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Curriculum development for environmental education at an Islamic boarding school

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ABSTRACT

This study aimed to produce and to evaluate a curriculum for environmental education to support sustainable development programmes at an environmentally friendly Islamic boarding school (*eco-pesantren*). It is a development study with a model of area-based curriculum. The development stage includes analysis, design, develop, implementation, and evaluation. This curriculum has been implemented in 3 Islamic boarding schools (107 students). This curriculum contains curriculum foundations, learning outcomes, teaching materials, learning activities, and learning evaluations. The foundation of this curriculum includes philosophical, psychological, organisational, socio-cultural, scientific and technological aspects. Teaching materials focus on the problems faced by students in everyday life. Learning activities include 2 stages (theory and practice). The results of this study indicate that it is a suitable curriculum for use in Islamic boarding schools with an eligibility percentage of 92% (very feasible category) based on aspects of consistency, relevance, effectiveness, completeness, continuity, correctness of content and language. The results of this study also show that this curriculum is practically used in Islamic boarding schools. The practicality of the curriculum is seen from the aspect of good communication, cooperation, sufficient time, and the ease of understanding the material.

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Introduction

Environmental Education (EE) in Islamic boarding schools (*pesantren*) is used to support sustainable development programmes from ministry. A breakthrough is needed in the sustainable development programme as a target for the 2030 global education agenda. This target was initiated by Ministers of Education from throughout the world in the World Education Forum meeting (ILO, 2017). In Islamic boarding schools, this can be realised through the *eco-pesantren* programme, an environmental education programme and one of the government's efforts to overcome environmental

problems in such schools. *Eco-pesantren* involves collaboration between the State Ministry of the Environment and the Ministry of Religion.

Environmental education is a basic foundation from which to create sustainable development programmes. Environmental education aims to: 1) convey information so that awareness arises, 2) build understanding so that a sense of belonging and care arises, 3) improve skills, and 4) activate sustainable action (Monroe et al., 2007). The purpose of environmental education is to produce citizens who are environmentally aware of environmental problems, realise how to solve them, and are motivated to implement solutions (Stapp et al., 1969).

At this time, many EE curriculums have been developed in schools, but there is still no development of EE curriculum in Islamic boarding schools. Mahat et al. (2020) emphasised that low-carbon schools (schools that implement environmental education) have been initiated but this has not included Islamic boarding schools. Currently, there are 28 thousand Islamic boarding schools in Indonesia. Education in Islamic boarding schools starts from primary school, junior high school, senior high school, to tertiary level. The development of the EE curriculum in primary schools based on local wisdom has been carried out (Bakhtiar & Nugroho, 2016). The environmental literacy of high school pupils tends to increase in quality according to grade level or increasing age (Husamah et al., 2020). Knowledge of the environment affects attitudes and behaviour in managing the environment (Munawar & Suarja, 2014) and it was suggested the need to add environmental education materials to the curriculum in the schools (Azhar et al., 2016).

Environmental education is a new subject in Islamic boarding schools so that curriculum development is needed. Environmental education is generally characterised by a hidden curriculum—an educational practice or activity that is not explicitly prescribed by a structured curriculum (Yahya, 2013). Gunawan et al. (2018) describe environmental education as a hidden curriculum at the *Hidayatullah* Islamic boarding school in Indonesia through pupils being encouraged to take environmental conservation actions. Environmental education can be integrated into the national curriculum in schools and the curriculum of Islamic boarding schools in Indonesia (Saprodi et al., 2019). Environmental education can be done through learning and example in protecting the earth based on Islamic values (Efendi et al., 2017). This study aimed to produce an environmental education curriculum in Islamic boarding schools. The research question in this study is "how feasible is it to have an environmental education curriculum for Islamic boarding schools".

Methods

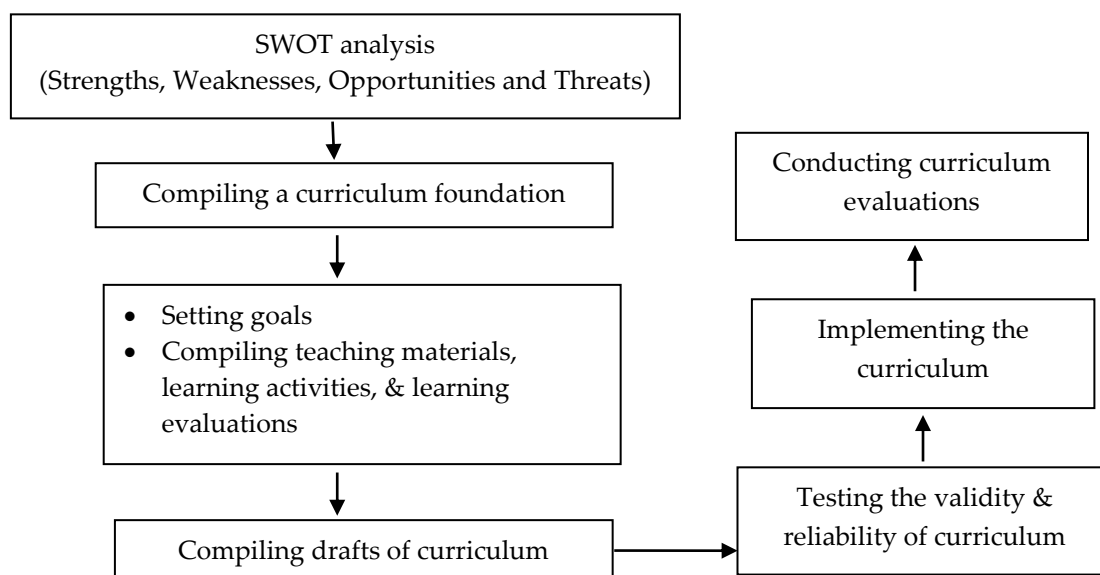
Research Design

Curriculum development in this context is carried out using the "area-based curriculum" development model in Figure 1 (Evans & Savage, 2015). This development model was chosen based on the premise that curriculum development in Islamic boarding schools must be adapted to the characteristics of Islamic boarding schools. The characteristics of Islamic boarding schools can be known from the SWOT analysis stage. SWOT analysis is an act of analyzing an institution from the aspects of Strengths, Weaknesses, Opportunities and Threats (SWOT). And then the results of the analysis are used as the basis for compiling a draft curriculum (curriculum foundation, subjects, activities, & learning evaluation).

Test the validity and reliability of the draft curriculum based on expert review. This is done by experts on higher education curriculum, Islamic boarding school curriculum experts, education and learning experts as well as education practitioners in Islamic boarding schools. Based on their evaluations, improvements were made to the curriculum. From this stage, a curriculum is produced that is suitable for use at the implementation stage. After the validity and reliability testing phase, the curriculum implementation phase was carried out in Islamic boarding schools. Furthermore, a curriculum evaluation is carried out.

Figure 1

Procedures of Research



Note. Adapted from Evans & Savage, 2015.

Participants

The curriculum implementation stage was carried out at the Islamic boarding school of *Jagad 'Alimussirry*. This Islamic boarding school is a modern Islamic boarding school in Surabaya, Indonesia. This stage is implemented in 3 Islamic boarding schools. They are 1 Islamic boarding schools (male), 1 Islamic boarding schools (female), and 1 Islamic boarding school (female and male). The students who were used as samples were 107 students. The participants are students aged 18-25 years.

Data Collection and Analysis

Data were obtained using 3 instrument. *First*, the interview instrument is used to obtain data related to the condition of the Islamic boarding school. This instrument is used by researchers at the SWOT analysis stage. This instrument consists of 12 questions include the geographical location, history, Islamic boarding school culture, facility, and dimensional analysis (personal dimensions, policy dimensions, and pedagogical dimensions). *Second*, the validation instrument is used to obtain data about the feasibility of the curriculum, especially to test the validity & reliability of the curriculum. This instrument is filled out by curriculum experts (two lecturers), environmental education experts (two lecturers), and education practitioners (two teachers in Islamic boarding schools). This instrument consists of 73 statements with aspects of consistency, relevance, effectiveness, completeness, continuity, correctness of content and language. *Third*, student response questionnaires consist of 7 questions. This instrument is given to students to find out student responses after implementing the curriculum. These instrument consists of 5 aspects (cooperation, communication, understand the material, trouble doing the task, sufficient study time). Data from this instrument is used as a basis for evaluating the curriculum. All data were analysed descriptively quantitatively using detailed and in-depth analysis. The results of the analysis are interpreted into curriculum eligibility standards (Riduwan, 2006).

Findings

Results of Curriculum Component Development

The EE curriculum contains the curriculum foundation, learning outcomes, teaching materials, learning activities, and learning evaluations. This draft is structured in such a way as to become a curriculum book. This EE curriculum also describes the vision, mission, and goals as well as the motto of the Islamic boarding school. In addition, it also explains the profile of Islamic boarding schools ranging from geographical location, history of the establishment, culture, facilities, personal dimensions (students, teachers, & caregivers), political dimensions (government policies and internal policies of Islamic boarding schools), and pedagogical dimensions (learning). This explanation is obtained from the results of a SWOT analysis related to the condition of Islamic boarding schools. This results of the analysis are used as the basis for developing the curriculum. The basis for the preparation is called the curriculum foundation.

The curriculum foundation is used as the basis for preparing learning outcomes, selecting learning materials, designing learning activities, and compiling evaluations of EE learning in Islamic boarding schools. These foundations include philosophical foundations, psychological foundations, organizational foundations, socio-cultural foundations, scientific and technological foundations as shown in Table 1.

Table 1

Curriculum Foundation

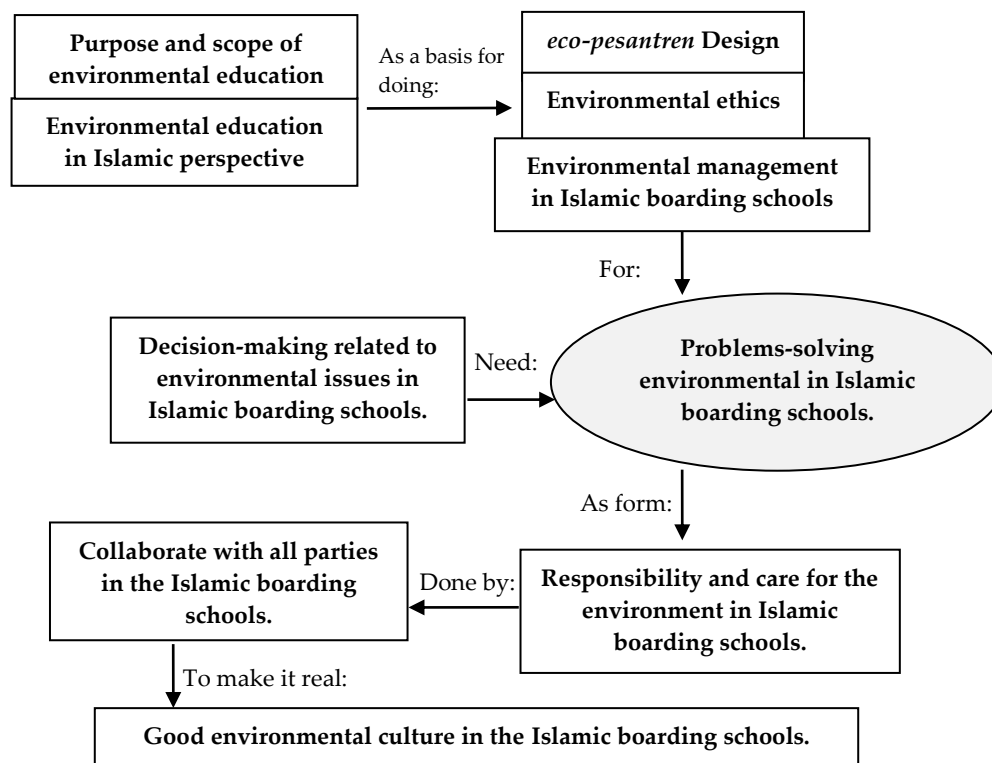
No	Curriculum Foundation	Description
1	Philosophical foundation (al-Qur'an and as-Sunnah).	Environmental education is explained in the Qur'an as stated in QS. al-Baqarah, 2:30, QS. al-A'raf, 7:129; QS. an-Naml, 27:62; QS. Fatir, 35: 39. In the verse it is explained that "humans as caliphs on earth have the ability to manage and care for the environment with the guidelines of the Qur'an".
2	Psychological foundation	Students aged 18-25 years are included in the formal operational stage. At this stage, students have the ability to think independently and logically to solve complex and abstract problems. Students can reconstruct their thinking with facts and events in their environment. This foundation includes student developmental psychology and learning psychology.
3	Organizational Foundation	Environmental learning is more contextual, applicable, and effective if it focuses on everyday problems in Islamic boarding schools. The problem was solved by students with multidisciplinary knowledge.
4	Socio-Cultural Foundation	Students are in the Islamic boarding school for about 18 hours. Students come from a society with an Islamic culture. Students are educated in an environment with an Islamic culture. Students contribute to fostering an Islamic culture. The community around the lodge supports the Islamic boarding school program. Therefore, environmental education learning is more relevant and meaningful if there is collaboration with community.
5	Science and Technology Foundation	This foundation is the basis for the EE curriculum in Islamic boarding schools to be in line with the development of science and technology. Students are taught multidisciplinary sciences as a provision for life in society. Students can use the facilities to develop their knowledge, such as wifi, journalism extracurricular, publishers of books, magazines and journals.

The learning outcomes are obtained from the curriculum objectives. The objectives are grouped into three categories, namely long-term, medium-term, and short-term goals. These objectives are arranged based on priority aspects. The long-term goal is to realize an *eco-pesantren* in accordance with the vision, mission, and goals of the Islamic boarding school. One of the indicators of *eco-pesantren* is the development of a nature-based curriculum. The medium-term goal is to develop a book of EE curriculum. The short-term goal is to develop learning tools such as learning outcomes in Islamic boarding schools.

The learning materials consist of: 1) the purpose and scope of environmental education, 2) environmental education from an Islamic perspective, 3) *eco-pesantren* design, 4) environmental management, and 5) environmental ethics. The learning materials are developed with a problem-solving approach. Students solve problems in Islamic boarding schools. Students make several alternative solutions to problems and make decisions on them. Students are trained in responsibility, caring for the environment, and working together. This material is taught by teachers in order to create a good environmental culture. The surrounding nature becomes the object of learning for students in studying environmental education materials supported by the arguments of the Qur'an. Learning materials can be seen in Figure 2.

Figure 2

Concept Map of Environmental Education Materials at Islamic Boarding Schools with a Problem-Solving Approach.



There are 5 materials in the environmental education curriculum. *First*, the purpose and scope of environmental education. The objectives of environmental education are: 1) to understand about the environment that the environment plays an important role for humans, humans are part of the system, and humans have the ability to change the environment, 2) to understand environmental problems, 3) to train skills to improve the environment, and 4) to carry out sustainable actions as a form of caring for the environment. The scope of environmental education is the physical environment, social environment and natural environment. *Second*, environmental education from an

Islamic perspective. Environmental education is an Islamic teaching because Islam teaches a clean life both physically and spiritually. Environmental education is very important for Muslims as a manifestation of one's faith because "cleanliness is part of faith". Humans protect the environment based on Islamic values. *Third, eco-pesantren* design. The *eco-pesantren* program aims to encourage increased knowledge, obedience and awareness of Islamic boarding school residents in efforts to preserve the environment based on Islamic teachings. *Eco-pesantren* program as one of the programs that involves residents of Islamic boarding schools plays an active role in the activities of creating eco-friendly Islamic boarding schools (*eco-pesantren*).

Fourth, environmental management. Environmental management is an activity that includes aspects of utilization, regulation, maintenance, recovery, control, guidance, and environmental preservation efforts that are carried out in an integrated manner. The Islamic boarding school environment can be managed by creating organic pages to create *eco-pesantren*. The concept of an organic courtyard consists of three aspects, namely: 1) the aspect of the Islamic boarding school garden, 2) the aspect of organic treatment, and 3) the aspect of the utilization of Islamic boarding school waste. Environmental management in Islamic boarding schools must be based on Islamic teachings. *Fifth, environmental ethics.* Humans are obliged to do good to themselves (personal ethics as servants of *Allah*) and to others (social ethics as caliphs on earth) so that there is a balance in society. Humans are part of the environment that is mandated by *Allah* as caliph on earth to maintain the balance of nature, prevent damage, and preserve the living things in it.

Learning activities at this Islamic boarding school include 2 stages, namely the stage of delivering material and the stage of real practice. The stage of delivering the material is explaining the concept of environmental education objectives, environmental education in an Islamic perspective, environmental ethics, *eco-pesantren* design, and environmental management. The real practice stage includes students solving environmental problems in Islamic boarding schools, reporting on observations of environmental damage in Islamic boarding schools, determining several alternative solutions, evaluating solutions based on demands and constraints, choosing the best alternative solutions, planning solutions, implementing solutions, and evaluating solutions. Students form a team to control the *eco-pesantren* program. Then the students prepare daily programs and educational programs related to the environment. At the next meeting, the students planned and carried out environmental management efforts in the form of sorting and processing waste and reforestation in Islamic boarding schools. Students work together in solving environmental problems and are responsible for protecting the environment and taking action to care for the environment. At the last meeting, the students evaluated the solution to environmental problems and it ended by taking lessons learned.

The Feasible of Environmental Education Curriculum

This research resulted in a "very feasible" EE curriculum used in Islamic boarding schools to improve problem-solving and decision-making skills. The feasibility of the curriculum is based on aspects of consistency, relevance, effectiveness, completeness, continuity, and correctness of content and language. The percentage of curriculum eligibility is 92% as shown in Table 2. This shows that the curriculum developed is "very feasible" to be implemented in Islamic boarding schools. Curriculum components such as curriculum foundation, curriculum content, curriculum organization pattern, and curriculum evaluation are good and complete. Aspects of curriculum objectives and learning experiences have slightly improved. The forms of improvement are 1) curriculum goals are more directed to environmental education and 2) learning experiences are more focused on improving environmental skills. The curriculum has been improved according to suggestions from the validator.

Table 2*Validation Results of Environmental Education Curriculum at Islamic Boarding Schools*

No	Validated Aspect	Score			Average (%)
		V ₁ (%)	V ₂ (%)	V ₃ (%)	
1	Consistency with Goals	89	92	97	93
2	Relevance	79	88	83	83
3	Effectiveness	91	97	97	95
4	Completeness	100	100	100	100
5	Continuity	94	88	94	92
6	Language	86	92	89	89
7	Theory	86	94	92	91
Average Eligibility (Category)		92 % (Very feasible: usable)			

Note. V₁ (Validator 1) = Curriculum and Environmental Materials Expert; V₂ (Validator 2) = Curriculum Expert at Islamic Boarding Schools and Islamic Religious Materials; V₃ (Validator 3) = Education Practitioner at Islamic Boarding Schools.

Curriculum implementation is carried out in 14 meetings. *First*, the teacher teaches the purpose of environmental education and the reasons for caring for the environment. Students identify several actions to care for the environment (physical and social). *Second*, the teacher teaches problem definition, how to formulate problems, and practice formulating problems. Students present environmental care actions that they have done. *Third*, the teacher teaches how to make solutions. Students practice making solutions to a problem at Islamic boarding schools and take lessons from learning the goals of environmental education. *Fourth*, teachers teach environmental education from an Islamic perspective and how to make good decisions. *Fifth*, the teacher teaches the design of an *eco-pesantren* and students practice compiling an eco-Islamic boarding school design based on an analysis of the condition of the *pesantren*. *Sixth*, the teacher teaches *eco-pesantren* management supported by the al-Qur'an and students practice making *eco-pesantren* plans. *Seventh*, the teacher teaches *eco-pesantren* management supported by the al-Qur'an and students practice it.

Eighth, students presented *eco-pesantren* programs such as the daily cleaning program at Islamic boarding schools. *Ninth*, students present environmental literacy programs and make products (stickers or posters) for environmental literacy at Islamic boarding schools. *Tenth*, the teacher teaches the various types of waste and students practice making waste products. *Eleventh*, the teacher shows videos of waste utilization to students and students practice making products from waste materials to be placed in Islamic boarding schools (reuse and reduce). *Twelfth*, students plant hydroponically at Islamic boarding schools. *Thirteenth*, students plant vertically (vertical garden) at the Islamic boarding school. *Fourteenth*, teachers and students evaluate the results of solving problems that have been carried out as an *eco-pesantren*.

The results of this implementation phase are used to determine the effectiveness and practicality of the curriculum. This practicality is seen from the aspect of the response of the students after the implementation of the curriculum. The response of the students was in good category from the aspect of time adequacy and the existence of obstacles in learning. Very good response from the aspect of ease of understanding the material, excellent communication with teachers and very good cooperation between students. This response can be seen in Table 3. This response is used as the basis for curriculum evaluation.

Table 3*Student Responses to Curriculum Implementation*

No	Question aspect	Response (%)	Category
1	Sufficient study time for students	61	Good
2	Have a trouble doing the task	71	Good
3	Understand the material easily	84	Very Good
4	Good communication between students and teachers	92	Very Good
5	Cooperation between students and friends is going well	82	Very Good

In general, Islamic boarding schools use the *pesantren* curriculum or a combination (*pesantren* curriculum & national curriculum from the government), while government schools use the national curriculum. Islamic boarding schools are educational institutions to teach Islamic religious teachings or a combination of subjects. In detail, it can be seen in Table 4.

Table 4*Curriculum in Islamic Boarding Schools versus in Government Schools*

No	Aspect	Islamic Boarding Schools	Government Schools
1	Curriculum	<i>Pesantren</i> curriculum, or Combination (<i>pesantren</i> curriculum and national curriculum from government)	National curriculum from government
2	Learning materials	Islamic religious teachings, or Combination (a lot of Islamic religious teachings and a few general knowledge)	General knowledge, or Combination (a lot of general knowledge and a few Islamic religious teachings)
3	Environmental Education	Teaching materials are based on Islamic values. There are arguments from the Qur'an and hadith related to the environment which are used by students and lecturers.	Teaching materials are not based on Islamic values but are based on moral values in generally.

Curriculum Evaluation Results

The evaluation stage is carried out in several ways, namely: 1) interviews and giving questionnaires to students, cleaning teams, teachers, and 2) observing students' activities in learning. Based on the results of the observation of learning activities, suggestions for improving this curriculum need to be improved, namely the concentration of students' attention, such as the addition of videos related to the material at the beginning of learning. This is done to increase the motivation of students in Islamic boarding schools.

There are several suggestions for improvement based on the questionnaire responses from students, the cleaning team, and teachers. The suggestion for improvement is that there is a need to add more real practices in Islamic boarding schools, especially new things for students. Real practice in Islamic boarding schools which is new to them, such as planting vertical and hydroponic techniques. Sorting of waste has been carried out by students, but efforts to manage the results of sorting have not been widely carried out in Islamic boarding schools due to limited land in urban areas. Based on this, more varied composting and plastic bottle processing practices can be added in Islamic boarding schools. New things like that need to be added to the EE curriculum in Islamic boarding schools.

Discussion

Environmental Education Curriculum in Islamic Boarding Schools

The EE curriculum is suitable for use in Islamic boarding schools with an eligibility percentage of 92% (very feasible category) based on aspects of consistency, relevance, effectiveness, completeness, continuity, correctness of content and language. This result is supported by the statement of several experts that the basic principles that need to be considered in developing a curriculum are: consistency in objectives, relevance, effectiveness, practicality, continuity, flexibility, and integration (Hidayat, 2013). Then it is also in accordance with the criteria proposed by Taba (1962) which are consistent with the purpose, relevance, effectiveness, continuity, and completeness.

This curriculum was developed based on an analysis of the condition of the Islamic boarding school. It is structured with philosophical, psychological, organizational, socio-cultural, scientific and technological foundations. This is supported by the finding of Sukmadinata (2016) that curriculum preparation requires strong foundations based on the results of in-depth thoughts and research. The foundations used in developing Islamic education are philosophical foundations, psychological foundations, socio-cultural foundations, science and technology foundations, religious foundations (Zuhri, 2016), and organizational foundations (Hidayat, 2013).

The curriculum components consist of profiles of Islamic boarding schools, curriculum foundations, learning outcomes, material descriptions, teaching materials, learning activities, and learning evaluations. This is supported by the argument of Lunenburg (2011) that the curriculum components are curriculum objectives, curriculum content (teaching materials), learning experiences, learning resources, and evaluation of learning. This is in accordance with the statements of several other experts that the curriculum components consist of curriculum objectives, curriculum content (teaching materials), learning experiences, learning resources, learning evaluations, curriculum design (organizing goals, content, and learning processes), learning strategies or methods (Hidayat, 2013), curriculum engineering, research and theory development (Beauchamp, 1975). The curriculum draft is written in detail and archived in the form of a curriculum book. Then Beauchamp (1975) explained that curriculum has three characteristics, namely: a) the curriculum is a written document, b) contains the outlines of the formulation of objectives, and c) the content or teaching materials because with these teaching materials, the curriculum objectives can be achieved.

Learning materials are developed with a problem-solving curriculum approach. Teaching materials focus on the problems faced by students in everyday life in Islamic boarding schools. Sukmadinata (2016) states that a problem-solving curriculum is a pattern of content organization that contains problem-solving topics encountered in life by using knowledge and skills obtained from various subjects or disciplines. Hidayat (2013) also argued that teaching materials must be relevant to the students' living environment and learning materials are in accordance with the real-life around students. Hamalik (2009) states that teaching materials must be related to the life problems of students and provide valuable and meaningful contributions to students. More in-depth and broader teaching materials (unfamiliar issues) about water awareness education with direct action in everyday life can be used as examples of environmental education (Cappellaro, 2011). The environment functions as a sign of God's greatness and as material for contemplation (*tafakur*) so that humans learn lessons (Lutfauziah et al., 2022).

Learning activities are intended to provide knowledge, values, attitudes, commitments and skills to manage the environment and to raise awareness and change the behaviour of students as a whole to care about the environment (UNESCO, 1977). Stapp et al. (1969) explained that in order for environmental education to achieve the greatest impact, the learning design must be able to: 1) provide factual information so that students have a thorough understanding of the environment, 2) develop a caring attitude towards the environment to solve environmental problems, and 3) inform the strategy to play an active role in managing the environment effectively. Monroe et al. (2007) describe a framework that regulates many environmental education activities and strategies that can

be used in various situations in both formal and non-formal education. The framework describes four categories of environmental education according to its objectives, namely: a) conveying information, b) building understanding, c) enhancing skills, and d) activating sustainability actions. Palmer (1998) asserts that there are four structures of environmental education, namely: education about the environment, education in or from the environment, and education for the environment.

Curriculum evaluation is carried out in several ways, namely: 1) interviews and giving questionnaires to students, cleaning teams, teachers, 2) analysis of achievement of learning indicators, and 3) observing students' activities in learning. First, it was proved by Docktor & Heller (2009) that curriculum evaluation can be done by responding to students through questionnaires or interviews. Hidayat (2013) also argued that curriculum evaluation serves to see the effectiveness of achieving goals. Curriculum effectiveness relates to how far the things planned can be implemented or how far the desired things can be achieved.

Studies about the Curriculum on Environmental Education

This curriculum is different from the environmental education curriculum in general. This is based on the premise that the characteristics of students in Islamic boarding schools are different from students in ordinary schools. This curriculum used the combination curriculum (*pesantren* curriculum & national curriculum from the government), while ordinary schools use the national curriculum from the government. This curriculum is implemented at the Islamic boarding school of *Jagad 'Alimussirry* with the specification of Sufism. Each Islamic boarding school has characteristics and specifications. This is similar to the Islamic boarding school of *Al-Munawwir* Krapyak-Yogyakarta with the specification of Al-Qur'an interpretation and the Islamic boarding school of *Salafiyah Syafi'iyah* Sukorejo-Situbondo with the specification of *fiqh* (Faiqoh, 2003). Then, the Islamic boarding school of *Gontor* with specifications of Arabic and English and the Islamic boarding school of *Tebuireng* with specifications of the *Al-Qur'an* and *Al-Hadits* (Mardiyah, 2015).

Hamalik (2009) emphasized that the curriculum was developed based on the conditions of Islamic boarding schools, and the needs and demands of the times. This is in accordance with the statement of Kamil (2011) that the curriculum was developed taking into account aspects of flexibility, local conditions, and the positive response of students, meaning that learning is tailored to the needs of students, time is adjusted to the tight schedule of students, there is empowerment, and active participation from all parties in Islamic boarding school. Evans & Savage (2015) explained that an area-based curriculum can be developed in accordance with the history, geography, culture and characteristics of students in a region or educational institution (Islamic boarding school). Curriculum development must be in the local context to be truly effective because students are formed where the students live.

This curriculum has advantages and disadvantages compared to the environmental education curriculum in ordinary schools. The advantages are: 1) this curriculum is in accordance with the characteristics of Islamic boarding schools, 2) the learning activities are adapted to the real conditions of Islamic boarding schools, 3) the learning activities are more flexible orientated towards solving everyday problems that occur in Islamic boarding schools, 4) more flexible teaching materials oriented towards the development of eco-friendly Islamic boarding schools (*eco-pesantren*) adapted to the characteristics of Islamic boarding schools, 5) the learning activities are oriented towards establishing a culture of a healthy and clean environment, 6) the learning activities are oriented towards developing decision-making skills of students, 7) the problem solving is studied based on various scientific perspectives, 8) the learning activities are more real practices that support the *eco-pesantren* program, and 9) the assessment includes three aspects of knowledge, attitudes (environmental culture), and skills (problem-solving skills, decision-making skills). Besides that, this curriculum has some disadvantages such as: the material presented is not too detailed and not too broad as studied in formal education and learning activities are limited to solving real and contextual problems in this boarding school.

Istiadi (2018) explains that the environmental education curriculum is no longer taught in ordinary schools (elementary schools, junior high schools, & senior high schools) since the implementation of the new curriculum in Indonesia. There used to be *adiwiyata* programs and schools with environmental culture, but now these programs are no longer the centre of attention for the government. This is different from the results of this study, that an environmental education program was developed at Islamic boarding schools (*eco-pesantren*) where students solve real and contextual problems at Islamic boarding schools.

The findings of Mongar (2022) asserts that environmental action-oriented materials are indispensable in solving environmental problems in the environmental science curriculum. Morgado et al. (2022) stated that real problems in accordance with real-world conditions can support contextual learning of the living environment, but teachers need to consider student characteristics, institutional conditions, and material characteristics. This is in accordance with the statement of Stapp et al. (1969) that environmental education aims: 1) to produce students who are knowledgeable about the biophysical environment associated with environmental problems, 2) to be aware of how to solve problems, and 3) to motivate students for implementation the solution. Mangunjaya et al. (2012) explained that the ideal model of *eco-pesantren* program activities is not only on the knowledge aspect but also emphasizes the involvement of students in practical and sustainable environmental action. Soykan & Atasoy (2012) also argued that environmental education in Turkey aims to spread knowledge about the environment to a wider circle so that this knowledge can be used and applied in everyday life. Herdiansyah et al. (2016) emphasized that environmental programs are more optimal after being actualized in the environmental education curriculum.

This is different from the results of this study, that: 1) the material in this curriculum uses a combination of materials (many Islamic teachings and a few general sciences), while ordinary schools only teach general knowledge or combination (a lot of general knowledge and a few Islamic religious teachings), 2) environmental education materials are based on Islamic values such as: environmental education in an Islamic perspective, environmental ethics, *eco-pesantren* design, and environmental management based on Islamic values, 3) environmental education materials at Islamic boarding schools was developed with a problem-solving approach (real everyday problem) because students must stay at Islamic boarding schools for 24 hours, while students studying at ordinary schools are only at school for 5-8 hours, and 4) the problem solving stage in this curriculum is taught in detail in Islamic boarding schools starting from observing environmental damage in Islamic boarding schools, choosing the best alternative solutions, planning solutions, implementing solutions, controlling the *eco-pesantren* program, preparing the daily programs and the educational programs related to the environment, evaluating the problem-solving about environmental in Islamic boarding schools and ending by taking lessons learned based on Islamic values. These results are in accordance with Fitriyah et al. (2022) that students must maintain good behaviour in Islamic boarding schools. Because belief in religious teachings and good behaviour must be a priority to be developed in students Jumi atmoko (2022). However, there are also those who combine science and Islamic material in ordinary schools in Indonesia (Metafisika et al., 2022).

However, the results of this study have similarities with other studies such as the learning activities include 2 stages, namely the stage of delivering material and the stage of real practice. The stage of delivering the material is explaining the concept of environmental education. The real practice stage includes students solving environmental problems.

Conclusion and Implications

This curriculum is suitable for use in Islamic boarding schools with an eligibility percentage of 92% (very feasible category) based on aspects of consistency, relevance, effectiveness, completeness, continuity, correctness of content and language. This curriculum was developed based on an analysis of the condition of the Islamic boarding school and was prepared on philosophical, psychological, organizational, socio-cultural, scientific and technological foundations. The curriculum components

consist of learning outcomes, curriculum foundations, curriculum design, teaching materials, learning activities, and learning evaluations. Teaching materials are developed with a problem-solving curriculum approach. Teaching materials focus on the problems faced by students in everyday life in Islamic boarding schools. Learning activities at this Islamic boarding school include 2 stages, namely the stage of delivering material and the stage of real practice. The stage of delivering the material is explaining the concept of environmental education based on Islamic values. The real practice stage such as the students solving environmental problems in Islamic boarding schools. Students form teams to control the *eco-pesantren* program.

This curriculum has characteristics such as: 1) the material in this curriculum uses a combination of materials (many Islamic teachings and a few general sciences), 2) environmental education materials are based on Islamic values such as: environmental education in an Islamic perspective, environmental ethics, *eco-pesantren* design, and environmental management based on Islamic values, 3) environmental education materials at Islamic boarding schools was developed with a problem-solving approach (real everyday problem) because students must stay at Islamic boarding schools for 24 hours, and 4) the problem solving stage in this curriculum is taught in detail in Islamic boarding schools starting from observing environmental damage in Islamic boarding schools, choosing the best alternative solutions, planning solutions, implementing solutions, controlling the *eco-pesantren* program, preparing the daily programs and the educational programs related to the environment, evaluating the problem-solving about environmental in Islamic boarding schools and ending by taking lessons learned based on Islamic values.

This curriculum is practically used in Islamic boarding schools. The practicality of the curriculum is seen from the aspect of student responses. The students' responses were in good category from the aspect of time adequacy and there were few obstacles in learning. Very good response from the aspect of ease of understanding the material, excellent communication with teachers and very good cooperation between students. This is used as the basis for curriculum evaluation. The development of this curriculum is limited to Islamic boarding schools for students aged 18-25 years. Therefore, it is necessary to develop an environmental education curriculum in Islamic boarding schools under the age of 18.

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References

- Azhar, A., Basyir, M. D., & Alfitri, A. (2016). The relationship of environmental knowledge and ethics with attitudes and behaviors to maintain environmental sustainability. *Jurnal Ilmu Lingkungan*, 13(1), 36–41. <https://doi.org/https://doi.org/10.14710/jil.13.1.36-41>
- Bakhtiar, A. M., & Nugroho, A. S. (2016). Curriculum development of environmental education based on local wisdom at elementary school. *International Journal of Learning, Teaching and Educational Research*, 15(3), 20–28. <https://www.ijlter.org/index.php/ijlter/article/view/581>
- Beauchamp, G. A. (1975). *Curriculum theory*. The KAGG Press. [https://www.daneshnamehicsa.ir/userfiles/files/1/8-Curriculum Theory-Beauchamp.pdf](https://www.daneshnamehicsa.ir/userfiles/files/1/8-Curriculum%20Theory-Beauchamp.pdf)
- Cappellaro, E. (2011). An applied sample environmental education for adults: Water awareness education. *Journal of Turkish Science Education*, 8(2), 157–173. <http://88j.76d.mywebsitetransfer.com/index.php/tused/article/view/365>
- Docktor, J., & Heller, K. (2009). Robust assessment instrument for student problem solving. *Proceedings of the NARST 2009 Annual Meeting*, 1–19. https://groups.spa.umn.edu/physed/People/Docktor/talks_papers/Docktor_NARST09_paper.pdf

- Efendi, M. H., Irawati, M. H., Rochman, F., & Gofur, A. (2017). Environmental conservation education by applying Islamic values. *Journal of Education & Social Policy*, 4(2), 180–186. http://jesnet.com/journals/Vol_4_No_2_June_2017/23.pdf
- Evans, W., & Savage, J. (2015). *Developing a local curriculum: Using your locality to inspire teaching and learning*. Routledge. <https://www.book2look.com/embed/9781317512349>
- Faiqoh. (2003). *Nyai, agent of change in Islamic boarding schools*. Kucika.
- Fitriyah, F. K., Chuma, M. M., Sodikin, M., Romdloni, M. A., & Lutfauziah, A. (2022). A new approach to counseling relations in Islamic boarding schools based on the Ta'limul Muta'alim book: An emansipatory hermeneutical study. *Journal of Islamic Civilization*, 4(2), 186–195. <https://doi.org/10.33086/jic.v4i2.3634>.
- Gunawan, A., Isnaini, D. E., Aulia, R. N., & Mardhiah, I. (2018). Implementation of hidden curriculum in environmental education (Case study: Pondok Pesantren Hidayatullah Balikpapan). *International Proceeding ASEAN Youth Conference*, 752–758. <https://core.ac.uk/download/pdf/211815684.pdf>
- Hamalik, O. (2009). *Fundamentals of curriculum development*. Remaja Rosda Karya.
- Herdiansyah, H., Jokopitoyo, T., & Munir, A. (2016). Environmental awareness to realizing green Islamic boarding school (Eco-pesantren) in Indonesia. *IOP Conference Series: Earth and Environmental Science*, 30(1), 1–6. <https://doi.org/10.1088/1755-1315/30/1/012017>
- Hidayat, S. (2013). *New curriculum development*. Remaja Rosdakarya.
- Husamah, H., Miharja, F. J., & Hidayati, D. A. (2020). Environmental literacy of Islamic boarding school students: Study in MA bilingual Sidoarjo, East Java Indonesia. *Prisma Sains*, 8(1), 57–68. <https://e-journal.undikma.ac.id/index.php/prismasains/article/view/2766/1970>
- ILO. (2017). *Sustainable development goals: Trade union reference manual on the 2030 agenda for sustainable development*. ILO Publications. http://www.ilo.org/wcmsp5/groups/public/@ed_dialogue/@actrav/documents/publication/wcms_553141.pdf
- Istiadi, Y. (2018). *Environmental education is forgotten in the curriculum*. <https://www.unpak.ac.id/>
- Jumiاتمoko, J. (2022). Gen Z teachers candidates: Perspective on early childhood moral religious values development. *Child Education Journal*, 4(3), 175–185. <https://doi.org/10.33086/cej.v4i3.3009>
- Kamil, M. (2011). *Non-formal education: Development through teaching and learning centers (PKBM) in Indonesia (A lesson from kominkan in Japan)*. Alfabeta.
- Lunenburg, F. C. (2011). Key components of a curriculum plan: Objectives, content, and learning experiences. *Schooling*, 2(1), 1–4. <http://www.nationalforum.com>
- Lutfauziah, A., Handriyan, A., Hartono, D., & Fitriyah, F. K. (2022). Environmental education in an Islamic perspective: An in-depth study based on sufism. *Journal of Islamic Civilization*, 4(1), 40–49. <https://doi.org/10.33086/jic.v4i1.2852>.
- Mahat, H., Hashim, M., Saleh, Y., Nayan, N., & Norkhaidi, S. B. (2020). Transformation of education for sustainable development through low carbon schools community program. *Journal of Turkish Science Education*, 17(3), 429–442. <http://88j.76d.mywebsitetransfer.com/index.php/tused/article/view/1100>
- Mangunjaya, F. M., Alikodra, H. S., Amin, A. A., & Abbas, A. S. (2012). *Eco-pesantren design on the framework of sustainable development* [IPB University]. <https://repository.ipb.ac.id/handle/123456789/58523>
- Mardiyah. (2015). *Kiai leadership in maintaining organizational culture*. Aditya Media Publishing.
- Metafisika, K., Azizah, R. N., & Fitriyah, F. K. (2022). The development process of Islamic STEAM activity storybooks for early childhood. *Child Education Journal*, 4(1), 1–12. <https://doi.org/10.33086/cej.v4i1.2703>
- Mongar, K. (2022). Alignment of the environmental science textbooks, examinations and curriculum framework to achieve the teaching objectives. *Journal of Turkish Science Education*, 19(1), 52–70. <http://88j.76d.mywebsitetransfer.com/index.php/tused/article/view/1682>

- Monroe, M. C., Andrews, E., & Biedenweg, K. (2007). A framework for environmental education strategies. *Applied Environmental Education & Communication*, 6(3), 205–216. <https://doi.org/10.1080/15330150801944416>
- Morgado, S., Leite, L., & Dourado, L. (2022). Teaching for the contextualised learning of science: A checklist-based science curriculum analysis. *Journal of Turkish Science Education*, 19(4), 1072–1095. <https://doi.org/10.36681/tused.2022.163>
- Munawar, M., & Suarja, Z. A. (2014). The relationship between knowledge of nature and the environment with student behavior in school environmental hygiene management at SMAN 15 Adidarma Banda Aceh. *Serambi Saintia*, 2(2), 134–142. <https://doi.org/https://doi.org/10.32672/jss.v2i2.96>
- Palmer, J. (1998). *Environmental education in the 21st century* (1st Editio). Routledge. <https://doi.org/10.4324/9780203012659>
- Riduwan. (2006). *Methods and techniques for compiling thesis*. Alfabeta.
- Saprodi, E., Kastolani, W., & Ningrum, E. (2019). Integration of environmental education in Eco-pesantren Daarut Tauhiid Bandung. *International Summit on Science Technology and Humanity*, 713–720. <http://hdl.handle.net/11617/11836>
- Soykan, A., & Atasoy, E. (2012). Historical development of non-formal environmental education in Turkey. *Procedia - Social and Behavioral Sciences*, 46, 736–743. <https://doi.org/10.1016/j.sbspro.2012.05.190>
- Stapp, W. B., Bennett, D., Bryan, W., Fulton, J., MacGregor, J., Nowak, P., Swan, J., Wall, R., & Havlick, S. (1969). The concept of environmental education. *Journal of Environmental Education*, 1(1), 30–31. <https://doi.org/10.1080/00139254.1969.10801479>
- Sukmadinata, N. S. (2016). *Curriculum development: Theory and practice*. Remaja Rosdakarya.
- Taba, H. (1962). *Curriculum development: Theory and practice*. Harcourt Brace Jovanovich, Inc.
- UNESCO, U. (1977). The tbilisi declaration. *Intergovernmental Conference on Environmental Education*, 3(1), 13–16. <https://unesdoc.unesco.org/ark:/48223/pf0000032763>
- Yahya, M. S. (2013). Hidden curriculum in the education system. *Jurnal Kependidikan*, 1(1), 123–149.
- Zuhri, Z. (2016). *Convergentive design of Islamic boarding school curriculum (conception and application)*. Deepublish.