



Effectiveness of Interactive Flat Panel (IFP) Training in Improving Teachers' Competence in Lampung Province

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Article History:

Received: 05-09-2026

Revised: 14-09-2026

Accepted: 26-09-2026

Keywords: Interactive Digital Panel, Teacher Competence, Digital Learning, Teacher Training, Educational Technology

Abstract: Digital transformation in education requires teachers to develop competence in using technology pedagogically, including Interactive Digital Panels (IDPs). This community service activity aimed to analyze the effectiveness of IDP training in improving the competence of basic education teachers in Lampung Province based on changes in pretest and posttest scores. The activity employed a quantitative approach with a one-group pretest–posttest evaluation design. The training was implemented through a blended learning approach, consisting of initial learning through a Learning Management System (LMS) followed by two days of face-to-face training. Data from 584 complete pairs of pretest and posttest scores were analyzed using descriptive statistics, the Shapiro–Wilk test, the Wilcoxon Signed-Rank Test, effect size, and N-Gain. The results showed that the mean score increased from 65.92 on the pretest to 71.59 on the posttest, representing a mean increase of 5.67 points. The Wilcoxon test indicated a statistically significant difference between pretest and posttest scores ($Z = 8.426$; $p < 0.001$), with an effect size of 0.349, categorized as moderate. However, the mean N-Gain of 0.0622 was categorized as low. These findings indicate an improvement in participants' achievement following the training, although the relative magnitude of improvement remained limited. The findings highlight the importance of follow-up practice, mentoring, and continuous professional development to strengthen teachers' use of IDPs in learning.

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INTRODUCTION

Digital transformation has become an important part of the development of education in the era of technology-based learning (Palacios-Rodríguez et al., 2023). Digitization of education is no longer just about the use of computer devices and the internet, but includes changes in the way teachers design, implement, and evaluate learning. In this context, teachers' digital competence is one of the important factors because teachers play the role of users as well as designers of technology-based learning experiences (Smestad et al., 2023).

A systematic study shows that teachers' digital competence includes various aspects, including the ability to plan technology-based learning, use technology to support teaching

practices, facilitate students' activities using technology, and develop students' digital skills (Smestad et al., 2023). However, previous research has also shown that the measurement of teachers' digital competence still has a diverse scope and tends to emphasize more on the ability to use technology as a learning tool than on the ability of teachers to design student-centered digital learning activities (Claro et al., 2024).

The need to strengthen these competencies is increasingly relevant in the context of Indonesia's education policy. Presidential Instruction Number 7 of 2025 officially encourages the acceleration of the development and revitalization of educational units as well as the digitalization of learning. Its implementation is realized through the Learning Digitalization Program which includes the provision of Digital Interactive Boards or *Interactive Flat Panel*, laptops, learning materials, and teacher training. The government targets the program to reach 288,865 schools and education units (BPMI Setpres, 2025). In line with this policy, the Indonesian government launched a *Digitization of Learning for Smart Indonesia* on November 17, 2025. This program aims to support the improvement of the quality of learning through the provision of *Interactive Flat Panel* (IFP) for schools throughout Indonesia. The program is also accompanied by efforts to strengthen the capacity of teachers in utilizing digital technology in the learning process (Ministry of Primary and Secondary Education, 2025).

In the context of the implementation of the policy in the regions, The Lampung Province Teachers and Education Personnel Center (BGTK) held a Training on the Utilization of Digital Interactive Boards (PID) for educators in 15 districts/cities in Lampung Province. This activity is directed to improve teachers' competence in optimizing PID as an innovative and interactive learning medium. The implementation of the activity is supported by collaboration with lecturers and academics as well as the assistance of facilitators and the Digital Warrior Teacher community (Munawaroh et al., 2022).

Digital Interactive Board (PID) or *Interactive Flat Panel* (IFP) is known by various terms, including interactive whiteboard (*Interactive Whiteboard/IWB*), *Smart Board*, and digital whiteboards. This device is a large screen with touchscreen technology that allows users to write, draw, operate applications, and interact directly with digital content (Campbell et al., 2019). PID can be used as a touchscreen computer device independently or connected to other computers to support various learning activities (Bourbour, 2023).

Digital Interactive (PID) or *Interactive Flat Panel* (IFP) is one of the digital learning technologies that has great potential to increase interaction in learning and student engagement. Its interactive features allow teachers and students to interact directly with digital learning content and support the integration of various multimedia resources into classroom learning activities (Kurniawan & Hakim, 2024; Riyadi & Ningsih, 2024). Therefore, PID should not be seen only as a replacement for conventional whiteboards or projectors, but as an interactive learning medium that can support more engaging, collaborative, and student-centered learning activities (Siringo Ringo et al., 2026).

However, the availability of digital devices does not automatically drive change in learning practices. Recent studies on PID shows that the acceptance and utilization of technology by teachers is influenced by the perception of usefulness, perception of ease of use, pedagogical competence, training, and infrastructure support (Takulani et al., 2026). Evidence from the implementation of PID in schools in Indonesia also shows that although this technology has the potential to support interactive and student-centered learning, its use may not be optimal when teachers have limited competence in using advanced features or when technical and infrastructure constraints are still ongoing (Hasbullah et al., 2026).

Novelties This community service activity lies in the quantitative evaluation of the Digital Interactive Board (PID) training for teachers at the elementary education level in Lampung Province using data *Pretest* and *Posttest*. In contrast to previous research that focused more on perception, acceptance, and factors that influence the use of PID technology (Takulani et al., 2026). This activity evaluates the changes in participants' knowledge and competencies after participating in the training through a combination of material delivery, demonstrations, hands-on practice, mentoring, and presentations. Thus, this activity provides empirical evidence regarding changes in participants' learning outcomes as well as the level of improvement achieved after participating in the training.

Based on this description, this community service activity aims to analyze the effectiveness of Digital Interactive Board (PID) training in improving the competence of teachers at the elementary education level in Lampung Province based on changes in *pretest* and *posttest* scores.

IMPLEMENTATION METHOD

This community service activity uses a quantitative approach with a *one-group pretest–posttest evaluation design* to measure changes in teachers' competencies before and after participating in the training on the use of Digital Interactive Boards (PID). The training was organized by the Lampung Province Teachers and Education Personnel Center (BGTK) and attended by teachers at the basic education level from districts/cities in Lampung Province. The data analyzed consisted of 584 complete pretest and posttest score pairs. The evaluation design for the implementation of the activity is shown in Figure 1.

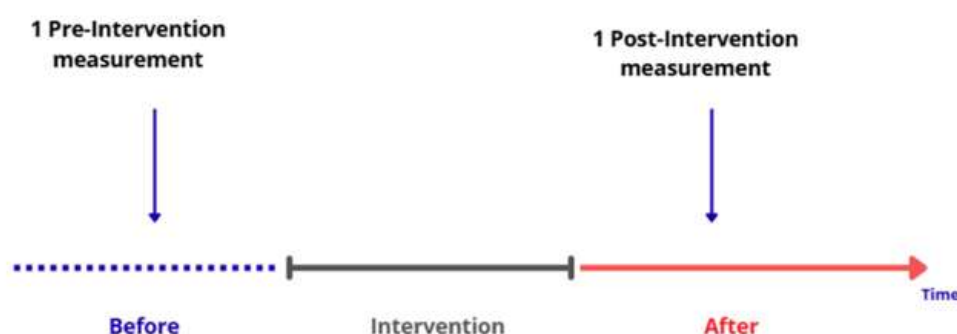


Figure 1. One-Group *Pretest–Posttest Design*

The training was carried out using a *blended learning approach*, namely initial learning through the Learning Management System (LMS) of the Ministry of Education Education Building's Independent Training feature, namely the Utilization of Digital Interactive Boards. for the Dikdas level which was followed by face-to-face training. The pre-training stage through LMS was used as learning and preparation for participants before participating in offline activities. Face-to-face training was carried out for two days involving Digital Warrior Teachers and practitioner lecturers. The stages of activities included *pretest*, material delivery, demonstration, practice use of PID, mentoring, presentation of practical results, and *posttest*. The material includes the concept and operation of PID, the use of PID in learning, the creation of interactive learning media, and teaching practices using PID. PID is used as the main device in participant demonstrations and practices.

Data is collected through tests, documentation, and participant testimonials. Tests in the form of pretest and posttest are used to measure changes in participants' competency achievements before and after participating in training. Documentation is used as supporting data to record the process of implementing activities, including participants' activities during the delivery of materials, demonstrations, practice of using PID, mentoring, and presentation of practical results. Documentation in the form of photos and/or evidence of activities obtained during the implementation of training. In addition, participant testimonials are used as supporting data to describe participants' experiences, benefits, and responses to the implementation of training.

The data was analyzed using *IBM SPSS Statistics*. Descriptive analysis was used to obtain *N*, minimum, maximum, mean, median, and standard deviation of *pretest* and *posttest* scores. Furthermore, *the difference* score between the posttest and the pretest was calculated and the normality test was carried out using Shapiro–Wilk. The results of the normality test showed that the difference data was not normally distributed, so the difference in pretest and posttest scores was analyzed using *the Wilcoxon Signed-Rank Test* at a significance level of 5%. The magnitude of the change was also analyzed through effect size and *N-Gain*. *N-Gain* was used to describe the relative rate of increase in participants' scores, while data by district/city were analyzed descriptively as additional analysis. Participant testimonials were analyzed descriptively to support the interpretation of quantitative results.

RESULTS AND DISCUSSION

Results

The results of community service activities were presented based on the implementation of training and evaluation of participants' achievements before and after participating in the training on the use of Digital Interactive Boards (PID). The presentation of the results included the implementation of activities, descriptive statistics of pretest and posttest scores, comparison of achievements by district/city, testing of score differences, *N-Gain* analysis, and participant testimonials as supporting data. Quantitative analysis was carried out on 584 teachers who had complete pretest and posttest data.

The training on the use of Digital Interactive Boards (PID) was carried out for two days face-to-face as a follow-up to initial learning through the *Learning Management System* (LMS) of the Ministry of Education Houses. The activity involved teachers at the basic education level from districts/cities in Lampung Province with facilitation by Digital Warrior Teachers and practitioner lecturers. The implementation of activities included the delivery of materials, demonstrations of PID operation, the practice of using devices, the creation of interactive learning media, mentoring, and the presentation of participants' practice results.

During the training, participants are directly involved in the operation of PID and its application to support learning. Practical activities provide opportunities for participants to try out device features, develop interactive learning media, and present practical results. Activity documentation shows a series of participant activities ranging from the delivery of materials and demonstrations, the practice of using PID, mentoring, to the presentation of practical results.



Figure 2. Documentation of the implementation of training on the use of Digital Interactive Boards

The results of the evaluation of the training on the use of Digital Interactive Boards (PID) were obtained through the measurement of participants' achievements before and after participating in the training. The analysis was carried out on 584 teachers who had complete pretest and posttest data. The results of the analysis included descriptive statistics, testing the normality of score difference data, testing the difference in pretest and posttest scores, effect measurements, and the level of improvement based on N-Gain.

Table 1. Descriptive Statistics of Pretest and Posttest Scores

Statistics	Pretest	Posttest
N	584	584
Minimum	5	15
Maximum	90	90
Red	65,92	71,59
Std. Deviation	16,69	13,43

Based on Table 1, the average score of participants increased from 65.92 in the pretest to 71.59 in the posttest, with an average increase of 5.67 points. The minimum score increased from 5 to 15, while the maximum score remained at 90. The standard deviation decreased from 16.69 in the pretest to 13.43 in the posttest, which indicates that the spread of participants' scores after training tended to be lower. These results showed a change in the participants' score achievement after participating in the training. The SPSS output showed that the descriptive analysis used 584 valid data for both measurements

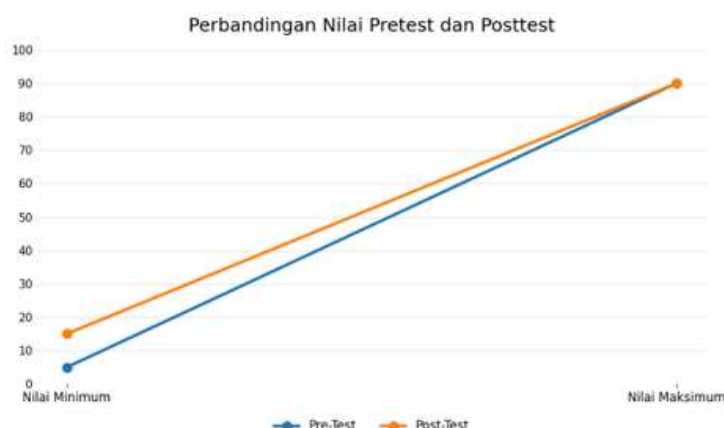


Figure 3. Comparison of minimum and maximum pretest scores d posttest tires of trainees

Figure 3 shows that the minimum value increased from 5 in the pretest to 15 in the posttest, while the maximum value in both measurements remained at 90.

To see the variation in participants' achievements between districts/cities, a descriptive analysis was carried out based on the region of origin of the participants. The results of the analysis are presented in Table 2.

Table 2. Descriptive Statistics of Pretest and Posttest Scores in the District

Regency/City	N	Red Pretest	Mean Posttest	Red
Bandar Lampung	56	60,18	67,05	+6,87
Lampung Barat	29	52,59	71,38	+18,79
Lampung Selatan	46	71,96	70,11	-1.85
Lampung Tengah	27	66,67	74,07	+7,40
Lampung Timur	25	66,40	74,00	+7,60
Lampung Utara	30	70,00	73,00	+3,00
Mesuji	26	70,77	75,58	+4,81
Metro	29	67,59	72,41	+4,82
Pesawaran	49	70,31	71,53	+1,22
Pesisir Barat	24	69,38	73,96	+4,58
Pringsewu	29	70,69	77,93	+7,24
Tanggamus	55	62,91	70,36	+7,45
Tulang Bawang	50	68,00	72,80	+4,80
Tulang Bawang Barat	53	66,79	72,64	+5,85
Way Kanan	56	60,18	67,05	+6,87
Total	584	65,92	71,59	+5,67

Based on Table 2, there are variations in the achievement of pretest and posttest scores between districts/cities. Descriptively, 14 out of 15 districts/cities showed an increase in average scores, while Lampung Selatan showed an average decrease of 1.85 points. The largest increase was in Lampung Barat, which was 18.79 points, from the average pretest of 52.59 to 71.38 in the posttest. The smallest increase was found in

Pesawaran, which was 1.22 points. Other districts/cities showed an average increase of between 3.00 and 7.60 points. These variations showed that changes in participant scores were not completely uniform between districts/cities.

Before determining the analysis technique to test the difference in pretest and posttest scores, a normality test is carried out on the score difference data (*Difference*), which is calculated from the posttest score minus the pretest score.

The results of the Shapiro–Wilk test showed that the difference data was not normally distributed ($W = 0.928$; $p < 0.001$). Thus, the normality assumption for the use of parametric tests was not met. Therefore, the test of the difference in pretest and posttest scores was continued using the Wilcoxon Signed-Rank Test.

The Wilcoxon Signed-Rank test was used to find out if there was a difference in scores between before and after training. The results of the test on 584 data pairs showed a value of $Z = 8.426$ with $p < 0.001$.

Table 3. Differences in Pretest and Posttest Scores

Statistics	Value
N	584
Z	8,426
<i>p</i> (2-tailed)	< 0.001
Effect size (<i>r</i>)	0,349

These results showed that there was a significant difference between pretest and posttest scores. The effect size of $r = 0.349$ showed an effect in the medium category. Thus, statistically there was a change in participants' score achievements after participating in the training.

To complete the score difference test, an N-Gain analysis was conducted to describe the level of improvement in participants' achievement by considering the initial score and the maximum score that could be achieved. The results of the analysis are presented in Table 4.

Table 4. Descriptive Statistics of N-Gain

Statistics	Value
N	584
Red	0,0622
Median	0,1429
Std. Deviation	0,44865
Minimum	−3.50
Maximum	0,83

The results of the analysis showed that the average N-Gain was 0.0622, which was included in the low category. The median value of 0.1429 was also in the low category. The fairly wide range of N-Gain, which was from −3.50 to 0.83, showed a variation in the change in achievement between participants.

These findings suggest that the statistical significance and the rate of improvement of N-Gain provide different information. The Wilcoxon test showed that the change in pretest and posttest scores was overall significant, while the N-Gain showed that the magnitude of the increase relative to the initial score was still in the low category. Therefore, the results

of the study are incorrect if it is only concluded that the training resulted in a high improvement based on the N-Gain.

In addition to the results of the quantitative evaluation, participant testimonials were used as supporting data to describe participants' experiences and responses during training. Three testimonials were selected representatively to provide an overview of participants' experiences in understanding the use of PID, following practices, and seeing the benefits of using PID in learning.

Table 5. Participant Testimonials on the Implementation of Training

Aspects	Participant Code	Testimonials
Understanding the use of PID	P1	"This training helped me understand how to use Digital Interactive Boards and their features in learning."
Practical experience	P2	"Hands-on practice has made it easier for me to understand the use of PID and try to create interactive learning media."
Benefits in learning	P3	"After participating in the training, I gained new experience in utilizing PID to make learning more interactive and interesting for students."

Based on the three testimonials, the participants' experiences during the training can be used to complement the quantitative findings by providing an overview of the learning process and direct experience in utilizing PID. The participants' testimonials also provide supporting information about the training aspects felt by the participants, especially related to the understanding of the use of the device, practical experience, and its benefits in supporting learning.

Discussion

The results showed that the training on the use of Digital Interactive Boards (PID) was followed by an increase in participants' scores from an average of 65.92 in the pretest to 71.59 in the posttest. The increase of 5.67 points was reinforced by the results of the Wilcoxon test which showed a significant difference between the scores before and after the training ($Z = 8,426$; $p < 0.001$), with an effect size of $r = 0.349$ which is in the medium category. These findings show that the training provided is related to changes in participants' achievements after participating in the activity. These results are in line with the research Munawaroh et al. (2022) which shows that digital competency training programs can be used to improve the digital competencies of elementary school teachers.

This improvement can be understood from the characteristics of training that not only provides material delivery, but also involves demonstrations, practice using PID, creation of interactive learning media, mentoring, and presentation of practical results. This approach provides an opportunity for teachers to gain hands-on experience in using technology while connecting it with learning needs. These findings are in line with systematic review Amemasor et al. (2025) which shows that the professional development of teachers for the integration of digital technology is more supportive of change when it involves practical training, collaborative learning, ongoing mentoring, and institutional support.

The findings of the study also show that increasing competence in the use of technology is not sufficiently understood as mastering the technical aspects of devices. Teachers' digital competence includes the ability to use technology to plan and carry out

learning and integrate it pedagogically. Claro et al. (2024) Through a systematic review of the research on teachers' digital competencies, it is shown that these competencies include the use of technology for learning planning, teaching practices, student activities, and 21st century skill development. Thus, PID training activities that combine device introduction with the practice of media creation and learning simulation have relevance to the development of more comprehensive teachers' digital competencies.

The specific context of the use of PID also reinforces the relevance of the research findings. Soepriyanto et al. (2026) report that interactive teaching material development training by optimizing features *Interactive Flat Panel* It is necessary because the ownership of devices has not been automatically followed by the ability of teachers to develop teaching materials that make optimal use of interactive features. This shows that the provision of digital devices needs to be followed by strengthening teachers' capacity so that technology does not stop at its function as a presentation tool, but can be used as part of a learning strategy. Research on teacher acceptance of IFP also shows the importance of aspects of teacher acceptance and perception in the use of technology in learning.

Nevertheless, the N-Gain results showed an average value of 0.0622 which was in the low category. These findings need to be read carefully and do not contradict the results of the Wilcoxon test. The Wilcoxon test showed that the change in pretest and posttest scores was statistically significant, while the N-Gain described the magnitude of the increase relative to the available room for improvement from the initial score. Thus, the statistical significance does not necessarily indicate that the relative improvement of participants is in the high category. The fairly wide range of N-Gain, which is -3.50 to 0.83 , also indicates a heterogeneity of changes in participants' achievements.

A low N-Gain value may be related to a relatively diverse initial condition of participants. Differences in experience using technology, pre-training device mastery, and ability to integrate technology into learning may cause participants' responses to training to be inconsistent. It shows that teachers' digital competencies are influenced by a number of factors, including experience, technology use, teaching practices, and attitudes toward technology. Therefore, training with limited duration may not be enough to produce a high relative improvement in all participants, especially when participants' initial abilities are very diverse. (Claro et al., 2024)

These findings also provide important implications for the implementation of PID training. Training should not stop at face-to-face activities, but needs to be continued through practice in schools, mentoring, sharing of good practices, and technical support on an ongoing basis. Amemasor et al. (2025) emphasizing that teachers' professional development for technology integration will be more meaningful when carried out in a continuous, contextual, collaborative manner, and accompanied by mentoring. Thus, the results of this research can be the basis for developing a PID training follow-up model that provides opportunities for teachers to apply the skills acquired in the context of real learning.

The variation in achievement between districts/cities also shows that the impact of training is not entirely uniform. A total of 14 out of 15 districts/cities showed an increase in average scores, but the magnitude of the increase varied. West Lampung showed the largest average increase of 18.79 points, while South Lampung experienced an average decrease of 1.85 points. These variations indicate that participant characteristics and initial conditions may need to be considered in the design of teacher digital competency development programs. Because the inter-district/city analysis in this study is descriptive,

these differences cannot be used to conclude that one region has higher training effectiveness than others.

Overall, the results of the study provide empirical evidence that there was a change in teacher score achievement after participating in PID utilization training, with a moderate effect size. However, the low N-Gain value suggests that the increase is still relatively limited when compared to the potential increase based on the initial score of each participant. Therefore, the research findings are more appropriate to interpret as evidence of an increase in achievement after training, rather than as evidence that the training has resulted in a high competency increase in all participants. This interpretation is also important because the research design used one group without a control group, so the observed changes cannot be fully attributed to training alone.

CONCLUSIONS AND SUGGESTIONS

Based on the results of the evaluation of 584 pretest and posttest data pairs, the training on the use of Digital Interactive Boards (PID) showed a change in participants' achievements after participating in the activity. The average score increased by 5.67 points, from 65.92 in the pretest to 71.59 in the posttest. The results of the *Wilcoxon Signed-Rank Test* showed a significant difference between the pretest and posttest scores ($Z = 8.426$; $p < 0.001$), with an effect size of 0.349 in the medium category. However, the average N-Gain value of 0.0622 showed that the relative improvement rate of participants was still in the low category.

Thus, PID utilization training provides evidence of an increase in participants' achievement after participating in the training, but the increase has not shown a high level of achievement in all participants. These results confirm the need for follow-up in the form of practices in the use of PID in learning, mentoring, sharing good practices, and professional development in a sustainable manner. For program organizers, the results of this evaluation can serve as a basis for designing advanced training that is more contextual and oriented towards the application of technology in real learning.

ACKNOWLEDGMENT

The author expressed his gratitude to the Lampung Province Teachers and Education Personnel Center (BGTK) for organizing and supporting the implementation of the Digital Interactive Board Utilization Training (PID) for teachers at the elementary education level in Lampung Province. Thank you also to the facilitators of Digital Warrior Teachers, facilitators, practitioner lecturers, and all training participants from 15 districts/cities who have actively participated in each stage of the activity. The support and collaboration of various parties have contributed to the implementation of this activity and the preparation of this evaluation.

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