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Sanja Kuning Phenomenon in Students' Worksheets to Train Science Process Skills

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Abstract

Integrating local wisdom is important in learning, especially in the students' worksheet, a reference for student learning. The phenomenon of *sanja kuning* is very memorable for the people of South Kalimantan, with its various mythologies. This will be interesting if discussed through physics learning to support students' science process skills. This study aims to analyze the effect of students' worksheets integrated with local wisdom, namely the *sanja kuning* phenomenon, and the effectiveness of learning and improving students' science process skills. This quasi-experimental study applies students' worksheets integrated with local wisdom, namely the *sanja kuning* phenomenon. Data were obtained through one group pretest-posttest design with a total sample of 28 people. Data were analyzed using N-gain, and student learning outcomes obtained a gain of 0.38 with medium criteria. The data were also analyzed using a paired t-test, and the results showed that there was an effect on the learning of students' worksheets integrated with local wisdom of the *Sanja kuning* phenomenon. The results of this study conclude that student worksheets integrated with local wisdom, namely the *Sanja kuning* phenomenon, affect the teaching of light waves. In addition, the effectiveness is in the medium category. This student's worksheet can be used as an alternative to learning about light waves. The weaknesses of the research show that further development of this students' worksheet is needed to be maximized to improve the students' science process skills.

Keywords: light waves; local wisdom; *sanja kuning*; students' worksheet

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INTRODUCTION

Science process skills is a scientific activity that can add insight or be a role model for intellectual, social, and physical development that comes from the fundamental abilities that exist in oneself (Septantiningtyas et al., 2020). Science process skills are scientific work steps that involve skills and are used so that students can solve problems in the learning process by using creative thinking (Elnada et al., 2016; Mastuang et al., 2020; Putri et al., 2017 dan Rizki et al., 2022). Science process skills are very important for students as a provision for using the scientific method in developing science and are expected to gain new knowledge or develop existing knowledge (Jannah et al., 2021; Karim et

al., 2016; Mahjatia et al., 2021; Sudrajat et al., 2017).

How students achieve good science process skills for students, require teachers who have a good understanding and high competence in science process skills (Astuti et al., 2017; Dewi & Atun, 2019; Duda et al., 2019; Inayah et al., 2020) dan (Rahayu et al., 2018). The professional competence teachers show when providing students with information related to practicum greatly influences the science process skills they show (Adiningsih et al., 2019).

Science process skills are the ability of students to gain new knowledge or develop existing knowledge using the scientific method (Astuti et al., 2018; Diani et al., 2020); Firmansyah & Suhandi, 2021; Hendrawan et al., 2020; Jalil-Vega & Hawkes, 2018). This is done by developing curiosity and scientific knowledge. The formation of ideas by learners is built when they interact with a phenomenon, and this does not depend on the characteristics of the object; it also depends on learners' understanding to process and understand information so that new ideas are obtained (Rahman et al., 2022).

Initial data obtained by giving tests to students who became trial subjects found that 24.19% of students knew and could determine the formulation of the problem, 16.13% of students knew and could determine the formulation of the hypothesis, 3.23% of students knew and could determine the identification of variables from an experiment, 0% of students could define variables operationally, 14.52% of students could analyze the experimental data, and 17.74% of students could make conclusions based on the analysis of experimental data. The data shows that students' science process skills still need improvement. In order to overcome these problems, the following solutions can be designed.

Student worksheets are teaching materials made for students to learn material independently to make students more active in solving existing problems through group discussion activities, practicum, and activities to answer problems related to learning (Astuti et al., 2018). A student worksheet is a means of assisting and facilitating learning activities that form effective interactions between students and teachers that can increase student activities in improving learning achievement (Wahyuni et al., 2021; Limatahu et al., 2018). Student worksheets contain descriptions of learning materials to be conveyed, work steps that students will do, and exercises that students will complete (Manurung et al., 2021).

Improving the science process skills that students need can be achieved by developing student worksheets that can support learning activities where student worksheets can be supported by learning models that focus on student skills (Dewantara et al., 2019; Mahjatia et al., 2020; Mahtari et al., 2020; Riefani, 2020); Misbah et al., 2018). student worksheets are one of the learning media that helps students practice their science process skills (Limatahu et al., 2018). Through student worksheets, students are motivated to be more creative in finding answers to their curiosity and improve their ability to think, observe, interpret, communicate, and perform various other activities. Several relevant studies have integrated student worksheets with local wisdom in physics learning and found that the student worksheet used is effective in learning (Dani et al., 2022; Sani, 2021; Utami et al., 2020; Wisnuputri et al., 2023). However, no relevant research relates it to the phenomenon of *sanja kuning*, which has a mythology that is respected by the community. *Sanja kuning* is a phenomenon that occurs at sunset or in the afternoon when the sky occasionally takes on a yellowish-red color, and this happens in the evening. The people of South Kalimantan usually associate this *sanja kuning* phenomenon with various things that can lead to various myths. This event is related to one of the properties of electromagnetic waves, namely the polarization of light. This

novelty raised by researchers will be tested in this study. So, this study focuses on analyzing the effect of student worksheets integrated with local wisdom, namely the *Sanja kuning* phenomenon, along with its effectiveness in learning and improving students' science process skills.

METHOD

This study used a Pre-experimental research design with a one-group pre-test - post-test design (Chu & Chang, 2017). This research design used only one research subject, so the research was used in only one class. Measurement was carried out in one class (pre-test), then in one class was given learning using a student worksheet (exposure), after which a second measurement was taken (post-test), like Table 1. The student worksheet used in this study has gone through a validation test with a score of 3.7, so the validation criteria are very good.

Table 1 Product trial design

Pre-test	Dependent Variable	Post-test
O_1	X	O_2

Notation:
X = learning using student worksheet (treatment, independent variable)
O_1= test before learning using student worksheet (dependent variable)
O_2= test after learning using student worksheet

Data from the pre-test and post-test results were tested to see if there was a significant difference between the pre-test and post-test scores using the paired sample t-test. A significance value (2-tailed) <0.05 indicates a significant difference between the pre-test and post-test results when using mind mapping in learning. A significance value (2-tailed) >0.05 indicates no significant difference between the pre-test and post-test results when using mind-mapping in learning.

If the results of the paired sample t-test test state a significant difference between the pre-test and post-test scores, proceed with the N-gain test. The normalized gain (N-gain) (Hake, 1998) equation determines how students' learning outcomes after applying the student worksheet are integrated with local wisdom, namely the *sanja kuning* phenomenon.

The improvement of students' science process skills is reviewed from the student worksheet. Assessments of students' science process skills using a 4-0 rating scale indicator is calculates using the equation.

$$X = \frac{f}{N} \times 100\% \quad \ldots (1)$$

Notation:
X= percentage enhancement science process skills
f= science process skills indicator acquisition score
N= maximum score of science process skills indicator

Table 3 Science process skills assessment criteria

No	Students score	Criteria
1	$80 < P \leq 100$	Very good
2	$65 < P \leq 80$	Good
3	$55 < P \leq 65$	Acceptable
4	$40 < P \leq 55$	Poor
5	$P \leq 40$	Very poor

(Suyidno, Nur, Yuanita, & Salam, 2020)

RESULTS AND DISCUSSION

Learning by using student worksheets integrated with local wisdom, the *Sanja kuning* phenomenon, has been carried out in three meetings on light wave material (see Figure 1).

Figure 1 displays of student's worksheet

Descriptive statistical results of pre-test and post-test data are shown in Table 4.

Table 4 Descriptive statistical results of pre-test and post-test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test	4.5000	28	2.61760	.49468
	Posttest	40.5714	28	13.56583	2.56370

The paired t-test results of students' pre-test and post-test are shown in Table 5.

Table 5 The paired t-test results of students' pre-test and post-test

		t	df	Sig. (2-tailed)
Pair 1	Pretest-posttest	-14.430	27	.000

The results of the paired t-test are shown in Table 1. The results of the t-test analysis obtained a value of t = -14.430 with sig (2-tailed) = 0.000, which is smaller than the significance level of 0.05. Thus, the Null Hypothesis is rejected, and the alternative hypothesis is accepted. The results of the paired sample t-test analysis showed a difference between students' initial ability and learning outcomes after applying the student worksheet integrated with local wisdom, the *sanja kuning* phenomenon.

The data analysis was continued by knowing the level of effectiveness of the use of student worksheets in learning by using N-gain so that the following results are obtained in Table 5.

Tabel 5 Result of N-Gain

Based on Table 5, it can be seen that the N-Gain value obtained from the average pre-test and post-test scores is 0.38 with a moderate category. This shows that the improvement has not been at a high level.

The analysis continued by focusing on students' achievement of the science process skill. The achievement of science process skills was assessed based on students' answers in filling out the student worksheet given at each meeting. The science process skill indicators trained and assessed for achievement at each meeting were: formulate problems, formulate hypotheses, identify variables, define operational variables, design experiments, conduct experiments, analyze data, and make conclusions. The results of students' science process skills can be shown in Figure 2.

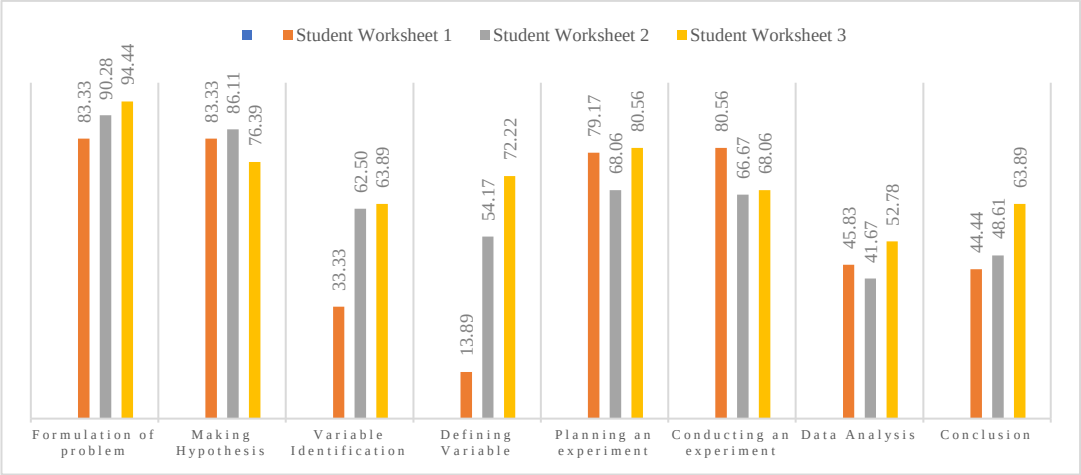

Figure 2 Graph of science process skills

The development of student science process skills in each group can be seen in Figure 3.

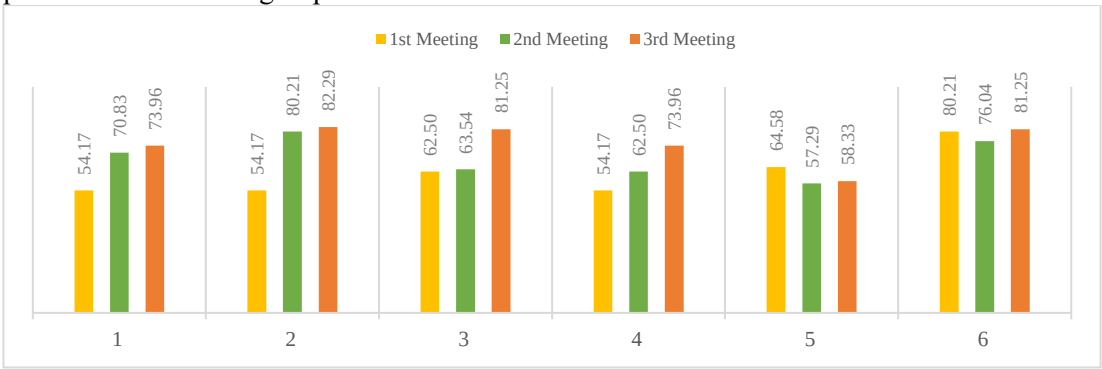

Figure 3 Graph of the development of science process skills for each group

The student worksheet that has been developed can train students' science process skills. In the sixth students' learning outcome test question, there was also an increase in the score obtained by students, so it can be said that integrating local wisdom in learning can improve student learning outcomes. The opinions support this (Hastuti & Rakhmawati, 2023; Khaerani et al., 2020; Uge et al., 2019) that learning based on local wisdom can improve learning outcomes and that the integration of local wisdom can provide knowledge insights for educators. However, the scores obtained by students are still not above the Minimum Completeness Criteria. Scores below the Minimum Completeness Criteria are obtained because the answers from students are correct but still do not reach the desired assessment criteria.

The thing that supports the improvement of student learning outcomes is that the student worksheet developed is valid; learning integrates local wisdom. There are still some shortcomings in the student worksheet, especially in formulating hypotheses, which is an indicator of science process skill to make initial guesses or temporary answers based on manipulation variables and response variables in statement sentences. It was found that there was a decrease in the ability of students to formulate hypotheses. This is because the student's initial knowledge of the material at the meeting three sub-material is still lacking. This agrees with

(Adiningsih et al., 2019; Dewi et al., 2017; Lubis et al., 2022) that students' prior knowledge affects science process skills.

However, there was also an increase in defining variables operationally to describe the variables to be measured. The improvement experienced by students in defining variables is supported by teachers who repeatedly train this skill. This is in accordance with (Adiningsih et al., 2019; Sanjayanti et al., 2022; Yuliarti et al., 2023), who stated that organizing important skills that must be trained repeatedly can train the skills that learners have.

Overall, the results of students' science process skills and students' learning outcomes have increased. Basically, the purpose of student worksheets is to help teachers achieve learning objectives, indicators, and competencies per the curriculum used. (Fatchurahman et al., 2022; Mudjid et al., 2022; Syahfitri & Muntahanah, 2023; Wisnuputri et al., 2023; Widyaningrum & Prihastari, 2020). This is in line with the benefits obtained from using student worksheets, namely that teachers can direct students to develop process skills and scientific attitudes and help teachers monitor the success of students in achieving learning objectives.

CONCLUSIONS

The results of this study conclude that student worksheets integrated with local wisdom have an effect, namely the *Sanja kuning* phenomenon in the teaching of light waves. In addition, the effectiveness is a medium category. This student worksheet can be used as an alternative to learning about light waves. The weakness of the research shows that further development of this student worksheet is needed to maximize the improvement of students' science process skills.

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