



## Jurnal Pendidikan Fisika

<https://journal.unismuh.ac.id/index.php/jpf>

DOI: 10.26618/jpf.v12i1.14009



# The Effectiveness of Teacher Training in Creating Web-Based Learning Media: An Analysis of Teacher Knowledge

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Received: September 23, 2023; Accepted: December 28, 2023; Published: January 20, 2024

**Abstract** –The background of this research is to produce professional teachers with digital competency through training in making web-based learning media. This study aims to analyze how effective the training on teachers' knowledge in generating web-based learning media is to produce professional teachers. This research used a quantitative study with the one-group pre-test/post-test design approach. This research was conducted by the 20 teachers at SMAN 2 Tondano who trained in making web-based learning media integrated by a project-based learning model (PjBL). Based on data analysis with the N-gain test, this study concludes that web-based learning media creation training on teachers at SMAN 2 Tondano has improved teacher knowledge in a medium category, with an average increase of 43%. The data has also been confirmed through a hypothetical test showing that the  $\alpha < 0.05$  significance value indicates that training activities are running effectively. These results indicate that training can improve teachers' knowledge, support a better learning process, and make teachers more professional with digital competency.

**Keywords:** ICT; teachers training; web-based learning media

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## I. INTRODUCTION

The current digital age presents a more challenging learning environment (Erstad & Silseth, 2023), and teachers require high competence in fulfilling roles and responsibilities to create a good learning system. Teacher competence is essential for effective teaching, as it can positively impact student academic development and skills and help maximize student learning outcomes

(Omar et al., 2018). Competence is the skills and knowledge that enable a teacher to succeed, and a teacher requires a variety of competencies to face the complex challenges of today's world (Pranowo et al., 2023; Zamri & Hamzah, 2019). One of the things that teachers can do in today's technology era is to design ICT-based learning media. Therefore, teachers need to continually improve their competence, one of which is through training.

The advantages of using ICT-based learning media for students are that it can further improve the learning process and the independence of learning (Setuju et al., 2020), and the teacher can become more professional. However, the problem occurs when the teacher's competence in optimizing ICTs is insufficient. Various studies show a lack of teacher competence in shooting ICT-based learning media (Fadly, 2020; Myori et al., 2019; Rudini & Saputra, 2022).

Based on observations made at SMA Negeri 2 Tondano, teachers have yet to utilize digital technology, such as web-based learning media, that can be implemented in learning due to the lack of ICT competency. Moreover, it was also found that the learning process in SMAN 2 Tondano was still using a conventional methods where teacher was dominant on learning process (Teacher Centered Learning-TCL) (Paendong et al., 2023; Siburian et al., 2014). Generally speaking, teachers at SMAN 2 Tondano use textbooks in teaching, use unusable security tools, and have yet to make the most of the ICT lab facilities. Research reports that the barriers to teachers producing learning media are low understanding, difficulties, and time constraints in developing digital media (Falah et al., 2023; Mesra et al., 2022; Rumondor et al., 2023). In this regard, the author has carried out training activities at SMAN 2 Tondano to enhance the competence of teachers in producing ICT-based learning media by creating websites as learning media

(Kamaruddin et al., 2023). Therefore, through this research, we analyze the level of teacher knowledge in improving their competence to assess the effectiveness of this training.

The reports claimed that to improve competence, teachers need to undertake training or courses to enhance their ability to use ICTs as a learning medium (Myori et al., 2019). Using web-based learning media can provide many benefits for students and teachers (Lestari et al., 2020), and several studies have success in generating learning media using websites (Fakhrudin, 2016; Rahman et al., 2014; Setuju et al., 2020). It is in line that students use digital technology to obtain information through the Internet.

The problem is the knowledge level of the teacher at SMAN 2 Tondano, especially on limited ICT competency (Kamaruddin et al., 2023), which needs to be identified. It is also essential to analyze teachers' knowledge in developing their professionalism for future development and management. According to the study report, there are several learning management weaknesses at SMAN 2 Tondano, including instructors' lack of preparation for creating instructional materials due to financial constraints and their hectic schedules (Rumondor et al., 2023) and age factor in adapting to online learning media (Mesra et al., 2022). In line with this, the study examines efforts to enhance the competence of teachers in designing learning media, improving learning effectiveness, increasing student interest in learning,

enhancing students' understanding of learning material, improving the interaction between students and learning materials, and improving the quality of learning (Miftah, 2022).

Therefore, this study aims to analyze teachers' knowledge in generating web-based learning media through training and creating learning websites to produce professional teachers. After analyzing the level of teacher knowledge in training on creating website-based learning media, how effective is the training?

## II. METHODS

The study aims to determine the teacher's knowledge level in producing a website-based learning media. The method used is quantitative with the one-group pre-test/post-test design approach. The sampling technique used in this study was done using purposive samplings. The sample obtained based on the inclusion criteria in the research was 20 respondents, namely teachers at SMAN 2 Tondano. The research was carried out in June-August 2023 at the SMAN 2. Data is collected using a double-selection questionnaire. The instruments used to measure the teacher's level of knowledge in producing a website-based learning media and its intervention evaluation (Pranowo et al., 2023). The research procedure is shown in Figure 1.



**Figure 1.** The research procedure

Figure 1. describes the research procedure for this teacher training, adapted from previous research (Wijaya et al., 2021). The pre/post-test result assesses the cognitive aspects of the final training activities. The given test is a question of double choice analyzed by calculating the score obtained using the correct answer condition, obtaining points 1 (one) and wrong points 0 (zero) (Kurniawan & Hidayah, 2020). The pre-test and post-test scores are analyzed using the gain normality test and confirmed through the hypothesis test. (N-gain). This test is used to determine the effectiveness of the given treatment. Here is the formula used to calculate the gain normality according to Meltzer (2002) (Oktavia et al., 2019).

$$N - Gain = \frac{Posttest\ Score - Pretest\ Score}{Ideal\ Score - Pretest\ Score}$$

The interpreted effectiveness criteria of the normality value gain are categorized in the N-Gain interpretation classification shown in Table 1

**Table 1.** The classification of N-gain interpretation (Kurniawan & Hidayah, 2020; Oktavia et al., 2019)

Interval	Classification
$g > 0.7$	High
$0.3 \leq g \leq 0.7$	Medium
$g < 0.3$	Low

### III. RESULTS AND DISCUSSION

The training for teachers on creating web-based learning media at SMAN 2 Tondano has been successfully implemented (Kamaruddin et al., 2023). Based on the total number of teachers on the Educational Tree Data (<https://dapo.kemdikbud.go.id/>), that is 22 people. However, the teachers who participated as respondents in this study based on the absence and registration of participants were only 20 people. About 90% of the teacher-teachers at SMAN 2 Tondano have participated in this research. Table 2. shows the data characteristics of respondents in this study.

**Table 2.** Participant characteristics

Characteristics	Frequency	Percentage
<b>Gender</b>		
Male	5	25%
Female	15	75%
<b>Age</b>		
<40	6	30%
41-50	8	40%
>50	6	30%
Mean(45,45), STD(7,84), Min(33), Max(59)		
<b>Educational level</b>		
Diploma	2	10%
Bachelor	17	85%
Magister	1	5%
<b>Status</b>		
Civil Servant	19	95%
Non-Civil Servant	1	5%

Based on the data characteristics of respondents obtained, as many as 75% are women, the average age of teachers is 45.6 years, with an undergraduate education background of 85%, and predominantly civil servant teacher status. Similarly, the results of the research show that factors of gender, age, and length of work influence Technological Pedagogical and Content Knowledge (TPACK), which includes teacher skills in using media based on Information and Communication Technology (ICT) (Hapsari et al., 2022). Generally, the teachers at SMAN 2 Tondano have used ICTs like powerpoint presentation and video-based learning. However, the teachers need to be more proficient in using internet-based media and are bound to or familiar with conventional media. Through training activities, teachers are expected to be able to improve their knowledge and motivation in producing learning media based on websites that can link powerpoint presentation, YouTube Learning Videos, and other teaching materials that can be accessed by students in real time.

Figure 2. shows the process of training activities at SMAN 2 Tondano. In this activity, participants were given knowledge and simulation of website creation using the Google Sites platform as a learning medium.



**Figure 2.** The training activities involved making web-based learning media using Google Sites.

There are a variety of platforms that can be used to generate web-based learning media, one of which is Google Sites. The advantages of Google sites are that they are flexible, efficient teachers can design learning materials and tasks, and list (Islanda & Darmawan, 2023; Rosiyana, 2021; Suryana et al., 2023).

A website-based learning media creation training at SMAN 2 Tondano has been successfully carried out, and a learning media website with a domain name <https://www.pkm-sma2tondano.sch.id/home> was produced. Figure 3. shows a website-based learning media start page with a login page that leads to each subject whose access rights are owned by the teachers in charge of the subject. This website-based learning media is integrated with the project-based Learning (PjBL) learning model. The PjBL model was implemented to enhance students' knowledge (Londa & Kamaruddin, 2023). The website-based learning media can align with using the website as a learning resource, medium of teacher and student interaction, project assignment as a form of integration, and facilitating teachers in monitoring and

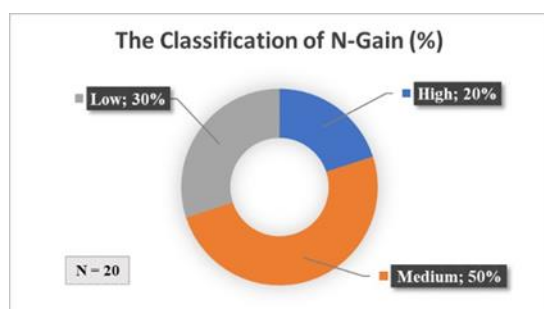
evaluating student learning processes in conducting project-based learning.



**Figure 3.** Display of web-based learning media on the SMAN 2 Tondano using Google sites

An analysis of SMAN 2 Tondano teachers' understanding of web-based learning media using the Google platform was further studied while measuring the effectiveness of training activities. The impact of training treatment and supporting the creation of web-based learning media is carried out by providing proficiency tests before and after treatment following previous research procedures (Kurniawan & Hidayah, 2020; Oktavia et al., 2019). The method used is the pre-experimental method with the one-group pre-test and post-test design approach, where the pre-test is done against a group of research subjects, after which the treatment is given, then the post-test is done with the exact measurement (Oktavia et al., 2019).

The result of the pre-test serves to identify the early knowledge of SMAN 2 Tondano teachers. Based on the data obtained, there is an improvement in the knowledge of SMAN 2 Tondano teachers in web-based learning media creation training. Data from the N-gain test analysis can be seen in Figure 4.



**Figure 4.** The result of the N-gain analysis

Based on the analysis of the N-gain test, as many as 30% belong to the lower category, 50% to the middle category, and 20% to the high category. The average result of the N-gain test obtained is  $g=0.43$  or 43%. This value refers to the classification in the medium category (Kurniawan & Hidayah, 2020; Oktavia et al., 2019). One of the factors or problems teachers face is their ability to adapt to today's digital age, while the average age of teachers in SMAN 2 Tondano is over 45 years. In line with the results, previous research revealed that 53.24% of teachers over 41 had not mastered ICTs (Wicaksono et al., 2020).

Subsequently, a T-test is performed to confirm and evaluate the effectiveness of the treatment given using the Paired Sample T-test method (Lespita et al., 2023). This test, also called a hypothesis test, aims to test temporary assumptions in studies using a degree of significance  $\alpha = 0.05$  (Faisal et al., 2022). The results of a test of hypotheses using Ms. Office Excel are presented in Table 3.

**Table 3.** Results of the Hypothesis Test

t-Test: Paired Two Sample for Means		
	pre-test	post-test
Mean	7,95	11,1
Variance	4,89	2,94
Observations	20	20
Pearson Correlation	0,47	
Hypothesized Mean Difference	0	
df	19	
t Stat	-6,84	
P(T<=t) one-tail	0,00	
t Critical one-tail	1,73	
P(T<=t) two-tail	0,00	
t Critical two-tail	2,09	

Table 3. shows the results of the hypothesis test as the calculated t-statistic. Based on the data shown in Table 3., it is obtained that a significance value  $\alpha=0,00<0.05$ , which means there is an improvement in the result after the treatment is given. These results align with previous studies using the same method (Faisal et al., 2022; Lespita et al., 2023).

The effectiveness of teacher training in creating web-based learning media has been identified by analyzing teacher knowledge during the program. The results claimed that the teachers at SMAN 2 Tondano were enthusiastic about improving their digital competency after 90% participated. Based on the testing design, there was an improved level of teacher knowledge, which means the training was effective. In addition, one of the participants, who was a physics teacher, said that the program was excellent. This program may be conducted primarily for physics

teachers to develop web-based learning media for physics students.

#### IV. CONCLUSION AND SUGGESTION

This research presents the results of an analysis of the improvement of teacher knowledge in generating a website-based learning media in SMAN 2 Tondano. The web-based learning media created in teacher training has been integrated with the project-based Learning Model (PjBL) that teachers can implement in teaching-learning. Based on data analysis with the N-gain test, this study concludes that web-based learning media creation training on teachers at SMAN 2 Tondano has improved teacher knowledge in a medium category with an average increase of 43%. The data has also been confirmed through a hypothetical test showing that the  $\alpha < 0.05$  significance value indicates that training activities are running effectively.

It is recognized that this research still needs to be developed and implemented in learning. Therefore, the researchers recommend further research development, mainly in integrating project-based learning models (PjBLs) through web-based learning media with Google Sites. Teachers can develop web-based learning media to support a better learning process and make teachers professional.

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