The Assessment Profile of The Skills to Interpret Data and Evidence Scientifically in High School on The Covid-19 Virus Pandemic Content

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Abstract. The assessments used in learning are often not in accordance with the demands of developing students' life skills and soft skills, when in fact these skills can be the basis for students to be able to compete with the global community in the future. This research aims to analyze the assessment of the skills to interpret data and scientific evidence on the written test of virus content used in Senior High Schools (SHS). The research method is descriptive through the collection of written test questions documents. The written test questions are analyzed on the Student Worksheet, Daily Test, Mid-Semester Assessment and Final Semester Assessment. A total of six schools in the city of Bandung categorized as public and private were selected by stratified random sampling representing the quality of each school. A total of 133 virus questions from six high schools in Bandung were collected for analysis. The research instrument used a validation rubric about science epistemic skills on indicators of skills in interpreting scientific data and evidence (PISA, 2019 framework). The data were analyzed qualitatively and quantitatively with descriptive statistics. The results showed that the questions used in schools on virus content (94.75%) had not measured the skills of interpreting scientific data and evidence. These questions also do not test students' literacy in facing a virus pandemic. Only a minor proportion of items (2.25%) were found to test data interpretation and scientific evidence skills. In general, the subject of the test in schools still focuses on memory or memorization of material, basic understanding and does not present information or data to be processed and interpreted. Most of the questions presented are only in the form of basic concepts so that it does not require students to think at high levels and reason.
Keywords: development of written test instruments, skills to interpret data and evidence scientifically, the COVID-19 pandemic

Introduction

COVID-19 pandemic that is currently happening has had a tremendous impact on the structure of human life, from the impact on the economic sector to the impact on the education sector. Education, which should have been carried out face-to-face in schools between teachers and students during the COVID-19 emergency period, has been eliminated, and this has resulted in a change in the learning process that takes place. Educational policy has changed. The central government down to the regional level

provides a policy to close all educational institutions. The policy has an impact on the learning process in schools and universities where students and educators cannot be present at the place and carry out face-to-face learning activities as usual (Ahied, et al., 2020). This is done as an effort to prevent the spread of COVID-19.

The Minister of Education and Culture (Mendikbud) of the Republic of Indonesia issued a circular No. 4 of 2020 concerning the implementation of education policies in the emergency period of the spread of COVID-19 which was signed on March 24, 2020. One of which regulates that the learning process is held from home except in green zone areas with certain provisions (Syahril, 2020). The home learning policy is implemented while still involving educators and students through Distance Learning (Arifa, 2020). Distance learning can provide a new learning experience for both students and educators. Students can learn actively, independently and responsibly during distance learning (Arulogun, et al., 2020); Ahied, et al., 2020). In addition, students can also improve various essential skills such as higher order thinking skills during online learning because it provides a lot of actual information as a flexible substitute for distance learning (Reimers, et al., 2020). Basically the principles applied in the policy during the COVID-19 pandemic is "the health and safety of students, educators, education personnel, families, and the community are the top priorities in determining learning policies" (Anugrahana, 2020).

The learning process in schools is the best public policy tool as an effort to increase knowledge and skills (Persel, 1979). In addition, many students think school is a very fun activity; they can interact with each other. Schools can improve students' social skills and social class awareness. School as a whole is a medium of interaction between students and teachers to improve intelligence, skills and affection between them (Aji, 2020). But now learning activities at schools have stopped due to the disruption of COVID-19.

The changing of the current educational structure causes all parties involved to adapt to be able to create an effective learning process without reducing the quantity and quality of learning itself. However, in its implementation, the learning process that occurred during the COVID-19 emergency had several problems that could result in the achievement of educational goals being less than optimal. Some of these problems include the provision of school facilities and infrastructure (Bakalar, 2018), such as the internet network that cannot be enjoyed by all schools, especially in villages, as well as the cost of purchasing expensive data packages. Sikirit (2020) revealed that the most significant obstacle faced by students when studying at home was the lack of internet access and electronic devices. Bad signals are also an obstacle in the implementation of learning. Often students are late in collecting and completing assignments, even understanding the material becomes a significant problem for students (Rasmitadila, et al., 2020).

In addition, the assessment process carried out by teachers has not been carried out optimally. There are fundamental disadvantages for students when there is a school or campus closure. There are many exams that should be done by students in normal conditions, now suddenly because of the impact of COVID-19, the exams are cancelled or postponed. Internal assessments for schools may be considered less important but for students' families assessment information is very important. There are those who think that the loss of student assessment information is very meaningful for the sustainability of the student's future (Aji, 2020).

Departing from this problems, it is necessary to adapt learning, including in the assessment process to be carried out. Inadequate assessment techniques can lead to low abilities of students, one of which is scientific literacy. Literacy is the ability to analyse problems, provide reasons, communicate ideas effectively and apply scientific knowledge flexibility according to problems faced in everyday life (Rustaman, 2006). According to Diana, et al., (2015) currently the position of the quality of Indonesian students in the international world in terms of scientific literacy is very low. This can be seen from the results of the mapping carried out by the Program for International Student Assessment

(PISA) in 2018 published by the Organization for Economic Cooperation and Development (OECD) showing that Indonesia is in 74th place out of 79 countries in the fields of reading, math, and literacy skills, and science performance (OECD, 2019).

In addition, based on PISA results, it shows that the value of scientific literacy skills of Indonesian students is still far below the international standard value set by the OECD (Yuliati, 2017). Indonesia's average score which is still relatively low also shows that most students in Indonesia have not been able to analyze and apply concepts to solve a problem. Students are very good at memorizing, but are still not able to use the knowledge they have (Sholikah & Pertiwi, 2021). Finally, the phenomenon that occurs is that students' willingness to read and write is still lacking (Hasasiyah, et al., 2020).

The teacher's ability to carry out an assessment is very important because it affects the results of the assessment and the evaluation process, where the assessment process is one of the factors in supporting the success of a process and learning outcomes (Sumarra, et al., 2020). Teachers are required to have good competence in carrying out an assessment because it will affect the quality of learning outcomes and student achievement, including the steps students will take to achieve their future. The challenge faced by teachers is how to develop and use instruments to assess scientific literacy. It is important for a teacher to provide a standard scientific literacy test instrument which can then be used by science teachers in Indonesia (Jufri, et al., 2019). In addition, teachers must really have good assessment competence (Hidayatulloh, 2017).

Assessment is seen as an assessment of the process, progress, and student learning (outcomes) (Stiggins, 1994). The assessment must reveal the student's achievements that have been achieved and the student's development of a concept that has been taught (Marzano, et al., 1993). The assessment is carried out as an effort to measure the level of achievement of learning indicators and collect information on student learning progress in various aspects. Aspects measured include cognitive, psychomotor, and affective aspects which are indicated by a change in the thinking paradigm of students, both individually and in groups (Astuti, et al., 2012).

Assessment of learning is an assessment that is carried out after the learning process is complete. Assessment of learning can be used as a tool for program evaluation and accountability using standardized tests (Sumintono & Widhiarso, 2015). In the assessment of the skills to interpret scientific data and evidence, its role is very important in the context of assessment of learning, but the facts show that the assessment used to assess scientific investigation is not yet accurate. Assessment of the skills of interpreting scientific data and evidence in schools is carried out to improve students' comprehension skills in reading data in various representations, analysing and evaluating scientific data, claims and arguments in various representations and drawing appropriate conclusions.

According to the results of the analysis conducted by Sarah, et al., (2020) it shows that the instruments or questions made by the teacher (in this case the Daily Test, Mid-Semester Assessment and Final Semester Assessment) are only a small part (1,81%) of which displays the characteristics of the data interpretation skills and scientific evidence that appears in the questions made by the Science-Biology teacher. Then Faisal, et al., (2018) revealed that the ability of students' scientific competence in petroleum material based on the ability to use scientific evidence was in the sufficient category, reaching 61%. Another study from Harlina, et al. (2020) stated that scientific literacy skills in the aspect of scientific competence of grade IX students at SMP Negeri 3 Makassar for indicators using scientific evidence on the material pressure of substances, the human respiratory system, light materials and optical devices are very low with an average percentage of 26.36% , 33.10%, and 25.94%, then on the material of vibration and low waves with an average percentage of 52.44%.

Based on the results of literature studies, there have not been many studies on the analysis of the assessment profile used by the teachers / schools regarding the skills of

interpreting scientific data and evidence which are part of the 2018 PISA scientific literacy. Therefore, further study is needed on the analysis of written test assessment in particular on the COVID-19 virus pandemic content on the skills to interpret scientific evidence data.

Methods

This research aims to analyse the assessment of the skills to interpret data and scientific evidence on the written test of viral content used in high school. The research method used is a descriptive study through the collection of documents written test questions.

The data of this study were taken from six Bandung City Senior High School (SHS) with documentation techniques; this documentation was used to obtain data in the form of question on Student Worksheets (SW), Daily Test (DT) Questions, Mid-Semester Assessment (MSA) questions and Final Semester Assessment (FSA) questions on the Biology subject of virus content. School selection is carried out by referring to the National Exam (NE) scores of high school students for the 2019/2020 school year in Bandung City based on the criteria of the National Education Standards Agency as follows ; Good: 70 < NE average ≤ 85; Enough: 55 < NE average ≤ 70; Less: 0 ≤ NE average ≤ 55. In this study, the coding of the name of the school was carried out, namely School (SHS) + Category + Status which is presented in Table 1.

Table 1. School Coding

No	School Code	School Status	Category	NE Score
1.	SHSG01P	Private	Good	84.15
2.	SHSG02P	Private	Good	71.48
3.	SHSE01S	State	Enough	68.42
4.	SHSE02S	State	Enough	64.71
5.	SHSL01P	Private	Less	52.02
6.	SHSL02P	Private	Less	48.43

Items that have been collected are the reviewed with using the framework 2019 PISA on the skills of interpreting scientific data and evidence.

Processing the data from the analysis of the percentage of questions that are appropriate, close to appropriate and not in accordance with the question documents of SW, DT, MSA and FSA, then use qualitative descriptive. The percentage calculation is intended to see how many questions from the document suitable, close to or not suitable for indicators of interpreting scientific data and evidence. The percentage (P) is obtained by comparing the number of questions frequency (F) and the number of samples (N) associated with number 100% (Arikunto, 2006). In order to facilitate the assessment criteria, assessment guidelines are interpreted and categorized using the criteria proposed by Koentjaraningrat (1990) which are presented in table 2 below.

Table 2. Guidelines for assessing

| Percentage	Interpretation
0	None
1 – 25	Smaller proportion
26 – 49	Almost half
50	Hal
52 – 75	Most
76 – 99	Almost full
100	Fully

Results and Discussion

Hasil Analisis Data

Data analysis results show that there are four indicators of data interpretation skills and scientific evidence contained in SW, DT, MSA and FSA, namely the transformation of data from one representation to another (SIDSE01); analysing and interpreting data and drawing appropriate conclusions (SIDSE02); identify assumptions, evidence and reasoning in science-related texts (SIDSE03) and evaluate scientific arguments and evidence from various sources (e.g. newspapers, internet, journals) (SIDSE05). The questions were categorized into 3, namely questions that were in accordance with the interpretation of a small part (2.25%), questions that were close to the interpretation of a small part (3%), and questions that were not in accordance with the interpretation of almost entirely (94.75%) on the skill indicators of interpret data and evidence scientifically. The test used by schools to test the skills of interpreting data and scientific evidence is analysed into an analysis of the appropriate percentage of questions, analysis of questions that are close to appropriate, and analysis of the percentage of questions as a whole. Figure 1 shows the percentage of all the questions used in the study, as follows.
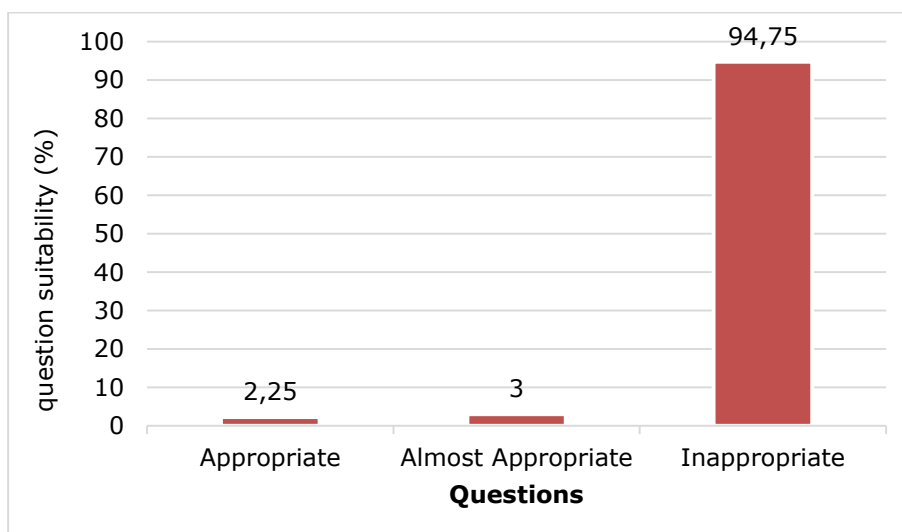
Figure 1. Percentage of using written tests of skills to interpret data and scientific evidence in the content of the COVID-19 virus pandemic

Appropriate Questions Regarding

Analysis of the appropriate percentage of the questions regarding the skill of interpreting data and scientific evidence was only 3 questions with a percentage of 2.25% with a small part of the interpretation. Based on the questions on the SW, DT, MSA and FSA used by schools, there is only one indicator, namely the transformation of data from one representation to another (SIDSE01) obtained from two DT questions from one high school in the city of Bandung, and the third indicator is identifying assumptions, evidence and reasoning in science-related texts (SIDSE03) obtained from one SW questions from one high school in the city of Bandung. These results are presented in Figure 2 as follows.
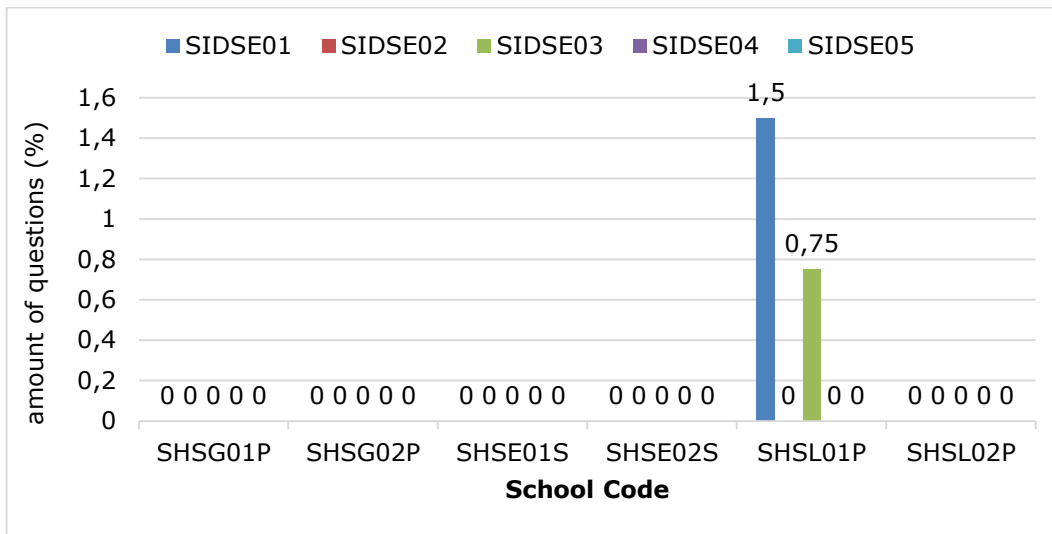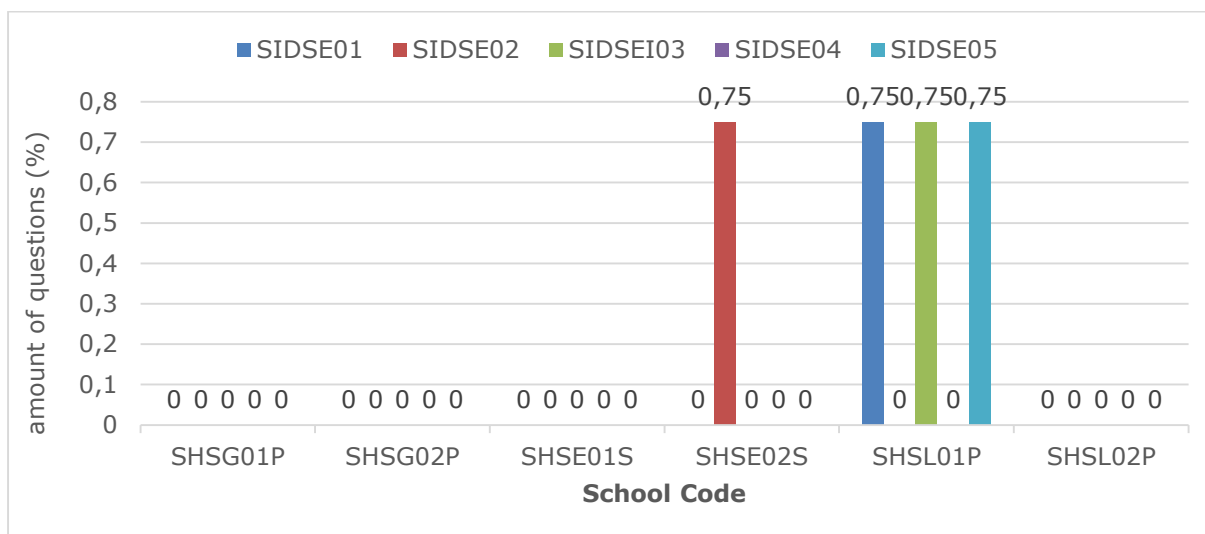
Description: SIDSE = Skills to Interpret Data and Scientific Evidence; SIDSE01 = Transforming data from one representation to another; SIDSE02 = Analysing and interpreting data and drawing appropriate conclusions; SIDSE03 = Identifying the assumptions, evidence and reasoning in science-related texts; SIDSE04 = Distinguishing between arguments that are based on scientific evidence and theory and those based on other considerations; SIDSE05 = Evaluating scientific arguments and evidence from different sources (e.g. newspaper, internet, journals)

Figure 2. Percentage of questions in accordance with the skill of interpreting data and scientific evidence

The percentage of questions that was close to the right about the skills of interpreting data and scientific evidence.

Analysis of the percentage of questions that were close to the appropriate ones regarding the skills of interpreting data and scientific evidence was only 4 questions with a percentage of 3% with small part of the interpretation. Based on the questions on SW, DT, MSA and FSA used by schools, there is only one indicator, namely the transformation of data from one representation to another (SIDSE01) obtained from one SW questions from one high school in the city of Bandung, the second indicator is analysing and interpreting data and drawing appropriate conclusions (SIDSE02) obtained from one SW questions from one high school in the city of Bandung , the third indicator is identifying assumptions, evidence and reasoning in science-related texts (SIDSE03) obtained from one SW questions from one high school in the city of Bandung and the fifth indicator, namely evaluating scientific arguments and evidence from various sources (for example, newspapers, internet, journals) (SIDSE05) obtained from one DT questions from one high school in the city of Bandung. These results are presented in Figure 3 as follows.

Description: SIDSE = Skills to Interpret Data and Scientific Evidence; SIDSE01 = Transforming data from one representation to another; SIDSE02 = Analysing and interpreting data and drawing appropriate conclusions; SIDSE03 = Identifying the assumptions, evidence and reasoning in science-related texts; SIDSE04 = Distinguishing between arguments that are based on scientific evidence and theory and those based on other considerations; SIDSE05 = Evaluating scientific arguments and evidence from different sources (e.g. newspaper, internet, journals)

Figure 3. The percentage of questions that almost appropriate according to the skill of interpreting data and scientific evidence

Assessment of written tests used by schools on SW, DT, MSA and FSA that measure the skills of interpreting data and scientific evidence exists but the amount is very limited. The written test used by high school teachers in Bandung is in the form of multiple choice questions and essays. The teacher-made question instrument is still dominated by elements of Lower Order Thinking Skills (LOTS). These questions have not yet explored scientific investigation skills, in particular the skills to interpret scientific data and evidence. The results of the analysis of 133 SW, DT, MSA and FSA questions made by Biology teachers at Private and Public Schools in Bandung show that the skills in interpreting data and scientific evidence contained in the document are still low in making data interpreting skills and data evidence scientifically with a percentage of 2.25%. This is supported by research conducted by Sarah (2020) which reveals that the percentage of PTS and PAS questions used in the schools studied have not measured the skills to interpret data and scientific evidence, only a small percentage (1.81%) of questions that match the indicator criteria, 2.17%) questions that are close to the indicator criteria and most (95.93%) questions do not match the criteria for interpreting data and scientific evidence skills indicators.

Another study that examines the use of scientific literacy test instruments by teachers in schools has been carried out by Ilannur, et al. (2020) which shows that only a small portion (1.86%) of the six Bandung junior high schools contain skills to explain phenomena scientifically. In addition, Sumarra, et al. (2020) stated that the percentage of PTS and PAS questions used in the schools studied had not been based on the skills of evaluating and designing scientific investigations only had a small portion (1.87%).

Based on the findings and research results so far on various written test assessments that exist in various schools, teachers tend to only use rote questions that do not develop High Order Thinking Skills (HOTS) and are not based on scientific investigation. The questions made by the teacher cannot explore and develop PISA skills, one of which is the skills to interpret data and evidence scientifically, even though the PISA program which is

held every three years is a routine program that is followed by Indonesia as an effort to measure and compare the extent of students' abilities. Indonesian students with other countries in the international assessment the PISA program can be used as a reference for Indonesian education to continue to improve and develop the Indonesian education system. PISA is designed to help governments not only understand but also improve the effectiveness of the education system (Angraini & Sriyati, 2019). With the implementation procedure in accordance with international standards, the results of the PISA assessment have a high degree of truth and reliability so that the data from the PISA study is expected to increase understanding of educational outcomes in both developed and developing countries (Yusuf, 2003). Evaluation can be used as a reference for improving the quality of education and learning that has been carried out previously (Sholikah & Pertiwi, 2021). There needs to be a validity and reliability test for the questions tested in school so that the questions being tested are able to accurately assess students' abilities in order to improve scientific inquiry skills.

The low of skills of interpreting data and scientific evidence according to Sari, et al., (2017) can be caused because students are not trained in solving PISA questions, the availability of supporting teaching materials for students to think at higher levels is still rare, in addition to the limitations of similar questions PISA and low reading interest of students. To improve scientific literacy, teachers need evaluation tools based on scientific literacy. Teachers often ignore scientific literacy-based evaluation tools because they do not understand how to make these evaluation tools (Fraenkel, et al., 2012). Other factors that cause this can be caused by the learning process that occurs in the classroom is still oriented towards traditional patterns where the teacher still dominates the course learning, students are not accustomed to an active and creative learning process based on scientific investigations, especially about interpretation skills data and scientific evidence. Marcharis, et al., (2015) suggest that the teaching that has been carried out so far has rarely carried out investigations such as practicum so that students tend to be passive when in class, and Biology subjects are considered as a lot of theory and memorization lessons so that students feel bored in studying them. Lack of learning that involves the scientific process, such as identifying scientific questions, using existing knowledge to explain natural phenomena, and drawing conclusions based on facts obtained through investigations can have an impact on students' low scientific literacy skills (Ramdaniyah & Dwiningsih, 2017).

In addition, the assessment process carried out by teachers has tended to lack in developing 21st century abilities or competencies such as scientific literacy, even though these competencies are actually competencies that must be possessed by student to be able to compete with the global community. Evaluation of scientific literacy is used to formulate policies that can support the creation of competitive natural resources in the era of globalization, this is in line with the OECD principle that scientific literacy is indispensable in modern society (Sujudi, et al., 2020). In fact, most of the questions developed by teachers in terms to provide questions that do not develop 21st century competence, this is in line with research conducted by Rosalina (2014) which showed that the biology teacher's ability to make 100% test questions was LOTS (Low Order Thinking Skills) questions. The questions given by the teacher tend to be simple, the level of thinking is only at the level of remembering, understanding and applying which results in when there are international student assessment programs such as the Program of International Student Assessment (PISA), Indonesian student tend to lag behind and have lower scores than other countries. Other countries even from Southeast Asian countries. This is contrary to the demands of the prerequisite characteristics of scientific literacy questions presented at PISA, namely presenting questions with a number of information, phenomena or fata in various forms of presentation to be processed by students, questions asking students to process or link the information contained in the question stem Rustaman (2006), which can be presented in the form of multiple choice questions and descriptions, provided that

these questions require students to think HOTS (High Order Thinking Skills) (Ilannur, et al., 2020). The assessment system used by the teacher tends to be a test with a cognitive level of C1-C3, which is only at the level of remembering to the level of applying (Astuti, et al., 2012).

The questions presented in the assessment tool are mostly in the form of understanding concepts and memorizing material so that they do not require students to be able to reason and think at a higher level. Students are not used to working on questions that require understanding and analysis because the evaluation questions given by the teacher on DT, MSA, and MSA are questions that only require students' memory of the material they have learned (Sutrisna, 2021). Students are very good at memorizing, but are still not able to use the knowledge they have (Sholikah & Pertiwi, 2021). The absence of information processing in the questions causes students' reasoning on the meaning of the questions to be lower. This will certainly have an impact on students' mastery of answering Higher Order Thinking Skills (HOTS) questions and the weakness of students' skills in conducting scientific investigations. Identification and investigation activities, formulating problems and providing hypotheses as well as concluding and communicating become one of the supports for students to improve scientific literacy competencies such as explaining scientific phenomena and interpreting scientific data and evidence (Fauziah, et al., 2019).

One of the solutions that can be offered to overcome this problem is by integrating the 2013 Curriculum as the current curriculum in Indonesia with the framework PISA from the OECD, as an effort to introduce and accustom Indonesian students to working on PISA-type problems so that scientific literacy skills students become increased. An example of its application can be carried out in the development of Biology issues as follows: 1) context aspect, can link the context of the COVID-19 pandemic that is currently happening with real life in society, whether related to personal, local / national and global problems; 2) aspects of knowledge, including content knowledge related to the COVID-19 pandemic, namely virus content material according to Curriculum 2013 class X odd semester; and 3) competency aspects, namely the skills to interpret data and scientific evidence. By linking these or new innovation in an assessment process that is more varied, more communicative, and more demanding for students to get out of the assessment comfort zone which has been oriented towards memory or memorization of material. Basic understanding and existing questions do not provide much information or data to be processed and interpreted.

Conclusion

Based on the findings and research, it shows that only a small proportion (2.25%) of the questions were found to test the skills of interpreting data and scientific evidence on viral content used by teachers / schools on SW, DT, MSA and FSA. Teacher-made question instruments are still dominated by Lower Order Thinking Skills (LOTS) elements. There are still many questions that focus on memory or memorization of material, basic understanding and do not present information or data to be processed and interpreted. Most of the questions presented are only in the form of basic concepts do that it does not require students to think at high levels and reason. The results of this study are expected to be a benchmark and provide an overview to educators and various stakeholders in improving and improving the quality of learning and assessments to improve students' scientific literacy skills.

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