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Practicum Ticker Timer with Inquiry Approach to Improve Student Learning Outcomes

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Abstract: This study aims to develop a ticker timer practicum guide with an inquiry approach to improve student learning outcomes in class X MIPA. This research was conducted at SMAN 1 Belik Pemalang with the research subjects being all students of class X MIPA 1 and X MIPA 2 SMAN 1 Belik Pemalang. The research method used is Research and Development. Data collection techniques through tests and observations. The results of the study showed that (1) the ticker timer practicum guide in terms of material and media content shows the practicum guide in the "Very Good" criteria and is suitable for use with an average score of 90% material validation and 92% media. (2) the ticker timer practicum guide with an inquiry approach to improve student learning outcomes, there is a difference in the acquisition of the N-Gain score for the experimental class <G> = 0.68 in the medium category and the control class <G> = 0.30 in the medium category. Thus, it can be concluded that the development of a ticker timer practicum guide with an inquiry approach can improve student learning outcomes but not too significantly.

Keywords: Development of practicum guide; Learning Outcomes; Ticker Timer

Introduction

Education can be said to be a process or a way to acquire more knowledge that one does not yet have. The development of science and technology in Indonesia in the current era of globalization is very influential on life. Technology in education is a system that is used to support learning so that the desired results are achieved (Lestari, 2018). In learning physics, it is closely related to practicum activities. Practicum is one embodiment of scientific work in learning. Through practicum, students are moved to make new breakthroughs. The implementation of a practicum activity really needs a practicum guide as a guide when the activity takes place. The practicum guide is a practicum implementation guide which contains procedures for preparation, implementation, data analysis and reporting (Wahyuni & Rosana, 2019).

Learning activities affect student learning outcomes in class. The student learning outcomes are due to the fact that the teacher is not clear in explaining physics material and does not attract students' attention and in general the teacher is too fast in explaining the subject matter (Nilson, 2008). So that students in understanding and mastering the material are still lacking and the scores obtained by students tend to be low. For this reason, the authors developed learning media in the form of a ticker timer practicum guide with an inquiry approach to improve student learning outcomes which were validated by 2 lecturers at PGRI Semarang University and one physics teacher at SMAN 1 Belik Pemalang to assess the feasibility and validity of the media. The formulation of the research problem is: What is the shape of the ticker timer practicum guide with an inquiry approach to improve student learning outcomes? How to increase student learning outcomes through the implementation of the ticker timer practicum guide with an inquiry approach?

The objectives of this study include: knowing the form of a ticker timer practicum guide with an inquiry approach to improve student learning outcomes. knowing the increase in student learning outcomes through the application of the ticker timer practicum guide.

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Learning changes in behavior carried out by individuals so that there is an addition of knowledge, skills, attitudes as a series of activities towards the development of the whole human person (Hutzler et al., 2019; Nurrita, 2018). Therefo[33] according to Berutu & Tambunan (2018), to measure the success of the learning process, it is necessary to have learning outcomes (Dwijayani, 2019; Hartikainen et al., 2019; Joy & Garcia, 2000; and Yanti et al., 2020). Practicum activities according to Setyaningrum et al. (2013) are activities carried out to improve student skills obtained from learning through experiments or experiments (Gunawan et al., 2019; Darmaji et al., 2019). When carrying out practicum activities, a practicum guide was needed. According to Mahrawi et al. (2022) a practicum guide is a book that presents information to guide or provide guidance to its readers to conduct experiments. Practicum activities can run using the Mundilarto approach in Octavany et al. (2022) it requires active involvement of students by providing opportunities to work together in groups to make observations in order to solve problems and actively participate in completing tasks that are inherently challenging (Alam, 2022; Khoiri et al., 2020; Rasmitadila et al., 2020).

Method

This research develops a ticker timer practicum guide with an inquiry approach using a development research model or called Research and Development. This research was conducted at SMAN 1 Belik Pemalang for the 2022/2023 school year in [13]gust 2022. The population in this study were all 140 students in class X MIPA SMAN 1 Belik [13]malang. The samples used were two classes, namely X MI[13] 1 as a control class with conventional learning and X MIPA 2 as an experimental class, namely assisted learning with a ticker timer practicum guide. The procedures in this study included an introduction, preparation of research instruments in the form of tests, collecting research data, analyzing data, and drawing conclusions (Ratnasari et al., 2018; Thomas et al., 2022). The instrument used to obtain, process and analyze data is a test. Data collection techniques in this study used observation and tests (Day et al., 2016; Hediansah & Surjono, 2019). The data analysis technique used independent sample t-test analysis at a significance level of 5%. Before testing the hypothesis, it is carried out first using the normality test and homogeneity test. Furthermore, to find out the increase in student learning outcomes before and after using the ticker timer practicum guide. Here is the normal Gain equation (Astalini, 2019).

$$\text{N-Gain} = \frac{Posttest\ Score - Pretest\ Score}{Score\ Maximum - Minimum\ Score} \quad (1)$$

Table 1. N-Gain Category

Limitation	Category
$G \geq 0.7$	High
$0.3 \leq G < 0.7$	Midle
$G \leq 0.3$	Low

Result and Discussion

The research entitled "Development of a Ticker Timer Practicum Guide with an Inquiry Approach to Improve Student Learning Outcomes in Class X SMAN 1 Belik[40]emalang" with the validation of media experts from the Physics Education Study Program, PGRI University Semarang and media experts at SMAN 1 Belik Pemalang with a total of 3 validators. The data obtained in this study included media and material validity tests as follows.

Validation Test Results by Media Experts

Instrument validation was carried out by 2 media expert validators (Hikmi et al., 2020). In this research the instrument includes three aspects of assessment with the following data obtained.

Table 2. Media validator test results

Aspect	Validator Score 1 (%)	Validator Score 2 (%)
General View	83	87
Presentation	85	100
Language/Readability	100	100

[30]

Based on the table, the results of the overall recapitulation by media experts show results in a very good category.

Validation Test Results by Material Experts

Table 3. Results of the material validator test

Aspect	Validator Score (%)
Material Coverage	100
Material Accuracy	100
Material Update	75
Stimulate Curiosity	75
Presentation	100

Instrument validation was carried out by 1 material expert validator. In this research the instrument includes three aspects of assessment with the following data obtained. The effect of using the ticker timer practicum guide with an inquiry approach to im[12]ove student learning outcomes can be seen through the pretest and posttest scores in the experimental class and the control class. The following are the learning outcomes obtained from each class.

Table 4. Average pretest and posttest scores in the experimental class and control class

Class	N	Value total Pretest	Average	Value Total Posttest	Average
Control	35	1942	55.48	2433	69.51
Experiment	35	2100	60.00	3074	87.82

Prior to testing the hypothesis to determine the effect of using the ticker timer practicum guide with an inquiry approach to improve student learning outcomes in class X, a prerequisite test was carried out which consisted of a normality test and homogeneity test.

The pretest significance value for the experimental class was 0.23 > 0.05, so the conclusion was that the data were normally distributed, and the posttest significance value for the experimental class was 0.07 > 0.05, so it was concluded that the data were normally distributed.

Table 5. Normality test (liliefors)

Class	Data	N	Sig	Level Significance	Conclusion
Kontrol	Pretest	35	0.81	0.05	Normal
	Postest	35	0.15	0.05	Normal
Eksperimen	Pretest	35	0.23	0.05	Normal
	Postest	35	0.07	0.05	Normal

Homogeneity Test

Tabel 6. Uji homogenitas (Bartlet Test)

Data	Sig	Level Significance	Category
Pretest	0.079	0.05	Homogen
Postest	0.521	0.05	Homogen

Based on the Bartlets test, the pretest significance was 0.079, which means more than 0.05 and the posttest sig value was 0.521, which is more than 0.05. So it can be concluded that the sample comes from the same or homogeneous population.

Hypothesis Test (One Tailed Test)

Based on the results obtained, t_table = 416 with α = 0.05 and t_count = 10.606. Because t_count > t_table is 12,139 > 416 and P <0.05 is obtained, then H0 is rejected so that there is a significant difference between the learning outcomes of experimental and control class students, which means that there is an influence of the ticker timer practicum guide with the inquiry approach to improve learning outcomes.

Table 7. Hypothesis Test (One Tailed Test)

Class	F	T	P	α	Decision	Category
Experiment	416	12.334	0.000	0.05	H0 Accepted	Significantly Different
Control		12.334	0.000	0.05	H0 Accepted	Significantly Different

To find out the average increase between the pretest and posttest results of the two classes. The following is the average increase data based on the N-Gain Test from the results of the pretest and posttest in both classes.

From the gain results it can be seen that the N-gain of the experimental class and the N-gain of the control class have the same criteria, namely "Medium". The experimental class obtained a result of 0.68 and the control class obtained a result of 0.30 which means that there has not been a significant increase in student learning outcomes in the experimental class and control class.

Table 8. Gain Test

Class	Average Pretest	Average Posttest	<g>	Criteria
Eksperimen	60.0	87.8	0.68	Moderat
Kontrol	55.0	69.5	0.30	Moderat

Based on Table 2 and 3, the results of the validation assessment were obtained by media and material experts. The average percentage of media expert validation percentage results is 90% with a very feasible category and the average percentage of material expert validation results is 92% with a very feasible category.

Product revisions were carried out in accordance with the suggestions given by the validator, both media and material experts. Suggestions for improvement given by media and material experts aim to correct the deficiencies of the product or media being developed. The ticker timer practicum guide that has been developed has specifications including: (1) Front cover (front cover), (2) Preface, (3) Table of Contents, (4) Characteristics of the Practicum Guide, (5) Rules of Procedure, (6) Systematics of Compilation of Practicum Reports, (7) Typing Timer Experiment which contains Experiment Objectives, Basic Theory, Tools and Materials, Work Steps, Questions, Conclusions, (8) Bibliography.

The research carried out strengthens research Aprilia et al. (2020) which states that practicum guidelines are declared valid and practical after trials are carried out on a small scale (Rosmaria & Heryani, 2023).

With the acquisition of a percentage of material experts and media experts of 83.01% which is categorized as very good. The suggestions contained in the study are that the practicum guide still needs to be refined for further trials on a large scale. The results of this study also strengthen previous research.

Conclusion

The form of the Ticker Timer Practicum Guide which has been validated by product material contains questions on product feasibility and product suitability with the material, a percentage of 90% is feasible for testing. Media validation with percentages of 87% and 96% with very good or very decent categories. With ticker timer practicum guide product specifications consisting of: front page (cover), preface, table of contents, practicum guide characteristics, rules of procedure, systematic preparation of practicum reports, typing timer experiments which contain objectives, experiments, theoretical basis, tools and materials, work steps, questions and conclusions. The increase in student learning outcomes seen from the n-gain in the experimental class was 0.68 and the control class the results were 0.30 which was classified as moderate, which means that the use of the ticker timer practicum guide with an inquiry approach can improve student learning outcomes but not too significantly.

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