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PREPARATION ASSISTANCE OF HOTS-BASED THEMATIC QUESTIONS FOR STUDENTS OF PRIMARY SCHOOL TEACHER EDUCATION (PGSD) PROGRAMME

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Abstract

Based on the results of the mid-semester exams of Primary School Teacher Education (PGSD) students class of 2019 (class 6B and 6C) of Sanata Dharma University, researcher get data if they still have difficulty in making HOTS-based thematic questions. Therefore, the researcher collaborated with 4th grade teacher of Santa Angela Elementary School Bandung (graduated from S2 Biology Education, Universitas Pendidikan Indonesia) to provide online assistance to students through high-end integrated learning courses (which is mastered by researcher). This research is a narrative research to describe (1) the strategy of preparing HOTS-based thematic questions in 4th grade Elementary Schools, (2) infographic analysis of HOTS-based thematic questions compiled by students, (3) the results of the trial of the infographic of these questions to 4th grade students of Santa Angela Elementary School Bandung.

Keywords: HOTS, narrative research, student mentoring

Introduction

One of the outputs of the high-end integrated learning lecture given to 6th semester PGSD students (class of 2019) at PGSD Sanata Dharma University is that they make Lesson Plan (RPP) for 4th or 5th grade Elementary Schools using a learning model that can help students think critically. For the midterm exam, PGSD students are asked to make a thematic lesson plan using a problem-based (PBL) or project-based (PjBL) learning model and contain Higher Order Thinking Skills (HOTS) based questions.

According to Lie, et al (2020, pp. 26-30) PBL, PjBL, inquiry, and discovery models can facilitate students to think critically. Therefore, PGSD students are asked to make lesson plan by applying the PBL or PjBL model so they can understand the peculiarities of the two models. PBL steps include training students to determine problems related to the subject and find solutions to overcome these problems (Jalmo, 2019, p. 81); while PjBL facilitates students to learn independently in solving problems and producing a certain project (Niswara, 2019, p. 88).

From lesson plans made by PGSD students in grades 6B and 6C, researcher found data: some PGSD students still have difficulty in making HOTS-based thematic evaluation questions. To overcome this, researcher collaborated with a class teacher from Santa Angela Elementary School Bandung to provide online assistance to PGSD students in the two classes. The teacher was chosen because (1) has a Master degree in education, (2) experience teaching in 4th grade Elementary School, (3) can test HOTS-based thematic questions made by PGSD students in the class.

Elementary School teachers candidat need to be skilled in creating learning and compiling HOTS-based thematic questions, because HOTS learning is intended to answer the education weakness problem in Indonesia. This is supported by the fact that indonesia's reading literacy achievement is 70% below the minimum competence, while the literacy ability of science and numeracy (mathematics) is 60% and 72% below the minimum competency (PISA, 2018, p. 2). This data was obtained from the results of The Programme for International Student Assessment (PISA) initiated by the Organisation for Economic Co-operation and Development (OECD), showing that the ability of Indonesian students is ranked 72 out of 77 countries (PISA, 2018, pp. 1-2). PISA (2018, p. 1) is a triennial survey since 2000 that aims to assess the extent to which 15-year-old students have gained enough knowledge and skills to fully participate in society. Indonesia has been participating in PISA since 2000, even though it is not part of the OECD countries. The question types tested by PISA are a combination of multiple choice and description that require learners to build their own responses. In other words, students must have reasoning ability, be able to evaluate and create in solving these problems. All points of the statement are arranged into groups, based on which part of the text is associated with contextual situations in society (PISA, 2018, p. 9). Due to the low reasoning ability of students in Indonesia for many years, the improvement of the educational quality starting from basic education has become a very important foundation. Test items were a mixture of multiple-choice questions and questions requiring students to construct their own responses. The items were organised into groups based on a passage of text describing a real-life situation.

In addition to PISA, another survey that can be considered in improving the quality of education is the Trends in International Mathematics and Science Study (TIMSS), sponsored by the International Association for the Evaluation of Educational Achievement (IEA). Since 1995, every 4 years TIMSS provides trend data on the achievement of numeracy and science of grade 4 and grade 8 students of the participating countries. TIMSS provides comparative data on the achievements of students of participating countries over time and in relation to the main variables of home, school, and classroom (Mullis, I. V. S., Martin, M. O., Foy P., Kelly, D. L., & Fishbein, B., 2019, p. 1).

Indonesia is one of the participating countries that participated TIMSS since 1999 to 2015. From the results of the 2015 TIMSS study, Indonesia was ranked 44 out of 49 countries with an average score of 397 out of 500. This low achievement shows that the ability of Indonesian students is limited to recognizing a number of basic facts but have not been able to communicate, relate various topics, and apply the concept of numeracy (Hadi, S., & Novaliyosi, 2019, pp. 562-563S., & Novaliyosi, 2019, pp. 562-563). Hadi, S., & Novaliyosi (2019, p. 565) stated that the results of the TIMSS study can be used as evaluation to improve the

quality of education, because the results of the TIMSS study are valid in describing the quality of education of participating countries.

Based on the results of PISA and TIMSS research for several periods until now, it shows that the ability of Indonesian students has not met international standards, because the High Order Thinking Skill (HOTS) lags far behind compared to other countries (Hartini, Misri & Nursuprianah, 2018, p. 84). This is strengthened by several studies on science literacy such as those conducted by Rifqiayati (2013) on Biology students, Hadinugraha (2012) and Sophia (2013) on students of Bandung and Garut High School, Asma (2016) and Darmawan (2013) on Junior High School students, and Yuliati (2015) on Elementary School students; everything explains that the majority of Indonesian students are less able to develop analytical skills because they are not accustomed to doing so (Kencana, 2018, p. 34).

Mastery of literacy and critical thinking skills is needed in the era of the Industrial revolution 4.0 (Ghufron, 2018, p. 334). The indispensable literacy includes (1) technological literacy: students must be able to use technological applications or understand how machines and electronic devices work, (2) data literacy: students need to be accustomed to reading, analyzing and using information from the digital world and (3) human literacy: students are guided to become humanists, engage in organizations and work in a team. That is why every teacher should no longer do Lower Order Thinking (LOT)-based learning but use HOTS-based learning (Sani, 2019, p. 49). Teachers can at least apply problem-based learning (PBL) or project-based (PjBL) models, so that students have mastery of literacy and critical thinking.

HOTS-based learning has an impact on the teacher's ability to compose questions. The characteristics of the HOTS questions: (1) must measure higher-order thinking skills, (2) are based on contextual problems, and (3) use various forms of questions (Fanani, 2018, p. 57). Measuring high-level abilities means the types of questions formulated by the teacher are not so that students can repeat the answers as previously taught. Based on contextual problems means that the teacher gives questions in the form of narratives of actual problems in everyday life that have to do with the subject or concepts being discussed. Using various forms of questions means that teachers need to reflect on the questions issued by PISA which are oriented to higher-order thinking skills (Pangesti, 2018, p. 570). These skills train students to be able to conclude and synthesize the information obtained, and apply their knowledge in real life (Kurniawati & Rahmantika, 2021, p. 275). Marshall & Horton (2011, p. 93) state that HOTS can be said to be successful if students are involved with what they know in the learning process, are able to clearly differentiate ideas, argue well, solve problems, construct explanations, hypothesize and express complex things be easy to understand.

This study aims to describe (1) strategies for preparing HOTS-based thematic questions, (2) infographic analysis of HOTS-based thematic questions made by PGSD students, (3) test results of HOTS questions on 4th grade students of Santa Angela Elementary School Bandung.

Method

This research is a narrative research. According to Assjari & Permanarian (2010, p. 172), narrative research can be used by an educator to report their

experiences at work. The type of narrative research that the researcher chose was a scientific report on the results of assistance in the preparation of HOTS-based thematic questions to PGSD students (grades 6B and 6C) at Sanata Dharma University.

Strategy for Preparing HOTS Questions

HOTS was developed referring to Bloom's taxonomy which is the basis for higher order thinking (Rusminati & Styanada, 2020, p. 409). Teachers need to develop an implementation plan by formulating goals at levels C4 to C6 (analyzing, assessing/evaluating, creating/creating), implementing learning and evaluating learning by providing questions to measure students' higher-order thinking skills/HOTS (Qodra et al. al., 2021, p. 57).

HOTS questions are measurement instruments used to measure the ability of students not only to recall (recall), restate (restate), or refer without processing (recite). The steps for preparing HOTS-based questions that must be carried out by teachers are (1) analyzing Basic Competencies, (2) making question grids, (3) using problems related to everyday life, (4) compiling items, and (5) make scoring guidelines (Adimassana, et al., 2021, pp. 34.57).

Analyzing Basic Competencies, meaning that teachers choose Basic Competencies that can be made thematically-based HOTS questions. An explanation of the curriculum as a standard for a country, so that the preparation of questions must refer to the curriculum in order to avoid overlapping different levels.

Compile a questioning grid by mapping: (1) Thematic Basic Competencies that can be made HOTS questions, (2) selecting the main concepts related to the Basic Competencies to be tested, (3) formulating question indicators, and (4) determine their cognitive level. The cognitive level that needs to be used as a reference is the level of C4 (analyzing), C5 (assessing/evaluating), up to C6 (creating/creating).

Choosing contextual problems, the teacher chooses a stimulus related to events or information that motivates students to be interested in reading literacy questions related to metacognitive knowledge (Abduh & Istiqomah, 2021, p. 2073).

The contextual problems are arranged in the form of infographics that contain a case, discourse, scenario, visual or literacy text that has never been presented to students.

Writing questions according to the grid, the questions are written by the teacher according to the rules for writing HOTS items. The questions that are oriented to higher order thinking skills are: (1) Inferential questions: questions that can be answered by students after observing and assessing the subject provided by the teacher in the form of portraits, pictures, short writings, poems, news, and so on. This question aims to reveal what students understand after observing or reading subject from the teacher. (2) Interpretation questions: questions posed to students relate to incomplete information, and students must be able to provide an explanation. (3) Transfer questions: an attempt to broaden their horizons so that students can apply their knowledge. (4) Hypothetical questions: questions that encourage students to make predictions or forecasts of a problem they are facing (Ariyana et al., 2018, pp. 37-39).

Making scoring guidelines (rubrics) or answer keys is carried out by teachers based on educational evaluation standards (Ministry of Education and Culture, 2017, p. 17). The questions that are made are types of objective tests which can be in the form of multiple choice tests or complex multiple choice and subjective tests which are description questions (Zainuddin, 2021, pp. 66-67). These types of questions can also be used as instruments to explore or explore students' thinking skills: have they reached stages C4-C6 according to Bloom's revised taxonomy? (Umami, R., Rusdi, M. & Kamid, 2021, p. 66).

Based on these steps, the Santa Angela Elementary School teacher gave two examples of HOTS-based thematic questions for 4th grade (Table 1 dan 2). The goal is that PGSD students know the steps for preparing HOTS questions which must include three categories (1) transfer of information and knowledge, (2) critical thinking, and (3) problem solving (Mahanal, 2019, p. 52).

From Table 1, the teacher presents meaningful learning because it presents a non-fiction text about *Dracaena cinnabari* tree that grows on Socotra Island (Bahasa subject). Furthermore, students are invited to think critically to explore questions in the form of interpretation questions so that they can explain the eye process of seeing the *Dracaena cinnabari* tree (Science subject), so that they know the peculiarities of the tree.

From Table 2, the teacher invites students to examine numeracy question about the types of parents works in a particular school, in the form of a bar chart (Mathematics subject) to practice numeracy skills. Furthermore, students are invited to think critically by observing the bar chart so they can interpret the percentage according to the question (PPKn subject/Pancasila and Civic Education subject).

Based on Tables, the form of questions that the teacher has presented are now turned into infographics. Furthermore, the researcher guided the PGSD students to make infographics about thematic questions based on HOTS for 4th grade Elementary Schools with the Basic Competencies that the researchers had determined.

Table 1. The first grid is HOTS-based thematic questions for Science and Bahasa

No	Mata Pelajaran	Materi	KD	Bentuk dan No Soal	Indikator	Soal	Jawaban dan skor
1.	IPA dan Bahasa Indonesia	Indra Penglihatan (tema 5 subtema 3)	3.6 Menerapkan sifat-sifat cahaya dan keterkaitannya dengan indera penglihatan (IPA) 3.4 Menggali pengetahuan baru yang terdapat pada teks nonfiksi (Bahasa Indonesia)	Uraian Nomor soal 1	Disajikan gambar dan informasi: peserta didik dapat menjelaskan proses mata melihat mulai dari 1) Cahaya pantul dari benda masuk mata 2) Ditangkap pupil (mengatur intensitas cahaya) 3) Ditangkap lensa mata (memfokuskan cahaya) 4) Retina (layar dan menggolongkan warna) 5) Saraf optik 6) Otak	1) Perhatikan gambar dan informasi berikut! Pada saat liburan Natal tahun 2030, Kirana dan adiknya yang bernama Yuki berlibur ke Socotra. Socotra merupakan salah satu kepulauan yang terletak di Samudera Hindia. Keunikan spesies pada pulau Socotra salah satunya adalah Pohon Darah Naga (Dragon Blood Trees) yang menjadi pemandangan utama ketika tiba di Pulau Socotra. Pohon dengan kanopi serupa payung terbalik ini memiliki nama ilmiah <i>Dracaena cinnabari</i> dan memiliki getah berwarna merah yang mirip darah. Pemandangannya sungguh menakjubkan, Yuki yang saat itu masih berusia 7 tahun bertanya kepada Kakaknya yang sudah SMP, "Kak, taman ini sangat menarik dan pohon-pohonnya unik! Aku penasaran bagaimana cara mata kita melihat semua keindahan ini?" Sumber: https://www.cnindonesia.com/gaya-hidup/20200504160529-269-499906/pulau-alien-habitat-pohon-darah-naga-di-yaman Ayo bantu Kirana memberikan penjelasan kepada Yuki!	Peserta didik mampu menjawab 5-6 indikator = 10 Peserta didik mampu menjawab 3-4 indikator = 7 Peserta didik mampu menjawab 1-2 indikator = 4 Peserta didik hanya menjawab 1 indikator = 1

Table 2. The second grid is HOTS-based thematic questions for Pancasila and Civic Education with Mathematics

No	Mata Pelajaran	Materi	KD	Bentuk dan No Soal	Indikator	Soal	Jawaban dan skor
2	PPKN dan Matematika	Membaca diagram batang (tema 8 subtema 2)	3.3 Menjelaskan manfaat keberagaman karakteristik individu dalam kehidupan sehari-hari (PPKN) 3.5 Menjelaskan data diri peserta didik dan lingkungannya yang disajikan dalam bentuk diagram batang (Matematika)	Pilihan ganda kompleks Nomor soal 2	Disajikan diagram batang: peserta didik dapat menerjemahkan data pada diagram batang yang disajikan	2) Perhatikan diagram batang berikut! Berdasarkan diagram batang Jenis Pekerjaan Orang Tua Siswa Kelas 4 Tahun Ajaran 2023-2024, maka didapatkan informasi ... A. mayoritas orang tua kelas 4 Tahun Ajaran 2023-2024 yang bekerja sebagai pegawai swasta, yaitu 73,33% dari populasi B. perbandingan orang tua kelas 4 Tahun Ajaran 2023-2024 yang bekerja sebagai wirausahawan dengan PNS adalah 5:3 C. presentase orang tua kelas 4 Tahun Ajaran 2023-2024 yang bekerja sebagai TNI Polri sebanyak 42,67% dari populasi D. perbandingan orang tua kelas 4 Tahun Ajaran 2023-2024 yang bekerja sebagai PNS dengan wirausahawan adalah 6:11	Peserta didik menjawab AD = 2 Peserta didik menjawab ABD/ACD = 1,5 Peserta didik menjawab AB/AC/BD/CD = 1 Peserta didik menjawab ABDC = 1 Peserta didik menjawab ABC/BCD = 0,5 Peserta didik menjawab BC = 0

Infographic Analysis of HOTS-Based Thematic Questions by PGSD Students

Researchers asked PGSD students to create an infographic on HOTS-based thematic questions to:

1. Science subjects with Basic Competencies 3.8 understand the importance of efforts to balance and preserve natural resources in their environment, and Bahasa with Basic Competencies 3.5 outline personal opinions about the content of literary books (stories). Here is one example of an infographic about thematic questions made by PGSD students:



Figure 1. First infographic: Festival Susur Sungai (River Festival)

The Results of the Trial of The Application of HOTS-based Thematic Questions in 4th Grade Elementary Schools

A limited trial was conducted by teacher (researchers) to 27 4th grade students of Santa Angela Elementary School Bandung on June 9, 2022 (after Year-End Exams). Duration time for the students to fill 2 infographic of HOTS-based thematic questions made by PGSD students was 20 minutes.

The results of the students' work for the Science literacy infographic "River Festival ": 25 students (92.6%) answered correctly and 2 students (7.4%) answered incorrectly. It is shown that in a relatively short period of time, the majority of students were able to read carefully as the result they answer correctly. The results of the students work for a numeracy infographic on the comparison of the weight of newborn elephants with the heaviest elephants: 20 students (74%) answered correctly because they were able to apply the concept of numbers and counting operations in the context of Sumatran elephant growth, while 7 students (26%) were unable to answer completely in a relatively short time.

Conclusion

The conclusion of the assistance carried out by researchers to help PGSD students (class 6B and 6C) class of 2019 Sanata Dharma University on the preparation of HOTS-based thematic questions are:

1. PGSD Students understand the strategy for preparing HOTS-based thematic questions for 4th grade Elementary School with the following stages:
 - a) Must include three categories, namely the transfer of information and knowledge, critical thinking, and problem solving.
 - b) Made based on Operational Verbs, to formulate question indicators that measure the analytical competence of students, the ability to evaluate and apply teaching materials in everyday life.
 - c) Determine the type of question (multiple choice, complex multiple choice, fill in, true/false and description) and its scoring score.
 - d) Arranged in the form of an infographic that contains a case, discourse, scenario, visual or literacy text that has never been presented to students, so they can think critically to solve the problem.
2. The majority of HOTS-based thematic questions chosen by PGSD students in their infographics are in the form of inferential and interpretation questions.
3. Limited trial results from the work of HOTS-based thematic question infographics by 27 4th grade students of Santa Angela Elementary School Bandung: within 20 minutes 92.6% of students were able to do science literacy and 74% were able to do numeracy.

PGSD students need to practice making HOTS-based thematic questions using transfer and hypothetical questions, in addition to inferential and interpretation. Trials of HOTS-based thematic questions to students need to take into account the time duration, especially for working on numeracy questions.

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