



## Islands Education Studies and Challenges in Learning Science

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Pendidikan Ganesha.

### ABSTRAK

*Pembelajaran sains di nusantara memiliki tantangan dan hambatan meskipun telah terjadi perubahan kurikulum. Masalah dalam penelitian ini adalah bagaimana IPA diajarkan dalam konteks kurikulum KBK, KTSP dan K-13. Penelitian ini bertujuan untuk mengembangkan kurikulum dari KBK ke Kurikulum 2013 dalam pembelajaran IPA. Penelitian kualitatif dilakukan dengan menggunakan studi kasus untuk mengecek kondisi melalui wawancara mendalam dengan informan. Informan yang terlibat adalah guru dan kepala sekolah di 17 SD serta kepala dinas pendidikan setempat. Pengumpulan data dilakukan melalui wawancara terstruktur dengan informan. Instrumen penelitian berupa lembar pertanyaan wawancara yang berisi kurang lebih 7 item pertanyaan yang dikembangkan oleh peneliti berdasarkan tujuan penelitian. Analisis data dilakukan secara kualitatif melalui reduksi, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa 80% informan lebih memilih pembelajaran IPA dikelola secara terpisah dari konten pembelajaran lainnya. Meskipun setiap kurikulum memiliki kelebihan dan keterbatasan. Hal ini dinilai lebih efektif dalam memastikan pemahaman konsep sains yang lebih luas dan mendalam. Selain itu, terungkap pula bahwa ketersediaan fasilitas dan kompetensi guru merupakan faktor yang mendukung keberhasilan pembelajaran IPA di sekolah dasar. Bagi peneliti selanjutnya, disarankan agar pembelajaran dan kurikulum dirancang dengan menunjukkan keberpihakan pada materi pelajaran dan tidak menggabungkan satu bidang ilmu dengan bidang ilmu lainnya.*

### ABSTRACT

Learning science in the archipelago has challenges and obstacles even though there has been a change in curriculum. The problem in this study is how science is taught in the context of the KBK, KTSP and K-13 curricula. The aims of this research is to develop the curriculum from the KBK to the 2013 Curriculum in science learning. Qualitative research was carried out using case studies to check conditions through in-depth interviews with informants. The informants involved were teachers and principals at 17 elementary schools as well as the head of the local education office. Data collection was carried out through structured interviews with informants. The research instrument was an interview question sheet containing approximately 7 question items developed by the researcher based on the research objectives. Data analysis was carried out qualitatively through reduction, data display, and conclusion. The research findings show that 80% of informants prefer science learning to be managed separately from other lesson content. Although each curriculum has advantages and limitations. This is considered more effective in ensuring a broader and deeper understanding of the science concept. In addition, it was also revealed that the availability of facilities and teacher competence are factors that support the success of learning science in elementary schools. For future researchers, it is recommended that learning and curriculum be designed by showing partiality to subject matter and not combining one field of science with another.

## 1. INTRODUCTION

Indonesia has undergone significant changes, especially since the reform era in 1998. The resignation of President Suharto marked it. Currently, the country faces many development challenges,

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which are pretty significant, including poverty and incompetent human resources. It is especially true in the informal sector, where most of the population is poor. It makes education and poverty alleviation a part of the national development agenda (Hadi et al., 2015; Raihani, 2017). General education in Indonesia starts from kindergarten (two years), elementary school (six years), junior high school (three years), and senior high school (three years). Elementary and junior high school education are the responsibility of the city/district government, while senior high school is under the authority of the Provincial Government. The central government is responsible for education at all levels, including school management and monitoring (Lewis & Pattinasarany, 2011; Rosser & Joshi, 2013). In general, the government has worked hard to improve the quality of education at all levels. One of the causes of the weak development of human resources is the incompatibility of the education system with the surrounding area. Applying the general school system to a particular area is not suitable for its application as development towards skills becomes more important. The application of public schools is suitable for children aged 5 to 16 years. Meanwhile, for further development, a community-based skills education system is needed to increase regional creativity. It generally occurs for archipelagic regions that experience disparities in various sectors with areas close to regional economic civilization. Therefore, it is necessary to develop skills-based archipelagic areas in utilizing existing natural resources (Leasa & Corembima, 2017; Rogan & Grayson, 2014). Development can be carried out through the land concept and the sea concept. The land concept will relate to the construction of schools equally for each point. In contrast, the sea concept is the development of education by sea by using ships or with a combination of land concepts and sea concepts in archipelagic education. (Alpha Amirrachman, 2014; Mercer, 2015)

Some of the problems faced in education in Maluku are the lack of educators and education staff, the common welfare of teachers, the lack of facilities and infrastructure, the lack of equal opportunities for education, the education culture is still low and the geographical location based on islands which are obstacles to equal access to education that must be reached by sea transportation (Fenanlampir et al., 2019; Kempa et al., 2019; Rumahlatu et al., 2016). Based on the existing empirical data, the local government has made several efforts to improve the quality of education in Maluku, including increasing students' mathematical literacy from elementary to high school levels. In addition, the Indonesian teaching program (Indonesia mengajar), which started In 2009, was intended to overcome the shortage of teachers in remote elementary schools, producing future leaders and learning from the realities of life in remote parts of the country (Gozali et al., 2019; Ratumanan & Laurens, 2016). The other efforts are the motivator teacher program, Kampus Merdeka (liberation policy for higher education) (Hendayana, 2021; Widiyono et al., 2021). Besides the Faculty of Teacher Training and Education (FKIP) policy, Pattimura University in 2021 activities in the form of FKIP researching, FKIP serving, and FKIP teaching. The considerable challenge faced by the government in equal distribution of education in archipelagic areas is influenced by geographical conditions in the form of separate islands with uneven population distribution (Hill, 2021; Rahabav et al., 2021). Various solutions for archipelagic education have been implemented, especially the construction of schools on land (Irnidayanti et al., 2020; Sion et al., 2012). Therefore, alternatively, it is necessary to develop archipelagic education infrastructure to address the education gap due to distance problems and student availability. The results of previous studies revealed that very few high school graduates in the islands continue their studies to college (Rahmadi, 2020). In addition, there is a need for an alternative to developing archipelagic education infrastructure to address the education gap due to distance problems and the availability of students (Leasa et al., 2021; Richardson & Mishra, 2018). Education in the islands in Indonesia is known for something unique with a variety of complex problems.

A good and comprehensive concept on handling education in an area with the characteristics of an archipelago with thousands of islands still needs much discussion and thought to answer the existing problems. The concept offered for junior high and senior high school students is a learning center in the sub-district with a dormitory-based school system. Dormitory-based schools aim to make it easier for students to walk long distances or use sea transportation to go to another village for school. In dormitory-based and integrated schools, students will be educated with a good curriculum based on local excellence. The purpose of sending children to dormitories is to discipline and train them to become leaders and improve students' academic progress (Behaghel et al., 2017; Martin et al., 2021). With the presence of dormitory-based schools, local and central governments can facilitate dormitory-based schools so that students and graduates have good competence according to the conditions and demands of today's world. The benefits of dormitory-based schools are increasing motivation, building psychological involvement and well-being, building academic and non-academic skills, and preparing themselves maturely to enter college. The concept of elementary school is to build small rural schools, namely the availability of good school facilities and infrastructure, must have enough teachers, provide teachers with adequate training, and treat their teachers well in the form of welfare that is paid according to predetermined standards (Martin et al., 2014; Tan & Bodovski, 2020). This information is hoped to be

carried out in overcoming educational problems in the islands. This study aims to analyze the implementation of science learning in the context of the competency-based curriculum, school based-curriculum, until the 2013 Curriculum (Kurikulum 2013/K-13) in the archipelago area of Southwest Maluku Regency.

There is a Study Program Campus Outside the Main Campus (PSDKU) as a form of collaboration between the Southwest Maluku Regency Government and Pattimura University in developing human resources in the region. The establishment of the PSDKU Campus shows the government's commitment to providing access to quality higher education in the context of developing and improving human quality in the MBD archipelago. The implementation of education in this region is full of challenges, especially the geographical aspect because this region has many small islands with the status of a 3T area (underdeveloped, poorest, and foremost). Therefore the aims of this research is to develop the curriculum from the KBK to the 2013 Curriculum in science learning.

## 2. METHOD

The research was conducted in a qualitative study, namely a case study about the development of education in Southwest Maluku Regency related to the development of the curriculum from the KBK to the 2013 Curriculum in science learning. Data collection was carried out through structured interviews with informants. The research instrument was an interview question sheet containing approximately 7 question items developed by the researcher based on the research objectives. Data collection involved 50 students from the Study Program Outside the Main Campus of Southwest Maluku Regency (Program Studi di Luar Kampus Utama Kabupaten Maluku Barat Daya/PSDKU MBD) who offered Curriculum Development courses. Before being involved in data collection, they were trained in advance so that they have perception, knowledge, and skills in interviewing. The informants interviewed included 50 teachers spread across 17 elementary schools on Moa Island, 6 elementary school supervisors and the Headmaster of the Southwest Maluku Regency Education Office. The criteria for teachers who were involved as informants were teachers who had 15 years of teaching experience. Data analysis was carried out qualitatively through reduction, data display, and conclusion.

## 3. RESULT AND DISCUSSION

### Result

The findings in 2021 show that out of 17 elementary schools in Southwest Maluku Regency especially on Moa Island had implemented the 2013 Curriculum for 100%. The schools followed the mandate of the Ministry of Education, Culture, Research, and Technology. However, in 2018 only 20% of schools used the 2013 Curriculum and 80% used KTSP. Changes in the curriculum often occurred every few years because it followed the times. However, the regions still needed a lengthy adjustment. Moreover, schools in Maluku still lacked facilities in the form of books, inadequate classrooms, lack of teachers, and no internet service to find information in teaching students. This condition made Maluku and, more specifically, in Southwest Maluku Regency in education experience obstacles in improving the quality of education. Moreover, Southwest Maluku Regency had 17 sub-districts, with each sub-district reaching quite far, which must be traveled by ship. This condition made education equity still had many obstacles. Teachers preferred to live in cities, so one teacher must teach isolated areas for several classes or contract teachers help students learn. Another finding was that some school principals rarely went to the city. They only went to the city approximately once a year. If they left the school, students did not study well. In addition, it required a high cost to the city. The cost of going to the city by ship was equal to living in the Regency for a few days. Moreover, school operational assistance funds were not too large. It was what made schools think 100 times about traveling. The results of interviews with principals and teachers can be shown in [Table 1](#).

**Table 1. Results of Interviews with Informants**

Questions	Informant's Answer
What are the difficulties in learning the 2013 Curriculum compared to the competency-based curriculum (KBK) and KTSP curriculum in science learning?	The 2013 Curriculum is challenging because students who play an active role in the classroom seek and find in compiling scientific concepts and can solve problems and apply them in daily life. In contrast, the teacher only explains, gives topics, and provides indicators and objectives in learning related to one science concept of physics or biology. Therefore, students look for information themselves compared to the KBK and KTSP curricula.

Questions	Informant's Answer
<p>Is thematic-based learning better than subject-focused learning?</p>	<p>(KS12)</p> <p>It is better if we look at thematic learning because it can hone students' thinking power and help students do something and be active in class. In addition, students can relate one concept to another.</p> <p>(G4)</p> <p>I prefer subject-based learning like the old one because the teacher is very busy finding common threads or the relationship between one subject concept and another subject in thematic learning. In addition, with a thematic basis, many concepts in individual lessons are reduced so that the deepening of knowledge to students is less than optimal. By being based on the subject, the teacher can focus on expanding the scope of the study of each concept.</p> <p>(G20)</p>
<p>What are the difficulties in Thematic Learning</p> <p>Have you integrated science learning content into local wisdom in Southwest Maluku Regency?.</p>	<p>The difficulty is the way the teacher assesses the students. It is because each student can think, and students' character is not the same. Therefore, it is difficult for teachers to make assessments.</p> <p>We have provided much information to teachers to integrate science content into local wisdom and include it in the school curriculum. Regional leaders have mandated the hope so that local wisdom is not lost and extinct (KD).</p> <p>I have done many evaluations so that every teacher can include the content of local wisdom in science learning. Moreover, students are more familiar with and understand the surrounding phenomena found every day. I hope teachers include it in teaching materials, lesson plans, and learning syllabus. For example, the manufacture of woven fabrics from natural materials and the Moa Buffalo, which is an endemic animal that is often kept by the community.</p> <p>(KS2)</p>
<p>What are your hopes for future curriculum development, especially science learning</p>	<p>In the future, I hope that there will be laboratory training in practicum for science teachers in schools and computerized training in packaging teaching materials that are either video-based, web-based, or animation-based, so that classroom learning is more fun. As teachers in remote areas, we receive less attention and are not called upon for activities. Usually, the teachers who are called are specific people. Senior teachers received less attention and sent younger teachers to participate in activities. In addition, there are still many villages that do not have the internet to find the latest information in learning. I hope the Government can see this condition.</p> <p>(G10)</p>

Table 1. informs that teaching science in a thematic context tends to make it difficult for teachers to determine the linkages/meeting points between science content and other lesson content. Thematic learning also narrows the study of science. In addition, there has been no integration of natural science content with local wisdom in the local of Southwest Maluku Regency community. In K-13 students are more encouraged to develop thinking, reasoning, and being active in connecting one concept to another so that their knowledge is more comprehensive and integrative. However, the obstacle is in the assessment to measure the thinking abilities and different characters of students. on the other hand it is known that as many as 80% of informants still want subject-based learning in the previous curriculum (KTSP), because it helps students more easily master and explore science concepts in a clear, detailed, and sequential manner. That means only 20% of informants agreed to learn science using the thematic learning approach. Quality science learning requires adequate facilities such as laboratories, tools, materials, computers, and teaching materials. Moreover, in various remote areas in the Southwest Maluku Regency, many schools have not been able to properly organize science learning by utilizing information technology, internet access, as well as digital learning materials, and media. Besides that teachers in remote areas need training and assistance in managing science learning, especially science practicum in laboratories.

## Discussion

### Science learning in the Southwest Maluku Regency

Learning concepts can include knowledge and understanding of how students think about learning objectives, activities, strategies, tasks, processes, and learning. Scientists suggest that science should be introduced to children as early as possible. It is because children's capacity for science concepts is still very minimal compared to today's world's challenges and demands that are suggested for science and technology (Genç et al., 2009; Liliawati et al., 2018). Moreover, science learning in K-13 is more narrowed. Many things that teachers want to develop for students are reduced because certain materials dominate theme-based learning. Material-based learning or teacher subjects will be more focused and easier to deepen knowledge to students. Some science concepts or materials are no longer taught in thematic learning. Concepts or learning materials that exist in the KBK and KTSP, but are not present in the 2013 curriculum include the five human senses, photosynthesis, simple machines, light, special characteristics of living things, and changes in matter (chemical and physical changes). It is predicted that these materials are not relevant to the needs and cognitive development of elementary school students.

Science content learning in K-13 is carried out thematically. Thematic learning is very helpful in forming learning experiences from various scientific aspects on one theme. Thus, several competencies can be achieved at once when studying one theme. Science content learning uses handbooks provided by the government through the Ministry of Education and Culture of the Republic of Indonesia, namely teacher books and student books (Dewantara et al., 2022; Yuniyanto & Rokhimawan, 2021). Based on the results of observations and interviews, it was also found that teachers rarely analyze science material. Teachers prefer to follow the learning guide on each subject matter. In each study, the teacher needs to prepare learning tools (lessons plan, teaching materials) and learning evaluation tools covering cognitive, affective, and psychomotor aspects. Thus many documents need to be provided in implementing one thematic learning. This also encourages teachers to prefer using the K-13 guidebook provided by the government. This was chosen because the needs that need to be prepared have been accommodated in the handbook (Rahim & Hulukati, 2021; Virmani, 2019). Limited assistance from K-13 supervisors and instructors has caused some teachers in the Moa Islands region, especially those who are senior and not IT literate, to experience difficulties in developing learning tools and implementing science learning.

Until now, the teacher refers to the description of learning objectives available in the teacher's book (2017 and 2018 Revised Teacher's Book). The learning objectives for science content can be reviewed if the teacher conducts a basic competency analysis to formulate competency achievement indicators (Indikator Pencapaian Kompetensi/IPK) or indicators. One of the teachers' difficulties in designing lesson plans is formulating an indicator (Ernawati. & Safitri, 2017; Nurtanto et al., 2021). So the way teachers usually do to deal with this condition is to quote the formulation of science content learning objectives in the teacher's handbook. If so, then the operational verbs (Kata Kerja Operasional/KKO) used in the indicators are the same as those available in the learning objectives. In the end, there is no more opportunity to develop science learning content that is more detailed and specific according to the content of the material. Apart from that, it is still difficult for teachers to determine the right KKO both in the indicator formula and in the learning objectives in science content.

Regarding the integration of natural science content with the local wisdom of the local community, not much has been disclosed. This indicates that science learning in the Southwest Maluku Regency is rarely integrated with the potential of the local area. Even though this archipelago region has many unique and interesting potentials to be studied by students contextually. Teachers' difficulties in integrating local regional potential with science learning materials are mainly due to a lack of training for teachers. The intended training is designing learning materials and developing lesson plans that accommodate the local potential of the archipelago (Alfiana. & Fathoni, 2022; Hakim, 2017).

### Facilities and Teacher Competence in Curriculum Change Paradigm

The quality of science learning in the archipelago is a never-ending struggle. Moreover, teachers in small islands still lack facilities. They do not participate in proper training, which interferes with teachers' understanding of the implementation of K-13. The findings in the field show that 80% of teachers wanted learning to be more focused on subjects when learning was theme-based. Teachers were very troubled finding ways to connect one material with other materials. Besides, scientific studies have been narrowed, so it is challenging to deepen science knowledge for students in elementary school. Therefore, students' conceptual and metacognitive decline due to incomplete learning. Circumstances like this will affect elementary school students to move up to the junior high, senior high school, and even college levels with fragmented science knowledge. Whereas in science, learning more directs students to explore the world around them through investigations, analyzing and interpreting data, building

explanations, designing solutions, and developing understanding concepts and relationships between science concepts (Batlolona et al., 2022; Fries-Gaither & Lightle, 2011; Stefanski et al., 2019). With good conceptual and science skills, students will get exemplary achievements and careers. Ten (10)-year-old American students score higher than most Western European students score average. The quality of education is more focused on subject areas when combined (Alake-Tuenter et al., 2012; Gonzalez et al., 2009). Similarly, previous study use a survey for elementary school teachers in California determined that 90% felt ready to teach language arts and mathematics, but only about a third felt ready to teach science (Dorph et al., 2011). They are not sufficiently prepared to teach science because it requires knowledge of complex science domains and pedagogical skills (Carrier et al., 2014; Mansour, 2009). Therefore, teachers are constantly trying to improve their self-efficacy about learning science to change their approach to science teaching.

There is an expression often used in the education community, saying change the minister, change the curriculum. In fact, since the independence of Indonesia in 1945, the curriculum has indeed changed, namely in the year 1947-2013 curriculum. It is a logical change because of changes in the political, socio-cultural, economic, and science and technology systems in society in the life of the nation and state. Changes in the curriculum will affect the quality of education in Indonesia. Changes in the Minister of Education from period to period have carried out many policies that significantly improve the quality of education. Through the Minister of Education, Culture, Research, and Technology, there is currently a pretty good leap in the form of Freedom of learning (Merdeka Belajar) and Kampus Merdeka. All of this was done to improve Indonesia's grades and quality of education (Alhamuddin, 2014; Peristiwo, 2020). In 2022, the Ministry of Education and Culture will initiate a curriculum policy option as part of an effort to mitigate learning loss and as a form of learning recovery. As stated in the Guidelines for Implementing the Curriculum in the framework of Recovery of Learning. The Ministry of Education and Culture provides three options for education units to implement a curriculum based on the National Education Standards that suit the learning needs and context of each educational unit. The three options are as follows: 1) 2013 Curriculum in full, 2) Emergency Curriculum Curriculum, 3) Freedom Curriculum.

The KBK which was put into effect in 2004, was designed to encourage increased student competency in facing global science and technology challenges. Two (2) years later, the KBK was revised into KTSP to open up many opportunities for local education authorizers and teachers in designing learning tools and learning evaluation (Faisal & Martin, 2019; Parker, 2017). Then in 2013, K-13 was implemented by taking into account various facts and challenges of 21st-century learning, developments in science and technology, globalization, and societal changes. The change in the curriculum from KTSP to K-13 is intended to further improve the quality of education. This challenge has implications for the content of science learning in elementary schools, where higher education demands that graduates acquire good competence in science learning to be accepted in the world of work. However, basic education is faced with a curriculum that does not direct the specialization of science. Teachers have less time to study science. These results are very similar to the report from Horizon Group for a science learning survey in the USA. It shows that an average of 19 minutes per day is spent on science (Ozgur & Yilmaz, 2018). Only 22% of elementary school teachers feel highly qualified to teach science, while 63% feel qualified to teach reading. Students who study one field of science and are focused will be more effective and have good study skills and good academic learning outcomes.

#### 4. CONCLUSION

According to findings and discussion, it is concluded that teachers prefer learning based on subject areas compared to themes because it is more effective and students' understanding of concepts is broader and deeper. Generally, teachers are more interested in using the 2006 curriculum compared to the thematic curriculum in science learning because science content is more systematic and easy to learn compared to the 2013 Curriculum which contains various learning content in the theme packaging. Students study more science content and focus on one concept in studying with subjects. When it is combined, students feel bored and bored. In addition, teachers find it difficult to find a common thread to connect one concept with the concept of another field of science. For the future, it is suggested to design learning and curriculum in favor of the subject matter and not combine one field of science with another. Therefore, learning is more focused, and students are more comfortable in learning.

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