Management of Environment-Based Curriculum in Senior High Schools: Barriers and Challenges

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Abstract: This study investigates the management system of an environment-based curriculum in senior high schools, specifically in Bandung City, encompassing elements of curriculum planning, implementation, and evaluation. Conducted as qualitative research, this investigation draws its primary data from the vice principal in charge of curriculum development. The data collection techniques employed include interviews and documentation, with the primary research instruments being observation guidelines, interview guidelines, and document analysis. The study was conducted at three schools: SHS 3, SHS 12, and SHS 20 Bandung, with teachers and vice principals serving as informants. The findings indicate that 1) curriculum planning involves all school members participating in the developmental process, 2) curriculum implementation refers to a pre-established learning plan (RPP) and Teaching Modules, with the theme of environmental appreciation conveyed organically, and 3) evaluation outcomes guide school decision-making processes, with subsequent actions being determined to enhance and foster participatory, effective, and efficient learning activities. This research holds implications for improving environment-based curriculum management in senior high schools, offering valuable insights for stakeholders striving to enrich learning outcomes and foster environmental consciousness among students.

INTRODUCTION
Humanity is currently grappling with significant challenges, with the environmental crisis being one of the most pressing. To cultivate a societal ethos of environmental stewardship, countries like Australia, Turkey, Singapore, Canada (Derman & Gurbuz, 2018), Portugal (Spínola, 2015), and Indonesia (Prihantoro, 2015), have integrated environmental consciousness into multiple facets of life, notably educational programs. These countries are committed to mitigating the environmental repercussions of industrialization and modernization, such as pollution, global warming, deforestation, and overexploitation of natural resources (Bhatt et al., 2017).

According to Martin et al., (2016), the environmental predicaments faced by humans include degradation of natural resources, ecological decay, pollution, loss of biodiversity, and extreme climate change. Environmental problems are intricate, unpredictable, and extend beyond the human-environment relationship. Lack of understanding often exacerbates imbalances (Underdal, 2010). Since humans and the environment are
interdependent, most environmental challenges necessitate significant shifts in governmental, corporate, and individual attitudes and behaviors (Dolan et al., 2006). Environmental issues involve numerous actors and shift spatially and temporally, thus causality is insufficient for resolution. There is typically a considerable time lag between human behavior and its environmental impact (Voulvoulis, 2012).

Education is an essential tool for instilling environmental responsibility. It serves as a novel approach to shaping individual behaviors and skills in devising effective policies and actions for managing natural resources. Kurniadin & Machali (2013) argue that education plays a fundamental role in human capacity development and resource optimization, emphasizing the importance of knowledge, activities, and character.

Interdisciplinary research that integrates human and natural systems is essential for effective environmental solutions. Technological change is a multi-level process, often asynchronous and spatially imbalanced outside a scientist's purview (Sorensen et al., 2016). Environmental science, technology, and the new generation all play pivotal roles in catalyzing change and addressing environmental challenges. Environmental technologists amalgamate participatory thinking with an extensive understanding of human-nature dependence, providing data for evaluating and updating technology.

Multiple countries endeavor to imbue the younger generation with environmental sensitivity through character education. Environmental protection programs like the 'Green School Program' in the European Union, United States, and Mexico strive to foster environmental respect among communities and schools (Kocabas & Bademioglu, 2017; Yanez, 2018). These programs seek to encourage understanding and awareness about environmental protection among the younger generation, preparing them for future challenges (Gabriela, 2018).

A critical question concerns the ideal stage and level at which environmental consciousness should be imparted. Ulfah et al. (2020) propose that environmental literacy should be strengthened from basic education, utilizing appropriate models and methods. Enhancing environmental literacy can potentially minimize future environmental impacts and improve academic performance (Nurwidodo et al., 2020). Despite the introduction of environment-based curriculum at the elementary level, high school is considered a more suitable stage for developing environmental literacy.

The Adiwiyata School, a project supported by the Ministry of Environment, Education, and Culture in Indonesia, aims to foster an environmentally friendly school environment (Nurwidodo et al., 2020; Siswanto et al., 2019; Susilawati et al., 2020). Schools are evaluated for the Adiwiyata awards at regional, provincial, and national levels based on their environmental curriculum and student attitudes toward environmental responsibility. A school's quality management system, including leadership, training, staffing, supervision, and learning processes, plays a crucial role in becoming an Adiwiyata school (Wolor et al., 2020). Diversity programs should be systematically implemented in schools to improve the quality standards of education (Basuki et al., 2020).

According to Adela (2018), an environment-based curriculum can enhance students' understanding of environmental issues. The Adiwiyata National Team (2012) explains that this program is supported by strategies for environmental education, integrated environmental activities, and environmental protection advocacy. Nevertheless, obstacles to implementing
the environmental curriculum include inflexible teachers and limited integration of environmental resources into learning units (Fadlillah et al., 2018). Budget constraints and a lack of programs to train and empower teachers are additional challenges.

To achieve the objectives of the Adiwiyata program, these constraints must be recognized and addressed. As such, regional management regulations based on the curriculum have been developed and integrated with environmental management materials (Muhaimin, 2015). Efforts to increase environmental awareness in education extend from the central government to regional governments, as seen in Bandung City's initiatives.

This research aims to analyze the management of environmentally-based curriculum systems in Adiwiyata schools. It seeks to understand how environmental education is integrated into the formal education system and how this enhances environmental literacy and awareness among students. The study explores the challenges and obstacles in implementing an environmentally-based curriculum and potential solutions.

Although previous research has been conducted on environmental education, this study offers a unique, in-depth examination of environmentally-based curriculum systems in Adiwiyata schools. It seeks to understand how environmental education is integrated into the formal education system and how this enhances environmental literacy and awareness among students. The study explores the challenges and obstacles in implementing an environmentally-based curriculum and potential solutions.

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The study was conducted in three public high schools in Bandung City, namely Senior High School 3 (SHS 3), Senior High School 12 (SHS 12), and Senior High School 20 (SHS 20). These schools were selected as they had received the Independent Adiwiyata Award from the Indonesian government, a recognition of their commitment to environmental education.

This study sought to thoroughly analyze all facets of management, including planning, organizing, directing, and evaluating programs related to the Environment-Based Curriculum. Further details about the data collection techniques and informants will be presented in the Table 1.

<table>
<thead>
<tr>
<th>Table 1. Data Category.</th>
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RESULT AND DISCUSSION
Planning Process

Curriculum planning is the precursor to the implementation of learning. It functions as a catalyst in the execution of the education system to yield optimal outcomes (Purwanti et al., 2019). Planning is the phase where an organization establishes its goals and strategies for reaching them, sets policies, designs programs, devises procedures, determines methods, and also calculates the necessary budget (Sista, 2017). It involves identifying the goals or objectives to be attained and deciding on the routes and resources needed to achieve these objectives. As cited by G.R Terry in Sista (2017), key points of discussion in planning the environment-based curriculum encompass: (1) the school's vision, mission, and goals, which include efforts towards environmental management; (2) curriculum development team; (3) planning for intra-curricular programs, and (4) planning for additional programs that incorporate environmental elements. The subsequent discussion is based on the research findings.

Firstly, the formulation of the vision, mission, and goal is a vital component to strive for in the implementation of education. This component is crucial in deciding school programs linked to intra or extra-curricular, as well as self-development programs in the form of regular activities, to realize the vision and mission.

One vision of SHS 3 Bandung involves elements pertaining to the environment, namely environmental consciousness. This environmental vision forms the basis of the formulation of missions and objectives, especially in relation to the environment. Consequently, the school devises eco-friendly programs such as minimizing the use of plastic bags, abstaining from styrofoam use for the sake of nature preservation, and processing organic and inorganic waste for reuse in intra and extracurricular activities within the school environment. Through a variety of environment-based programs aligned with the vision and mission, it is anticipated that students can contribute to predicting and addressing emerging environmental issues.

SHS 12 Bandung holds a pro-environment vision. With an overarching vision of 'Care for the Environment', the school aims to become a clean, healthy, comfortable, safe institution, and a second home for the academic community. In this regard, SHS 12 Bandung continually prioritizes and considers aspirations from various stakeholders. The school's inclusive approach in drafting the vision, mission, and goals fosters an open climate among staff and school members, encouraging the collective pursuit and preservation of the school's vision and mission. Interestingly, SHS 20 Bandung, an Adiwiyata school, seeks to incorporate environmental elements into its vision, mission, and goals.

In formulating the school's mission and program, the teacher council and the school principal undertake studies to determine key elements for inclusion, particularly in relation to objective facts
and the current condition of the school. When preparing the school's vision and goals, SHS 20 Bandung prioritizes deliberation before deciding which characteristics of environmental stewardship will be integrated. This vision is then utilized as a benchmark to measure success as an Adiwiyata school. With such a vision, a variety of environmental programs are developed to attain predetermined targets.

Secondly, establishing a development team and outlining the phases of curriculum development are vital considerations for schools aiming to expand the Adiwiyata school program. Curriculum development is conducted in accordance with the basic framework of preparation, consistent with the Indonesian Minister of Education and Culture's Regulation Number 69 of 2013, concerning the Basic Framework and Curriculum Structure for High Schools. A team directly appointed by the school principal, considering teachers' competence and performance, facilitates curriculum development.

SHS 3 Bandung conducts curriculum development through operational stages, starting from feasibility and need studies; initial concept planning; planning for implementation development; field trials of the curriculum; assessment and monitoring; and remedial and adjustment phases. The curriculum development pays heed to crucial factors such as balancing regional and national development requirements, workforce demands, advancements in science and technology, socio-cultural contexts of the local community, and most significantly, the characteristics of the educational unit. All these aspects are handled by a team directly formed by the school, consisting of teachers and school staff.

At SHS 12 Bandung, curriculum development is accommodated by a team directly appointed by the school principal as a curriculum development team, both for general programs and environment-based programs. The development process involves education unit committees and other stakeholders, all under the coordination and supervision of the education office. The curriculum evolves based on graduate competency standards, content standards, process standards, and assessment standards, along with curriculum development guidelines from the education office. The curriculum of SHS 12 Bandung consists of compulsory curriculum content, local content, and self-development in an integrated manner. It also ensures meaningful and appropriate continuity and linkages between subjects.

The curriculum development at SHS 20 Bandung commences with an analysis of the school's actual conditions, from teacher needs, readiness of facilities and infrastructure, to the utilization of all resources for maximum results. Subsequent steps include revising the school's vision and goals, organizing curricular content through the assignment of teaching tasks, determining the students' learning load, reorganizing the educational calendar, preparing lesson plans, and creating modules. The curriculum of SHS 20 Bandung was developed to provide the school with guidelines for implementing learning activities and fulfilling the 8 National Education Standards (SNP), aiming to achieve sustainable National Education goals.

Thirdly, we discuss intra-curricular program planning. The planning of intra-curricular activities is a critical component in the delivery of education. This planning process involves the preparation of learning tools, including teaching materials, learning media, and content structures, all of which are integrated with environmental education.

Teachers at SHS 3 Bandung develop learning tools (RPP) collectively through the KKG and MGMP forums. The school seeks to optimize learning as
much as possible. Evidence of this is seen in the provision of training for each subject teacher on the integration of environmental issues into the sub-topics or themes of their subjects. The aim is to enhance teachers’ proficiency in delivering material and their competence in implementing learning activities for optimal results. With clear and precise guidance, various materials can be optimally delivered to students.

As an Adiwiyata school, SHS 12 Bandung requires each teacher to incorporate environmental values into the lesson plans they create. A well-planned and developed RPP results in optimal learning implementation. Learning activities are optimized by providing guidance to teachers, starting from module and lesson plan creation, enhancement of soft skills in using IT-based learning media, and workshops and training related to integrating environmental issues into the sub-topic or theme of each subject.

The principal of SHS 20 Bandung stresses the importance for every teacher to integrate a caring and cultured attitude towards the environment into the prepared lesson plans. In planning the curriculum with regard to these intra-curricular activities, school learning tools are prepared with a consideration of time and prioritization of community needs. Teachers are encouraged to play a more active and dynamic role in modifying and integrating environment-based elements into their lesson plans.

Fourthly, additional program planning is integrated with environmental education. Adiwiyata schools not only incorporate environmental stewardship into their teaching but include it in all extracurricular activities as well. By implementing policies like these, students are constantly encouraged to respect the environment, both inside and outside the classroom.

As an Adiwiyata school, SHS 3 Bandung organizes numerous environment-based programs. Both intra-curricular and extra-curricular planning is conducted through deliberation. Both the general curriculum team and the Adiwiyata team meet, analyze, and assess the readiness and availability of various facilities and resources needed to support all program sustainability that has been designed and will soon be realized. The school utilizes and manages BOS funds according to the technical guidelines and implementation guidelines issued by the government. The Adiwiyata program itself has a funding allocation of 20% of the APBD in each academic year.

The learning plan for both intra-curricular and extra-curricular at SHS 12 Bandung is also conducted through deliberation. Both the general curriculum team and the Adiwiyata team sit together, analyze, and review the readiness and updating of facilities and infrastructure to support the sustainability of the programs that have been designed and will soon be realized. Each plan is always adapted to intra-curricular learning and is initiated based on considerations of school readiness, both in terms of infrastructure and financing. In relation to environmental-based program planning, in addition to human resources, planning is also influenced by financing factors. Educational management encompasses three major areas of focus, namely human resources, including students, teachers, stakeholders, and local community; learning resources, such as learning media and teaching materials; as well as financial facilities and resources (Ali & Abdalla, 2017).

SHS 20 Bandung allocates 20% of school finances for environmental-based program planning, based on a government recommendation. Funds are managed according to the instructions and implementation guidelines provided by the education office. The school disseminates information to students and school members to ensure collective success in the programs announced.
Moreover, to reinforce internal networks, schools should also leverage external networks by building coordination and consultation related to the Adiwiyata program. Following is the process of environmental-based curriculum planning carried out by each school as described in Table 2.

**Table 2. Whole Data for Curriculum Planning.**

<table>
<thead>
<tr>
<th>Components</th>
<th>SHS 3 Bandung</th>
<th>SHS 12 Bandung</th>
<th>SHS 20 Bandung</th>
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<tbody>
<tr>
<td>Formulation of Environment-Based Vision and Objectives.</td>
<td>The creation of the vision, mission, and objectives involves the participation of the team and school stakeholders. This information is disseminated to all school members and committees, and it also involves relevant offices/agencies.</td>
<td>The formulation of the vision, mission, and goals involves the collective effort of the team and school stakeholders. This information is distributed to all school members and committees, and it ensures to include the corresponding departments/agencies.</td>
<td>The development of the vision, mission, and goals includes the participation of the team and school stakeholders. This is shared with all school members and committees, without forgetting the involvement of associated offices/agencies.</td>
</tr>
<tr>
<td>Identification of Development Team and Stages of Environment-Based Curriculum Development.</td>
<td>The team is established by the school principal. The developed tools encompass the lesson plans and syllabus.</td>
<td>Curriculum development is conducted by a team assembled by the school principal, following the guidelines established by the educational office.</td>
<td>The curriculum is designed by the educational unit, involving the school principal, TPMPS, MGMP, and the School Committee, taking into account the potential, characteristics, needs of the educational unit, and the school's surroundings/environment.</td>
</tr>
<tr>
<td>Environmental-Based Program Planning.</td>
<td>The planning is conducted by the Adiwiyata team, aligned with general subjects and guided by the enrichment and Standard Operating Procedures (SOPs) of the Adiwiyata school.</td>
<td>Implementation is carried out based on the Memorandum of Understanding (MoU) with Institutions, Services, Agencies, school residents, parents or other parties related to moral and material support for the independent Adiwiyata school program.</td>
<td>The planning is conducted by the Adiwiyata team, aligned with general subjects and guided by the enrichment and SOPs of the Adiwiyata school.</td>
</tr>
</tbody>
</table>

Based on the observational data presented in Table 2, it is evident that the curriculum planning conducted in these schools includes the development of an environmentally focused vision, mission, and goals, which encompass specific measures for environmental conservation. Additionally, a curriculum development team is formed under the direct supervision of the school principal. Pertaining to curriculum development, a study highlights that process standards form the central thread in the 2013 Curriculum (K-13) employed for curriculum development (Prihantoro, 2015).

Within curriculum planning, the process of planning environment-based intra-curricular activities is encapsulated in the creation of lesson plans, modules, annual, and semester programs. Furthermore, environment-based...
programs are compiled through collaboration with other groups (in this case, the Bandung City Environment Agency), while continuing to align with and be guided by the Adiwiyata school's Standard Operating Procedures (SOPs). This leads us to the conclusion that the curriculum planning undertaken aligns with PermenLH No. 05 of 2013 regarding the guidelines to implement the Adiwiyata program. Evidence suggests that programs developed by stakeholders can enhance credibility and reinforce students' skills in undertaking the responsibility of environmental preservation in the future (Singh & Rahman, 2012).

**Curriculum Implementation**

Curriculum implementation involves the execution of educational objectives and materials, and the organization of educational activities to reach predetermined goals. Curriculum implementation is the process of putting curriculum plans into practice in a learning environment that fosters interaction between students and teachers. As a critical component of the curriculum dimension, teachers play a pivotal role in this implementation process. The successful implementation of the curriculum is dependent on the abilities of the teachers as they are the primary planners and developers in the classroom. George Terry Sista (2017) proposed that curriculum implementation involves motivating members of the organization in various ways, fostering a desire to reach set targets. Curriculum implementation is the conversion of the documented curriculum into a practical or real curriculum. It's executed as a learning experience that fosters and enhances communication with various parties including school leaders, teachers, school supervisors, and other stakeholders.

At SHS 3 Bandung, several programs are implemented that distinguish it from non-Adiwiyata schools. These include several environment-based programs that are habituated, such as: Clean classroom picketing, JUMSIH (Clean Friday), and garden maintenance activities for each class. Schools have facilities and infrastructure that support curriculum implementation, as outlined in Permendiknas Number 24 of 2007, which include school gardens, school forests, healthy canteens, ponds, infiltration wells, use of paving blocks, and efficient waste management. According to the school's teachers, participation is the key. In environment-based activities, students are encouraged to engage and actively participate in environment-based activities like tree planting events, river cleaning activities, and donating tree seeds to the Bandung City Environmental Service..

SHS 12 Bandung places students as the main agents in implementing school programs. Students are also involved in out-of-school activities such as tree planting to commemorate Earth Day, educational seminars, and participation in competitions using materials. This presents a challenge for educators, as teachers also need to be more proactive and involved in implementing the Adiwiyata program. This involvement extends beyond students, as teachers and staff are also encouraged to enhance their understanding of environment-based education. Schools provide teacher manual facilities, IT-based media learning training, and workshops and IHT with the aim of educators becoming more adept and competent at integrating environmental education into each of the taught sub-subjects.

In all forms of environment-based intra and extra-curricular activities, student involvement is the key to the implementation of learning activities. This is supported by research conducted by Chawla & Cushing (2007) which suggests that the precursors of action are far more complex than just the provision...
of material. In this context, SHS 20 Bandung students have participated in several environmental action activities conducted by external parties, sometimes even taking the initiative to organize events such as Earth Day celebrations with tree planting activities. Alongside intra-curricular activities, there are also extra-curricular activities that focus on the self-development of students, with programs related to environmental protection and management, including: Composting, Medicinal Plants, Biopores, Recycling, Energy Saving, and Biogas. SHS20 has also developed an Entrepreneurship Education extra-curricular for handicrafts.

**Table 3. Whole Data for Curriculum Implementation.**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Implementation of Curriculum in Intracurricular Activities.</td>
<td>The environmental education program is incorporated into each subject. In certain sub-chapters and learning themes, the selection of environmental issues is included in habituation activities. Facilities and infrastructure are optimally prepared to enable conducive and efficient learning.</td>
<td>Generally, environmental education is integrated into each learning component. Both in the provision of material and practicum, environmental education is incorporated into each subject by adjusting each learning activity.</td>
<td>Educators integrate environmental education into each sub-chapter of subjects, both in the provision of material and practicum. The school enhances this by implementing a habituation program.</td>
</tr>
<tr>
<td>Implementation of Curriculum in Extracurricular Activities.</td>
<td>The environmental education is also integrated into extracurricular activities such as: 1) Craft and Entrepreneurship, 2) Environmental Education, 3) Organic Farming.</td>
<td>The Environmental Education program includes the following activities: 1) Hydroponics, 2) Medicinal Plant Garden, 3) Biodigester and Composting, 4) Garbage Bank.</td>
<td>Learning integration is primarily focused on Crafts and Entrepreneurship subjects.</td>
</tr>
<tr>
<td>Implementation of Environment-Based Programs.</td>
<td>It's executed as outlined in the plan, and students’ awareness begins to emerge in terms of healthy lifestyle habits, environmental cleanliness, and sorting and disposing of waste properly.</td>
<td>Compile and document the results of the application of environmental problems within the school environment. Document and compile reports on participatory-based environmental and energy-saving activities.</td>
<td>This is done by encouraging and guiding students to be mindful of the socio-cultural characteristics of the surrounding community, and to uphold the preservation of environmental cultural diversity through habituation activities promoted by the school.</td>
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</table>
The observations in Table 3 demonstrate that the implementation of the curriculum applied in those schools adheres to the 2013 Minister of Environment Regulation. This involves conducting activities aimed at enhancing teachers’ competence in teaching, involving students and teachers in diverse indoor and outdoor activities centred on environmental issues, and integrating environmental education into subject units in intra-curricular activities.

Empowerment or the enhancement of educator competence can be achieved by reinforcing positive behavior, providing timely information updates, and practicing simple routines that can fulfill the required skills (Singh & Rahman, 2012). Learning activities that can support such facilities include school forests (Green Houses), hydroponic plants, absorption wells, garbage management, and healthy canteen activities.

The findings of this study align with the model presented by Pujol in Carmen (2010, p. 478), which outlines four models for implementing environmental education: 1) the Sword Model; 2) Needle and Thread Models; 3) Benign-kinglet; and 4) the Infusion Model. The Infusion Model combines environmental themes by integrating them into all areas of knowledge and daily school activities. This supports the findings of research conducted by Dhea Adela (Adela et al., 2018) that environmental education is, in practice, integrated into intra-curricular and extra-curricular activities. Teachers and students are encouraged to be more proactive, thus shaping and realizing schools’ environmentally sound efforts.

Research conducted by Desi et al., (2017) indicates that the environmental education model can increase knowledge and foster environmentally friendly attitudes in students and organization members. Furthermore, the results reveal that students become more active in harmonious interaction with the environment, fostering a caring character for the environment among participants.

Table 3 also shows that several activities were conducted to enhance teachers’ competence in mastering learning activities. This view is also supported by Grabber and Robottom (Conde & Sánchez, 2010), who believe that developing criteria for teacher quality is crucial to making them more competent, particularly in implementing environment-based learning.

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<th>SHS 20 Bandung</th>
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<tbody>
<tr>
<td>Student Participation in Environment-Based Activities.</td>
<td>Students act as the primary agents in the execution of environment-based activities, spanning both intra- and extracurricular scopes.</td>
<td>Students consistently participate in environmental conservation and energy-saving initiatives, regardless of whether these activities are organized by the school or fall beyond its immediate scope.</td>
<td>Students are directly engaged in environmentally-oriented activities, which are embedded within practical learning exercises.</td>
</tr>
<tr>
<td>Enhancing Teacher Competence in Implementing an Environment-Based Curriculum</td>
<td>Workshops and In-House Training (IHT) are provided to train teachers on integrating environmental education within the school's learning framework.</td>
<td>Energy-saving and environmental campaigns are conducted, featuring guest speakers from outside the school. Teachers actively participate in environmental actions both within and outside the school's premises.</td>
<td>Workshops, In-House Training (IHT), and educational seminars are conducted. Teachers are involved in environment-based events outside the school, including tree-planting fairs, cycling events, and cultural seminars.</td>
</tr>
</tbody>
</table>
Curriculum Evaluation

Curriculum evaluation plays a crucial role in determining and measuring the degree to which the program has been implemented. Curriculum evaluation is a term synonymous with measurement; fundamentally, it assigns a full value to the learning process and the effectiveness of ongoing activities (Bharvad, 2010). Curriculum evaluation first emerged as an organized and growing field. It encompasses all aspects of the curriculum, from curriculum documents, fulfillment of curriculum operational standards and curriculum implementation, to follow-up efforts based on the results of curriculum evaluation. Thus, it's not surprising that curriculum evaluation is always closely related to educational assessment and measurement indicators (Levine, 2002).

The developed curriculum must be scrutinized through evaluation techniques. A good curriculum prepares all important elements for students’ development, school development, and the success of national development (Bharvad, 2010). SHS 3 Bandung maintains two ledgers as documentation of curriculum achievements. The first ledger is a document book that contains an introduction, vision and goals, curriculum structure, graduation standards, learning activities, and government policies used as a reference for school operations. The second is a document book containing annual programs, semester programs, syllabuses, lesson plans, modules, or what is known as learning media. Document evaluation at SHS 3 Bandung is monitored directly by the school supervisor. Technically, the school principal conducts class visits to perform cross-checking or evaluation of learning device documents with all teaching staff. This document evaluation is carried out routinely every month by the school principal and school supervisor.

The principal of SHS 12 Bandung conducts curriculum evaluation by holding a public meeting attended by all teachers and staff. The principal, as the leader, inquires about the extent of curriculum achievement from homeroom teachers to the lowest staff. If a problem arises, a solution is sought and formulated into a policy to keep the Adiwiyata program on track. The data brought to the general meeting is the result of daily monitoring by the school principal. Technically, the school principal conducts class visits wherein check and control have previously been applied or evaluation of learning device documents to all teaching staff. Then, follow-up evaluation efforts are jointly mandated by the school’s entire academic community.

The principal of SHS 20 Bandung pays close attention to the evaluation stage to receive input from the ongoing implementation process. The school involves all elements in the evaluation stage, ranging from the principal, teachers, school committee, to supervisors, to analyze the strengths and weaknesses of the implemented curriculum. The results of this evaluation are then utilized as a consideration for the preparation of the curriculum in the new school year. With appropriate evaluation techniques, schools can determine the next steps for various environment-based school activities. Considering aspects of effectiveness and funding, schools can decide on the sustainability of an environmental program. Schools will continuously strive to enhance programs that are considered good and reduce less effective programs. This adjustment corresponds to the needs and availability of the school budget.
Table 4. Whole Data for Curriculum Evaluation.

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<th>SHS 12 Bandung</th>
<th>SHS 20 Bandung</th>
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<tbody>
<tr>
<td>Basic or Achievement Indicators in the Implementation of an Environment-Based Curriculum.</td>
<td>These are specified in the school's curriculum document.</td>
<td>These are articulated in the school's curriculum document.</td>
<td>These are outlined in the school's curriculum document.</td>
</tr>
<tr>
<td>Evaluation of Environment-Based Intracurricular Activities.</td>
<td>These evaluations are performed annually by school principals and school supervisors, with a focus on both the learning tools and their implementation. Special attention is given to the integration of environmental education in lesson planning and learning execution.</td>
<td>The school principal conducts these evaluations monthly, and there is also supervision from the school supervisor four times per year. Furthermore, daily monitoring is carried out by the vice principal in the field of curriculum, involving examination of class agendas and picket books. The primary objective is to monitor learning activities.</td>
<td>These evaluations are routinely conducted by the principal every month for all educators in rotation. Over a span of six months, the supervisor regularly supervises with the aim of ensuring the fulfillment of teacher administration (Lesson Plan) and monitoring the implementation of learning.</td>
</tr>
<tr>
<td>Evaluation of Environment-Based Activities and Determination of Follow-up Actions</td>
<td>These activities are evaluated through meetings involving teachers, committees, and various relevant parties to assess the sustainability and effectiveness of the program.</td>
<td>These evaluations involve various stakeholders from different components, including teachers, parents, committees, and competent community leaders, especially those knowledgeable about the environment.</td>
<td>Evaluations incorporate a diverse range of parties from various components, namely teachers, parents, committees, and competent community leaders, particularly those experienced in environmental matters.</td>
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</table>

Table 4 illustrates that the curriculum evaluation conducted at SHS 3, SHS 12, and SHS 20 in Bandung encompasses the evaluation of curriculum documents as well as through learning activities. The evaluation process involves teachers, principals, and supervisors. Curriculum evaluation can be carried out by teachers, serving as evaluators of learning activities to ascertain whether objectives have been met (Levine, 2002).

Evaluation is an ongoing process, involving follow-up actions aimed at improving the program and providing accountability to all participating parties. This aligns with the definition and purpose of evaluation described in McBeth et al.'s research (2014), which emphasizes its function as a means of providing information to inform decision-makers. The findings of this study also align with Bharvad's classification of curriculum evaluation into two categories, namely 1) evaluation of curriculum products (RPP, Syllabus, Textbooks, etc.); 2) evaluation of curriculum programs (Bharvad, 2010).

**Barriers**

Despite the fact that the three schools studied have received the Adiwiyata Mandiri award from the Indonesian government, their implementation is not without challenges. Based on interviews with teachers, most of them expressed difficulty in integrating values of environmental care and love into their
lesson plans (RPP). The researchers' documentation also supports this, indicating that only certain subjects contain elements of environmental awareness such as religious education (PAI), social studies (IPS), and citizenship education (PPKN). Teachers have reported that content on these topics was spontaneously introduced during lessons. This represents a challenge, given that spontaneous remarks can be difficult to evaluate and it's impossible to determine their effectiveness or their impact on students.

Prihantoro (2015) suggested that students should be engaged in real-world activities to encourage them to analyze current environmental issues rather than simply being informed about them by teachers. This approach can result in a valuable long-term investment: after graduating, these students may become agents of social change, influencing adults to be more environmentally aware (Craig & Allen, 2015).

Challenges

With the continuous degradation of the global environment, the future challenges for the Adiwiyata program will only intensify. Teachers and vice principals interviewed by the researchers concurred with this statement. They mentioned that as an Adiwiyata-labeled school, expectations from the community, who are the consumers of education, have also increased. One teacher cited a parent's complaint about their child's lack of cleanliness and habit of littering at home. Parents believe that by sending their children to an Adiwiyata school, their children's environmental attitudes and behaviors will change immediately. The ultimate goal of Environmental Education is Environmental Literacy (Spínola, 2015) and the cultivation of pro-environmental behavior (Wong et al., 2018), but this is a process that takes time.

These expectations aren't entirely misguided; the label of an Adiwiyata school is indeed a mandate for the school to cultivate in students a greater care for nature. This is a challenge that both the school and the government must address. Future Adiwiyata programs must be more outcome-oriented to generate more tangible impacts on both students and nature. Although the Indonesian curriculum has integrated character education across all subjects (Amalina et al., 2023), emphasis must be placed on students applying these values in their daily activities, thereby creating positive impacts in their daily lives.

Based on the research conducted in the three award-winning Adiwiyata schools, there are clear indications that significant steps are being taken to integrate environmental education into their curriculum. These steps include teacher training, workshops, seminars, and a variety of environmental campaigns. This aligns with the model of Pujol in Carmen (2010) that identifies four ways of implementing environmental education, including integration into all areas of knowledge and daily school activities.

Nevertheless, challenges persist, and some areas require further attention and improvement. For instance, while teachers are trained to develop and deliver an environment-based curriculum, the application of these skills into everyday lesson plans appears to be a struggle for some. As such, further emphasis should be placed on integrating environmental education into all subjects and not only those traditionally associated with environmental concern.

In addition, there seems to be a misunderstanding among parents about the expected outcomes and timeline for students to change their behaviors. Education is a gradual process, and it
takes time for students to fully grasp and adopt new concepts, especially when these concepts require behavior changes outside the classroom.

This study is not without limitations. The research was conducted in a specific context: Adiwiyata schools in Bandung, which might limit the generalizability of the findings. Furthermore, the research primarily relied on interviews with teachers and vice principals, leaving out the perspectives of students and parents, who are key stakeholders in the education process. For future research, it might be beneficial to include the viewpoints of students and parents. Understanding their expectations, experiences, and perceived challenges could provide valuable insights into how the Adiwiyata program can be improved. Furthermore, it could be beneficial to study the long-term impacts of the program on students' attitudes and behaviors, even after they leave school.

In addition, research could be conducted in other geographical locations or types of schools to see how environmental education is implemented elsewhere. Comparing and contrasting different models of environmental education could help to identify best practices and areas for improvement. Lastly, an examination of the policy frameworks guiding environmental education could offer insights into the structural changes needed to make environmental education more effective.

CONCLUSION

This study has provided key insights into four aspects of the educational approach in SHS 3 Bandung, SHS 12 Bandung, and SHS 20 Bandung. Firstly, the schools developed their curriculum based on Permendiknas No. 61 of 2014, involving all members of the school in the process. Secondly, the organization of the curriculum was aligned with the 8 National Education Standards, with the time allocation for the 2013 environment-based curriculum adjusted according to the students' learning pace. Thirdly, the implementation of the curriculum adhered to the developed Lesson Plans, Teaching Modules, and Syllabus, and was supplemented by diverse programs incorporating environmental education. Finally, the evaluation process was comprehensive, involving all stakeholders, and was focused on optimizing learning activities and fulfilling administrative requirements. The results of the evaluation were utilized as a guide for decision-making and identifying areas for improvement.

Moving forward, it is recommended that efforts be made to expand the integration of environmental education across all subjects. Additionally, improving communication with parents about the Adiwiyata program could help manage expectations and enhance support. Future studies could further explore these areas to deepen our understanding of the implementation and impact of an environment-based curriculum.

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