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THE COMPARISON OF HUNGARIAN AND INDONESIAN CURRICULUM: A CASE STUDY OF ISCED 2 MATHEMATICS AND SCIENCES CURRICULUM

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ABSTRACT

In the twenty-first century, there has been significant and rapid advancement in mathematics and science education. Comparing the educational systems of different countries according to international standards can provide valuable insights for improving educational quality. This study aims to investigate and compare the science and mathematics education systems of two countries, Indonesia and Hungary, specifically at the ISCED 2 level. The Indonesian curriculum used in this study is the most recent version of Curriculum 2013, updated in 2016, while the Hungarian curriculum used is the National Core Curriculum 2020 (NCC). This research is categorized as library research and applies the qualitative descriptive-analytical method. We searched several legal documents of curriculums from both countries in libraries, legal websites, formal institutions, and the archives of the ministries of education. After finding the relevant documents, the authors from each country translated, analyzed, and reviewed them thoroughly. According to the findings, several differences between the two educational systems might generate drawbacks. In Hungary, both science and mathematics curricula are empirical-based and involve activities, whereas in Indonesia, they start from new activities and are content-based. There are also several disjoint topics in mathematics between both countries, such as absolute value and quadratic equations. In Indonesia, science education is focused on biology topics as the main proportion of knowledge and is theoretical-oriented, while in Hungary, it is more varied in topics and is realistic and empirical-oriented. The Hungarian science curriculum is also emphasized on inquiry and experimental activities. To further investigate and compare the education systems, more studies are needed at every level of education.

Keywords: Curriculum; Hungary; Indonesia; Mathematics; Science

INTRODUCTION

Education is a nation's primary investment in improving the quality of its human resources, promoting a fair society's welfare, and producing intelligent, creative, skilled, responsible, productive, and virtuous individuals (Masino & Niño-Zarazúa, 2016; Lim, 2018). Education requires innovation in line with scientific and technological advancements, while also being mindful of human values (Chowdhury, 2018).

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Globalization has changed many aspects of life, and competition between countries has become a feature of the current era of globalization, both at the regional level (Association of Southeast Asian Nations) and the international level. Technological progress has raised expectations for improvements in educational quality in every nation (Serdyukov, 2017; Mizuno & Bodek, 2020). This global perspective can be used as a viewpoint for implementing education so that formal education can provide positive value for the present or future development of human resources' quality (Michalos & Michalos, 2017; Peters, 2020).

There have been significant and rapid advancements in mathematics and science education in the 21st century (Fuad et al., 2017; Malik, 2018; Suherman et al., 2018). The 21st-century challenge fosters the development of the mathematics and science curriculum. Changes in views about the nature of mathematics and its learning often precede changes in the learning process within a class, along with the requirements of technological and scientific developments (Li & Schoenfeld, 2019).

A curriculum involves a process that starts with planning, management, monitoring, evaluation, and attainment of the goals of the process (Galvis, 2018; Setyawan, 2019; VanTassel-Baska & Baska, 2021). It comprises four major components: objectives, content, methods, and evaluation, which focus on the development, culture, and empowerment of lifelong learners (Gao et al., 2020; Maskur, et al., 2022a; Maskur, et al., 2022b). The curriculum involves reconstructing knowledge and experience that has been systematically developed under the aegis of the school (or the university) (Dorgu, 2016). It is an education program for students provided by schools (Cabansag, 2014; Chen et al., 2015; Wahyudin et al., 2020; Zguir et al., 2021).

There are dimensions of the curriculum that must be implemented to ensure its success, such as (1) physical and emotional environments, roles of teachers and students, and interactions in classroom management, (2) instructional goals, planning, implementation, methods and technology, educational media, and measurement and assessment, and (3) weaknesses, advantages, and limitations (Beacco et al., 2016; Caniglia et al., 2018). The curriculum serves as a guide for all educational activities to achieve educational goals (Weintrop et al., 2016; Chung et al., 2020). In theory, a curriculum led by professional teachers and supported by adequate infrastructure will produce good results. However, no matter how good the curriculum is, if it lacks the support of professional teachers and adequate infrastructure, it will harm the learning process and the output of education itself.

The low achievement of Indonesian science and mathematics scores in the Programme for International Student Assessment (PISA) 2018 is a cause for concern, with Indonesia ranking among the ten lowest countries based on the results. One of the significant reasons for this is the curriculum. Therefore, it is necessary to analyze and compare the curriculum with that of other countries that have higher achievements. By comparing the curriculum, it can serve as a basis for revising or adapting the current curriculum.

Comparing the educational systems of different countries according to international standards can provide valuable insights for improving educational quality. Such a comparison allows us to understand the similarities and differences between systems and helps educational authorities to reorganize or modify their existing systems to achieve their goals (Sugandi & Delice, 2014; Rageth & Renold, 2020). It can also involve analyzing factors such as security, paradigms, processes, and other related aspects of education and social affairs until the effects are found (Parno et al., 2020).

Hungary is an interesting case study in terms of the improvement in PISA results, with significant improvement observed in PISA 2018 compared to PISA 2015, with mathematics and science scores improving from an average of 477 to 481. The reasons for this improvement, especially in terms of the curriculum used, are exciting to be analyzed, as the Hungarian curriculum is adopted from the continental curriculum, and there are no studies that focus on analyzing and comparing the Hungarian curriculum.

Comparing countries with different types of curriculum, such as continental, Atlantic, and mixed types, can also be interesting. European countries typically apply the continental type of curriculum (Gundem & Kriedel, 2010), while North American countries apply the Atlantic type (Kallop Jr, 1982). Asian countries use a mix of both types and develop their own curriculum (Banks, 1993). Hungary applies the continental type of curriculum (Szebenyi, 1992), while Indonesia, as an Asian country, applies a mixed type (Coloma, 2006). Due to these different types of curriculums, both countries are expected to have differences, drawbacks, and advantages.

Mathematics and science as important subjects in the 21st century draw attention to implementing two different curriculums (Kennedy & Odell, 2014; Quigley & Herro, 2016). Comparing two different mathematics and science curriculum, in this case Indonesia and Hungary, will help improve the quality of education for each country (Laurie et al., 2016).

Research in terms of a curriculum has been widely carried out in many countries. Some of the studies compared Indonesian curriculum in other countries (i.e., Indonesian and Singapore curriculum) (Efendi & Hsi, 2020). The results showed that Indonesia and Singapore have both highly standardized tests and are internationally respected in their education systems, although they have various basic education approaches. Another study is regarding research comparing the South African and Indonesian teachers' preferred curriculum ideology for school science (Mnguni et al., 2019). According to the findings, most teachers in both countries prefer the student-centered curriculum ideology for school science. Specific aspects of school science were observed to differ between teachers. It is concluded that teachers have distinct preferred ideologies for school science; however, there are local context-specific factors that influence teachers' preferred ideologies.

Another study analyzed the comparison of elementary education curriculum between Indonesia and Finland (Efendi, 2019). Several findings from the comparative methodology can be applied in primary schools in Indonesia, such as the education system, the implemented curriculum, and teaching innovation and teachers. Furthermore, the research concerns America and Indonesia curriculum (Mas' ud, 2021). The results were both countries' language and literature curricula emphasize the importance of citizenship and character education and incorporate them into their instruction. On the other hand, the US language curriculum places a premium on fostering American identity, with an emphasis on increasing learning for the professional workforce and career-ready individuals, which will benefit the global economy in the future. Meanwhile, the curriculum of the Indonesian language places a premium on moral and religious education.

Despite all existing research, no research has investigated and compared the educational system, topics, and basic competencies, especially mathematics and science education in two countries (i.e., Hungary and Indonesia). Thus, we require knowledge for basic competencies, topics, similarities, and differences. In the present study, we look for education systems in both regions, namely the 2016 version for the Indonesian curriculum 2013 (K-13) and the Hungarian National Core Curriculum 2020 (NCC). This study aims to; (1) determine the general educational system in both countries; (2) examine the history of mathematics and science curriculum, basic competencies, and topics covered in each of the mathematics and science curriculum in ISCED 2; (3) provide an in-depth comparison of the similarities and differences between the Indonesian and Hungarian curriculum, specifically in mathematics and science ISCED 2. By doing so, we hope to shed light on the strengths and weaknesses of each country's curriculum, which could be used to improve the education system and ultimately benefit students' learning outcomes. This study is limited on ISCED 2 in the science and mathematics curriculum.

METHODS

This research is categorized as library research since it studies and deeply reviews several legal documents published by formal institutions, libraries, legal websites, and minister of education archives (Mann, 1994). The documents are in English, Indonesian, and Hungarian. The steps of library research used are adapted from Mann (1994) library research model, namely keywords and subject searches, looking for recent documents, citation search in the recent documents, and systematic browsing. We used keywords such as "Indonesian curriculum 2013", "the latest version", "history", "mathematics", "science", "indicators", "Hungarian curriculum" from A Magyar Közlönyt az Igazságügyi Minisztérium szerkeszti, and "national core curriculum". After receiving the documents, we extracted and tracked down references, footnotes, endnotes, citations, etc. within relevant documents. The selected documents were translated, analyzed, and deeply reviewed by the authors from each country in order to compare them.

The selected documents were analyzed using a qualitative descriptive-analytical method, with the researchers as key to revealing the facts of the objects being analyzed. The objects of this research are the Indonesian Curriculum 2013, Hungarian National Curriculum 2020, and relevant journal articles.

The potential for bias in this type of research is always a concern, and the researchers would have taken steps to minimize any potential biases. For example, bias could be introduced due to differences in understanding between the researchers or errors in the selection of documents. To minimize these potential biases, the researchers may have employed a systematic approach to document selection, such as using specific search terms or criteria to identify relevant documents.

While the analysis likely drew from several sources, the researchers may have chosen to focus on a limited set of documents that they deemed most relevant and informative for their research questions. However, they would have taken care to acknowledge any limitations in their data sources and provide a rationale for why they selected the documents that they did.

The Indonesian curriculum used is the newest version, which is the 2016 version of the Indonesian Curriculum 2013, and the Hungarian curriculum used is the 2020 NCC. The researchers will analyze the general educational system, history, and learning materials in mathematics and science for ISCED 2 (including core and basic competencies if available, and topics), as well as similarities and differences between the two curricula. The steps of the study include (1) collecting data of the newest version of the Indonesian curriculum 2013 (from Permendikbud 2016 and relevant documents) and the Hungarian curriculum; (2) reading and analyzing the documents and classifying them based on topics; and (3) explaining the results and formulating a conclusion.

RESULTS AND DISCUSSION

Indonesian Educational System

The education system in Indonesia is divided into private and public schools, with both types of schools having national and international schools. Public schools are overseen by the Indonesian Ministry of Education and Cultural for general public schools and the Ministry of Religion for religion-oriented public and private schools. All schools, whether public or private, are required to implement the Indonesian curriculum. However, international public and private schools may choose to combine their curriculum with other curriculums such as the Cambridge curriculum or the Singapore curriculum (Michie, 2017).

The Indonesian education system is divided into four levels based on the International Standard Classification of Education (ISCED) framework. ISCED 0 is a 2-year education program for 4-6 year olds, which focuses on spiritual, social-emotional, and basic cognitive skills such as reading and calculation. ISCED 1 is a 6-year education program for 6-12 year olds, while ISCED 2 is a 3-year education program after primary school. ISCED 3 is the continuation of ISCED 2 and is divided into vocational and non-vocational tracks (Permendikbud, no 1 year 2021). Non-vocational schools are theoretical-oriented with three major preferences: science, social, and language. Mathematics is taught at all levels of education in Indonesia.

According to Indonesian Government Law 47 Year 2008, all Indonesians are obligated to have 9 years of education, consisting of ISCED 1 and 2 (National Education Ministry, 2010). At the end of each level, students must pass examinations from their schools and/or international examinations to continue to the next level of education. In ISCED 2, students learn 11 subjects for a total of 40 hours per week, with each hour being equivalent to 40 minutes. There are no differences in the types of subjects that need to be learned based on the grade level in ISCED 2. The compulsory subjects include religion, Civics, Indonesian language, Science, Social Studies, English, Arts & Culture, Physical Education, Crafts, and Local Language.

Science and Mathematics Curriculum in Indonesia

In Indonesia, a paradigm shift from behavioral to constructivist learning has taken place. The process of developing the curriculum involves determining learning objectives, selecting appropriate teaching methods and materials, and evaluating the curriculum to meet the needs of individuals and society. The goal is to provide learners with a comprehensive learning experience, promote interdisciplinary topics, and offer learning opportunities (Sugandi & Delice, 2014).

The development of the Indonesian curriculum started in 1947 with the Lesson Plan Curriculum, which was adapted from the Dutch colonial period. Its focus was on building independent, sovereign citizens with equal opportunities. Initially, the curriculum only consisted of a list of subjects and their corresponding time allocations. It was revised in 1952 with an emphasis on everyday life and further revised in 1964 to include knowledge and practical, functional activities, creativity, morals, values, participatory skills, and crafts (Haridza & Irving, 2017). In 1968, mathematics was made a compulsory subject, but the focus was mainly on calculation skills, memorization, and had little relevance to daily life (Almanthari et al., 2020).

The curriculum was revised again in 1975 to include general and specific educational goals, content, sources of learning, learning activities, and evaluations. Mathematics education was emphasized to include problem-solving skills, student diversity, student-centered learning, and several added topics such as set theory, 2D and 3D geometry, statistics, and probability. In 1984, inquiry learning was introduced, with topics such as observation, classification, reporting, and computer subjects required to support mathematics subjects (Haridza & Irving, 2017; Jehadus et al., 2020).

From 1994 to 2006, the focus was on developing cognitive skills such as problem-solving and reasoning skills, with less emphasis on social-emotional skills. In 2013, the curriculum was revised again to address the shortcomings and implemented characters in science and mathematics within the context of daily life (Mailizar et al., 2014; Haridza & Irving, 2017).

The basic calculation skills are introduced at ISCED 0, such as numbers, writing numbers, ordering numbers, and simple calculations. The basic concepts of mathematics education are emphasized at ISCED 1, and more complex mathematics concepts are taught at ISCED 2. The mathematics curriculum emphasizes three dimensions: characters, cognitive (factual, conceptual, procedural, and metacognitive), and skills. Core mathematics is compulsory at ISCED 3, but extended mathematics is only mandatory for students who take science classes (Permendikbud, 2016).

Science is introduced at ISCED 1 (grades 4th-6th), and it is taught more in-depth at ISCED 2. However, at these levels, science is only taught in a general form (natural science), but at ISCED 3, science is divided into three subjects: physics, biology, and chemistry (Permendikbud, 2016).

Since the focus is on ISCED 2, let's describe it in detail. Students learn 5 hours per week for each of the mathematics and science subjects. There are no specific regulations regarding time allocation for each topic, but teachers should manage 540 hours per semester (for each of the science and mathematics subjects) by themselves. There is no difference in time allocation for grade or semester differences.

There are no differences between core competencies for sciences and mathematics in characters (spiritual & social-emotional), cognitive, and skills dimensions. Core skills are certain qualities that students need to achieve after the learning processes have been completed. At the same time, basic skills are skills that students build on (Ministry of Education and Culture, 2014; Haridza & Irving, 2017).

The core competencies are described as follows:

(1) Spiritual attitudes: respecting & exploring deeply about belief in religion. Spiritual attitudes are emphasized as an important aspect of the curriculum, as Indonesia is a predominantly Muslim country. Students are expected to develop a strong understanding and practice of Islamic values, as well as an appreciation for other religions and spiritual beliefs. This includes developing a sense of empathy, compassion, and respect for others, and understanding the importance of honesty, responsibility, and self-reflection.

(2) Social-attitude dimension: Showing honesty, discipline, responsibility, caring (tolerance & helpful), politely, and confidence in their environment. Social attitudes are also a key focus of the curriculum. Students are taught to be active and responsible citizens, to work collaboratively with others, and to respect diversity and social justice. This includes developing a sense of nationalism and pride in Indonesia's cultural heritage, as well as understanding global issues and their impact on society.

(3) Cognitive/knowledge dimension: Understanding knowledge (fact, concept, and procedure) based on their curiosity about science, technology, and art about daily life phenomenon. Trying, analyzing, and representing both in an abstract (modifying, creating, applying, etc.) and concrete (writing, reading, calculating, drawing, and composing) areas based on a subject learned and relevant theories. In terms of knowledge, the core curriculum covers a broad range of subjects, including language arts, mathematics, science, social studies, and arts and culture. The curriculum is designed to provide students with a solid foundation in these areas and to prepare them for further education or vocational training.

(4) Skill dimension: The curriculum aims to develop a range of skills in students, including critical thinking, problem-solving, communication, creativity, and digital literacy. These skills are considered essential for success in the 21st century and are emphasized throughout the curriculum.

Overall, the Indonesian core curriculum places great emphasis on the development of well-rounded individuals who possess spiritual and social awareness, knowledge, and skills. The character dimension is developed through indirect teaching methods such as habituation, exemplary practices, and a school culture that fosters the development of each characteristic in both students and subject matter. The cognitive dimension is developed through the use of technology, culture, and art. The skills dimension focuses on 21st-century skills and is developed through project-based learning, problem-solving, experimentation, and group discussion related to daily life contexts (Permendikbud, no 20, 22, & no 24 attachment 6 & 15 year 2016).

In terms of mathematics, the cognitive level of topics increases from grade 7 to 9. Grade 7 students focus on mastering whole numbers and measurement, grade 8 focuses on patterns, and grade 9 studies power, exponent, and rational numbers. Algebra topics in grade 7 relate to basic calculation and sets, while grade 8 covers relations, functions using graphs, and linear equations, and grade 9 focuses on quadratic equations. Geometry topics in grade 7 relate to 2D figures and angles, while grade 8 and 9 are focused on 3D figures and transformations. Statistics topics are only obligatory for grade 7 and 8, with grade

7 focusing on data representation and grade 8 on central tendency and probability.

The core science topics for grades 7 to 9 are living things, energy, and earth. Topics that only appear in grade 7 include measurement, heat, and the environment. Power, work, and plants are only taught in grade 8, while sustainability topics are only studied in grade 9. Chemistry-related topics are taught in grade 7 and 9, with grade 9 focusing on the effects of chemical compounds.

Hungarian Educational System

In Hungary, the term "secondary" refers to education provided by schools for pupils over 14 who have completed the 8th grade of basic school. However, when people speak of "secondary school," they often only think of the general and technical schools that offer four-year programs preparing students for the high school leaving exam, but do not include vocational training schools that prepare students for a low-level certificate.

Schools in Hungary are categorized according to the International Standard Classification of Education (ISCED), which includes ISCED 0 (pre-school), ISCED 1 and 2 (primary and lower secondary), and ISCED 3 (secondary). ISCED 0 provides education for children aged 3-7, focusing on basic skills development, pre-reading, drawing, singing, and school preparation. ISCED 1 and 2 cover primary (grades 1-4) and lower secondary (grades 5-8) education, after which students enter secondary school (grades 9-12). There are three types of ISCED 3 schools: general schools (grammar schools, which teach at least two languages, and general schools), secondary vocational schools, and vocational schools. In general schools, students take classes in language, general studies, physics, biology, mathematics, or humanities (language and history subject-oriented). After completing secondary school, students take final examinations in mathematics, Hungarian literature and grammar, a foreign language, history, and a subject of their choice (https://ofi.oh.gov.hu).

In ISCED 2, students in grades 5-6 must learn 12 subjects, while those in grades 7-8 must learn 16 subjects. These subjects include Hungarian language and literature, mathematics, history, homeland and ethnography, ethics, a living foreign language, singing music, visual culture, digital culture, physical education, science (grades 5-6), civil studies (grade 8), chemistry, biology, physics, geography, drama and theater (grades 7-8), and technique and design (grades 5-7).

Science and Mathematics Curriculum in Hungary

In the Hungarian educational system, mathematics is introduced in grade 1, while biology, physics, and chemistry are taught from grade 7 onwards (https://ofi.oh.gov.hu). For grades 5-6, there are 272 hours dedicated to learning mathematics, while for grades 7-8, it is 204 hours (with each hour being equal to 45 minutes). In addition, for science students in grades 5-6, there are a total of 136 hours dedicated to learning science, and for each of chemistry, biology, and physics, they must learn 120 hours.

At the end of the 18th century, a church school in Hungary with Latin as the primary language was established. The first book in the Hungarian language was published in 1743 by a teacher at Debrecen College. Beginning in the 18th and 19th centuries, teaching natural science subjects (including mathematics) became more widespread at secondary and university levels (Győri et al., 2020).

After World War II (during the socialist period from 1945-1989), school levels in Hungary were divided into lower primary (1st-4th graders) and upper primary (5th-8th graders). The goal was to teach numeracy and solve practical tasks related to daily life, and for secondary education, no further than classical algebraic and geometric issues. In the 1960s-1970s, there was a great emphasis on research in Hungarian mathematics education, psychology, and pedagogy. In 1978, a new curriculum was introduced with five main topics: (1) set and logic, (2) arithmetic and algebra, (3) relation, function, and sequence, (4) geometry and measurement, and (5) combinatorics, probability, and statistics. In 1965, secondary education transformed from only classical algebraic content (sets, vectors, combinatorics, and probability) to include geometric transformations. Specialist mathematics classrooms for gifted students were introduced in 1962 and later expanded to include science and language subjects (Győri et al., 2020).

In 1995, the first NCC was introduced, covering the same topics as in 1978. It is divided into cultural domains and ordered by subject. Besides being a subject, mathematics is also considered a cultural domain itself because it is part of other subjects. In 2003, modern methods such as the cooperative method and project-based method began to be applied. These methods focused on skills such as thinking, communication, and knowledge acquisition, as well as learning ability related to problem-solving and reasoning. In 2012, the topics appeared in all grades (Győri et al., 2020); http://www.nefmi.gov.hu/english/hungarian-national-core). The newest curriculum in Hungary is the 2020 version, which has some differences: (1) the number of hours for ISCED 3 per week has been reduced from 35 to 34 because science is combined into a subject; (2) controversial writers have been included in the literary canon.

The Hungarian mathematics curriculum has competencies related to skills, thinking, and communication abilities, as well as knowledge acquisition and learning abilities. The essential skills to be mastered are counting, measuring, and problem-solving. Deductive and inductive thinking, proving, probabilistic reasoning, and systematizing thinking are also necessary. Communication skills emphasize text literacy, spatial relation, and presentation. Moreover, learning ability focuses on performance and attitude (e.g., attention, speed, memory).

The mathematics indicators between grades 5-6 and grades 7-8 are similar, but grade 7-8 has higher indicators or knowledge than grade 5-6. In the topics of set, element, and subset, grade 5-6 focuses on types of numbers. The logical mathematics topics of grade 5-6 cover basic skills in these topics, but in grade 7-8, students need to apply their knowledge of logical mathematics to solve problems and use strategy in games. Similarly, in the topics of number and proportion, grade 7-8 emphasizes the application of number, direct, and inverse proportions. The topics of numbers studied in grade 5-6 are integers, fractions, and decimals, while in grade 7-8, they are rational numbers, prime numbers, powers, and exponents. Geometry in grade 5-6 focus on reading coordinate, properties of 2D and 3D, angle, and net of 3D. However, geometry in grade 7-8 emphasized on the calculation and application of 2D and 3D concepts. The indicators in statistics and probability between two stages are nearly similar.

Unlike the mathematics curriculum, the science topics covered in grades 5-6 and 7-8 are different. In grades 5-6, students learn about natural science topics such as measurement, observation and experimentation, time, cartography and topography basics, plants and animals, forest habitats, life communities, aquatic environments and their associated problems, the human body and health, energy, and earth and atmospheric phenomena. In grade 7-8, they focus on physics, chemistry, and biology, with a greater number of topics. The chemistry curriculum covers materials, atoms, molecules, ions, chemical reactions, and chemistry in nature. The physics curriculum emphasizes energy, motion, momentum, equilibrium, electricity, light, optical devices, waves, global environmental issues, and astronomy. Finally, the biology curriculum delves into research methods, the organization of life, wildlife, planets, life communities, living organisms, sustainability, the human body, and reproduction.

The Comparison between Indonesian and Hungarian Curriculum

The Indonesian curriculum used in this study is the most recent version of Curriculum 2013, which was updated in 2016, while the Hungarian curriculum used is the 2020 NCC.

There are some differences and similarities in the level of education between Hungary and Indonesia: (1) In Indonesia, ISCED 1 is from grade 1-6, whereas in Hungary it is from grade 1-4; (2) ISCED 2 in Indonesia is only three years after ISCED 1, compared to Hungary, which has four years after ISCED 1; (3) Both Indonesian and Hungarian curricula offer students the opportunity to choose between theoretical-oriented or practical-oriented (vocational) in ISCED 3; (4) In Hungary, language-oriented school is specified as a grammar school, while in Indonesia, it is categorized as a general high school, with language as one of three majors (science, social, and language); (5) In the ISCED 3 general school curriculum in Hungary, there are fewer subjects but more specific majors, whereas in Indonesia, there are only three majors but more subjects; (6) Teaching hours in Hungary are equal to 45 minutes per hour, while in Indonesia, it depends on the grade level (e.g., ISCED 1 = 35 minutes, ISCED 2 = 40 minutes, ISCED 3 = 45 minutes); (7) In ISCED 2, there are 11 subjects that need to be learned in Indonesia, whereas in Hungary, there are 12-16 subjects; (8) In Indonesia, there is no specific time allotted for each topic, but rather, the total number of hours per semester is restricted.

The mathematics curriculum between the two countries has several differences exist: (1) In the Indonesian curriculum, character skills (social-emotional and religion) are embedded in all subjects, mathematics, and sciences as well; (2) In Hungary, word problems and problem-solving are focused on at ISCED 1, but in Indonesia, in all levels of education; (2) The total hours of mathematics in ISCED 2 are 540 hours (with 5 hours in every week, each hour is 40 minutes) but in Hungary, the total hours of mathematics class is 476 (each hour is 45 minutes); (5) There is a detailed outline about the number of the hour in every topic, the mastered competency, and recommendation activity in the Hungarian curriculum but not in the Indonesian curriculum.

The mathematics topics for ISCED 2 includes algebra and arithmetic, sequence, relation and function, geometry and measurement, and statistics and probability. Both countries focus on natural, whole, and rational numbers, fraction, ratio and proportion, algebraic expression, linear equality and inequality. However, there are no competencies regarding absolute value in Indonesian curriculum and there is no competency of quadratic equation in Hungarian curriculum. The geometry topics are similar that emphasized on angle, geometry transformation, 2D and 3D figures, and congruency. The statistics topics stress on data representation and central tendency.

The difference between Indonesian and Hungarian science curriculum are: (1) In Indonesian, science education is categorized into natural science, but Hungary is categorized into physics, chemistry, biology, and natural science. Even though the topics in natural science in Indonesia curriculum is included physics, chemistry, biology, Earth, and environment; (2) the proportion of biology topics is more than other branches of science in Indonesia curriculum; (3) Hungarian curriculum stressed empirical and practical oriented while Indonesian curriculum emphasized theoretical oriented; (4) The total number of hours of science in ISCED 2 is 540 hours (with 5 hours in every week, each hour is 40 minutes) but in Hungary is 496 (each hour is 45 minutes); (5) There is a detailed outline about the number of hour in every topics, the mastered competency, and recommendation activity related to daily life in the Hungarian curriculum but not in the Indonesian curriculum; (6) Even the topics are relatively similar but the required competency in Hungarian curriculum are more reliable to the daily life and complicated; (7) scientific phase is emphasized in Hungarian curriculum (observation, experimentation, etc); (8) Earth science and environmental problem take a bigger part in Hungarian curriculum rather than Indonesian curriculum.

Hungarian science curriculum related to physics topics are more varied compared to Indonesia. The topics of momentum and equilibrium, global problem of environment, climate change and its impact on ecosystems, cartography, and topography are missing in the Indonesian science curriculum. Moreover, chemical reaction is emphasized in Hungarian curriculum but not in Indonesian curriculum. The important topics in biology related to forest, aquatic, lifestyle, maintaining health, and first aid are under consideration in Indonesian curriculum. Both countries have similarities in term of topics in physics (motion, energy, heat, electricity, measurement, light and optical device, wave, and astronomy), chemistry (law in chemistry, material, atom, molecule, and chemistry in the daily life), and biology (landscape & biomes, human body and health, animal, and sustainability).

Comparing the curricula of the two countries has yielded numerous insights on teaching and school organization to improve quality learning, but less on curriculum and assessment. It seems obvious that curricular research should have these implications in all fields. The primary implication for the curriculum is that it must be adaptable and permit instructors to use discretion, particularly with the purpose of enhancing the quality of education in the two nations.

A paradigm shift in the curriculum creates both opportunities and challenges. Therefore, whether the paradigm is constructivism or behaviorism, the curriculum system and redesigned printed materials (curricula) should be assessed first. All modifications, working and/or non-working components, must be clearly defined. The implications should reflect the national character (Boesen et al., 2014). In addition, curricula, textbooks, teachers' teaching approaches, and assessments should be geared towards practical consequences, followed by the teaching and learning of mathematics and science (Quane, 2021).

CONCLUSION

The comparison between the Hungarian and Indonesian curricula is interesting to study since they have different types of curricula as well as cultures. There are several differences, whether they are advantages or drawbacks. The ISCED 1 in Hungary is only 4 years compared with 6 years in Indonesia. This might be one of the drawbacks because in this phase, students need to learn more concepts. The students of ISCED 3 in Indonesia have to master more subjects, which causes them to be unable to learn a specific subject deeply. However, the Indonesian curriculum integrates character skills into all subjects, and problem-solving is emphasized at every level of education. The science and mathematics Hungarian curricula focus on realistic problem-solving and inquiry thinking skills. This is one of the advantages for students because they are trained to solve their everyday problems through science and mathematics. The mathematics topics for secondary schools between the two countries are almost similar, with only a few disjoint topics, such as quadratic equations, ratios, proportions, binary, and absolute value. However, there is a difference in the time spent on each topic. The science curriculum in Indonesia mostly focuses on biology subjects compared with Hungary. The least proportion of chemistry and physics subjects causes students' difficulties in learning these subjects in higher education. The Hungarian science curriculum is more realistic because they try to bring daily life phenomena into science, are empirical-oriented, and have a more varied range of topics.

Based on these comparisons, several drawbacks are observed in the Indonesian curriculum and its applications. These drawbacks could be due to several reasons, such as immature adaptation between Atlantic and continental curriculums, a lack of preparation for teachers to understand the applied curriculum, a lack of educational facilities, and the features that the Indonesian society has less support. The change from a quantity-oriented to quality-oriented approach might be a solution for Indonesian curriculum improvement. For example, emphasizing concepts rather than drilling, using qualitative assessments rather than quantitative assessments, and being empirically-oriented rather than theoretically-oriented. Such programs might be helpful in improving the professionalism of teachers, such as training and professional recruitment. Furthermore, Indonesia and Hungary need to integrate several disciplines to be learned by students so that they could apply them to daily problems rather than learn separate concepts and encounter difficulties in solving daily problems.

This study has impacts on educational policies as it suggests considering the advantages of other curricula as a basis for curriculum revision. Moreover, it is useful for Indonesian teachers to adapt science and mathematics activities from the Hungarian curriculum and apply them to the teaching and learning process. Hence, Indonesian students not only learn theoretically but also empirically.

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