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# Outdoor Learning Model by Utilizing Mount Penanggungan Cultural Heritage to Realize Education for Sustainable Development

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## *Abstrak*

*Cagar budaya Gunung Penanggungan berpotensi menjadi ruang pendidikan untuk pembangunan berkelanjutan. Namun hal tersebut belum dimanfaatkan secara optimal oleh sekolah formal. Penelitian ini bertujuan untuk membangun model pembelajaran yang dapat berkontribusi dalam mewujudkan SDGs melalui pendidikan untuk pembangunan berkelanjutan dengan memanfaatkan potensi yang ada di Gunung Penanggungan. Design-based research digunakan dalam pengembangan model outdoor learning ini. Ada tiga tahap pengembangan: 1) analisis dan eksplorasi; 2) desain dan konstruksi; dan 3) evaluasi dan refleksi. Subyek penelitian ini adalah pengembangan model one day outdoor learning yang melibatkan dua orang ahli untuk validasi produk kualitatif. Metode pengumpulan data penelitian disesuaikan dengan tujuan penelitian, antara lain: 1) studi pustaka, jurnal, prosiding, dan buku penelitian yang relevan; 2) tinjauan ahli; dan 3) lembar validasi draf model pembelajaran. Analisis data yang digunakan dalam penelitian ini adalah strategi analisis data kualitatif-verifikasi. Hasil penelitian ini menunjukkan komponen model outdoor learning yang terdiri dari: 1) dampak; 2) sintaks; 3) peran guru; 4) sistem pendukung; dan 5) prinsip pembelajaran, telah layak untuk diuji. Model outdoor learning yang dikembangkan dinilai sudah sesuai dengan tujuan ESD. Dukungan sekolah, kompetensi guru dan persiapan teknis adalah kunci keberhasilan pembelajaran. Keunggulan model ini terletak pada proses eksplorasi, kolaborasi dan refleksi yang dilakukan secara langsung di kelas outdoor.*

***Kata kunci**: Pembelajaran Outdoor, ESD, SDGs, Pembangunan Berkelanjutan*

## Abstract

The cultural heritage of Gunung Penanggungan has the potential to become a space for education for sustainable development. But it has not been optimally utilized by formal schools. This study aims to construct a learning model that can contribute to realizing the SDGs through education for sustainable development by utilizing the potential that exists in Mount Penanggungan. Design-based research is used in the development of this outdoor learning model. There are three stages of development: 1) analysis and exploration; 2) design and construction; and 3) evaluation and reflection. The subject of this study was the development of a one-day outdoor learning model involving two experts for qualitative product validation. Research data collection methods are adjusted to the research objectives, including: 1) literature studies, journals, proceedings, and relevant research books; 2) expert review; and 3) a validation sheet of the learning model draft.The data analysis used in this study is a qualitative-verifiable data analysis strategy. The results of this study show the components of the outdoor learning model, which consist of: 1) impact; 2) syntax; 3) the role of the teacher; 4) a support system; and 5) the principles of learning, have been worth testing. The outdoor learning model developed is considered to be in conformity with the objectives of ESD. School support, teacher competence and technical preparation are key to successful learning. The advantage of this model lies in the process of exploration, collaboration and reflection carried out directly in an outdoor class.

**Keywords:** Outdoor Learning, ESD, SDGs, Sustainable Development

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## 1. INTRODUCTION

Education for sustainable development (ESD) is one of the development agendas in the world. The increasingly real climate change that occurs in various parts of the earth, very intense deforestation, poverty and hunger, war, and natural disasters that continue to hit are signs that humans must immediately do something in order to live sustainably on earth (Bravo et al., 2021; Listiawati, 2011; Tejedor et al., 2019). The United Nations (UN) in New York declared the Sustainable Development Goals Agenda (SDGs). It is globally recognized

by the leaders of 193 countries in the world. The achievement of the SDGs and the implementation of ESD in education must go hand in hand. One of the efforts made through ESD (Kopnina, 2012; Tejedor et al., 2019). Currently, the implementation of ESD in formal education is still a hidden curriculum. This is a positive trend for ESD to be increasingly known by education practitioners, especially teachers in Indonesia. The development of ESD concepts and practices by teachers is essential for the future (Gunansyah et al., 2021; Sinakou et al., 2019).

Actually, ESD issues in the last two decades have been very closely studied by educational researchers. There are many studies that focus on conceptual studies on ESD and have begun to formulate the concept of ESD, its relevance to environmental education, its approach in schools, and its potential in Indonesia (Jickling & Wals, 2008; Mogren et al., 2019; Segara, 2015). A decade ago, researchers began to conduct applied research in various fields of study in school education. In the same way that natural science studies (Fetiana et al., 2022; Hartadiyati et al., 2017), there is also the implementation of ESD through transformative learning, Include sustainable development content in teaching materials, even implement via ICT (Anggraini et al., 2021; Fibonacci et al., 2020; Rahmawati, 2019). The research was carried out to develop learning objectives for the realization of the SDGs.

The main goal of ESD is to integrate sustainable development principles, values, and practices into all aspects of education and learning. This effort is expected to encourage changes in human behaviour. It will create a more sustainable life in terms of environmental integrity, economic feasibility, and social justice for now and future generations (Malik, 2018; Rahman et al., 2019; Suprastowo, 2010). Looking at some of the objectives of ESD, it seems that the use of the outdoor environment to develop ecological awareness about sustainable living can be a potential. Outdoor learning accommodates holistic and exploratory education through the outdoors and local communities (Atencio et al., 2015; Karppinen, 2012). Based on this, utilizing the outdoor environment as a vehicle for developing sustainable life competencies is important to realize.

Mount Penanggungan has the potential to be utilized for ESD development through outdoor learning. Previous study states the geographical and socio-cultural conditions and the large number of historical sites that are there are very relevant to the goals of ESD. Research on Mount Penanggungan, which focuses on searching archaeological sites, also revealed the characteristics of Hindu-Buddhist sacred buildings in G. Penanggungan. The results showed that on this mountain, religious elements (Hindu-Buddhist fusion) can be seen from the shape of the building and the approximate function of the building. The sacred buildings located on Mount Penanggungan have their own characteristics related to natural (geographical) factors and the character of the community that makes them (Izza, 2016; Muhammad & Pamungkas, 2016).

Potential studies related to geographical conditions and the distribution of historical sites on Mount Penanggungan were quite intensively carried out. Tetek Belahan Temple and Jolotundo Temple are springs with tourism potential and local wisdom that can be used in educational tour packages (Basalamah & Hariri, 2020; Khakim et al., 2020). In addition, there is one temple that is considered the master piece of the temple complex in G. Penanggungan because of its beauty and its function as a hermitage location during the Mpu Sendok (Medang Kingdom) period of the Majapahit Kingdom. There is also an optimistic study that suggests Mount Penanggungan can become a potential tourist destination. The situation will improve for the surrounding economy if supported by adequate infrastructure and the attention of policymakers (Megawati et al., 2016; Nugroho et al., 2019; Pratiknyo et al., 2017). Mount Penanggungan has had an extraordinary function in the past. The mountain is referred to as Karshyan, Pertapaan, or Mandala, and this mountain is also full of mythology. In the mythology of Mount Penanggungan, there can be a lot of value, and it has

potential as a media for learning that is in line with ESD goals, especially those related to the sustainability of natural resources and spiritual and social life (Wartha, 2016; Wennersten et al., 2020).

Until now, the use of Mount Penanggungan as an object of learning studies has been carried out by PPLH Seloliman (a private institution). However, in this informal learning has not focused on ESD. In addition, the sites around the mountain do not yet been optimized. There are several weaknesses in the implementation of environmental education at PPLH Seloliman, namely first, the unavailability of adequate learning media. Second, teachers' understanding of environmental education is not evenly distributed. Meanwhile, formal schools have never utilized the potential that exists in this for ESD purposes. In fact, as mentioned earlier, this mountain has great potential to develop students' understanding of environmental sustainability values.

This research is imperative because students around Mount Penanggungan need to have a good understanding of environmental sustainability. Do not let it happen. Historical sites, water resources, and other natural resources are not maintained and are being overexploited. ESD practice should go into schools with fun and challenging learning. Outdoor learning is one of the recommended to improve students' wellbeing, mood, connect to nature (Habibah et al., 2022; Harvey et al., 2020). So, in addition to cognitively students can understand the importance of environmental sustainability development, psychologically they will also be better.

There has been a lot of work done in schools to implement ESD. However, the use of an environment with potential sustainability values has not been developed at the praxis level. For this reason, it needs a reliable framework to be implemented through ESD learning in schools. This framework is expected to help education practitioners, especially teachers, carry out outdoor learning activities in the Mount Penanggungan Cultural Reserve area or another environment that has similar potential. Based on these rationales, this study develops an outdoor learning model that is expected to make it easier for education practitioners to utilize an outdoor environment so that it is in line with the goals of ESD.

## 2. METHODS

The focus of this study is the development of a one-day outdoor learning model. The research uses a qualitative approach with the type of design-based research (DBR) that is used in development research (Sundayana, 2018). The design of this study bridges the basic research on the geohistorical potential of Mount Penanggungan as an ESD vehicle that was carried out the previous year. The design of this study bridges the basic research on the geohistorical potential of Mount Penanggungan as an ESD vehicle that was carried out the previous year. Because DBR allows for multiple methods at each stage of implementation, several methods were used during the course of this study. A literature review is carried out to explore information related to the theory underlying the design of this model. This step needs to be done in order to strengthen the foothold in designing a research product (Armstrong et al., 2018; Mertens, 2010). Studies for data from books, journals, and other documents are one of the steps taken before designing this model. Further stage of product development is carried out in two cycles. Each cycle consists of three steps of research. The flow of research can be seen in Figure 1.

The first step in a DBR cycle is analysis and exploration; this step is carried out to review the results of research in the previous year and explore concepts and theories related to research objectives. The second step is design and construction; after analyzing and exploring at this stage, the researcher will design a learning model consisting of: 1) learning principles; 2) theoretical foundations; 3) syntax; 4) social systems; 5) a support system; and

6) the role of the teacher. The output produced in this stage is a draft model 1. The third step is evaluation and reflection. Evaluation is carried out collaboratively with learning two model experts to get input and development, then reflection is carried out to understand shortcomings and input from experts. Then the cycle is repeated to get maximum results, until it produces a prototype model.

The objects of this study are not limited to the location or region of administration. The object of this study is an outdoor learning model of the use of Mount Penanggungan as an ESD. The subjects involved in this research are social studies learning model experts who will review the draft model to get constructive input and, in turn, produce a prototype outdoor learning model. The method of data collection in this study was carried out in several ways. Research data collection methods are adjusted to the research objectives, including: 1) literature studies, journals, proceedings, and relevant research books; 2) expert review; and 3) a validation sheet of the learning model draft. The validation sheet used in the research is in the form of notes provided by experts to develop the developed model. After obtaining the feasibility assessment, the model will be revised and become a prototype. The data analysis used in this study is a qualitative-verifiable data analysis strategy. This strategy is an inductive analysis effort of research data carried out throughout the entire research process (Bungin, 2010).

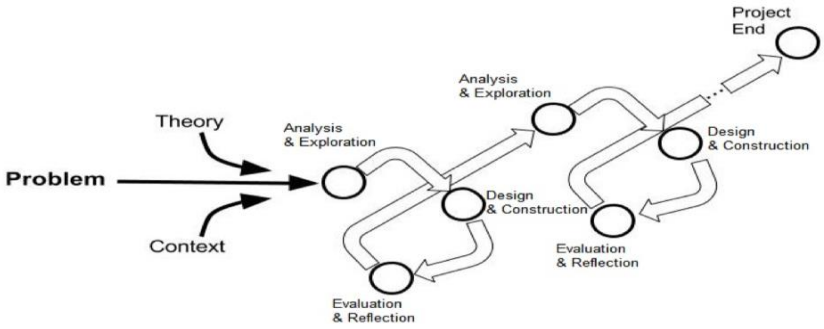


**Figure 1.** DBR Research Flow

## 3. RESULTS AND DISCUSSION

### Results

This will explain the results of the development of outdoor learning models that utilize the cultural heritage of Mount Penanggungan. The design of the model developed is given the term "one-day outdoor learning model." There are three things that are considered in the process of formulating the development of this model: the planning process, the implementation of learning, and assessment. This model's description will correspond to the competence on the learning model, which includes 1) impact; 2) syntax; 3) the role of the teacher; 4) the support system; and 5) the learning principles. A general overview of the components of the learning model can be seen in Table 1.

The expected impact of outdoor one-day learning is divided into two, namely the initial impact and the accompaniment impact. The instructional impact is twofold. 1) A concrete experience in the sense that it directly provides students with real-world experience to aid in their understanding of environmental conditions.2) Value construction, meaning that to form ESD goals related to awareness of attitudes towards environmental conditions, the meaning of the value of this learning is expected to be realized. Next is the impact of accompaniment, which students hope will grow their curiosity as well as soft skills that can be built during learning such as critical thinking, time management, cooperation, and communication.

The steps proposed for outdoor learning consist of three phases, namely: 1) Exploration is the stage where students are conditioned to make observations, take notes, and formulate related questions about the things they encounter while at the location or site. This process can be assisted by teachers, local tour guides, caretakers, or even independently with information obtained from various sources, such as information boards, visitors, etc. Of course, this process should be accompanied by the worksheet that has been shared before. 2) Confirmation: after taking notes and writing questions, students confirm the data that has been obtained, Confirmation can be guided by the teacher by conducting an open discussion. The set of answers from fellow students as well as confirmation from the teacher or guide will add strength to this phase. 3) This phase is a process of communicating the meaning of learning by inferring and retrieving values related to ESD objectives and competencies achieved in social studies. We recommend that students do it independently at this stage so that a sense of responsibility or attitude develops as a result of their awareness.

In this model, the role of the teacher becomes important in the learning process. In addition to being a lesson planner, teachers in the outdoor one-day learning process are: 1) As a tour guide, the teacher can be the director of which locations should be visited. Teachers with the ability and mastery of the location or site studies can become tour guides for students. This ability can be possessed if the teacher has basic knowledge of the route, factual conditions, and values and is able to interpret what he encounters. 2) A facilitator, teacher, or both can play a role in directing what learning activities are carried out while on site. Teachers should play an active role in directing learners when they are in a particular location or site. Teachers can also regulate the course of the learning process so that it is truly meaningful for students. Syntax of one day outdoor learning model is show in Figure 2.

There are two alternatives offered in the first alternative, namely 1st Flow. At the time of the implementation of outdoor learning, exploration was carried out in three locations that were used as the object of study, and then only at those locations were three stages of confirmation and inference carried out. Meanwhile, for the second alternative, called 2nd Flow, each phase of the outdoor learning model is completed at each location. Figure 2 shows how each phase in Plot 2 is carried out in each location; for example, in Location 1, learning activities are carried out starting from exploration, followed by confirmation and inference. The advantage of flow 1 is that exploration time is more flexible in each location, while flow 2 will be more detailed in responding to issues in each location. There is a concern that if Flow 1 is performed, locations 1 and 2 will be covered by issues in location 3. The companion must have a good strategy for carrying out the two steps.

The principles of learning should be present and considered in the application of this outdoor learning model. Some of the expected principles are: first, active. Students are conditioned to actively dig up information during the learning process, ask questions, and think critically, thereby developing their learning and cognitive abilities. Second, students learn by doing during the learning experience. Students conduct their own outdoor learning process, allowing knowledge construction to occur naturally as part of the learning process. Third, there must be meaningfulness or values that can be interpreted in order for this learning to be meaningful; at the end of the learning process, students are expected to be able to derive values from their existence in the location. In addition to the learning tools designed, technical planning for getting to the location, such as transportation and lodging, must be considered. At this stage, there are several things that need to be considered, namely: 1) determining the learning objectives; and 2) surveying the location to be visited. This is done to determine the number of sites visited, the duration of the visit, understanding of terrain and routes, accommodation and transportation, and learning activities carried out; and 3) learning tools are created after a survey of field conditions is completed. Example learning plan one day outdoor model is Table 2.

Base on Table 2 is an example of a scenario designed to apply outdoor one-day learning by utilizing Mount Penanggungan as an ESD vehicle integrated in social studies subjects. The formulation of learning planning in this outdoor learning model needs to pay attention to several things that are the focus of the model. First, it is necessary to pay attention to alignment with the goals of ESD. Second, it is necessary to determine the SDGs that you want to develop in students. Thirdly, subjects that are relevant to the goal Fourth, adjust the learning potential that exists on site. Fifth, formulate learning objectives. When the five things are aligned, then all expected achievements will be fulfilled in one learning process.

The implementation of learning is carried out after a careful planning process. Teachers should have prepared technical needs for departure, such as learning support systems and an understanding of terrain or field conditions, so that the one-day outdoor learning process runs smoothly. The implementation of learning activities follows the three phases specified in this model, namely exploration, confirmation, and inference. The following is a technical example of each phase of learning on the one-day outdoor learning model.

**Table 1.** Component of One Day Outdoor Learning Model

| | |
|---|---|
| **Impact** | Instructional: Concrete experience, value construction<br>Accompaniment: development of curiosity, soft skills. |
| **Syntax** | Exploration - Confirmation - Inferences |
| **The Role of the Teacher** | The role of the teacher in the outdoor learning process is: 1) Tour Guide, the teacher can be the director of which locations should be visited. 2) Facilitator, teacher directs what learning activities are carried out while on site. |
| **Support System** | Maps, Brochures (brief materials about locations or sites), worksheet (as guides for student learning activities) |
| **Principle** | Active, students actively to dig up information during the learning process.<br>Learning experience, students do learning by doing.<br>Meaningfully, at the end of the learning students are expected to be able to take values from their presence in the location. |

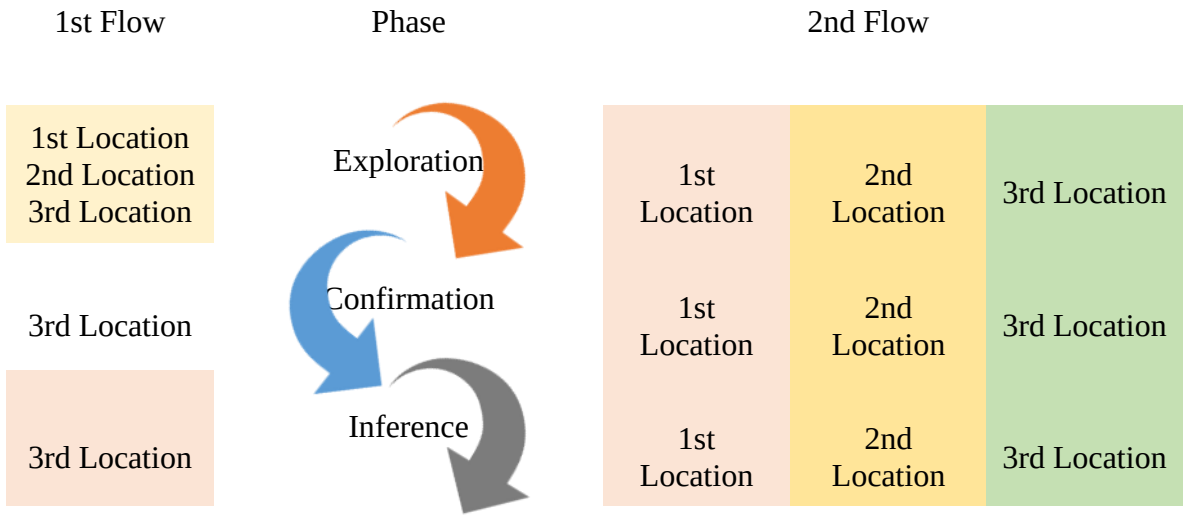


**Figure 2.** Syntax of One Day Outdoor Learning Model

**Table 2.** An Example Learning Plan One Day Outdoor Model

| | |
|---|---|
| **Purpose of ESD** | Education that prioritizes local culture. |
| **SDGs** | Clean Water and Proper Sanitation |
| **Theme of Social Studies** | Water Resources Sustainability |
| **Location** | Production Forest<br>Jolotundo Tropical Forest<br>Petirtaan Jolotundo |
| **Potential** | Geological, Geohistorical, Mythological |
| **Learning Objectives** | Students are able to interpret the values of water conservation in a historical site. |
| **Duration** | 3 hours 30 minute |
| **Support System** | Vegetation Distribution Map, Slope Map, worksheet |
| **Partner** | care taker / gate keeper |

***Phase 1. Exploration (Duration 2 Hours)***

Students arrive at location 1 and explore accompanied by a local teacher, caretaker, or guide who has an understanding of the location or site, its mythology, and the management system of the place visited. At Location 1 in the production forest, students can observe the types of plants that grow as well as the activities carried out by the community. At Location 2, which is located in Hutan Jolotundo, an activity that students can do is track around to observe and record forest conditions, vegetation density and dominance, and population activities in the forest. Then students can be given the opportunity to write down questions based on what they have already experienced. Then, in location 2, namely Pertirtaan Jolotundo, for 1 hour, an activity that can be done is to observe and record the condition or quality of water, water utilization, and sites in Jolutundo, Pertitaan. Students can also ask visitors what is being done, how the water is being used, the water conditions during the dry season, and so on.

***Phase 2. Confirmation (Duration 1 Hour)***

After arriving at the second location and spending an hour exploring, The next stage is confirmation. Students facilitated the teacher's ability to confirm the already existing questions resulting from critical thinking at the time of exploration. At this stage, a discussion of the answers to the results of the tasks carried out through worksheet is also carried out. It doesn't have to be much, but there needs to be a task that directs students to foster an understanding of the value of water conservation as well as how local wisdom is used to maintain water sustainability.

***Phase 3. Inference (30 Minutes)***

This phase is the end of one-day of outdoor learning. Inference is the drawing of conclusions resulting from observations and confirmations that have been made. The conclusions expected from students after completing the previous two stages include: 1) Maintained forests will have a good impact on water sustainability in Jolotundo Lightning; 2) Jolotundo water is considered sacred, efficacious, and of excellent quality, so many believe and come to the scene. 3) The sanctity of Jolotundo water cannot be separated from the mythology that develops in the community or among visitors to the scene. It is possible that students will find other conclusions that can enrich knowledge and awareness related to the importance of water resources for human life. Communities in the past protected water resources by building magnificent sites and keeping them for survival.

Assessments should be made with alternative approaches, or authentic assessments. Some assessment instruments that can be used as assessment tools are the worksheet and performance rubrics. A worksheet is used to assess the learning process through pre-designed questions or assignments. Maps, observation sheets, and other media needed during the outdoor learning process can be included as a complement. That way, worksheets are very necessary and are carried by students during the learning process. While the performance rubric is intended to assess the behavior of learners in the learning process, teachers can develop the criteria needed in the assessment process. Table 3 is an example of a rubric that can be used in assessing the performance of students during the one-day outdoor learning process.

**Table 3.** Rubric of Performance Assessment for One Day Outdoor Learning

| Criteria | Score | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Participation | Not participating at all during the learning process. | Participate 1-2 times during the learning process. | Participate 3-4 times during the learning process. | Pro Active participates 3-4 times during the learning process. |
| Enthusiasm | Not participating at all during the learning process. | Look excited for a few moments when participating in learning. | Look excited during learning. | Seems to always be excited during learning. |
| Work Focus | Not participating at all during the learning process. | Sometimes focus during learning activities. | Simply Focus during learning activities. | Seems to always be excited during learning. |
| Quality of Work | Not earnestly during learning activities. (fill out worksheet, make questions) | Sometimes earnestly during learning activities. (fill out worksheet, make questions) | Quite earnest during learning activities. (fill out worksheet, make a question) | Earnestly during learning activities. (fill out worksheet, make questions) |

The described model range is a prototype of two DBR cycles that have been performed. The development of the draft one-day outdoor learning model was carried out after analyzing the potential use of the Mount Penanggungan cultural heritage. Following that are the model's design and construction steps. Then the completed draft model was reviewed internally by a social studies education expert in the work environment of the research team, namely Dr. Sukma Perdana Prasetya, M.T. Table 4 shows the results of an expert review of the outdoor learning model.

After revising the results of the initial draft development carried out in cycle 1 by conducting an internal review, this research was continued to cycle 2. At this stage a preliminary draft analysis of the model is carried out. Revisions are carried out in accordance with the results of internal reviews and then the draft model is carried out external feasibility tests by local wisdom-based learning experts, Dr. Iin Wariin Basyari, M.Pd. As for this feasibility test, it is carried out qualitatively, the aspects tested are left entirely to experts, so that they openly and freely provide criticism and suggestions in every aspect of the draft

outdoor learning model. External feasibility result of one-day outdoor learning model is show in Table 5.

**Table 4.** Result of Internal Review of Outdoor Learning Model

| Review Aspects | Suggested Improvements | Status |
|---|---|---|
| Foundations of Learning Model Theory | It is best to reassure the theoretical basis used. In the draft outdoor learning model, there is no theoretical basis that matches the model used. | Revision |
| Components of the Learning Model | Each learning model is clarified by each component of the learning model, so that it is more comprehensive. Source references to books "Model of Teaching" | Revision |
| Syntax | Each learning model is clarified by each component of the learning model, so that it is more comprehensive. Source references to books. | Revision |
| Principles of Learning | Each learning model is clarified by each component of the learning model, so that it is more comprehensive. Source references to books. | Revision |
| Learning Media | Learning media is written more explicitly. | Revision |
| Worksheet | The developed worksheet should support learning measures. So there is a clear flow in the practice of outdoor learning models.<br>Worksheets need to be supported with simple questions so that they can explore the understanding abilities of issues in the learning process. | Revision |

**Table 5.** External Feasibility Result of One-Day Outdoor Learning Model

| Review Aspects | Valuation | Suggestion |
|---|---|---|
| Learning Model | Mount Penanggungan Learning Model for Education for Sustainable Development Theoretically, it is very adequate, both in terms of the theoretical foundation referenced as well as the implementation and general framework of the aforementioned model idea. Linguistically, it is communicative and easy for readers to understand. | Each model should be explicitly listed in the population system column: type of media, type of assessment instrument, both process and product assessment. |
| Components of the lesson plan | Generally, a learning plan is adequate to be used in learning the model mentioned above. | Keep in mind when starting out that the importance of perception is mainly to equalize the perception and understanding of important concepts that arise in the learning process. like the concept of resources. |
| Formulation of | It is implied that the learners are | We recommend that in the |

| Review Aspects | Valuation | Suggestion |
|---|---|---|
| learning objectives | junior high school students in grade VII, and the form of behavior change (expected competence) in attitudes, knowledge, and skills is obvious. | formulation of the objectives also include what learning experiences (conditioning) are carried out to achieve these goals. |
| Learning Activities | Learning activities have been formulated systematically and in sequence. | Since this model will be a reference for teachers who are interested in trying it out, use operational words, especially at the "confirmation stage." On "inference," can it be added to "communicate" the results of its conclusions through a class forum? |
| Assessment | The assessment is already comprehensive. | No advice. |
| Worksheets | The worksheet is already quite operational. It is implied that the experience of collecting data is carried out through observation techniques and interviews: there may also be documentation studies. | There should be a little guidance on which group of data observations are made and on which data the student should conduct an interview (in which case the bill should be followed by instructions that the student understands). |

After getting advice from the results of external expert reviews, the draft model for one day of outdoor learning was reanalyzed. The aspects that receive the recommendation are then analyzed for potential improvements. As suggested in the aspect of learning steps in the lesson plan, validators stated, "Keep in mind that in starting out, the importance of perception is mainly equating perceptions and understanding of important concepts that arise in the learning process," like the concept of "resources." This does need to be accommodated, considering that ESD learning also requires an understanding of the concept of resources before students are able to interpret the values of resource preservation during the outdoor learning process.

Another aspect that concerns experts is the formulation of learning objectives, which are also explained by the learning process, or experience of students. The formulation of learning objectives in the independent curriculum actually only contains two aspects, namely content and competence. The learning objectives contained in this model are also adjusted for the independent curriculum. For example, the formulation of this goal is "Students are able to interpret the values of water conservation at a historical site." "Interpreting" is the competence expected in learners, and "water conservation values" are its content. The clarity of the learning experience will be visible in the learning steps.

The use of operational words is also one that experts highlight. The use of the word "operative" is expected to make it easier for teachers to carry out the steps of the proposed learning model. As in the "inference" step is added to the word "communicate." Advice from these experts will be accommodated for the refinement of this learning model. The term "inference" is not yet familiar, but once the technical explanation in this phase is added, the word "communicate" will be added so that it can be easily understood by the teacher.

Worksheets are another developing component. "There should be some guidance on which data groups observations are made and on which data students should conduct interviews," experts advise (in this case, the bill should be followed by clear

instructions).This guide will be strengthened further, making it technically easier for students to find data. A well-prepared support system will facilitate the implementation and achievement of learning objectives as expected. All aspects of the model that have been suggested are then revised based on expert recommendations. Based on the components of the model that have received expert assessments in two cycles, the one-day outdoor learning model can be declared feasible as a prototype. The outdoor learning model will then be piloted in a preliminary study to increase the level of technological readiness so that it can be practiced more widely.

**Discussion**

This research succeeded in constructing a one-day outdoor learning model utilizing Mount Penanggungan for ESD. The theoretical foundation used actually refers to experiential learning. There are three types of experiences that contribute to the learner's cognitive, emotional, and moral learning modes. Of the three experiences, one that offers many opportunities is the hands-on experience. That's because it allows learning by touching, seeing, hearing, and experiencing it. To learn about the environment, learners need to actively use and explore the environment directly (Francis, 2017; Kolb, 2015). This model strongly emphasizes direct and contextual learning experiences. This hands-on experience is also expected to develop awareness of sustainability values.

The one-day outdoor learning model is one of the efforts at the praxis level to introduce ESD in the school environment. It seems that ESD practices in Indonesia that are included in the learning process are still not widely applied. Although there is an Adiwiyata school that is an environmental education-based school, environmental awareness still needs attention and has not yet been awakened. The reason is that environmental knowledge among students in adiwiyata schools is still lacking, so it contributes little to competence in environmental awareness (Pelita et al., 2020; Safrizal et al., 2020). This means that adiwiyata schools do not actually incorporate ESD into the learning process. The one-day outdoor model is a practical alternative to the early stages of implementing ESD in schools. Of course, it takes quite a while in ESD practice to be able to effectively develop environmental awareness of sustainability (Gunansyah et al., 2021; Olsson et al., 2022).

In the "independent curriculum" document, which began to be implemented in 2022 in Indonesia, it lists competencies related to sustainability development for several subjects. However, it is not clearly stated how to recommend approaches and learning processes that should be carried out. In several countries (Qatar, New Zealand, Singapore), ESD and SDGs have been integrated with the curriculum in K–12 schools (Fekih Zguir et al., 2021; Wennersten et al., 2020). This curriculum, which began to be implemented in 2022 in Indonesia, lists competencies related to sustainability development for several subjects. However, it is not clearly stated how to recommend approaches and learning processes that should be carried out. In several countries (Qatar, New Zealand, Singapore), ESD and SDGs have been integrated with the curriculum in K–12 schools.

School support is indispensable for ESD to be implemented on an ongoing basis. A holistic approach involving school resources is critical to the realization of ESD. It does, however, necessitate the support of an established capital building. The development of teacher competencies in the conceptual understanding of ESD is urgently needed. more specifically, the professional competence of teachers in the implementation of integrative ESD into the learning process (Forssten Seiser et al., 2022; Gericke & Torbjörnsson, 2022). Quite possibly, teachers have difficulty finding the relevance of phenomena encountered in the field to the ESD context. For example, in the production forest around the Jolotundo Temple site, teachers need to have knowledge to contextualize how the forest is managed so that it can remain relevant to the development of environmental sustainability values. Raising

existing issues in the outdoor learning environment can also be done to get context for ESD (Hirshberg, 2022; Windsor et al., 2022).

The values of sustainability of the natural, social, and cultural environments in Mount Penanggungan are potential ESD issues. This is also the focus of the outdoor learning model in this research. The meaningfulness of sustainability values in the learning process of this model is the main goal. Contextualization with problems found in the field The presence of vegetation and animals in the rainforest can be an issue that can be raised in outdoor learning (Cutting & Passy, 2022; Letouzey-Pasquier et al., 2022). On Mount Penanggungan, the potential of the rainforest can be a means to introduce environmental sustainability. The value can be understood from the fact that it is the preservation of vegetation formations that has an impact on the abundance of water resources. This issue can be an ESD topic in outdoor learning that is very relevant and problematic to ask students and improving reflective thinking (Aladağ et al., 2021; Wolf et al., 2022). Cognitive improvement through outdoor learning will be actualized in the steps of the one-day outdoor learning model.

Learning syntax consists of three steps, namely: 1) exploration; 2) confirmation; and 3) inference. These steps are a reference to several constructivist theories. First, the exploration step refers to the experiential theory of David Kolb, who believed that experience is essential in the development of knowledge constructions since learning occurs through discovery and active participation (Beard & Wilson, 2013; Kolb, 2015). Cultural relics that are used in the exploration phase on Mount Penanggungan are supported by Vygotsky's socio-cognitive theory, which views cultural artifacts as a means of developing cognitive aspects in children as state by previous study (Hyun et al., 2020). Furthermore, the confirmation and inference steps are still based on Vygotsky's theory. This phase facilitates collaborative learning by giving children the opportunity to observe, ask, listen, discuss, and cooperate with others who are more knowledgeable, including teachers and peers (Lyon et al., 2021; Newman & Latifi, 2021).

This one-day outdoor learning model is generally declared feasible according to experts. All components in the model structure have been developed in accordance with the needs in the field. Theoretically, this model is another form of the Experiential Learning Cycle Theory, showing four things: 1) concrete experience; 2) reflective observation; 3) abstract conceptualization; and 4) active experimentation. When presenting an environment in the learning process, it is a new experience for students. They need to understand the situation based on what they see and feel for themselves. Reflective observation, students will reflect on their experiences with knowledge gained during outdoor learning. Reflection will bring up new ideas. Students will be given the opportunity to express their ideas and collaborate on them. In active experiments, they are asked to apply ideas, and ideas that have been awakened are carried out in their world.

This outdoor, one-day learning model utilizing Mount Penanggungan can actually be implemented in various other locations. However, there needs to be studies to find out the relevant potentials for ESD in these locations. That is, teachers need to have a sufficient understanding of ESD and local potential. They are expected to choose the location that best fits the content they want to deliver. Through this learning, students' knowledge related to sustainable development values will be developed through direct experience.

## 4. CONCLUSION

The one-day outdoor learning model that utilizes Mount Penanggungan as an ESD vehicle is designed based on the potential that exists there. The design was developed based on the input of social studies education development experts. Several things are the focus of the first phase of development, including strengthening the theory and principles of learning,

technical syntax models, and the media types used. As a result, this one-day outdoor learning model deserves to be tested on a limited basis. Experimental learning is the foundation theory for carrying out this learning, and for that, it needs a good understanding of the teachers who will practice this model of learning. There are several things that need to be considered in the process of implementing this model: school support, teacher competence, and careful technical preparation will help ensure a smooth learning process. The emphasis on exploratory, collaborative, and reflective learning processes is an advantage of this model. It is hoped that with a good learning process, it will be able to expose the potential of Mount Penanggungan so as to foster sustainability values in students.

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