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Learning Science in Indonesian Curriculum from Time to Time

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ABSTRACT
This article aims to analyze the science learning according to the curriculum in Indonesia. This is based on the dynamic development of the curriculum in Indonesia. The method used in this study is literature review with descriptive analysis techniques. There are two main analyzes carried out, namely: 1) knowing how science learning according to the curriculum from time to time and 2) knowing whether science learning applied to the Kurikulum Merdeka has been able to answer global challenges. The results of the study show that the Indonesian curriculum has experienced dynamic development, there have been 12 curriculum developments since Indonesia's independence until 2023. In terms of the implementation of science learning, science has become a compulsory subject since Indonesia's initial curriculum. As in the 1947 learning plan, there were already three subjects related to science, namely: natural sciences, earth sciences and life sciences. Furthermore, science learning is increasingly becoming the focus of education, for example in the 2013 curriculum which promotes a scientific approach.

Keywords: *Indonesian Curriculum, Learning According, Science Learning*

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INTRODUCTION

The Indonesian constitution mandates education to develop the potential of students, which this potential is not only related to cognitive abilities. It is more clearly explained in Law Number 20 of 2003 concerning the national education system which states that "education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality , intelligence, noble character, and skills needed by himself, society, nation and state" (Undang-undang, 2003). In an effort to develop the potential of these students, education in Indonesia is regulated within a framework called the curriculum.

Curriculum was originally a term used in the world of sports. Derived from the word curir which means runner or curere which means a place to race, the curriculum is defined as the distance that must be traveled by a runner from start to finish to get a medal (Ruhimat, 2011). Then this understanding was adapted by the world of education so that the curriculum in education is interpreted as a number of subjects that must be followed by

students from the beginning to the end of the learning program to get an award in the form of a diploma. Currently, the understanding of the curriculum has become broader, not only limited to subjects but also includes all learning experiences experienced by students that can influence their personal development (Alberty & Weber, 1979; Bullough Jr, 1976; Dewey, 2013; Ruhimat, 2011). So in general it can be said that the curriculum is a reference in the implementation of education to achieve the goals that have been set.

Since independence, the curriculum in Indonesia has undergone several changes. This curriculum change was accompanied by the spirit of improving the quality of education. However, there is a stereotype that " curriculum change when the minister replace". This opinion is not true. In fact, curriculum changes were made based on a clear basis, such as changing the curriculum from the 1947 lesson plan to the 1950 lesson plan, which was a consequence of the birth of the Basic Education and Teaching Law (UUPP) Number 4 of 1950 (Insani, 2019). More precisely the development or change of curriculum is based on the results of an analysis of the challenges that will be faced by the nation which refers to predictions of internal and external conditions in the future (Machali & Hidayat, 2016).

This change also resulted in changes to the pattern of implementation of learning for each subject. For example learning science according to the 1947 lesson plan, although there are three subjects related to science, the focus of the 1947 lesson plan is the formation of Indonesian human character that is independent, sovereign and equal to the nation, while in the 2013 curriculum learning science becomes one of the main points marked by the promotion of the use of a scientific approach to Learning Activities. Therefore the writer is interested in conducting a literature study and writing about "Science Learning in the Indonesian Curriculum from Time to Time”

RESEARCH METHODOLOGY

This research is a literature review with a qualitative descriptive analysis technique. The main analysis carried out is to analyze how science learning is implemented in each of the curriculum developments from the past. In accordance with the research method earlier, the first stage the researcher carried out was to find valid information about the curriculum that had been implemented in Indonesia since Indonesia's independence in 1945 until now in 2023. It is known that there have been 12 curriculum developments in that time span. Further analysis carried out is how science learning according to each of these curricula. Furthermore, it will be analyzed whether the science learning set in the current independent curriculum is able to prepare Indonesia's young generation to face global challenges.

RESULT AND DISCUSSION

Changes and improvements to the curriculum are made as an effort to align the implementation of education with the enviromental needs. In general, curriculum changes are made once every decade, but can be done more quickly if there are certain conditions

that demand changes to the curriculum, such as when the Covid-19 Pandemic, Indonesia implementing an emergency curriculum.

Sequentially, the curriculum in Indonesia has been developed thirteen times since Indonesia's independence until now. The first curriculum in Indonesia was known as the 1947 learning plan. After that there have been twelve curriculum changes, as stated by the Ministry of Education and Culture quoted in the book "Introduction to Curriculum" by Arif Munandar. The changes are as follows: 1952 lesson plan, 1968 curriculum, 1975 curriculum, 1984 curriculum, 1994 curriculum, 1999 curriculum (1999 curriculum supplement), 2004 curriculum (Competence-Based Curriculum), 2006 curriculum (Educational Unit Level Curriculum), 2013 curriculum, Emergency Curriculum and Independent Curriculum. In each development there are differences that characterize the curriculum. One of the differences is the implementation of learning in the field of science. Below is an explanation of the implementation of science learning according to the curriculum in Indonesia from time to time.

A. *1947 Learning Plan (Rentjana Peladjaran 1947)*

The 1947 Lesson Plan was the first curriculum in Indonesia after Indonesia's independence. In that time, the term curriculum has not been used, but the term lesson plan was used. As a result of the unfavorable political situation at that time, this first curriculum could only be implemented in 1950. This curriculum did not emphasize cognitive aspects but prioritized character education (Insani, 2019). The main points contained in this first curriculum in Indonesia were a list of subjects, teaching hours, and an outline of teaching for each subject (Raharjo, 2020).

In the list of subjects there were 16 subjects for public schools (SR). Among the 16 subjects, there were three subjects related to science, namely natural sciences, earth sciences, and life sciences. Teaching material for each of these subjects is related to everyday life (Haryanto, 2010; Hidayat, 2019).

The field of science was also taught to students in community classes. This class was a class intended for SR graduates who did not continue to a higher level. This community class was taught various fields related to skills such as animal husbandry, agriculture, fisheries, and carpentry. Although it did not discuss scientific concepts in the realm of laws, theories and principles of science. However, the materials on agriculture, and so on, are the application of scientific concepts in everyday life. The existence of three subjects in the science cluster and material related to the application of science in life shows that since the beginning the curriculum designed science has been seen as important to be mastered by Indonesian young generation.

B. *1952 Lesson Plan (Rentjana Peladjaran 1952)*

Education Law number 4 of 1950 regulates the improvement of the curriculum in Indonesia, which was originally a 1947 lesson plan to a decomposed 1952 lesson plan. This curriculum already contains a clear syllabus of subjects (Alhamuddin, 2014; Raharjo, 2020). The distinctive feature of this curriculum is that each lesson is related to everyday life, in other words, contextual learning has been known since then. Another feature of the

1952 lesson plan is learning to apply ethics, values, morals, and applicable rules (Kalbu, 2020).

There are six knowledge groups in the 1952 Lesson Plan, namely: 1) language group, 2) exact science group, 3) natural science group, 4) social knowledge group, 5) economics group, and 6) expression group (Elisa, 2021). It can be seen that science is one of the groups that students must learn from the 6 groups of knowledge determined by the curriculum. In fact, to support the preparation of skilled and educated personnel in the third grade of high school, majors with exact sciences and natural sciences are conducted as one of the 2 majors provided. This also showed that since the beginning of Indonesia's independence, science has become an important part of the curriculum. In particular, in the 1952 study plan, science even became one of the majors to prepare a competent workforce.

C. 1964 Lesson Plan (Rentjana Pembelajaran 1964)

A description of the 1964 learning plan is written in Instruction number 2 of 1964, which contains five developments called Pancawardhana. Pancawardhana is listed on UNESCO as the five principles of education. The contents of pancawardhana are 1) moral, 2) intelligence, 3) emotional and artistic, 4) skills (skills), and 5) physical (Izmi, 2017). The learning method used in this curriculum was known as the guided mutual cooperation method (Insani, 2019; Kawuryan, 2013).

1964 lesson plan was a separate subject curriculum, meaning that it separated subjects based on five study groups according to the Pancawardhana principle. At the elementary science level, it was included in an intelligence development program known as natural knowledge subjects (Muhammedi, 2016). Furthermore, for the junior high school level, the implementation of learning was grouped into four groups (basic group, creative group, rasa/karsa group, krida group), and for science it was included in the creative group which was divided into natural sciences, life sciences, geometry, and wordl earth sciences. High school (SMA) was divided into three groups, namely: SMA – A, SMA – B, and SMA – C. In SMA – B students study natural sciences specifically. In this group there were subjects of exact sciences, natural sciences, chemistry, and life sciences.

D. 1975 Curriculum

The1975 Curriculum was motivated by national development. This curriculum was goal-oriented and was also known as the hierarchy of educational goals. The learning plan in this curriculum was known as the instructional system development procedure which was known as the lesson unit. The details of this unit of study consist of general instructional objectives, specific instructional objectives, teaching materials, teaching tools and materials, and learning activities. The details of these learning objectives were made by the teacher, so there was criticism in the application of this curriculum about teachers who were preoccupied with making details of what will been achieved in learning activities

(Insani, 2019; Raharjo, 2020)The 1975 curriculum calls science a natural science subject. Science subjects have existed since elementary school to high school. In high

school, science is one of the three majors (Asri, 2017). However, according to Rustaman, in this curriculum, science learning tends to focus on material. Whereas science learning should be able to balance product aspects and process aspects in accordance with the nature of science itself. This became one of the deficiencies in the science learning process in 1975.

E. 1984 Curriculum

The 1984 curriculum was a refinement of the 1975 curriculum. Compared to the 1975 curriculum, 1984 curriculum applied a process approach that prioritized student-centered in learning activities. This student-centered learning led to the emergence of the term "active student learning method" (Insani, 2019; Raharjo, 2020). According to this curriculum students are asked to make observations, classify, discuss, and report the results of observations, this is very much in accordance with the basics of science process skills.

Science materials compiled in the 1984 curriculum are essential materials. Another difference between the 1984 curriculum and the 1975 curriculum lies in the majors. If in the 1975 curriculum there were three majors (Science, Social Studies and Languages), in the 1984 curriculum there were two programs, namely programs A and B. Program A consisted of A1 which emphasized Physics, while A2 emphasized Biology (Asri, 2017).

F. 1994 Curriculum

The 1994 curriculum was implemented in accordance with Law number 2 of 1989 concerning the National Education System. In this curriculum the semester system changed to a quarterly system (Asri, 2017). This curriculum was oriented toward subject matter and problemsolving skills.

In the 1994 curriculum, mandated by the minister of education and culture at that time, it was hoped that the curriculum could facilitate the development of scientific and technological literacy within the scope of formal education. However, it turns out that the 1994 curriculum was not oriented towards developing scientific literacy but still emphasized mastery of natural science materials (Anjarsari, 2014).

The 1994 curriculum consisted of local to national content material. Local content was adapted to regional needs such as regional language subjects or regional arts. The large amount of content in this curriculum made the 1994 curriculum receive quite a lot of criticism, because it was considered to make the learning load of students (Asri, 2017; Kawuryan, 2013).

G. 1999 Curriculum Suplement

The change of President in 1998 had an impact on curriculum changes, so the 1999 Curriculum supplement was developed. However, in general this curriculum change from the previous curriculum was to provide additional or strengthening material from the 1994 Curriculum (Raharjo, 2020).

H. *2004 Curriculum – Competence-Based Curriculum (Kurikulum Berbasis Kompetensi)*

The 2004 curriculum or what is known as the competency-based curriculum (CBC) had the following characteristics: a) emphasizes good student competence, b) was oriented towards learning outcomes, c) learning activities used various approaches and methods, d) the teacher was not the only one the only source of learning, and e) assessment not only assesses the results but also assesses the process. For the field of science the scope of subjects according to the CBC consists of two dimensions, namely: scientific work and understanding of concepts and their application. Scientific work in it consists of student activities to carry out investigations, communicate scientifically, develop creativity and solve problems, and be able to demonstrate scientific attitudes and values.

According to CBC, science subjects in elementary schools and madrasah ibtidaiyah (MI) aim for students to be able to master the concepts and benefits of science in everyday life and are useful for continuing to a higher level of education. Science Education in CBC for elementary schools explicitly in the form of new subjects starting to be taught at the high grade level (grades 4-6). Whereas for the lower grades (grades 1-3) science is studied integrated with other subjects such as language subjects through thematic learning models.

The basic difference that appears in this curriculum compared to the previous curriculum for the science field is that there is a Chemistry study for the junior high school level which previously did not exist. This caused several obstacles in the initial implementation of CBC, especially for chemistry studies, such as the unavailability of modules, the absence of adequate chemistry books for junior high schools and the unavailability of teaching aids or tools for chemistry practicum (Wulandari, 2010).

I. *2006 Curriculum – Educational Unit Level Curriculum (Kurikulum Tingkat Satuan Pendidikan)*

During 2004 to 2006 the CBC was carried out as a limited test. Then in 2006, along with the Minister of National Education Regulation number 24 of 2006 concerning the implementation of Permendiknas number 22 years 2006 on content standards for primary and secondary education units and Permendiknas number 23 of 2006 concerning graduate competency standards for primary and secondary education units, the Education Unit Level Curriculum was implemented. In this curriculum the central government sets competency standards and basic competencies then schools are required to be able to develop syllabus and assessments according to school conditions (Permendiknas, 2006; Sumiyati, 2010).

In 2006 Curriculum scientific literacy has begun to be accommodated, this can be seen by the existence of graduate competency standards for the Science subject group, not only knowledge in the form of facts, concepts or principles but also a process of discovery (Anjarsari, 2014). KTSP also directs inquiry learning activities that are very in line with the nature of science and supports the training of scientific literacy and science process skills of students.

J. 2013 Curriculum

The development of the 2013 Curriculum was an improvement effort from the 2006 curriculum. In this curriculum competence was used as a reference in developing learning activities. Graduate competencies were translated into core competencies and basic competencies. Core competencies was divided into four parts, namely: KI 1 spiritual attitude, KI 2 social attitudes, KI 3 knowledge, KI 4 skills (Anjarsari, 2014; Prasetyowati, 2014; Wicaksono & Sayekti, 2020). The 2013 curriculum also popularized the term authentic assessment. The hallmark of authentic assessment is that assessment does not only focus on student learning outcomes but also assesses the process.

The 2013 Curriculum learning paradigm used a scientific approach with the steps: observing, asking, gathering information, associating, and communicating (Shawmi, 2016). This scientific approach refers to learning activities that make students active. The teacher no longer acts as the only source of knowledge for students, but as a facilitator who helps students to construct their own knowledge.

In accordance with the nature of science, where science can be seen as a process, product, and scientific attitude (Adi & Widodo, 2018; Ali dkk., 2013; Mariana & Praginda, 2009), this scientific approach provides opportunities for students to demonstrate a scientific attitude, carrying out processes to discover concepts in the form of facts, principles, theories, and law which is one form of IPA product. Based on this, it can be seen that the 2013 curriculum makes science as the basis for preparing a generation that understands technology in the digital era.

K. Emergency Curriculum (Kurikulum Darurat)

The emergency curriculum arose from the conditions of the Covid-19 Pandemic that hit Indonesia. This curriculum was a simplification of the national curriculum which was expected to fulfill the right to education in the Covid-19 Pandemic situation. The main form of simplification was the reduction of basic competencies for each subject (Sanjaya & Rastini, 2020). The implementation of this emergency curriculum was based on the Decree of the Minister of Education and Culture Number 719/P/2020 concerning guidelines for implementing the curriculum in educational units and special conditions dated 4 August 2020 (Kepmendikbud, 2020).

Due to the conditions of the Covid-19 Pandemic which require physical distancing and restrictions on gathering activities, face-to-face learning which has been the main activity of educational activities in formal schools has changed its form to online learning that utilizes information communication technology such as video conferencing, virtual classes, online video streaming or other forms of online activity. The results of the study "a comparative study of offline and online learning in junior high school in science subjects" show that offline science learning is more effective than online learning. In the research report it was stated that the learning outcomes of students during face-to-face learning before Covid-19 were higher than learning outcomes when learning was carried out online, this was because when online students were not facilitated directly to discover

science concepts. Meanwhile, science learning is more meaningful when students can build their own knowledge through direct experience (Kurnia, 2021).

L. *Merdeka Curriculum (Kurikulum Merdeka)*

The independent learning curriculum (Merdeka Curriculum) is based on Permendikbud number 3 of 2020. Minister of Education and Culture Nadiem Makarim explained three main points in the idea of Freedom to Learn, namely: 1) technology for acceleration, 2) diversity as the essence, and 3) profile of Pancasila students. Besides that, local wisdom is also an important element in learning which is considered in the Independent Curriculum (DISMP Kemdikbud, 2022; DITPSD Kemdikbud, 2022c, 2022b, 2022d). The essence of the concept of independent learning is to place students as learning subjects so that as an outcome later students are able to become problem solvers who are ready to face global competition.

Learning for elementary and junior high school levels in the Merdeka Curriculum combines science and social studies subjects, this aims to trigger students to manage the natural and social environment in one unit (DITPSD Kemdikbud, 2022a). The learning achievements in the independent curriculum are described in different phases for each level, from Phase A for grades 1 and 2 of SD/MI/Package A Program to Phase E for the SMA/MA/Package C Program level. Overall what is expected to be achieved by students from each of these phases is the ability of students to understand science and process skills. What is different from each phase is the complexity if in Phase A the focus is on training students to be able to optimize their senses to then carry out scientific processes to be able to understand science, in a higher Phase students have been trained to have the ability to be responsive to global issues and play a role active in providing solutions to real problems in the environment.

The Merdeka Curriculum also promotes the implementation of project-based learning to strengthen the profile of Pancasila students which is carried out at least twice a year (DITPSD Kemdikbud, 2022d, 2022a). The implementation of giving this project assignment to students can be done by integrating various subjects to solve a real problem in everyday life. All of the above descriptions regarding the design of the independent curriculum can be concluded that the Independent Curriculum indeed prepares students to be able to face global challenges.

CONCLUSION

Since Indonesia's independence, the curriculum has developed 12 times .From the beginning, the existence of a science curriculum has become one of the contents that is considered important for the young generation of Indonesia. The term natural science (IPA) itself began to be used in the 1968 study plan, while previously science was known in separate sections as life sciences, earth sciences and natural sciences. It is growing, now that parts of science that are known in Indonesian education are physics, chemistry, and biology, while the term integrated science is still used at lower levels of education (elementary and junior high schools). Furthermore, the current curriculum in Indonesia

aims to prepare students as individuals who have various skills to be able to face global challenges.

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