directorate General of Teachers and Educational Personnel part III of the analysis of Graduate Standard Competence (GSC), Core Competence (CC), and Basic Competency (BC) in the formulation of competency achievement indicators, the data needed is the teacher's potential in designing and analyzing (a) basic competency (BC) with indicators of competency achievement using action verbs (AO), (b) AO stimulus (level 4, level 5, and level 6), (c) question grid, (d) question criteria, and (e) scoring guidelines. The data analysis was done in stages, namely, qualitative and quantitative data analysis done simultaneously at one time (concurrent embedded). For qualitative data, the analytical steps include (a) making clear categories or information (open coding), for example, teacher's competence in designing critical thinking assessments; (b) choosing one category and placing it in a model theory (axial coding); (c) then describing the narrative form based on the relationship between the two cases (selective coding) (critical thinking done by students in writing texts with critical thinking essay test indicators in the form of a minimal structure). Measurement indicators include (1) focus, (2) supporting reasons (reasoning), (3) organization, (4) conventions, and (5) integration; with the score ranging from 1 to 5, with quality 5 = excellent, 4 = good, 3 = sufficient, 2 = fair, and 1 = poor.

FINDINGS AND DISCUSSION

Findings

Based on the interview, an overview of the participants' understanding of critical thinking assessment in writing scientific texts is as follows: (a) understanding the concepts and steps of critical thinking, (b) critical thinking indicators, (c) curriculum components or structures, and (e) basic competency analysis. Understanding the concepts and steps of critical thinking means that students are given an understanding of what and how the process must be done in learning by identifying problems, providing an assessment of relevant information, and finding solutions. Besides, the research participants explained critical thinking indicators, including analyzing skills, synthesizing problem-solving skills, concluding skills, and evaluating or assessing skills. For curriculum components or structures, the participants analyzed graduate competency standards, core competencies, basic competencies, and competency achievement indicators. In analyzing basic competencies, they compared indicators of competency achievement that refer to cognitive level thinking abilities C4 (analyze), C5 (evaluate), and C6 (create).

The problems found in designing critical thinking assessments in writing scientific texts include providing the right stimulus after analyzing basic competencies. The stimulus presented must be in line with the indicators and questions that will be designed. The stimulus given can be in the form of contextual phenomena, for example writing text articles with topics experienced by students in the context of online and off-line teaching and learning activities. Stimulus questions are related to historical information, experimental data, and health problems experienced by students. Other problems related to stimuli of critical thinking processes are interpreting texts, analyzing arguments, looking for relationships between contexts, and analyzing information critically to find solutions.

The participants had difficulty in writing the question grid by analyzing the interrelationships among components, basic competencies, materials, question indicators, and the form of the questions used. They had to consider various aspects related to the characteristics of each student's competence in reasoning and learning techniques, and found difficulties in preparing questions on basic critical thinking skills, namely description questions that required them to have inference competence, recognize assumptions, analyze arguments, and draw conclusions by deduction and induction. They also had difficulty in determining the score or result in the assessment. From the observations and collected documents, data about the design of critical thinking assessments in writing scientific texts were obtained and are presented in Table 1.

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Table 1. Data on Design of Assessment of Critical Thinking in Scientific Text Writing

Assessment Design Aspects	G1	G2	G3	G4	G5	G6
Analysis of basic competency (BC) considering the action verbs (AV)	v	v	v	v	v	v
Presenting stimuli	v	-	v	v	-	v
Writing test item grid	v	v	v	-	v	v
Test item criteria	v	v	v	v	v	v
Scoring guide	v	v	-	v	v	-

Notes: G1- G6 = teacher 1 – 6

Based on the qualitative data from interviews with the participants (teachers) and observations of the implementation of the assessment design for writing scientific texts in teaching to write scientific texts by teachers, the research findings are as follows. The data from six participants (G-1, G-2, G-3, G-4, G-5, and G-6) show that they (1) diagnose the level of critical thinking ability and character of students, so teachers can decide what to teach, (2) they give feedback to students about their critical thinking skills, so teachers can decide what to do about it, (3) they motivate students to become better critical thinkers, (4) they get information about the success of their efforts in teaching critical thinking to students, (5) there is information for student admissions and guidance to students, (6) there is information for school policies and other matters that can be accounted for related to students' critical thinking skills.

All participants (teachers) used the essay test rather than other forms because the essay test encouraged students to give a response or answer rather than just choosing an answer. Essay tests have the potential to reveal students' ability to reason, structure, analyze, synthesize, and evaluate. The advantages of essay tests are that (1) they can be used to assess critical thinking skills, (2) they can evaluate students' thinking and reasoning processes, and (3) they provide authentic experiences.

The data from six teachers (G-1, G-2, G-3, G-4, G-5, and G-6) show that they design an assessment of writing scientific texts using a critical thinking essay test (CTET) in the form of a minimal structure beginning with understanding and analyzing basic competencies (BC) in accordance with learning objectives so that the assessment of knowledge and skills (BC from CC-3 and CC-4) is carried out by measuring student mastery which includes the dimensions of factual, conceptual, procedural, and metacognitive knowledge in various levels of thinking processes. The knowledge assessment procedure begins with planning, developing assessment instruments, implementing the assessment, processing, and reporting, as well as utilizing the results of the assessment.

Other data from the six teachers (G-1, G-2, G-3, G-4, G-5, and G-6) show that knowledge assessments use written tests and assignments. Assessment of learning outcomes is expected to help students to improve their critical thinking skills because critical thinking in writing scientific texts can encourage students to think broadly and deeply about the subject matter in a realistic way.

The things that the teacher does in preparing questions are: (1) analyzing BC oriented to critical thinking questions and communicating scientific writing; (2) compiling a question grid according to the GPA, subject matter related to BC to be tested, formulating question indicators, determining cognitive levels, determining the form and number of questions, and choosing interesting and contextual stimuli; (3) writing the questions according to the question grid, except fory G-3 and G-6; (4) making scoring rubrics or answer keys.

Critical thinking-oriented questions in writing scientific texts are an instrument for measuring students' basic critical thinking skills, namely the ability to think that is not just recalling, restating, or referring without processing (reciting). These questions, in the context of an assessment, measure the ability to: (1) transfer one concept to another, (2) process and apply information, (3) find connections from different types of information, (4) use information to solve problems, and (5) scrutinize ideas and information critically.

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Viewed from the knowledge dimension, generally, critical thinking questions measure the metacognitive dimension, not just the factual, conceptual, or procedural dimensions. The metacognitive dimension describes the ability to relate several different concepts, interpret, solve problems, choose problem-solving strategies, discover, argue, and make the right decisions. The assessments using critical thinking skills-oriented questions are assessments based on real situations in everyday life, with which students are expected to be able to apply learning concepts to solve problems. The students must have the skills to relate, interpret, apply, and integrate knowledge in classroom learning to solve problems in real contexts.

Contextual problem-based assessment has the characteristics that students construct their own responses, not just choosing the available answers. Tasks are challenges faced in the real world, and the tasks given have not only one particular correct answer but allow many correct answers. However, there are still obstacles experienced by students in drawing appropriate conclusions based on their critical thinking competence. The level of reasoning is the level of critical thinking ability. For this reason, students must be able to remember, understand, and apply factual, conceptual, and procedural knowledge and they should have high logic and reasons to solve contextual problems (non-routine, real situations). The level of reasoning includes the dimensions of the thinking process of analyzing (C4), evaluating (C5), and creating (C6). The analytical thinking process dimension (C4) demands the students' ability to specify aspects/elements and to describe, organize, compare, and find implied meanings. The dimension of evaluating thinking process (C5) requires students' ability to formulate hypotheses, criticize, predict, assess, test, justify, and blame. Meanwhile, the creative thinking process dimension (C6) requires students' ability to design, build, plan, produce, discover, update, perfect, strengthen, beautify, and compose.

The learning outcome verbs or action verbs (AO) that are often used include: describe, organize, compare, formulate, criticize, predict, evaluate, test, conclude, design, build, plan, produce, find, update, perfect, strengthen, beautify, and compose. In addition to using AO, teachers also integrate indicators of critical thinking skills.

In preparing questions for writing scientific texts, only participants G-2 and G-5 did not determine the behavior to be measured and neither did they formulate the materials that would be used as the basis for the question (stimulus) in the context in accordance with the expected behavior of the students. The description of the questions requires mastery of teaching materials, skills in writing questions (construction questions), and the teacher's creativity in choosing the stimulus questions according to the situation and conditions of the school environment. Each test item should be equipped with a scoring rubric or answer key. Scoring rubrics are made in the form of description questions. The complete indicator questions contain the components of ABCD, namely Audience (students), Behavior (ability to be measured), Condition (stimulus), and Degree (degree of accuracy) in line with what the teacher does.

All knowledge assessment activities are measured by taking into account the indicators or ABCD formula, namely Audience (students), Behavior (ability to be measured), Condition (stimulus), and Degree (degree of accuracy). For example, Participant G-1 in writing the text about the observation report on the earthquake disaster designed questions that led students to be able to overcome the earthquake disaster; in the cognitive section, it was filled with reasoning (covering the dimensions of the thinking process of analyzing, evaluating, and creating/creating) the question form section, filled with writing descriptions of writing scientific texts; writing scientific texts on certain topics and the question number section being completed based on the serial number of the questions.

The same thing was also done Participants G-2, G-3, G-4, G-5, and G-6, who said, "We conduct an assessment of student learning outcomes related to indicators of critical thinking skills in writing scientific text using indicators or aspects: focus, supporting reasons, organization, conventions, and integration." The result of analysis data on scientific text writing done by students can be seen in Table 2.

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Table 2. Result of Analysis of Data on Scientific Text Writing Done by Students Using Critical Thinking Aspects

Student	Focus	Supporting Reasons	Organization	Conventions	Integration
A	5	5	5	4	5
B	5	4	5	5	5
C	5	3	5	3	5
D	5	5	5	5	5
E	5	4	5	5	4
F	5	3	5	4	5
G	5	5	5	4	5
H	5	4	5	5	5
I	5	5	5	4	5
J	5	3	4	3	5
K	5	5	5	4	5
L	5	5	5	4	5

Note: 5 = excellent, 4 = good, 3 = sufficient, 2 = fair, 1 = poor

Discussion

Basic Competency Analysis Using Action Verbs of Critical Thinking

The analysis of basic competencies (BC) using action verbs (AV) for critical thinking was evaluated according to Curriculum 2013. The BC analysis as a further description of core competencies (CC) which contains three domains, namely affective, cognitive, and psychomotor, was carried out by the teachers.

The results of the analysis of the assessment of writing scientific texts conducted by Bahasa Indonesia teachers in the city of Jambi showed that the teacher had analyzed student learning outcomes in the BC units set out in Curriculum 2013. The BC analysis was carried out considering BC as a further description of core competencies (CC) which contains three domains, namely affective, cognitive, and psychomotor domains. Furthermore, in analyzing BC, the teachers adjusted to the cognitive levels (C1 to C6). The use of cognitive levels C-4 or C-6 aims to improve students' critical thinking skills, as in the analysis of the BC of class XI in BC 3.3 "analyzing various types of clauses in scientific texts with the themes of education, environment, society, and culture." This is in accordance with the Regulation of the Minister of Education and Culture No. 37 of 2018. The results also show that high school Indonesian language teachers in the city of Jambi have carried out evaluation activities for student learning outcomes in BC units set out in Curriculum 2013. The research of Khaeruddin et al. (2018), in relation to the analysis of critical thinking skills in the basic competencies of Curriculum 2013, reported that the achievement of basic competencies (BC) shows critical thinking skills of the learning outcome verbs: conclude, present, process data, observe, explain, analyze, demonstrate, design, and conduct experiments. The determination of the cognitive level carried out by high school teachers in the city of Jambi is based on the suitability of BC with the level of knowledge of BC demands. Furthermore, the teachers analyzed the BC demands by paying attention to the action verbs (AO) in the BC determined by the curriculum structure.

The initial step taken by the teachers in developing indicators was to analyze the level of competence in the Core Competencies (CC) and Basic Competencies (BC), which can be seen from the action verbs. The Bahasa Indonesia teachers of high schools in the city of Jambi understand the level of competence that exists in BC, namely knowledge, process, and application levels. In addition, the verbs in BC also show aspects of attitude, knowledge, and skills. The results of this study are in accordance with the results of the research (Indaryanti et al., 2019) which show that teachers need to accommodate competencies that are in accordance with BC when they want to develop indicators using cognitive learning outcome verbs of three cognitive levels (C4, C5, and C6). Furthermore, Airasian et al. (2001) argue that if the

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skill aspect is more prominent in BC, the indicators developed must achieve the minimum skills that exist in BC, so it is possible to develop higher competence (C6) and continue to describe the knowledge competency hierarchy with the aspects that have action verb classification that is measurable and observable in achieving higher-order thinking competence. In Facione (1990), the action verbs in basic competence (BC) describe critical thinking skills seen as cognitive skills in interpreting, analyzing, evaluating, inferring, explaining, and self-regulating. This shows that critical thinking skills are competencies that must be developed in students in order that they can be competitive in the 21st century. Thus, students must learn to think critically, skillfully, and independently, so that they can develop their potential to the fullest.

Writing the Grid and Criteria of Critical Thinking Test Items

Based on the results of the research, the Bahasa Indonesia teachers of high schools in Jambi City use an essay test that aims to measure students' critical thinking competence so that teachers are able to (1) identify the level of thinking ability and character of students so that teachers can decide what to teach, (2) use students' critical thinking skills as feedback so that teachers can decide what to do, (3) encourage students to become critical thinkers, (4) use students' success in learning as information, (5) get information from students for student admissions and student guidance, (6) get information from students for accountable school policies related to students' critical thinking skills. To write a grid of critical thinking questions in writing scientific texts, the teachers had adjusted themselves to the steps in Ariyana et al. (2018), namely: (1) analyzing BC oriented to critical thinking questions, (2) compiling indicators of competency achievement (GPA), (3) analyzing the basic material related to BC to be tested, (4) formulating questions indicators, and (5) determining cognitive levels.

In preparing questions for writing scientific texts, the teachers have determined the behavior to be measured and have formulated the material that will be used as the basis for questions (stimulus) in a certain context according to the expected behavior of the students. At this stage, the teachers analyze the stimulus questions so that students can read the stimulus or issues that are happening in their daily lives. This is in accordance with a research by Husna (2019) that reported that teachers must facilitate students in learning activities to write texts with relevant activities to develop their critical thinking skills. This is because the stimulus contains demands for competence to interpret, search for relationships, analyze, conclude, and create. For example, for the BC that reads "analyzing cohesion and coherence in scientific articles", the stimulus for the question is the text of the article and the ability tested is to determine the cohesion and coherence of scientific articles with the cognitive level of C-4.

Constructing essay questions requires the mastery of teaching materials, skills in writing questions, and teachers' creativity in choosing the stimulus questions according to the situation and conditions of the school environment. Regarding the above findings, the results of research by Feng and Wei (2019) revealed that the questions that lead to higher-order thinking skills will encourage students to solve complex problems so that they can improve and develop critical thinking skills and ability to create innovation. Thus, when preparing questions for writing scientific texts, the teachers determine the behavior to be measured and formulate the material that will be used as the basis for the question (stimulus) in accordance with the expected behavior of the students.

For scoring critical thinking assessments in writing scientific texts, the Bahasa Indonesia teachers of senior high schools in Jambi City used the critical thinking essay test assessment as shown in Table 2, namely test indicators, including (1) focus, (2) supporting reasons, (3) reasoning, (4) organization, (5) conventions, and (6) integration. Furthermore, the teachers referred to the scoring indicators which are described into five descriptors, namely (1) all concepts are correct, clear, and specific; (2) all descriptions are correct, clear, and specific supported by

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strong and correct reasons, with clear arguments; (3) the flow of thought is good and all concepts are interrelated and integrated; (4) all aspects of the text are visible and the evidence is good and balanced; and (5) it uses all the characteristics of scientific language. The depiction of scores ranges from 1 to 5 with the quality: very good, good, sufficient, fair, and poor. The scoring is effective in helping the teachers measure students' critical thinking skills in writing scientific texts. The results of this study are in accordance with that of the research by Zubaidah et al. (2015) which reported that the assessment developed does not use a score range of 1-6 but a score range of 0-5, this is because in the 2nd and 3rd score ranges the levels are almost the same, so they can be combined into one. The essay form of assessment encourages students to show a response or answer rather than just choosing an answer. In addition, essay assessment has the potential to reveal reasons, structure, analyze, synthesize, and evaluate. Essay tests can be used to assess critical thinking skills, evaluate thinking processes, and provide authentic experiences. This assessment is aimed at (1) diagnosing the level of students' critical thinking skills, (2) motivating students to become better critical thinkers, (3) informing teachers about the success of their efforts, (4) getting information for student acceptance and guidance to students, (5) getting information about accountable school policies related to students' critical thinking skills.

Learning Achievement in Indonesian Scientific Text Writing Using Critical Thinking Assessment

The results of the analysis of the learning outcome in writing Indonesian scientific texts of the students of high schools in Jambi city, according to critical thinking indicators, show that the level of understanding and implementation is good in terms of focus and organization. The focus aspect is seen in the level of accuracy of the truth and clarity of ideas or main problems of the topic or type of scientific texts written by students in the text of debates, articles, and reports of observations. The students' position or opinion is shown clearly (explicitly) from the beginning to the end of the text and is consistently maintained. For the organizational aspect, the level of clarity or interrelationship between elements of thinking or frame of mind and the firmness of the planning at the beginning of writing the text is well illustrated. The organization aspect measures the composition of scientific texts with a logically clear structure, in both vertical and horizontal dimensions. The research findings show that the vertical dimension can be seen from the use of coherent paragraphs or transitional paragraphs, while the horizontal dimension shows the inter-sentence linkages in the scientific texts written by the students. The aspects of focus and organization in writing scientific texts in high school are the aspects that are relatively easy for students to understand in writing texts. These aspects are interrelated between the main idea and the structure of the text described by the students in writing.

For the aspect of supporting reasons, the student writing has shown the level of truth, clarity, trustworthiness, and credibility of the supporting reasons or evidence; and facts and appropriate sources of reference with good to very good quality. With reference to the results of research conducted by Abduh et al. (2019), scientific texts written by high school students in making statements in arguments have been followed by supporting evidence. However, in using relevant evidence, students still need guidance from the teacher. Thus, the writing produced by the students remains consistent according to the three types of reasoning components, namely generalizing, best-explanation inferring, and value judging.

For the aspect of conventions, the use of grammar by the students in writing scientific texts using sentence structures or clauses in the text is not good. They use sentences without a subject and inappropriate active and passive sentences. They do not use the form of nominalization in the main clause; they do not use technical terms and reference systems for the exophoric meaning; they do not use indicative-declarative sentences and minor sentences. Thus,

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in this case, the linguistic materials need to get attention from Bahasa Indonesia teachers of high schools in Jambi City. The way of assessing critical thinking in scientific writing is different from teacher to teacher. For example, teachers G2 and G5 do not use analogy stimuli or text examples to write in making questions, while teachers G1, G3, and G4 use a stimulus in preparing questions for writing scientific texts. Teachers G2 and G5 think that the material is complete with various linguistic and other elements so that there is no need to make analogies. Furthermore, students do not need other stimuli or analogies in answering questions. Critical thinking assessment in writing texts needs to be carried out to measure students' ability in writing scientific texts. Assessment of critical thinking in scientific writing on the linguistic aspect is a special concern in writing scientific texts. Teachers need to teach aspects of language at the beginning of their teaching. Previous research conducted by Dharma et al. (2019) reported that the teaching step designed by the teacher does not describe text-based teaching, so the text-based Indonesian teaching has not been fully implemented according to the design. In his research report, he states that the implementation of teaching to compose scientific texts should fulfill four stages, namely: (1) building context, (2) modeling, (3) compiling texts in groups, and (4) compiling texts independently.

The integration aspect shows a very good quality as a form of a general assessment of the clarity or correctness of the written descriptions made by students. Scientific texts written by students have shown a picture of the relationship among the supporting elements in writing scientific texts. The supporting aspects of the relevance of scientific texts have shown clear information and are in accordance with the demands of a good text. This is in line with the research conducted by Suhartono (2014), which showed that critical thinking has a direct and positive effect on scientific writing skills. Increasing students' critical thinking skills will have an impact on increasing scientific writing skills by 16%. The research concluded that scientific writing skills were directly affected by the ability to think critically. Furthermore, the research conducted by Singh et al. (2018) on cognitive schema theory suggested that understanding and higher-order thinking skills contributed to writing. Assessment of critical thinking in writing scientific texts is very important for teachers to train students in developing mastery of critical thinking in depth which will form the concept of reasoning critically, making decisions, thinking creatively, drawing logical conclusions, and being able to solve problems.

Based on the findings and discussion of teacher competence in designing critical thinking assessments of writing scientific texts, teachers must prepare learning outcomes assessment instruments by examining cognitive competency achievements in accordance with learning demands. The assessment of competency achievements is carried out to describe the hierarchy of knowledge competencies with aspects that have a measurable and observable classification of learning outcome verbs. In preparing questions for the test of writing scientific texts, the teacher determines the behavior to be measured and then formulates the material that will be used as the basis for the question (stimulus) in accordance with the real behavior expected from the students. The right form of questions to measure students' critical thinking competence is the use of critical thinking essay test assessments. The essay test presented refers to the aspects of focus, supporting reasons, organization, conventions, and integration.

CONCLUSION

Based on the results of the study, Bahasa Indonesia teachers have constructed an instrument for assessing critical thinking in writing scientific texts by conducting the analysis of basic competency (BC) and analysis of competency achievement indicators (CAI) by considering action verbs (AO); making stimuli; making question grids, question criteria, and scoring rubrics by considering the critical thinking aspects of (1) focus, (2) supporting reasons, (3) organization, (4) conventions, and (5) integration. Student learning outcomes describe students' critical thinking competence in writing scientific texts with good quality in accordance with the

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objectives of teaching Bahasa Indonesia in high school. Thus, the results of this study indicate that critical thinking skills are related to the ability to write scientific texts. Based on the results of the study and related to the understanding in designing critical thinking assessments in writing scientific texts, it is suggested that Bahasa Indonesia teachers pay attention to the syntax in making (a) concepts and steps of critical thinking, (b) critical thinking indicators, (c) curriculum components or structures, and (e) competency analysis. In making question grids, question criteria, and scoring, the teachers should consider critical thinking aspects, namely the aspects of (1) focus, (2) supporting reasons, (3) organization, (4) conventions, and (5) integration.

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