

The Mathematics and Science Learning in Independent Curriculum for Scholastic Tests in Society 5.0

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Abstract

This study aims to find out how mathematics and science teachers teach students so that they are in accordance with kurikulum merdeka (the independent curriculum), national assessment, and scholastic exams to enter higher education so that they are able to compete in society 5.0. The method used is a literature study. There are several conclusions obtained. The national assessment used in the independent curriculum, especially the minimum competency assessment that measures reading and numeracy literacy as a cognitive learning outcome, corresponds to the scholastic test. The scholastic test that will be used in the college entrance exam in 2023 is almost the same as the college entrance test that has long been used in the United States. This test is able to predict a person's success after he is accepted into college. The Discovery/Inquiry Learning model, the Problem-based Learning model, and the Project-based Learning are recommended in the independent curriculum and are very suitable to improve students' reasoning abilities needed to prepare students for the scholastic test, as a college entrance exam in 2023. The use of data to decide something will familiarize students with the way Artificial Intelligence technology decides things so that students will be ready to face society 5.0.

Keyword: Independent curriculum, national assessment, scholastic test, society 5.0.

Abstrak

Studi ini bertujuan untuk mengetahui bagaimana guru matematika dan sains mengajar siswa sehingga sesuai dengan kurikulum merdeka, asesmen nasional, dan ujian skolastik untuk masuk perguruan tinggi sehingga mereka mampu bersaing dalam masyarakat 5.0. Metode yang digunakan adalah studi literatur. Ada beberapa kesimpulan diperoleh. Asesmen nasional yang digunakan dalam kurikulum merdeka, terutama asesmen kompetensi minimum yang mengukur literasi membaca dan numerasi sebagai hasil belajar kognitif, bersesuaian dengan tes skolastik. Tes skolastik yang akan digunakan dalam ujian masuk perguruan tinggi tahun 2023 hampir sama dengan tes masuk perguruan tinggi yang sudah lama digunakan di Amerika Serikat. Tes ini mampu memprediksi keberhasilan seseorang setelah dia diterima di perguruan tinggi. Model *Discovery/ Inquiry Learning*, *Problem-based Learning*, dan *Project-based Learning* dianjurkan dalam kurikulum merdeka dan sangat cocok meningkatkan kemampuan penalaran peserta didik yang dibutuhkan untuk mempersiapkan siswa mengikuti tes skolastik, sebagai ujian masuk perguruan tinggi tahun 2023. Penggunaan data untuk memutuskan sesuatu akan membiasakan siswa dengan cara teknologi Artificial Intelligence memutuskan sesuatu sehingga peserta didik akan siap menghadapi masyarakat 5.0.

Kata Kunci: Kurikulum merdeka, asesmen nasional, tes skolastik, masyarakat 5.0.

1. Introduction

Revolution 4.0 is the era of the application of modern technology, such as high technology connected to the internet network, which works for all economic activities ranging from production to consumption. The term of the industrial revolution 4.0 is also known as the internet of things (IoT),

which integrates the virtual world, machines, data into human life. The era of society 5.0 is an advanced era of the industrial revolution 4.0. This era is a human-centered society. The balance of economic progress with solving social problems is always maintained through an integrated system between the virtual world and the real world. Teachers who are the driving force in education in the era of society 5.0 and must have adequate competence. He must be proficient in providing subject matter and able to move students to think critically and creatively. In addition to curriculum preparation and adequate facilities in the era of society 5.0, teachers are expected to be able to ensure the curriculum runs optimally.

Kurikulum Merdeka (Independent Curriculum) or Kurikulum Merdeka Belajar (Independent Learning Curriculum) is a curriculum with diverse intra-curricular learning where the content will be more optimal. So that students have enough time to explore concepts and strengthen competencies. Teachers have the flexibility to choose various teaching and learning tools that can be tailored to the learning needs and interests of students. The Independent Learning Curriculum is one of the new policies of the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia (Kemendikbud Ristek RI) which aims to realize an innovative learning process that is in accordance with the needs of students.

To measure the competencies contained in the independent curriculum, the Minister of Education and Culture (Mendikbud), Nadiem Makarim, has officially replaced the 2021 National Examination into a National Assessment. This is referred to as a marker of change in the evaluation of education in Indonesia. Minister of Education and Culture, Nadiem Anwar Makarim, said that the fundamental change in the National Assessment was no longer evaluating the achievements of individual students, but evaluating and mapping the education system from input, process, to results. The National Assessment consists of three parts, namely: (1) Minimum Competency Assessment: Measuring reading and numeracy literacy as cognitive learning outcomes, (2) Character Survey: Measuring attitudes, habits, values as non-cognitive learning outcomes, (3) Environmental Survey Learning: Measuring the quality of learning and the school atmosphere that supports learning.

In line with the national assessment, the Minister of Education, Culture, Research and Technology (Mendikbudristek), Nadiem Makarim, announced several changes in the selection of state universities. One of the changes that take effect from September 1, 2022 is the abolition of subject tests in the Joint Selection for State University Entrance (SBMPTN). The big change made is the form of the test for the college entrance exam, namely, the test material is not the subject matter. This will be replaced, and simplified into a scholastic test. There is only one scholastic test that measures students' reasoning abilities. The scholastic test materials for the 2023 SBMPTN are potential cognitive abilities, mathematical reasoning logic, literacy in Indonesian, and literacy in English. The questions in the national selection based on tests emphasize the reasoning of students, not memorization.

The paradigm shift in education in Indonesia is going so fast. First, the curriculum as the basis for learning was changed to an independent curriculum. Second, the individual assessment of learning outcomes was changed nationally into a national assessment that was very different from before. Finally, the college entrance exam also turned into a scholastic test that was not related to subjects at school. So the question that arises is how can mathematics and science teachers teach students so that they are in accordance with the independent curriculum, national assessments, and college entrance scholastic exams, and are able to make students compete in society 5.0?

2. Research Method

This study aims to collect literature on the independent curriculum, national assessments, and scholastic tests for college entrance examinations. Furthermore, it discusses the mathematics and science learning model that is able to make students successful in following the independent

curriculum, successfully entering college, and being able to adapt to society 5.0. Researchers approach with descriptive qualitative research. Qualitative research is one type of research where the research source comes from data, existing theories. The data collection technique used is literature study. Research activities are carried out systematically by collecting, processing, and concluding data.

3. Research Results and Discussion

Society 5.0 is a society that can solve various challenges and social problems by utilizing various innovations born in the industrial era 4.0 such as internet on things, artificial intelligence, big data, and robots to improve the quality of human life (Nidia, 2022). Therefore, teachers must have several competencies such as competence in the field of education, competence in determining future strategies, and as counselors. Teachers also need to have an attitude that is friendly with technology, collaborative, creative, and willing to take risks, have a good sense of humor, and teach thoroughly (Asih et.al, 2022). Furthermore, to develop character as a life and career skill, it can be done either directly integrated in learning or indirectly where the teacher acts as a model or applies it in daily activities (Runisah, 2021).

To be ready in the era of society 5.0, the Ministry of Education, Culture and Higher Education implemented a new curriculum called the independent curriculum or the independent learning curriculum. The independent learning curriculum will change the learning method that was previously implemented in the classroom into learning outside the classroom. The concept of learning outside the classroom can provide an opportunity for students to be able to discuss flexibly with the teacher. With this, students can shape their character by being able to express opinions, social skills, and become competent students. The independent learning curriculum frees teachers to create educational and fun learning. The current pedagogical competence also requires teachers to be able to become models and implement the learning process. Teachers are also given the mandate as a driving force to plan, implement, evaluate, and follow up on the results of the evaluation. Active, innovative, and comfortable learning must be able to realize students according to the needs of the times. Teachers must also become facilitators to shape the character of students who think critically, creatively and innovate, skilled in communicating and collaborating, and have character. This era is an opportunity as well as a new challenge for students to improve their soft skills as preparation for the future. It is well known that the curriculum is the lifeblood of education. The curriculum must be evaluated periodically following the times, especially science and technology. The curriculum is also prepared by taking into account the competencies needed by the community and graduates. The independent learning curriculum with a learning model makes students able to adapt to the competencies needed in the era of society 5.0 (Indarta, 2022).

Assessment is something that cannot be separated from the curriculum. The independent curriculum uses the National Assessment which consists of three parts, namely: (1) Minimum Competency Assessment, (2) Character Survey, and (3) Learning Environment Survey. The Minimum Competency Assessment (MCA) is an assessment of the basic competencies needed by all students to be able to develop their own capacities and participate positively in society. There are two basic competencies that are measured, namely: reading literacy and mathematical literacy. In both reading and numeracy literacy, the competencies assessed include logical-systematic thinking skills, reasoning skills using concepts and knowledge that have been learned, as well as skills in sorting and processing information. MCA measures the various contexts that students are expected to be able to complete using their reading and numeracy literacy competencies. MCA must be able to measure competence in depth, not just content mastery. Reading literacy is defined as the ability to understand, use, evaluate, reflect on various types of written texts to develop individual capacities as citizens of Indonesia, citizens of the world to be able to contribute productively to society. Numeration is the

ability to think using concepts, procedures, facts, and mathematical tools to solve everyday problems in various types of contexts that are relevant to individuals as citizens of Indonesia and the world.

Many studies have been conducted to look at national assessments for an independent curriculum. The results showed that the assessment was carried out not only to measure the ability to master the material according to the curriculum as in the national exam, but was designed to map and improve the quality of education as a whole. The Minimum Competency Assessment (MCA) focuses on mastering literacy and numeracy competencies. Thus, the implementation of MCA is expected to improve students' numeracy literacy skills (Rohim, 2021). The results of the teacher group study stated that 75% of teachers understood the national assessment and 25% of teachers did not understand the national assessment. A national assessment is carried out to evaluate the input, process, and quality of teaching and learning in the classroom so as to improve the quality of Indonesian education (Rokhim et al., 2021). Over time, teachers' mastery of this national assessment will improve year after year.

Major changes were also made to the Joint Selection for State Universities (JSSU) through the test route. In JSSU 2023, there will be no more test material sourced from school subject matter. Instead, students must take a scholastic test. The scholastic test will measure students' abilities in four areas including: cognitive potential; mathematical reasoning; literacy in Indonesian; and literacy in English. Nadiem explained that the scholastic test was not related to memorizing material as was the subject test. Scholastic tests are related to students' reasoning, problem solving, and cognitive potential. The questions related to Indonesian and English in the scholastic test are not related to grammatical techniques, but the ability to understand the logic of the text. Nadiem is sure that later students will not be surprised by the types of questions in the scholastic test because the test questions are similar to the national assessment. So all the questions are about understanding logic and being able to analyze a contextual problem. This new regulation is contained in a Ministerial regulation, namely: Permendikbudristek no.48 of 2022. Chapter 6 verse (1) states that national selection based on tests is carried out using standardized computer-based tests. Verse (2) says the standardized test as referred to in verse (1) is a test that measures cognitive potential, mathematical reasoning, literacy in Indonesian, and literacy in English. Verse (3) states that the national selection based on the test as referred to in verse (1) can be held several times in the current year and each prospective student can take a maximum of 2 (two) national selections based on the test. Selection to enter Indonesian universities with the scholastic test in 2023 is the same as the Scholastic Assessment Test (SAT) or American College Test (ACT) which has long been carried out in the United States. The results of the study show the college acceptance test in the United States and consider the issue of fairness. The two main tests are the SAT, first administered in 1926, and the ACT, first administered in 1959. Scores on these tests have been shown to contribute to the prediction of college performance (Zwick, 2019). So that the scholastic test which will be used as a university entrance test in Indonesia will run as expected.

The scholastic test is a question that measures the reasoning competence of the participants. The level of a person's reasoning ability will determine the level of success in completing college (Zwick, 2019). According to the Minister of National Education Regulation Number 22 of 2006 concerning Standard Content for Mathematics Subjects, mathematical reasoning ability is the ability to analyze new situations, generalize, synthesize, make logical assumptions, explain ideas, give good reasons and make conclusions. So that the reasoning ability indicators can be formulated as follows: 1) Proposing allegations, 2) Performing mathematical manipulations, 3) Drawing conclusions, compiling evidence, providing reasons or evidence for the correctness of the solution, 4) Checking the validity of an argument, 5) Finding patterns or characteristics of mathematical phenomena to make generalizations (Kurniawan et al, 2021). This reasoning indicator corresponds to the steps of the scientific method.

Teachers must be proficient in providing subject matter and able to move students to think critically and creatively. Teachers also need to have an attitude that is friendly with technology, collaborative, creative, and willing to take risks, have a good sense of humor, and teach comprehensively (Asih et al., 2022). By paying attention to the reasoning indicators needed in the scholastic test and the use of technology in society 5.0, a teacher must use a learning model that familiarizes students to learn to reason and utilize technology as much as possible. The ability to reason can be grown by following the activities of the scientific method. The Government of Indonesia makes regulations on Process Standards using 3 (three) learning models that are expected to shape scientific, social behavior and develop a sense of curiosity with Permendikbud No. 22 of 2016. The three models are (1) the Discovery/ Inquiry Learning model, (2) the Problem-based Learning (PBL) model, (3) the Project-based Learning (PjBL) model (Manik, 2020). Learning will be easier if the subject matter starts from the things that are around students and ends with its use in everyday life (Manik, 2021).

In Society 5.0, Artificial Intelligence (AI) technology was added to the Internet of Things (IoT) which functions as data processing and data analysis. The data source is the human itself through physical sensors. Furthermore, the data is processed by AI and IoT and the results are returned to humans in various physical forms. The previously collected data will be studied by AI and used to make the best decisions to decide the next course of action. The use of data to decide something is in accordance with the indicators of reasoning ability and in accordance with the steps of the Inquiry, PBL, and PjBL learning models.

The Discovery/Inquiry Learning, PBL, and PjBL models are suitable learning models for learning mathematics and science. This model is recommended for learning in the independent curriculum. Although the science material is not tested in the scholastic test, the steps in the learning model will improve students' reasoning abilities. The use of data to decide something will familiarize students with the way AI decides things so that students will be ready to face society 5.0.

4. Conclusion

By studying the results of research and discussion, several conclusions are obtained:

- i) The national assessment used in the independent curriculum, especially the minimum competency assessment which measures reading and numeracy literacy as a cognitive learning outcome, is in accordance with the scholastic test.
- ii) The scholastic test used in the 2023 college entrance exam is almost the same as the long-established college entrance test in the United States. This test is able to predict success after someone is accepted into college.
- iii) The Discovery/ Inquiry Learning, PBL, and PjBL models recommended in the independent curriculum are very suitable to improve students' reasoning abilities needed in the scholastic test as a college entrance exam in 2023.
- iv) The use of data to decide something will familiarize students with the AI way of deciding things so that students will be ready to face society 5.0.

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