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Karangsari's Starfruit Agrotourism; Blitar's Local Pride as A Source of Biology Worksheet Apps to Enhance Students' Science Literacy

Shafila Sahnaz[1*], Paramita Cahyaningrum Kuswandi[2]

[1] Master of Biology Education, Yogyakarta State University, Yogyakarta,Indonesia.
[2] Biology Education, Yogyakarta State University, Yogyakarta, Indonesia.

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Corresponding Author:
Shafila Sahnaz
shafilasahnaz@gmail.com

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Abstract: The utilization of local potential as a biology learning source is still not maximized. This research focuses on integrating the local potential of Blitar, namely Karangsari's Starfruit Agrotourism which was developed into a student worksheet app to increase students' science literacy. Karangsari's Starfruit Agrotourism can be used as a learning resource on biodiversity material by discussing the diversity of starfruit (*Averrhoa carambola*) varieties, the use of starfruit, and efforts to preserve starfruit. Utilizing local potential and implementing the Sustainable Development Goals (SDG) in biology learning aligns with the *Merdeka Belajar* curriculum. This study used the ADDIE model which consists of analysis, design, development, implementation, and evaluation stages. The final product of this development research is a student worksheet app implemented to enhance science literacy in class X of students at SMAN 1 Blitar. Data was collected with needs questionnaires, teacher interviews, assessment questionnaires for material experts, media experts, biology teachers, student response questionnaires, and science literacy skills tests. The data obtained were statistically analyzed tests between subjects. Research results concluded as Karangsari's starfruit agrotourism applied as the materials of the student worksheet app was declared feasible by experts, there are differences in science literacy between students who had taken part in learning while using the worksheet and students who did not, and the effect/contribution given by student worksheet apps to science literacy is 58%.

Keywords: Agrotourism; Biology worksheet apps; Local pride; Science literacy

Introduction

Indonesia has 80% of its population at its peak productivity. These human resources potential have to be utilized to be able to compete globally. Global competition requires humans to be literate to solve the problems around them (Yacoubian, 2018). But in reality, the data obtained shows that the science literacy level of Indonesian students is still below average (ranked 69 out of 79 countries) (OECD, 2019). Efforts to improve students' science literacy still become a challenge for educators. One of the innovations is the utilization of local potential as a source of learning biology (Abidinsyah et al., 2019; Ardan, 2018; Lestari et al., 2019).

The local potential is all potential that exists in an area, including the potential of natural resources, human resources, geography, culture, and history (Abidinsyah et al., 2019). Local potential-based learning exposes students to real objects in the environment. This learning links learning materials with problem-solving applications in everyday life (Wilujeng & Suryadarma, 2018). Through the implementation of local potential-based learning, science literacy which is the basis of 21st Century skills can be improved (Anthony et al., 2022; Aprilia & Suryadarma, 2020; Sunariyati et al., 2019).

Karangsari's Starfruit Agrotourism is a conservation slash tourist area of starfruit, one uniqueness of Blitar City. Three starfruit varieties are planted in this agrotourism, namely the Karangsari's

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Carambola, Red Bangkok's Carambola, and Malaya's Carambola (Abdullah et al., 2018; Baswarsiati, 2020).

The use of the local potential of the natural environment as a source of learning biology has several conditions, including 1) alignment with learning outcomes and learning objectives, 2) the potential availability of clear objects and issues raised, 3) clarity of material objectives and their designation, 4) clarity of information disclosed, and 5) clarity of exploration guidelines (Ardan, 2018). Karangsari's Agrotourism fulfills this prerequisite. Karangsari's Agrotourism can be used as a source of learning biology on Biodiversity material, which discusses 1) the diversity of starfruit varieties, 2) the utilization of starfruit, and 3) the way to preserve starfruit flourishing (Priadi et al., 2021). Utilizing local potential around the student's environment and implementing the Sustainable Development Goals (SDG) aligns with the curriculum.

In addition to the innovation of learning resources, to encourage students' science literacy enhancement, educators must innovate in aspects of learning media. Innovations developed by researchers to increase science literacy are student worksheet applications (Widodo et al., 2021). Student worksheets are teaching materials designed to facilitate students' independent learning with clear information and steps for use, presented in interesting material, presenting contextual data, and easy practicum implementation steps (Dankbaar et al., 2017; Irwansyah et al., 2021; Pachler et al., 2016). Student worksheet apps applied to biology class contextually can train students to solve problems, investigate scientifically, and increase students' understanding of science (Alias & Siraj, 2020).

This innovation of student worksheet apps provides: (1) presenting starfruit's biodiversity materials based on local potential in the city of Blitar which has not been utilized by previous student worksheet products, (2) presenting material by the *Merdeka Belajar* Curriculum by implementing the SDGs which have not been presented in other student worksheets, (3) presenting student worksheet in the form of smartphone applications that are interactive, interesting, and not limited by space and time, (4) providing student worksheet which integrated with discovery learning models that are suitable for increasing science literacy, 6) adding social network features for online discussion forum between students and teachers so they can build their knowledge and share knowledge with peers everywhere.

Method

This study uses the ADDIE technique which is composed of five stages, namely Analysis, Design, Development, and Implementation (Aldoobie, 2015). Sampling used cluster purposive sampling. The research subjects in the product feasibility trial were all class X students, 2 expert lecturers, and 6 biology teachers at SMAN 1 Blitar, while the subjects for product implementation were 30 students of class X-8 as the control class, and 30 students of class X-9 as the experimental class. Data was collected with needs questionnaires, teacher interviews, assessment questionnaires for material experts, media experts, biology teachers, student response questionnaires, and science literacy skills tests. The validity and reliability test were carried out on the science literacy test questions.

This research was carried out from November 2022 – February 2023, producing the final product in the form of student worksheet apps, while product implementation in class was carried out on 13 February 2023 – 4 March 2023 with 5 meetings in class and 1 independent practicum. The data obtained are: (1) product feasibility data, and (2) students' science literacy data as a result of product implementation that has been made. Product feasibility was assessed by subject materials experts, media experts, teachers, and responses from students using a Likert scale consisting of 4 choices, namely: Very Good (VG), Good (G), Poor (P), and Very Poor (VP). Student science literacy score was obtained through pretest and posttest using science literacy tests. Product feasibility data analysis uses the formula, and then the scores obtained are converted according to the following table.

$$\text{Score} = \frac{total\ score}{Total\ \max score}\ x\ 100 \quad (1)$$

Table 1. Interpretation for Feasibility Score (Riduwan, 2018)

Score	Interpretation
81-100	Very good
61-80	Good
41-60	Fair
21-40	Poor
0-21	Very poor

The analysis for science literacy level is using a test between-subject by SPSS ver. 24. The decision taken in this test is by using the significant value. If the significance value<0.05 means there are differences in science literacy between students who had taken part in learning while using the worksheet app and students who did not. The effect/contribution of the student worksheet apps on science literacy can be seen from the eta square value which is then multiplied by 100 percent.

Result and Discussion

Based on product development using the ADDIE method, we managed to establish a student worksheet app by using Karangsari's Starfruit Agrotourism as biology material sources and then applied it to class X students of SMAN 1 Blitar. The implementation of the apps resulted in product feasibility assessments from experts, teachers, and students, and also the improvement of science literacy. Results can be seen in the table and figure as follows.

Table 2. The Analysis of Karangsari Agrotourism as a Biology Materials

Biology Learning Needs	Available Material Resource at Karangsari Agrotourism	Implementation of student *worksheet* apps
Learning outcomes of the *Merdeka Belajar* curriculum require students capable to create solutions to problems of issues regarding biodiversity and possess the skills to observe, ask questions, predict, plan and carry out investigations, process and analyze data, evaluate and communicate results which are part of science literacy	Starfruit's diversity at Karangsari Agrotourism can be used as study materials for Indonesia's diversity and uniqueness	The learning activities in the student worksheet provide students with direct observation of starfruit morphology, analyze differences and draw conclusions about differences in starfruit varieties
	Karangsari Agrotourism provides workshops on processing star fruit into high-value food ingredients such as syrup, lunkhead, chips, and chili sauce.	The student worksheet activity encourages students to design their project for processing starfruit into food products according to examples that have been seen in the field
	Agrotourism provides information on how to preserve starfruit, starting from looking for nurseries, planting, fertilizing, and dealing with pests to harvesting	Activities in the student worksheet encourage students to find out in detail information on how to preserve starfruit plants as part of the responsibility to maintain biodiversity
Learning based on *sustainable* development goals (SDG)	Karangsari Agrotourism provides learning resources that explain how to conserve starfruit as one of local potential is in line with SDG	Presenting materials that are in line with the 15th SDG namely; protecting, restoring, and increasing the sustainable use of terrestrial ecosystems, managing forests sustainably, restoring land degradation, and stopping the loss of biodiversity.
Learning innovation in the form of interesting learning media	Karangsari Agrotourism Provides a contextual learning environment that facilitates students to observe, seek information, and conduct experiments directly with the help of resource persons and teachers	The innovative student worksheet apps provide easy-to-follow learning steps, equipped with pictures, videos, articles, communication channels, and recording devices, as well as direct feedback from the teacher so that learning can be carried out anywhere in a fun and interesting way

Table 3. Results of Student Worksheet Apps Feasibility Assessment by Subject Experts, Media Experts

Score Aspect	Subject Expert		Media Expert	
	Average Score	Criteria	Average Score	Criteria
Software engineering	95	VG	87.5	VG
Visual communication	95	VG	95	VG
Material eligibility	93.75	VG	93.75	VG
Material accuracy	93.75	VG	93.75	VG
Didactic	95.75	VG	100	VG
Construction	97.25	VG	100	VG
Technical	100	VG	80	G

Table 4. Results of Student Worksheet Apps Feasibility Assessment by Teachers, and Students

Score Aspect	Teachers		Students	
	Average Score	Criteria	Average Score	Criteria
Software engineering	94.5	VG	95	VG
Visual communication	95.75	VG	95.75	VG
Material eligibility	100	VG	93.75	VG
Material accuracy	93.75	VG	93.75	VG
Didactic	93.75	VG	93.75	VG
Construction	96.75	VG	97.25	VG
Technical	98	VG	93.75	VG

Figure 1. The results of worksheet apps development

Based on the results of the analysis of the use of Karangsari Agrotourism as a biology material, it can be concluded that the available resources in Agrotourism can be used in biodiversity topics in line with the learning outcomes of *Merdeka Belajar* curriculum and the challenges of today's innovations to increase science literacy.

The result of feasibility assessments by subject experts, media experts, teachers, and students show that almost all aspects are considered to have very good criteria. Therefore, it can be concluded that the use of Karangsari agrotourism as biology material in the biodiversity chapter is suitable and can be implemented properly.

Table 5. N-gain of Science Literacy Score

Class	Average Score		n-gain score
	Pretest	Posttest	
Experiment	32.4	90	0.85
Control	32.89	84	0.76

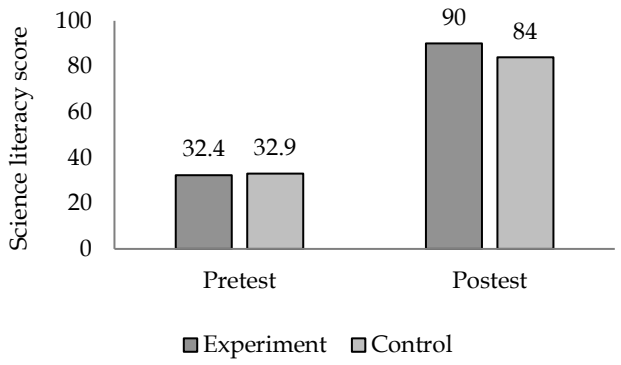

Figure 2. Test Results of science literacy improvement

Table 6. Test of Between Subject Science Literacy Result

Variable	df	Mean Square	F	Sig.	Eta Squared
Science literacy	1	539,700	97,941	0.007	0.583
				Sig < 0.050	Eta squared percentage 58%

According to the research results, it can be concluded that there is a difference in scientific literacy improvement between students who participate in learning using student worksheet apps and students who take lessons without the apps in the biodiversity chapter. The percentage of effect/contribution given by the student worksheet is 58%. Utilizing local potential as a biology material source in the form of student worksheet apps can improve scientific literacy (Nakano & Wechsler, 2018; Susilo, 2018). OECD (2019) states that achieving competence in scientific literacy requires the ability to critically discuss issues around technology systems and scientific knowledge.

The selection of the biodiversity chapter as the objective of this lesson also encourages students to understand how important it is to monitor environmental sustainability. These materials make a positive impact on students' scientific attitudes and the Sustainable Development Goals (SDG) which are part of the objectives of the *Merdeka Belajar* curriculum. The learning activities in the student worksheet apps are also designed in the form of experiment-based activities to find out the diversity of starfruit plant varieties in Karangsari's Starfruit Agrotourism. According to Archer-bradshaw (2018), the emergence of students' scientific literacy is when students are given a lesson that has rational prospects, so problem-solving activity is carried out objectively and based on logical thinking. Structured activities by utilizing existing information in Agrotourism can train students in mastering scientific literacy competencies, namely being able to interpret evidence and data scientifically and make decisions based on data findings. Ardan (2018) added that local potential-based learning can facilitate students to explore scientific literacy skills by presenting real problems. Kampourakis (2019) also argues that discovery-based learning combined with the provision of contextual material can stimulate students' self-initiative in learning and improve group collaboration skills, encourage the increased ability to process data and draw conclusions from the facts found, where this ability is part of the aspect of scientific literacy.

Presentation of issues around this local potential-based learning activity will stimulate students to be able to ask how these problems can occur, what causes them, and what will happen if these problems continue to occur (Cahyaningtyas et al., 2019; Rukiyati & Andriani,

2020). Departing from the results of critical thinking, it is expected to encourage students to conduct investigations and test hypotheses that they make themselves, so they will learn how to design and devise a scientific investigation to answer the questions they make themselves (Yacoubian, 2018). Scientific investigations carried out by students will encourage students to be able to find answers to questions that they make themselves, by looking for various information such as data and information which will indirectly force students to hone their reading skills and interpret the data/information (Ogunkola & Jgunkola, 2020). Information and data that have been collected by students can then be discussed among students to get a conclusion as a basis for answering the problems presented (Dabbagh & Kitsantas, 2017). Students who can ask questions, compile hypotheses, design experiments to test hypotheses, collect data, and draw conclusions as a result of mastering scientific literacy are students who can apply a systematic scientific way of thinking, which is beneficial for students when carrying out academic activities and work (Abubakar et al., 2019; Rubini et al., 2019; Tabroni et al., 2022).

The improvement in students' scientific literacy is also caused by the form of student worksheets that are presented in electronic form. According to Dikkers (2011) and Pachler et al. (2016), the use of electronic student worksheets in learning activities can support students to participate optimally, because learning activities are centered on students. Furthermore, electronic worksheets can improve communication between students, schools, and teachers through interesting communication channels (Gani et al., 2022; Milala et al., 2022). Students are also able to access learning materials at any time, even though they are outside the learning class. The presentation of the student worksheet apps is complemented by pictures, videos, articles, and communication channels that facilitate students in exploring the subject of starfruit plant diversity.

Conclusion

Integrating Karangsari's Starfruit Agrotourism as biology materials in the biodiversity chapter is deemed feasible by experts, teachers, and students. Biology learning resources from the local potential of Blitar City are implemented in the form of student worksheet apps which can help students improve scientific literacy. The use of student worksheet apps combined with contextual material encourages students to design research, collect data independently, and draw conclusions from the facts found. The test results show that there is a significant difference in improving scientific literacy between students who use the student worksheet apps and those who do not. The effect/contribution given by student worksheet apps to science literacy is 58%.

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Author Contributions
This research contributes to the development of digital based-learning media for biology based on local pride to enhance student literacy. The author is involved in the overall making of this article.

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Conflict of Interest
The authors declare that there is no conflict of interest regarding the publication of this paper.

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