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Research Article

# Reconstruct Local Potential as Learning Resources to Support Science Learning

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**Abstract.**
This research aims to reconstruct the scientific knowledge that exists in the local natural tourism potential of Ledok Sambi and Code River. It is hoped that this research will be able to add references for teachers and developers of junior high school science learning, to utilize the local potential that exists in the environment around the school as a context for science learning. This research is exploratory research which is used to examine an interesting object. This study explores the local potential close to the school area as a learning resource. The local potential that is the object of study is in Yogyakarta Province, namely, Ledok Sambi and Code River tourism. Data collection was carried out using direct observation and interview techniques. Interviews were conducted with managers, visitors, and the community around tourist attractions. The results of the observations show that the material that might be used as a learning resource from Ledok Sambi and Sungai Code is related to ecosystems and pollution. The implication of this research is to develop science teaching materials. Apart from that researchers can also conduct direct research regarding the pollution level of the Code River and the benefits of Ledok Sambi natural tourism in education.

**Keywords:** assessment, conceptual framework, design thinking, teacher education

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## 1. INTRODUCTION

Natural Sciences (IPA) has strong relevance to the 21st century skills that are so necessary in the modern world. Science learning promotes critical, creative thinking, problem solving and scientific literacy skills, which are the main foundations for facing challenges in this era [1, 2]. In addition, science also teaches students about scientific methods, technology, and collaboration, all of which are important skills in dealing with increasingly complex and rapidly changing work and daily life environments [3]. Science learning is not only about conceptual knowledge, but also about preparing students to become skilled, adaptive and competent individuals in facing the demands of the 21st century

[4]. Science learning at the junior high school (SMP) level has an increasing urgency in developing 21st century skills. 21 which are critical for student development. In this digital and globalization era, critical thinking skills, scientific literacy, information technology skills, and collaboration are the keys to success. Science in junior high school is not only about mastering scientific concepts, but also preparing students to become adaptive, innovative thinkers and able to face rapid changes in an ever-changing society.

Science learning that integrates local potential has a significant impact on students' understanding and skills. The integration of local potential in science learning allows students to connect scientific concepts with the context and reality around them (Tyas et al., 2020). Integrating local potential in science learning is not just about cultivating local knowledge, but also strengthening a sense of love for culture and respect for environmental diversity [6]. When students are invited to understand how science can interact with nature, culture and traditional knowledge around them, science learning not only becomes more relevant, but also more meaningful. Integration of local potential provides opportunities for students to engage in research, exploration and problem solving based on the needs and challenges in their own environment. Students can learn how to apply science concepts to answer questions they ask about the world around them. In addition, the integration of local potential encourages a sense of social responsibility and environmental awareness, because students will better understand the impact of their actions on the community and nature around them.

The integration of local potential in science learning provides significant benefits for the development of 21st century skills. With this integration, students can develop their critical thinking abilities. This is because in the context of local potential, students are faced with real problems that require in-depth analysis and critical thinking to find effective solutions [7]. In addition, the integration of local potential promotes strong communication skills, as students have to interact with the community and discuss their ideas for solving environmental or cultural problems [8]. Science learning that integrates local potential also supports the development of collaboration skills. Students work together on projects that require teamwork to achieve a common goal. These skills are important in modern work environments that often emphasize teamwork. In addition, the integration of local potential fosters more contextual problem solving skills, because students learn to identify and overcome problems related to the context of the surrounding environment [4, 9, 10]. Students learn about the needs and challenges in society, so this can stimulate students to play an active role in making positive changes to the surrounding environment. The integration of local potential in science learning not only enriches understanding of science, but also produces students who have the

skills to think critically, communicate, work together, and have strong social awareness, all skills that are very important in facing the challenges of the 21st century [11, 12]

However, resources to support integrated science learning with local potential are often limited, both in the form of textbooks and teaching materials (Tyas et al., 2021). In addition, integration of local potential requires a strong understanding of the connections between IPA and local realities. Teachers need additional training and mentoring to be able to plan and implement this learning effectively. However, the reality in the field is that teachers even encounter difficulties in teaching science in an integrated manner. Integration of local potential in science learning begins with observation and identification of local potential that will be integrated. Then, an analysis of the concept of community science contained in the local potential was carried out. The next step is to reconstruct community science into scientific science that can be accounted for and can be implemented in junior high school science learning. This research aims to reconstruct the scientific knowledge that exists in the local natural tourism potential of Ledok sambi and Code River. It is hoped that this research will be able to add references for teachers and developers of junior high school science learning to be able to utilize the local potential that exists in the environment around the school as a context for science learning.

## 2. METHOD

This research is exploratory research which is used to examine an interesting object [14]. This study explores the local potential close to the school area as a learning resource. The local potential that is the object of study is in Yogyakarta Province, namely, Ledok Sambi and Code River tourism. Data collection was carried out using direct observation and interview techniques. The observation data collection instrument uses an observation sheet as in Table 1.

Table 1: Observation Sheet.

| No | Aspect |
|---|---|
| 1 | Conditions |
| 2 | The existence of living things |
| 3 | Existence of Facilities |
| 4 | Visitor Activites |

Interviews were conducted with managers, visitors and the community around tourist attractions. Interviews were conducted using semi-structured interviews using interview

guidelines by paying attention to several points. The results of the interviews are then transcribed and the results of the observations are described according to needs. The description in question relates to scientific analysis of science which can be used as a learning resource for the natural tourism of Ledok Sambi and the Code River.

## 3. RESULTS AND DISCUSSIONS

The potential of the environment around the school shows that the environment around the school, such as the Ledok Sambi natural tourist attraction and the Code River, can be used as a learning resource. The review was carried out by observing the surrounding conditions which are presented in Table 2.

Table 2: Observation Result.

| No | Aspect | Description | |
|---|---|---|---|
| | | Ledok Sambi Local Tourism | Code River |
| 1 | Condition | Located in the Kaliurang area, Sleman Regency, north of Yogyakarta City. The location near Mount Merapi makes the land in Ledoksambi fertile. There is a small river with a moderate water flow, there are lots of trees, insects dominate, and the air is cool and cool. | The Code River is 42 kilometers long and flows from the upper reaches of Mount Turgo and flows into the Opak River. The code river is located in the city and in the village. The appearance of the river tends to be murky with a current that is not strong. Sometimes there is a new smell that is not pleasant. |
| 2 | The Existence of living things | There are several coconut trees, the rest are dominated by shade trees. The fauna found in Diledok Sambi is dominated by insects and birds. | During the observation, no resident animals were seen, but there were freshwater fish in the river |
| 3 | Existence of facilites | There are various facilities such as bathrooms, cleaning equipment, river crossing bridge, flying fox | There are several cleaning facilities such as trash cans, there is a tourist village for education and entertainment |
| 4 | Visitor Activites | Activities carried out by visitors include playing in the water, flying fox, outbound, or camping. | Educational activities for children, fishing and entertainment |

Table 2. Provides an illustration that Ledok Sambi and Sungai Code have the potential to be used as natural science learning resources. The results of the observations show that the material that might be used as a learning resource from Ledok Sambi and Sungai Code is related to ecosystems and pollution. One of the first steps taken to make these two objects learning resources is to reconstruct community science into

scientific science that can be accounted for and can be implemented in junior high school science learning. The results of scientific reconstruction for each local potential are in Table 3.

TABLE 3: Reconstruction Local Potential.

| Local Potential | Observed | Science Concept | Science Material |
|---|---|---|---|
| Ledok Zambia Tourism | Diversity of biotic and abiotic components Interaction between biotic and abiotic component | Ecosystem components Interaction of living things | Ecology and diversity of living things |
| Code River | Pollutant | Environmental pollution Air pollution Soil pollution Water pollution | Environmental Pollution |

This is reinforced by the results of interviews conducted by researchers with Ledok Sambi natural tourism managers and Code River managers.

Researcher: Is there currently a change in the colour of the water or the smell of the Code River water?

Source: that's right, in some places, the colour of the river water has changed and the smell is much more pungent. This area is addressed by creating a waste stream. Meanwhile, in urban areas it is still not there and there is often an unpleasant smell.

Researcher: What causes the change in water color or unpleasant odour?

Source: Disposal of MSME industrial waste such as culinary businesses, there are also chicken and cow slaughter services in Terban. Apart from that, there is household waste from toilets, kitchens and the like.

Researcher: What impacts have been felt around the Code River?

Source: There hasn't been a big impact yet, but the impact felt by residents is like the release of river water when rainfall is high, even though it's not a big flood, it's quite disturbing because the rubbish is carried away. During the dry season, the smell from the river is quite strong.

Researcher: is there still an abundance of fish in the Code River? If so, what types are they?

Soruce: the fish that used to exist are almost extinct too. During social service activities, people definitely scatter fish seeds. If you catch it, it's not much, only 1-2 (fish). As a result of this waste, the fish automatically don't live long. In the past, there were lots of small shrimp, fish, wader fish and eel, but now there are only 1-2 (fish) left.

The interview results show that there is ecosystem material, especially focusing on the concept of environmental pollution. The concept of environmental pollution was explained by the resource person that there was an addition of excessive mass to the river ecosystem. If this process occurs continuously, it causes accumulation and results in damage to an ecosystem. The local natural tourism potential of Ledok Sambi and the Code River is a suitable place to invite students to learn contextually. The introduction of biotic and abiotic concepts as ecosystem components can be seen directly by students [15–17].

The construction of local potential in science learning will support contextual learning (Purwasih & Wilujeng, 2023). Natural Sciences develops based on the results of observations, so to introduce them it is necessary to program real learning for students. Science learning by utilizing the surrounding environment can create learning activities that emphasize active student involvement (student-centred), namely exploration activities, experiments, discussions or other activities to uncover natural phenomena or everything that occurs in daily activities by utilizing the surrounding environment. For example, in the process of identifying pollutants that cause pollution, students can directly observe what objects are found in the flow of the Code River.

Environmentally based science learning is an approach that allows students to be actively involved with the subject matter while understanding its impact on the surrounding environment (Purwasih & Wilujeng, 2023). Learning modules can be designed to present information about environmentally relevant scientific concepts, such as the water cycle, food chains, or climate change [19–21]. Handouts can contain images, diagrams, or short text that reinforce students' understanding of the material, as well as highlight its connection to the current environment. Meanwhile, activities may include practical experiments, field observations, or creative projects that allow students to apply learned concepts in real-life contexts. Student worksheets can be an effective evaluation tool, allowing teachers to track student progress and provide appropriate feedback for further development issues [22]. With this approach, science learning not only becomes an in-depth learning experience but also promotes environmental awareness and responsibility among future generations. The research results show that the integration of local potential in science learning can increase understanding of scientific concepts, strengthen students' cultural identity, and increase environmental and sustainability awareness.

## 4. CONCLUSION

The research results illustrate that local potential can be used as a learning resource to improve the quality of learning and student involvement. Contextually based learning can be more relevant, interesting and meaningful for students. Students' scientific abilities can be honed if learning continues to provide creativity to shape experiences in their environment. This is a valuable strategy to implement in an educational context, as it not only enriches students' learning experiences but also promotes closer connections between science, culture and the environment around them. It is very possible for further research to develop science teaching materials. Apart from that, researchers can also conduct direct research regarding the level of pollution of the Code River and regarding the benefits of Ledok Sambi natural tourism in education.

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