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The Development of Indonesia National Curriculum and Its Changes: The Integrated Science Curriculum Development in Indonesia

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Abstract: The national curriculum of Indonesia has changed several times, more than ten times precisely. Those alterations logically result from science learning political issues, government systems, social culture, economics, and science technology in the community. This study aims to develop integrated science in the science classroom. Qualitative research and document analysis are used in this study. The result of this qualitative research is a deeper analysis of the history of science, science textbook development, and an integrated curriculum for science learning. The history of science depicts that the curriculum change impacted how science integrates with other knowledge in the curriculum. In the last curriculum, junior high school taught integrative science, which differed from integrated science. There are two primary methods used by the Indonesian government to provide textbooks to aid in the implementation of the curriculum: the government development and a non-government publishing company developing textbooks with national standards. The last finding is the integrated curriculum for science learning. There is a relationship between the philosophy of science, integrated science, and science education. This research contributes to science, especially science education, with a term of integrated science model called Biology-Physics-Chemistry and other disciplines-Philosophy (BPCO_P)

Keywords: bpco_p; curriculum, integrated science, science education

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INTRODUCTION

Indonesia has five fundamental ideologies: belief in one God, humanitarianism, national unity, consensual democracy, and social justice. Thus, five essential principles are called *Pancasila*; *Panca* is five, and *Sila* is the Indonesian people's norm or ideology. Pancasila become the guideline for the citizen to hold their social interaction (Weatherbee, 1986). From the 1500s through the 1600s, Indonesia developed into a hub for trade between traders from the Middle East, Europe, and India. In addition, there was no national educational system program during that time. However, religious schools based on Hinduism, Buddhism, and Islam were provided, and the religious organization was responsible for those schools, including Christian missionaries and Muslim religious schools. In particular, colonialism did not affect Islamic education, emphasizing writing, accounting, and reading capability in the Melayu language because it was used in daily trading (Supriadi, 2003).

Before the Dutch arrived in Indonesia, a few Chinese people came to Indonesia and married the native people. In Indonesia, Chinese people are divided into two types: Totok and Peranakan (Suryadinata, 1972). The Totok people are Chinese with pure blood or origin from mainland China. There are two ethnicities of Totok: Hakka and Cantonese. On the other hand, the Peranakan people are Chinese with mixed blood with the native people. It means that the Peranakan was married to local people and stayed for the next generation in Indonesia; their ethnicity is Hokkien. Based on the education, Totok and Peranakan have different treatments. The children from Peranakan did not pay much attention to education because mostly they were born in the 1880s. In the twentieth century, schools were rare. If it exists, it is only informal schools based on the Confucianism paradigm. Since three Dutch missionaries such as Albers, Coolsma, and van der Linden came to Indonesia, the educational system was starting to look faint, particularly for the school. Those Dutch missionaries established an exclusive school that taught Malay language, writing, arithmetic, drawing, and advanced class Dutch.

In 1908, the first Dutch primary school for the Chinese, the Hollandsch-Chineesche School (HCS), was established in Batavia and duplicated later in other major cities. Further, the school was separated between the Dutch school and the oldest Chinese school in Djakarta called Tiong Hoa Hwee Koan (THHK) School. The students who failed to register in the Dutch school would be enrolled in the Chinese school. The population of Chinese and Dutch Medium Schools from 1915 to 1926 is described in Table 1.

Table 1. The Population of Chinese and Dutch-Medium Schools

Year	Chinese-Medium School	Dutch-Medium School
1915	16.499	8.060
1920	14.242	13.617
1925	29.401	19.382
1926	32.668	27.802

Suryadinata (1972)

During the Japanese colonialism from 1942 to 1945, the Western and the Dutch-medium school were banned, while the Indonesian and the Chinese-medium schools were permitted to operate. This regulation started on August 1, 1942. The Japanese government threatened Totok and Peranakan Chinese with the same level of education. The Peranakan Chinese were also encouraged to study Chinese. Students in HCS also received their education in Chinese-medium schools.

The Dutch East India Company conquered Indonesia brutally in the late sixteenth century, seizing control of its resources and territory. In 1800, the Dutch government took over management of the trade enterprise. By 1819, the region had been designated as the Dutch East Indies, an official colony of the Netherlands. Furthermore, the Dutch government introduced limited public and private schooling reserved solely for the Dutch and other Europeans.

During the colonial era and the beginning of the 20th century, the educational system was recognized as classes from elementary school to university. In 1942, at the elementary school level, the educational system was divided into several levels with different curriculum, facilities, and teachers. Regarding the educational system at the elementary school level, there are three categories of students: local students, local students with high status, and students from China and European descendants. In terms of local students, in the elementary school level, they have two grades of class: four and five. Those grades were the continuity of village school (*Volkshool*) with Melayu language and Latin script. In addition, some schools (*pribumi*) also provided basic literacy and math training for two or three years. HIS elementary school (*Hollandsche Inlandsche School*) provided seven years and taught in Dutch to local students with high social status. The ELS (*Europesche Lagere School*) is a school intended for elementary students of Dutch and European offspring. In addition, only a few high-status students from local (*pribumi*) registered for ELS school. The different schools for different students' backgrounds also happened in junior and senior high school.

On the one hand, HBS (Hogere Burger School) is the continuation of ELS school for students from Dutch and European. However, in Japan's colonial, the educational system based on the social strata was erased. Since the independence era, the government determined the one educational system called *Sekolah Rakyat* (*SR*) or lower school SMP/SGB/ST, SMA/SMK/teacher's school. In addition, from 1968 until 1975, the same government was responsible for the educational system.

The Japanese compelled the Netherland indies three months after the Pearl Harbor tragedy to surrender. It happened on March 9, 1942, and ended nearly 350 years of Dutch ascendancy in Southeast Asia, especially Indonesia. Moreover, the Japanese era happened for three and a half years. The Japanese invasion was welcomed by some Indonesians who wished to end Dutch rule. The first mass education system was established by the Japanese while they were in control of Indonesia. It allowed all learners access to schools and promoted the use of regional languages for instructions (Bangay, 2005). However, just like the Dutch schools, the education provided in these institutions was intended to serve Japan's needs as an occupier rather than to advance the education of Indonesians. Until the conclusion of the war in 1945, the Japanese were still present. Unfortunately, there is no detailed instruction on how the Japanese government managed schools in their colonial era, particularly in Indonesia. However, there was no instruction during the Japanese colonialism, and the Japanese school was not spread on each island, but the Japanese instruction is considered to influence almost all sectors of Indonesia.

The Dutch curriculum supported the construction of pure science as the Dutch colonial project (Goss, 2009). Meanwhile, after three years and a half of the occupation, Japanese curriculum brought in some important educational policies that persist and still can be found today. The subject was also altered later, during 1942, the old curriculum contained *kagaku* (natural science), and it changed to *rika* (science) in the new curriculum in 1943 (Ramli, 2010). Thus, Dutch and Japanese did not accommodate science in integrated ways and focused on pure science.

Furthermore, the national curriculum of Indonesia has changed several times, more than ten times precisely, such as the curriculum before colonial until after independence (Faisal & Martin, 2019). Those alterations are logical consequences of political issues, government system, social culture, economics, and science technology in the community (Brown & Beswick, 2014). The changes in the curriculum also impact the

essence of science as integration in school, particularly in elementary and junior high school (Faisal & Martin, 2019). Curriculum 2013 accommodates the integrated science, and it was taught in the science classroom (Kemdikbud, 2013; Rohmatulloh et al., 2019). However, the meaning of "integration" and the value of an integrated approach have not always been explicit (Brown, 1977). Based on previous research, the researcher analyzes Indonesia's integrated science curriculum development, particularly at the junior high school level.

METHODS

This study is qualitative research with document analysis as a method (Gray, 2004). Document analysis is a form of qualitative research in which the researcher interprets documents to give voice and meaning to an assessment topic (Bowen, 2009). The instruments are some documents that will be analyzed to explore science at the middle school level. Furthermore, there are three document types: the public record, personal documents, and physical evidence. The record consists of the basic law of 1945, the Indonesian government law, the curriculum documents before and after Independence Day, national textbooks, strategic plans, and syllabus. Personal documents are the previous article journals. Meanwhile, the training material and handbook represent the physical document or artifacts (O'Leary, 2014).

Document analysis was a complementary data collection procedure supporting triangulation and theory building. Analyzing documents incorporates coding content into themes similar to how focus group or interview transcripts are analyzed. Document analysis involves skimming (superficial examination), reading (thorough examination), and interpretation (Bowen, 2009). In this research, the data analysis used skimming, reading, and interpretation of several documents with content analysis.

RESULT AND DISCUSSION

The History of IPA/Science

The curriculum change influenced the history of the majors and courses in Indonesia. The curriculum in 1964 offered the culture major for senior high school and Prakarya (handicraft) course. Furthermore, in the curriculum of 1968, the mathematics course emerged with health education and inclusive education. On the other hand, the numeracy subjects were erased. Mathematics is related to science because science requires mathematics in the formula of physics, chemistry, or biology law (Bishop & Nabney, 2008). For instance, the physician needs mathematics to count the number of frequencies. In addition, from curriculum 1947 to curriculum 1964, no institutions analyzed and discussed mathematics and science subjects because the government focused on civic and history education. Curriculum 1968 changed where students choose a major in senior high school. Moreover, there is no evidence or data about why that adjustment happened. Furthermore, even though the curriculum was changing in the last decade or 20 centuries, the subjects are the same, such as botany, algebra, and the history of the world (Soedijarto et al., 2010).

In curriculum 1975, the government intended to organize the curriculum based on the National Education standard to develop science and technology. There was an institution from the government to handle the curriculum called Curriculum Center Organization (Pusat Kurikulum). Based on their research, the curriculum cantered developing the science major for senior high school students. In 1984, the government divided the science majors into physics majors (chemistry and physics) and biology majors (Program B). However, in the early 1990s, science majors (physics) and biology were removed and replaced by SCIENCE majors in senior high school. After one decade, the science has broad field into junior high school as an integrated science. It stuck out until the curriculum of 2013, which is integrated science in junior high school (Belen, 2007). For instance, the basic competencies 3.9, "Recognizing the concept of static electricity, electrical potential, electrical conductors, electricity in the nervous system, electricity in the heart, electricity in the skeleton, and animals that contain electricity" (Kemdikbud, 2013). This basic competency is integrative physics and biology subject.

The curriculum 2013 proposed three approaches to teaching IPA (science) at each level of schooling. In elementary school, science is taught as an integrated subject with Pancasila and Civics Education, Indonesian, and Mathematics. IPA is intended as an integrative science course for junior high school students, not as a separate science field (Kemdikbud, 2013). Three subjects, such as biology, physics, and chemistry, are electives in senior high school.

Interestingly, teaching science in junior high school is integrative and different from integrated science. Those kinds of the term are different. Particularly in integrative science as opposed to integrated science, the term "integrative" is uncommon. The term "integrated science" often implies that the course's material is drawn from a variety of fields. Integrative science is used elsewhere to imply the inclusion of social and cultural (including cross-cultural) aspects and scientific understandings. From this perspective, the curriculum 2013 may be considered integrative because Core Competencies 1 and 2 throughout refer to the religious, social, and cultural basis of education in Indonesia (Michie, 2017).

Science Textbook Development

Kemdikbud publishes a teacher's guidebook for each year of IPA in junior secondary. Each guidebook serves two functions (Kemdikbud, 2014). The first function is teaching, learning, and assessing IPA and Core Competencies 1 and 2. The second function uses the student book to identify science teaching strategies for each year. Regarding the Ministry of Education and Culture Indonesia Law number 8, 2016, two textbooks are used in schools: lesson and non-lesson. The lesson textbook is the primary operational tool for implementing the curriculum, and the non-lesson textbook is the supporting facility to implement, evaluate, and develop a lesson for students to cover the criteria available for education units or schools. In addition, the textbook lesson is the main resource for acquiring basic and core competencies, which are legally based on the Ministry of Education and Culture and can be used in education units. On the other hand, the non-textbook lesson is the enrichment textbook to support the learning process at each level of education.

There are two primary ways that the Indonesian government distributes textbooks to aid in the implementation of curriculum. The government may first endorse textbooks written by different authors and adopt them for publishing as national textbooks. An alternative is for a non-government publishing house to create a textbook that adheres to national standards. For instance, all science textbooks released by public or private organizations must contain instructional activities centered on observation, direct experiments/demonstrations, and inquiry-based investigations created to aid teachers and students in achieving both the basic and core competencies in the curriculum. More than 15 biology textbooks for each grade are actively published by seven non-governmental publishers: Yudhistira Galia Indonesia, Tiga serangkai, Erlangga, Esis, Gramedia Widiasarana Indonesia, Intan Pariwara, and Yrama Widya (Faisal & Martin, 2019). Since 2008, the Indonesian government has provided an electronic textbooks for all subjects, including the science textbooks in junior high school. This textbook is free for all students to download from the Ministry of education and culture website or provided by the school. In addition, the Indonesian government also provide two kinds of textbooks: teacher book and student book. Based on the discussion with one of the science teachers in junior high school, the science teachers have primarily utilized the formal textbook from the government and very rarely use other textbooks from the private publisher to teach students in the classroom.

However, the textbooks generally share common features, such as structure and content arrangement, as all authors use the same criteria described by the Ministry of Education Culture (Kemdikbud) for writing textbooks. The criteria require that textbooks be compelled with generalized content structure and organization and offer learning and teaching activities within the text. In addition, the compulsory guidelines provide clear instructions about layout, preference, content, and closing. Moreover, the government and a private company that publishes the lesson and non-lesson textbooks should consist of the publishers, editors, illustrators, and reviewers. There is therefore little room for customization. The authors must also represent a variety of academic specializations and occupations, including those of science teachers, lecturers, teacher educators, and researchers (Kemdikbud, 2016).

Following the adoption of new educational standards in the national curriculum, the textbooks are typically revised. The newest textbooks are meant to help teachers and students meet the 2013 National Science Competencies. Regarding science textbooks, the platform of science is biology because living things are used as objects to explain the basic principles in nature, such as natural objects and their interactions, energy and balance, and others. Through discussions using various fields of science in the natural science cluster, a complete understanding of the nature it inhabits along with natural objects encountered in its surroundings can be mastered by junior high school students (Kemdikbud, 2014). To aid students in understanding concepts and carrying out experiments efficiently, textbooks frequently incorporate pictures, diagrams, and images. For example, the overview of integrated science textbook for eighth-grade students contains a lot of the activities instruction for students to acquire the basic competencies of science, such as the biology activities on stimulant effects on closing motion and opening shy princess leaves, straight motion experiment in physics, and investigate dyes on foods that are safe for the body in chemistry. Students can complete the learning activities indicated in the textbook if teachers have the necessary laboratory equipment and materials. However, they can alter or create a new sort of activity aimed at the listed subject competencies if there are no accompanying laboratory tools and materials or at least identify the label of the food sachet, which contains the artificial substances (Kemdikbud, 2014).

Regarding the changes in the Indonesian curriculum, it has offered integrated IPA/science at the junior high school level since early 2000. There are emerging questions on how to teach science subjects in junior high school by integrating science or other subjects. Moreover, to integrate science and other subjects, teachers should look back at the curriculum and try to analyze the concept that can or cannot integrate.

Integrated Curriculum

The first question was, "what is the integrated curriculum?". This question can be answered by a simple word, the integration curriculum with making connections. The following question was, "what kind of

connections?". The definition of the integrated curriculum has been an issue of discussion since the turn of the 20th century (Hurd, 1986). The National Council of Teachers of English (NCTE) in 1935 has the definition of integrated science. The definition is that the correlation may pay less attention to related materials in other subject areas, but it focuses on the teachers making the materials of one subject and interpreting the problems of topics to other subjects.

There are ten models to integrate curriculum: fragmented, connected, nested, sequenced, shared, webbed, threaded, integrated, immersed, and networked (Fogarty, 1991). Based on those models, it can be divided into four primary disciplines such as single disciplines (fragmented, connected, nested), across several disciplines (sequenced, shared, webbed, threaded, integrated), the disciplines within learners (immersed), and across networks of learners (networked). However, it is not all of that models can be implemented in the integrated science, especially for teaching science in junior high school. Moreover, several models can be implemented at the faculty level to arrange the curriculum and the policymaker to construct the curriculum policy in countries. Furthermore, there are three categories of integrated curriculum: multidisciplinary integration, interdisciplinary integration, and transdisciplinary integration (Drake & Burns, 2004). Multidisciplinary integration focuses on disciplines. It means that the integration is from different disciplines such as science, mathematics, history, English, arts, design, and technology. This integration concept is that all disciplines are bound to one big theme. Second, interdisciplinary integration is across disciplines, for instance, the integration between science and social programs, such as embracing science with history and geography. However, this integration still uses the theme as a glue for each discipline. Besides the theme, literacy, thinking, numeracy, and research skills are the skills to placard among disciplines (Powell et al., 2011). Transdisciplinary integration is the integration of interdisciplinary and disciplinary in the real-life context. This integration concept is the negotiations with the students' questions and concerns. It means that integration is an integrated curriculum with students because the subject should be related to students' backgrounds (Brown, 2002). For example, the curricular program is a motion for junior high school students. In that context, students develop their curriculum, teaching methods, and assessments around areas of interest to them.

Regarding the integrated curriculum, the Ministry of Education Indonesia by Pusat Kurikulum (Puskur) has the official document to adjust the integrated science in junior high school called The Academic Education Curriculum Policy for IPA/Science Subject. The official documents talk about two kinds of integrated curriculum approaches, intradisciplinary and interdisciplinary integration. Intradisciplinary integration integrates biology, physics, and chemistry in the science programs—for instance, the study of motion and change. The examples are learning about motion in physics and biology, such as motion in irregular straight motion in physics and motion of blood in the blood vessel, which is integrated with changing chemistry concepts like chemistry and physical changes. On the other hand, interdisciplinary integration integrates across disciplines (Drake & Burns, 2004), for example, the integration between science and health in "cigarette and health." That topic is in the basic competencies for science students in the 8th grade.

Regarding the concept of integration, integrated science differs from the integration in STEM concept. The U.S. National Science Foundation (NSF) is the institution that first introduces STEM education. Since then, it has spread and become famous in several countries, including Indonesia. The integration consists of science, technology, engineering, and mathematics. In STEM education, science is incorporated with the study of natural phenomena using observation and measurement to explain and answer the hypothesis in the environment. Science is the general term comprising the biology, physics, chemistry, and the space/astronomy sciences. Technology, on the other hand, connects with human innovations that can be used to help humans gain their needs in life. Meanwhile, engineering addresses the need to gain and apply the science, knowledge, and economics to design and construct machines or tools that have advantages for human beings. The last is mathematics, which should provide a basic implementation of science, technology, and engineering.

STEM education emphasizes that students have competencies which appropriate for the 21st century. It means that the mathematics and scientific concepts are not enough for students to become modern people but also need the related knowledge of these to engineering and technology. In addition, it encourages learners to have problem-solving and critical thinking skills related to STEM and solve the problem in their daily lives (Paul & Elder, 2006; Bybee, 2013; Chesky & Wolfmeyer, 2015). Furthermore, due to the STEM education, students in primary and secondary levels should: 1) identify, explain, and draw the phenomena by gaining the knowledge, attitude, and skills, 2) acquire the STEM discipline can enhance human knowledge, investigation, and design the skills, 3) enhance the materials, intellectual, and cultural environment, and 4) proliferate the willingness to participate in solving the problem which related to the cultural environment (Bybee, 2013).

Thus, STEM is a general integration of science, technology, engineering, and technology, while science, including biology, physics, and chemistry, is a part of STEM. However, the integration of science is not enough to face the challenges of globalization. Learners need to have problem-solving, critical, and creative thinking competencies and try blending them into STEM to deal with the 21st century. Recently, scientists have often perceived that philosophy is different from science and cannot be combined. However, philosophy contributes

to science, such as clarification of scientific concepts, the critical assessment of scientific assumptions or methods, the formulation of new concepts and theories, and the fostering of dialogue between different sciences and science and society (Laplane et al., 2019). Based on the analytic approach, there is relevancy between the philosophy of science and science education. It is explained that the analytic philosophy of science can provide the significant concepts and methods of science education (Martin, 1953). Besides, hypotheses and experiments can integrate several disciplines in the science field (Von Bertalanffy, 1953). The proportion of instructors reports the ratio of science to consist of biology, thirty-nine percent; physics, thirty-five percent; chemistry, thirty-four percent. This confirms the other data that the burden of integrated science is borne by the specialist in the teachers. One of the first steps in mapping and developing integrated science education was to find a model for integrated Science. There are several ways to organize integrated Science education, and one of the ways is 'Concepts in Science': this involves presenting general concepts in science and demonstrations of how different disciplines interact with these concepts. An example of this is the concept of energy, which may be studied from the perspectives of chemistry, physics, and biology at different school levels.

Based on the purposes of curriculum 2013 and several previous references talking about the integrated science concept, there is a relationship between the philosophy of science, integrated science, and science education. For instance, the philosophy of the traded model is an appropriate model for delivering integrated science in junior high school and has core concepts with curriculum 2013. In addition, curriculum 2013 focuses on improving the students' skills by achieving the basic competencies of each science subject. Moreover, the traded model is treading the thinking skills, social skills, study skills, graphics organizer, technology, and multiple intelligence approach to learning throughout all disciplines (Fogarty, 1991). The model of integrated science philosophy for junior high school is in Figure 1.

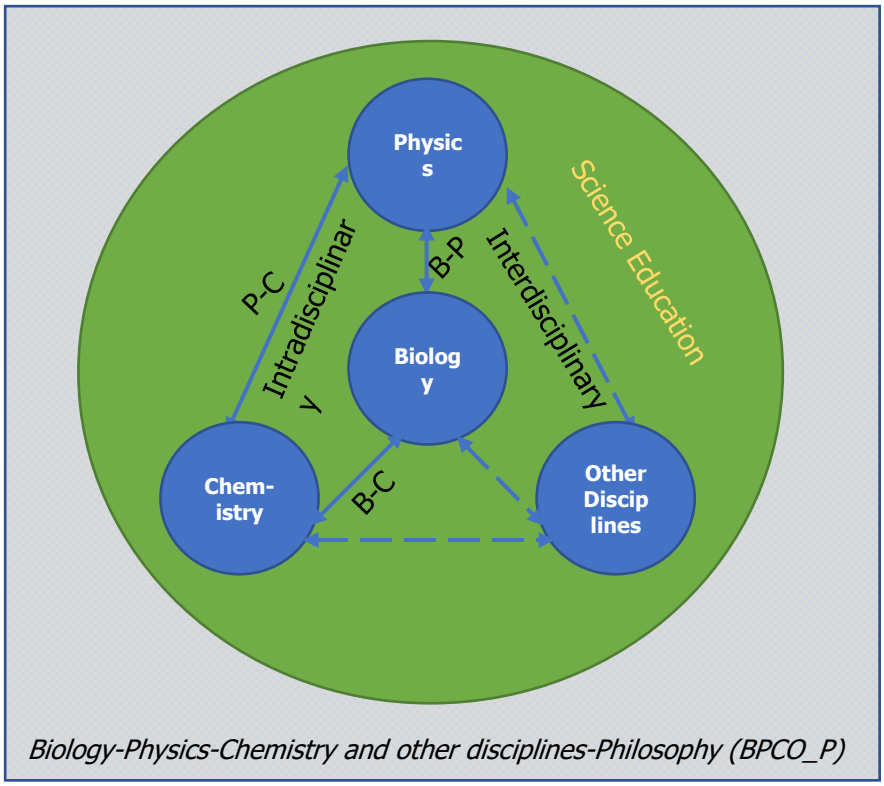

Figure 1. The BPCO_P Model of Integrated Science in Junior High School

CONCLUSION

The development of curriculum in Indonesia often changes. This change can be divided into two big groups: the curriculum development before and after the independence period. Before independence, it was dominated by colonialism from Netherlands and Japan. After independence, curriculum development was changed almost every ten years. Curriculum 2013 is the newest curriculum introduced to all Indonesian schools in 2013. It was implemented for all subjects in all year levels. The competencies used in the 2013 curriculum are divided into two categories: core competencies and basic competencies. There are four Core Competencies that apply to all topics and year levels; they are comparable and change as the curriculum does over the course of a year. The Indonesian students' practice of their religion is referenced in Core Competency 1. Core Competency 2 is a competency in social attitudes and demonstrates cultural attitudes from Indonesia that are largely relevant to the students' experiences in society. The unique knowledge and skills related to each subject

are covered by Core Competencies 3 and 4. Depending on the subject and year level, different basic competencies apply. Depending on the level of the school, IPA is taught differently in the 2013 curriculum. There is no science content taught in the lower grades (1-3) of primary education. Teachers are supposed to teach science in conjunction with other topics rather than as a separate subject in the upper grades (grades 4-6). The teacher is expected to teach it as a subject and integrated science in junior secondary. The integrated science in junior high school was blended among biology, physics, and chemistry. In the philosophy of integrated science in Indonesia, biology becomes the core of science because the nature of science is the big issue and the foundation of human living. In addition, integrated science also describes basic competencies, which one basic competency can be taught in biology, physic, and chemistry content. The appropriate type of integrated science in curriculum 2013 is the traded type because the concept of this type is integrated not only the knowledge but also the skills and attitudes of students. The teaching with integrated science can be implemented in two ways: inter-disciplinary for integrating each discipline, for example, integrated science content with language content, and intra-disciplinary, which integrates each discipline in one subject, for instance, the integration of biology, physics, and chemistry.

REFERENCES

Bangay, C. (2005). Private education: Relevant or redundant? Private education, decentralisation and national provision in Indonesia. *Compare: A Journal of Comparative and International Education, 35*(2), 167–179

Belen, S. (2007). *Kompetensi, Indikator & Penilaian Dalam Belajar Aktif KTSP*. Jakarta: Ditjen Manajemen Dikdasmen, Depdiknas.

Bishop, C. M. & Nabney, I. T. (2008). *Pattern Recognition and Machine Learning: A Matlab Companion*. Springer.

Bowen, G. A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal,* 9(2), 27-40. doi:10.3316/QRJ0902027.

Brown, N., & Beswick, K. (2014). Policy and curriculum research in the context of change. In *The Future of Educational Research* (pp. 1-11). Brill.

Brown, S. A. (1977) A Review of the Meanings of, and Arguments for, Integrated Science. *Studies in Science Education,* 4(1), 31-62, DOI: 10.1080/03057267708559845

Brush, S. G. (1989) History of science and science education. *Interchange,* 20(2), 60-70.

Bybee, R. W. (2013). *The case for STEM education: challenges and opportunities*. Arlington, VA: NSTA Press.

Chesky, N. Z., & Wolfmeyer, M. R. (2015). *Philosophy of STEM education: A critical investigation*. Springer.

Drake, S. M., & Burns, R. C. (2004). *Meeting standards through integrated curriculum*. ASCD.

Faisal., & Martin, S. N. (2019). Science education in Indonesia: past, present, and future. *Asia-Pacific Science Education,* 5(1), 1-29. DOI:10.1186/s41029-019-0032-0.

Fogarty, R. (1991). *The Mindful School: How to Integrate the Curricula*. Palatine, III: Skylight publishing Inc.

Goss, A. (2009). Decent Colonialism? Pure Science and Colonial Ideology in the Netherlands East Indies, 1910-1929. *Journal of Southeast Asian Studies*, *40*(1), 187–214. http://www.jstor.org/stable/27751556

Gray, D. E. (2004). *Doing research in the real world*. Sage.

Harianti, D. (2007). *Pusat Kurikulum*. Badan Penelitian Dan Pengembangan Departemen Pendidikan Nasional. Naskah Akademik Kajian Kebijakan Kurikulum Mata Pelajaran IPA.

Hodson, D. (1985). *Philosophy of Science, Science and Science Education. Studies in Science Education, 12(1),* 25–57. doi:10.1080/03057268508559922

Hurd, P. D. (1986). Perspectives for the Reform of Science Education. *Phi Delta Kappa,* 67, 353-358

Kelabora, L. (1976). Religious Instruction Policy in Indonesia. *Asian Survey,* 16(3), 230-248. doi:10.2307/2643542

Kemdikbud (Kementerian Pendidikan dan Kebudayaan). (2013). *Kompetensi dasar Sekolah Menengah Pertama/Madrasah Tsanawiyah*. Retrieved from https://www.academia.edu/9825906/KOMPETENSI_DASAR_Sekolah_Menengah_Pertama_SMP_Madrasah_Tsanawiyah_MTs

Kemdikbud (Kementerian Pendidikan dan Kebudayaan). (2014). *Buku guru untuk ilmu pengetahuan alam: Untuk SMP kelas VII, edisi revisi*. Jakarta: Kemdikbud.

Kemdikbud (Kementerian Pendidikan dan Kebudayaan). (2016). *Peraturan Menteri Pendidikan Dan Kebudayaan Republik Indonesia Nomor 8 Tahun 2016 Tentang Buku yang Digunakan oleh Satuan Pendidikan [Act of Ministry of Education and Culture no. 8, 2016 about National Textbook for school]. Jakarta: Ministry of Education and Culture*. Retrieved on March 14, 2019 from http://simpuh.kemenag.go.id/regulasi/permendikbud_08_16.pdf.

Koto, I. (2013). *Indonesian Primary School Science in Practice: Challenges between the Intended and Implemented Curriculum* [Thesis, Curtin University].

Laplane, L., Mantovani, P., Adolphs, R., Chang, H., Mantovani, A., McFall-Ngai, M., ... & Pradeu, T. (2019). Why science needs philosophy. *Proceedings of the National Academy of Sciences*, *116*(10), 3948-3952.

Martin, M. (1953). The Relevance of Philosophy of Science for Science Education. *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association*, *1974*, 293–300.

McComas, W. F., Almazroa, H., & Clough, M. P. (1998). The nature of science in science education: An introduction. *Science & Education*, *7*(6), 511-532.

Michie, M. (2017). *Comparing the Indonesian Kurikulum 2013 with the Australian Curriculum: Focusing on science for junior secondary schools*. The International Education Journal: Comparative Perspectives Vol. 16, No. 2, 2017, pp. 83-96. https://openjournals.library.sydney.edu.au/index.php/IEJ.

Morfit, M. (1981). Pancasila: The Indonesian State Ideology According to the New Order Government. *Asian Survey, 21*(8), 838-851. doi:10.2307/2643886.

O'Leary, Z. (2014). *The essential guide to doing your research project (2nd ed.)*. Thousand Oaks, CA: SAGE Publications, Inc.

Paul, R., & Elder, L. (2006). The Miniature Guide to Critical Thinking: Concepts and Tools. Retrieved from https://www.criticalthinking.org/files/Concepts_Tools.pdf.

Powell, R., van Wagtendonk, J. W., Machlis, G., Galipeau, R., van Riper, C. J., & von Ruschkowski, E. (2012). *Integrated science and interdisciplinary research for parks and protected areas*.

Ramli, M. (2010). Primary School System in Java Before and Under Japanese Occupation (1940-1944). *International Journal of History Education, 9*(1).

Rohmatulloh, A., Prasetyo, Z. K., & Pambudi, H. A. (2019, April). Implementation of the 2013 Curriculum for Science Learning. In *Elementary School Forum (Mimbar Sekolah Dasar)* (Vol. 6, No. 1, pp. 105-115).

Soedijarto., Thamrin., Karyadi, B., Siskandar., & Sumiyati. (2010). *Sejarah Pusat Kurikulum*. Pusat Kurikulum Badan Penelitian dan Pengembangan. Kementrian Pendidikan Nasional.

Supriadi, D. (2003). *Satuan Biaya Pendidikan Dasar dan Menengah (Educational costs of primary and secondary schooling)*. Bandung: Remaja Rosdakarya

Suryadinata, L. (1972). Indonesian Chinese Education: Past and Present. *Indonesia,* (14), 49-71. doi:10.2307/3350732.

Tilaar, H. A. R. (1995). *Pembangunan pendidikan nasional 1945-1995: Suatu analysis kebijakan*. Jakarta: Pt. Grasindo.

UKEssays. (2018). *The National Curriculum of Indonesia and its changes*. Retrieved from https://www.ukessays.com/essays/education/the-national-curriculum-of-indonesia-and-its-changes-education-essay.php?vref=1

Von Bertalanffy, L. (1953). Philosophy of Science in Scientific Education. *The Scientific Monthly, 77*(5), 233–239. http://www.jstor.org/stable/21168.

Weatherbee, D. (1986). Indonesia in 1985: Chills and Thaws. *Asian Survey, 26*(2), 141-149. doi:10.2307/2644449.