

Development of Science Process Skill Assessment for Fifth-Grade Students in Pontianak City

Anisa¹, Anisa Tusapipah², Ayu Sarah Agustin³, Utin Putri Sandy⁴, and Vidya Setyaningrum⁵
^{1,2,3,4,5}*Pendidikan Guru Madrasah Ibtidaiyah, Institut Agama Islam Negeri Pontianak, Pontianak, Indonesia*
romitasari200@gmail.com, anisatusapipah@gmail.com, ayusarahagustin9@gmail.com, saudid171@gmail.com,
vidyasetyaningrum@iainptk.ac.id

Abstract: Education in Indonesia is currently experiencing a curriculum change from the 2013 Curriculum to the Merdeka Belajar curriculum where natural science and social science learning subjects need to be combined into one unit, which we then call the term IPAS. In IPAS learning, there are 2 main elements: understanding IPAS (science and social) and Process skills. But in reality, the assessment of process skills in schools is rarely done. This study aims to develop an assessment instrument to measure fifth-grade students' science process skills (SPS) in all Madrasah Ibtidaiyah Negeri (MIN) in Pontianak City. The questions were developed using the 4D technique. The questions developed were then validated by 2 experts using the Gregory technique. Furthermore, the questions were distributed to all MIN in Pontianak City to determine their reliability. The results showed that based on expert assessment, the KPS questions developed had a very high validity category both in terms of material, construction, and language. Furthermore, based on the results of the trial at MIN in Pontianak City, the reliability value of the question was 0.41 with moderate criteria, therefore, it can be said that the developed questions are valid and reliable to be used as an instrument to measure the science process skills of fifth-grade students.

Keywords: Assessment, Fifth-Grade, Science Process Skill

INTRODUCTION

Education in Indonesia is currently experiencing a curriculum change from the 2013 Curriculum to the Merdeka Belajar curriculum. Merdeka Belajar is a new policy program of the Ministry of Education and Culture of the Republic of Indonesia (Kemendikbud RI) initiated by the Minister of Education and Culture Nadiem Anwar Makarim (Mustaghfiroh, 2020: 142). Merdeka learning forms students to have a caring attitude towards their environment because students learn directly in the field, thus encouraging students' confidence, skills and easily adapting to the environment (Ainia, 2020: 99). One of the subjects studied by elementary school students is Natural Science (IPA). As according to the Law on the National Education System No. 20 of 2003 Article 37 Paragraph 1 that the primary and secondary education curriculum must contain natural science. Science education is intricately linked with the processes of investigation and exploration. This is because science revolves around observing natural phenomena and events that take place in the world around us, which are deeply intertwined with everyday life. Thus, the essence of science learning lies in the activities of investigation and discovery (Hairida & Setyaningrum, 2020).

However, in the new paradigm curriculum for Primary School IV, V and VI Grades, Natural Science (IPA) subjects will be combined with Social Science (IPS) subjects under the name of Social Science (IPAS). This aims to make students better prepared to follow separate science and social studies learning at the junior high school level. (Barlian et al., 2022). According to the Ministry of Education and Research through the independent curriculum handbook, science and social studies subjects need to be combined. This statement is based on the fact that elementary school children still see everything as a whole / integrated, simple, holistic, and comprehensive, although not in detail. The combination of the two subjects is expected to enable students to manage the natural and social environment as a whole. The combination of the two subjects becomes IPAS and begins to be taught in grade III of the primary school level. To provide this understanding to students, natural science and social science learning needs to be combined into one unit which we then call the term IPAS. In IPAS learning, there are 2 main elements: IPAS understanding (science and social), and Process skills. (Kemendikbudristek, 2022).

Science process skills refer to a collection of versatile competencies that reflect the actions typically performed by scientists. Science Process Skills (SPS) play an important role for every education that is used as an asset in developing science and obtaining new knowledge or developing knowledge that has been obtained (Rahmawati & Suratsih, 2018: 227). (Tyas et al. (2021), states that through science process skills, students use their minds to apply various concepts or principles. Science process skills are important for learners because these skills can build the way learners make concepts naturally and at the same time as a way to find the concept itself, so that it is important for their psychological development in exploring the abilities contained in themselves (Nur Aisyah, 2017: 158). In addition, it is often found that low cognitive learning outcomes are related to low science process skills. This is in line with research conducted by Yuliati (2023: 73) the low level of science process skills (SPS) ultimately leads to the low science learning outcomes of students.

Science process skills are one that can be measured using multiple choice questions in accordance with the opinion of Zainab & Wilujeng, (2016:107) which says that the science process skills assessment instrument is a reasoned multiple choice test that can measure cognitive products and processes together to determine the ability of students as a whole. Because the indicators of science process skills measured are very many, but researchers limit it to basic science process skills, namely observing, measuring, classifying, predicting, concluding, and communicating (Sayekti & Kinasih, 2017:99).

Based on research by Ilmi dkk., (2016: 58) the observations results showed that in the field found that the assessment carried out by teachers was more emphasized on assessing knowledge, not process skills. This is because teachers have not done careful planning to measure science process skills, namely developing assessment instruments that measure students' science process skills specifically. In addition, according to research (Haniah & Annisa, 2018: 32) teachers have never given specific tests to measure science process skills in science subjects. The tests developed by teachers actually already exist which are included in science process skills-based tests only by chance the tests made are in accordance with the indicators and learning objectives that specifically measure science process skills. Teachers in

making questions have also never tested the quality of the test to measure the validity and reliability of the questions. This is in line with research Dewi Muliani dkk., (2021: 225) assessment tests given to students only measure concept understanding in the form of memorization without paying attention to students' science process skills. This is because teachers have not done careful planning to measure students' science process skills.

The same thing is also found in MIN in Pontianak city. Where from the results of interviews with several teachers, especially regarding the assessment of science process skills, the teacher asks students to do simple experiment according to the student book. For assessment, the teacher only assesses based on the report of the students' experiment results. sometimes the assessment of students' science process skills is also based on the results of students drawing concepts related to science. This is actually one aspect of basic science process skills, namely communicating. But for other aspects of science process skills, it is still not specifically assessed by the teacher. Therefore, researchers are interested in developing valid and reliable science process skills assessment to measure the science process skills of students, especially fifth-grade in all Madrasah Ibtidaiyah Negeri (MIN) in Pontianak City.

METHOD

This study aims to develop science process skills assessment, so the research method used is research and development (R&D). Sugiyono (2021), explains that R&D is a research method used to make certain products and test the effectiveness of these products. This science process skills assessment development procedure uses the 4D development model by Thiagarajan et al. (1974). This model consists of four stages known as the 4D model. Define, contains to define the product to be developed and its specifications. This stage is a needs analysis activity carried out through research and literature review. Design, includes activities to create a design for a particular product. Development includes activities where the design is made into a product and the validity of the product is tested so that the product is produced according to the specified specifications. Distribution involves the act of distributing products that have been tested for the benefit of others (Sugiyono, 2021). The trial in this study used a one-shot case study design, which is an approach that uses one-time data collection. The test stage consists of treatment (X) and test (O). which aims to determine the reliability of students' science process skills assessment.

The subjects in this study were all fifth-grade students at MIN in Pontianak City who were selected using the stratified random sampling technique. Sugiyono (2021) explains that this technique selects samples randomly based on groups or strata. From this selection, two classes each were selected from each MIN in Pontianak city. Validity in this study uses content validity as according to Sugiyono (2021) for instruments in the form of tests, content validation testing can be done by comparing the contents of the instrument with the subject matter that has been taught. The validity test was carried out to determine the validity of the test instrument for students' science process skills. The test instrument was carried out in the validity testing stage

using the Gregory (2015) test, with 2 expert judgment testers the science lecture and the teachers. The Gregory test validity criteria can be seen in the following table.

Table 1. Gregory test validity criteria

Coefficient of Validity	Validity Level
0,91 – 1,00	Very High
0,71 – 0,90	High
0,41 – 0,79	Moderate
0,21 – 0,40	Low
0,00 – 0,20	Very Low

According to Sugiyono (2021), states that a reliable instrument is an instrument that when used several times to measure the same object, will produce the same data. In this study, the instrument reliability test was carried out in an external way, namely using the splithalf method, where the questions were divided into odd-even. Reliability measurement indicators are presented in the following table:

Table 2. Reliability Test Criteria

Reliable test	Criteria
$0,80 < r_{xy} \leq 1,00$	Very High
$0,60 < r_{xy} \leq 0,80$	High
$0,40 < r_{xy} \leq 0,60$	Medium
$0,20 < r_{xy} \leq 0,40$	Low
$0,00 < r_{xy} \leq 0,20$	Very Low

RESULT AND DISCUSSION

The research results of the development of science process skills assessment for grade V students in MIN Pontianak Kota. This development has gone through a series of stages in the 4D model which can be detailed as follows:

Define stage

This stage is carried out through several steps, namely:

1. Front End Analysis.

This analysis is carried out to find and identify problems that occur through interviews and observations. The problems obtained will motivate the development of science process skills assessment. The results of this analysis, namely: 1) all this time in MIN-Kota Pontianak has not practiced science process skills. This is based on the results of teacher interviews and the results of students' scores. 2) Teachers have never made an assessment to measure students' science process skills.

2. Learner Analysis

In this study, learner analysis was conducted to find out the characteristics of students when learning. This analysis obtained the results that in the process of learning activities in the classroom, students' science process skills have never been trained by the teacher as a whole and the assessment in science subjects that teachers provide has not covered all aspects of basic science process skills, but only limited to concepts.

3. Task Analysis

This analysis is carried out to identify the tasks that will be performed by students. The results of this analysis, researchers determined 6 indicators of science process skills, materials and science process skills test questions on odd semester and even semester materials.

4. Analysis of Science Process Skills Indicators

This analysis was carried out with the aim of identifying indicators of science process skills that would be included in the odd and even semester material for science class V Madrasah Ibtidaiyah.

5. Formulation of Science Process Skills Indicators

Based on the results of the analysis of tasks and indicators of science process skills, question indicators are formulated based on 6 indicators of science process skills and odd and even semester materials on the content of science lessons for grade V Madrasah Ibtidaiyah to determine indicators of science process skills questions.

Design Stage

At this stage, researchers began designing science process skills test questions. The steps in this activity are as follows:

1. Preparation of Test Standards

At this stage, researchers compiled practice questions based on indicators of science process skills. The test standards set train students' science process skills which include observing, measuring, classifying, predicting, concluding, and communicating on odd and even semester material for science class V.

2. Selection of Test Format

The assessments developed to assess the science process skills of grade V students are:

a. Instructions for Working on Test Questions

The instructions for working on this test question are to pray before working on the question and read the question first then answer the question by putting a cross (x) on the answer letters A, B, C, and D on the question answer sheet.

b. Test Questions

Science process skills questions developed by researchers in the form of multiple choice questions consisting of 12 questions.

c. Test Answer Sheet

Science process skills questions tested in the form of multiple choice with four answer choices or options (A, B, C, and D) that refer to science process skills.

d. Test Answer Key

The test answer key on this science process skills question contains answers consisting of answer option A contained in 3 questions, answer option B contained in 3 questions, answer option C contained in 3 questions, and answer option D contained in 4 questions. So, each option A, B, C, and D is contained in 3 questions out of 12 science process skills questions.

e. Test Scoring Guidelines

This scoring method uses scores or numbers given to students who have worked on assessment test questions that contain science process skills. The test score on each item that has been done by students is 8.3 if the answer is correct and is given a score of 0 if the answer is wrong. The number of scores obtained by students is the number of items answered correctly with the scoring formula.

3. Preliminary Design

At this stage, researchers made a lattice of questions and questions about science process skills taken from odd and even semester material through the integrated thematic student book class V Curriculum 2013 Ministry of Education and Culture. In addition, researchers also made a question validation instrument to be tested for validation by 2 validators.:

Table 3. Question grid of science process skill

No	SPS Indicator	SPS Sub-Indicator	Question Number	Total
1	Observing	Presented with a picture of an unhealthy environment, students can observe data using the sensory organs.	1	2
		Presented a picture of a rabbit to observe the organs of motion in the rabbit using the sensory organs.	2	
2	Measuring	Presented with a picture, students can determine the correct measuring instrument.	1	2
		Given data, students can determine the temperature difference between two places.	2	
3	Classifying	Given data, students can classify animals that are carnivores.	1	2
		Presented with data, students can classify ecosystems that include artificial ecosystems.	2	
4	Predicting	Students can predict the changes in the food chain if the locust population is reduced.	1	2
		Students can predict the outcome of an event based on data	2	
5	Concluding	Students can draw conclusions from a solid change event.	1	2
		Students can summarize a story about heat transfer.	2	
6	Communicating	Students can describe empirical data from the results of compiling and submitting reports systematically and clearly.	1	2
		Presented with a description of a state change event, students can convey the state change event in the form of a picture.	2	
Total				12

Development Stage

Azwar (2013), states that it is very important to pay attention to the quality of a the product of the development of both questions and other evaluation instruments that will be used in research. So in this stage, the question of science process skills of grade V students is produced which has been validated by experts and tested by 325 grade V students in MIN Pontianak. The experts' assessment used a content aspect validation assessment sheet by 2 validators. The assessment criteria on the content aspect can be seen in table 4, the aspects assessed include: (1) the suitability of the material with the measurement objectives; (2) the suitability of the instrument items with the indicators; (3) the language used does not cause double meaning (Ilmi, dkk., 2016).

Based on the validation results, it was found that the science process skills assessment instrument developed was feasible to use as an assessment instrument to measure science process skills in science subjects grade V SD / MI. The summary results of the validation results for each item are shown in the table below:

Table 3. Validity of test

Item Number	Validity Score	Criteria
1	0,8	Very High
2	1	Very High
3	0,94	Very High
4	1	Very High
5	0,94	Very High
6	0,82	Very High
7	0,94	Very High
8	1	Very High
9	1	Very High
10	0,94	Very High
11	1	Very High
12	1	Very High

In this step, the question of scienceThe existence of an assessment and accompanied by suggestions and input to make revisions to the questions developed. Some of the suggestions and input given, namely (1) the picture in the question must be clear, (2) the systematics of the answer options in the question must be coherent, (3) errors in the writing section, (4) the description of the picture is still unclear (5) The writing system must use sentences that are in accordance with EYD. This revision was carried out to perfect the content developed. Testing this science process skills question is to measure the science process skills of grade V students. testing of this question was carried out at the end of the even semester of grade V in the 2023 academic year. Based on Gregory's 2 x 2 cross tabulation table, then the results of the validator's assessment are entered in Gregory's validation form, namely:

$$\text{Content validity Validitas isi} = \frac{D}{A+B+C+D} = \frac{16}{0+0+1+16} = \frac{16}{0+0+1+16} = \frac{16}{17} = 0,94$$

So, the coefficient of content validity of the expert evaluation instrument for multiple choice questions on science process skills in class V science subjects is 0.94. In conclusion, the level of content validity of the multiple-choice question expert evaluation instrument is very high. So it is declared suitable for use. As according to Sugiyono (2021) opinion, says that valid means that the instrument can be used to measure what should be measured.

Disseminate stage

At this stage, multiple choice questions were tested on students of class V se-MIN Pontianak who had been validated by the validator. The results are as follows:

Tabel 4. Test' Reliability

Reliability Standard (r_{tabel})	Correlation coefficient ($r_{\text{experiment}}$)	Criterion
$0,40 < r_{xy} \leq 0,60$	0,41	Moderate

Based on Table 4, it is known that the reliability of the items is considered moderate in this study. $r_{\text{experiment}} > r_{\text{tabel}}$ Based on these results, it can be said that the questions developed are

reliable. In accordance with Sugiyono (2021), explains that a reliable instrument is an instrument when used several times to measure the same object, it will produce the same data. This shows that an instrument that is reliable means that it remains or does not change. Valid and reliable are criteria that must be met by a research instrument so that it can be declared to have good quality (Kusuma & Nurmawanti, 2023).

CONCLUSION

Based on the data analysis that has been done, it can be concluded that the Science Process skills questions developed are valid and reliable. Content validity which includes aspects of material suitability, construction and language are all in the very high validity category. Furthermore, the results of the reliability calculation obtained a score of 0.41 with moderate criteria. Therefore, the questions developed can be used to measure the science process skills of fifth-grade students in Madrasah Ibtidaiyah Negeri in Pontianak city.

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