



# SPIES Training Model to Improve Teacher's Competence in 21<sup>st</sup> Century Learning

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## ABSTRAK

Model pelatihan SPIES dalam materi Collaborative Learning berfungsi sebagai alat untuk meningkatkan kompetensi guru dalam pembelajaran abad 21. Sintaksis pelatihan ini membantu guru dalam memahami konsep dan praktik Collaborative Learning. Penelitian ini bertujuan untuk menghasilkan sintaksis pelatihan yang lebih kolaboratif yang disebut model pelatihan SPIES dan meningkatkan kompetensi mengajar guru. Jenis penelitian ini yaitu penelitian pengembangan. R&D ini menerapkan model Borg and Gall yang terintegrasi dengan model pelatihan Dick and Carrey. Pengumpulan data dilakukan dengan menyebarkan kuesioner, wawancara mendalam, pre-test, dan post-test. Subjek penelitian ini adalah 15 guru dari tiga sekolah swasta. Pakar yang memvalidasi desain dan materi memastikan model pelatihan dan kelayakan materi. Analisis data yang dilakukan meliputi uji validitas dan reliabilitas terhadap instrumen yang digunakan. Untuk memeriksa pengaruh pelatihan dilakukan uji distribusi normalitas dan uji t berpasangan. Hasil penelitian ini adalah model pelatihan SPIES telah divalidasi oleh ahli dengan tingkat kelayakan 88,24% (sangat layak). Pemeriksaan kelayakan material persentasenya adalah 91,67% (sangat layak). Hasil uji-t menunjukkan bahwa post-test berbeda dengan pre-test. Model pelatihan SPIES efektif untuk meningkatkan kompetensi guru dalam pembelajaran abad 21. Disimpulkan bahwa model pelatihan SPIES layak diterapkan untuk meningkatkan kompetensi guru.

## ABSTRACT

The SPIES training model in Collaborative Learning materials serves as a tool to improve teacher competency in 21st-century learning. This training syntax helps teachers understand Collaborative Learning concepts and practices. This study aims to produce a more collaborative training syntax called the SPIES training model and improve teacher teaching competence. This type of research is development research. This R&D applies the Borg and Gall model, which is integrated with the Dick and Carrey training model. Data was collected by distributing questionnaires, in-depth interviews, pre-test, and post-tests. The subjects of this study were 15 teachers from three private schools. Experts who validate the design and materials ensure the training model and material feasibility. The data analysis included testing the validity and reliability of the instruments used. The normality distribution test and paired t-test were carried out to examine the effect of training. The results of this study are that the SPIES training model has been validated by experts with a feasibility level of 88.24% (very feasible). The material feasibility check percentage is 91.67% (very possible). The t-test results show that the post-test is different from the pre-test. The SPIES training model is effective for increasing teacher competency in 21st-century learning. It was concluded that the SPIES training model is feasible for improving teacher competency.

## 1. INTRODUCTION

Amidst the rapid growth of globalization, the way people live change due to the technology development. Therefore, the need of people acquiring 21<sup>st</sup> century skills is inevitable. The 21<sup>st</sup> century skills required is called the 4C (creative thinking, critical thinking, communication, and collaboration skills) (Ratama et al., 2021; Sitompul et al., 2019; Tang et al., 2020). People having these skills are claimed to be more ready to compete in the globalization. Realizing and responding this situation, schools have

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been adjusting education's goals and the teaching learning methods. As a result, educators should keep innovating to meet these needs so that students are ready to compete and survive in work life (Izzuddin, 2021; Septikasari & Frasandy, 2018). One way to improve teachers' competence is by attending trainings. Previous study stated in his research that educators need training in which there are activities that promote technology and communication skills to improve 21<sup>st</sup> century teaching skills (Cigerci, 2020; Erdoğan, 2019). The effort to improve teachers' competence has already been done. Nevertheless, previous study found out that the trainings held are still not adequate to fulfil the need (Ocampo, 2021). One of the supporting data for this insufficiency is the result of an examination to assess teachers' competence in teaching in Indonesia held by Indonesia Education Ministry. The standard score for this test in 2019 was 55 yet the average score for pedagogic and professional competences of the teachers was 53. This could imply that many teachers still did not meet the expected standard competence.

The lack of this competence may also influence the learning quality at schools. One situation that shows this correlation is PISA test result that was attended by representatives of Indonesian students in 2018. At that time, the result released showed that Indonesia was at the 68<sup>th</sup> place out of 72 participant countries. PISA tests 15 year old students' reading and numeracy skills. From the result, it can be concluded that Indonesian students' reading and numeracy skills are still below the OECD standard average (Hewi & Shaleh, 2020; Kurniati et al., 2018). Considering the situations and problems above, there is specific need to upgrade teachers' competence to be more relevant to 21<sup>st</sup> century learning need. A training model that can promote the development 4C skills components is needed (Frerejean et al., 2021; Ye & Xu, 2023). One method that can be done is applying a combination of knowledge sharing, peer teaching, implementation, evaluation, and academic supervision activities. Knowledge sharing is an activity done to exchange information or knowledge that happens between two persons or group of people. The aim of this activity is to create or to apply knowledge together (Castaneda & Durán, 2018; Laakso et al., 2021). Furthermore, it is explained that this activity really depends on the individual or group willingness or initiative. This process is important to enhance or improve academic performances (Rasto et al., 2021). In the research, there was a significant relation between knowledge sharing implementation and competence. Another research about knowledge sharing implementation (Huie et al., 2020). From the research, there was a finding about organizations that implement knowledge sharing management tend to be more competitive and able to survive among competition. Organizations that can grow sharing culture can maintain their competitive level. The reason of this achievement is when knowledge sharing becomes a culture, the people in the organization will be more motivated to keep adding their knowledge and applying the new knowledge. Therefore, later on, the instructor of this training model is the colleague or partner from the same school. The next step of the training is peer teaching. Peer teaching strategy is chosen as it facilitates collaboration among instructors and training participants. Previous study did a critical literature review about peer teaching titled "Peer-to-peer Teaching in Higher Education: A Critical Review" (Stigmar, 2016). This review overlooked the impacts of peer teaching both on the tutor and the students. From some researches reviewed, peer teaching had a huge impact on pedagogical benefit such as critical thinking, independent learning, motivation, collaboration, and communication. Besides effecting those areas, peer teaching is also advantageous to higher order thinking skills and students learning strategy (Lu et al., 2021).

Peer teaching may have these great impacts since the participants involved having the same level of knowledge (Febianti, 2014; Rees et al., 2015). In peer teaching process, they do a cooperative problem solving process in a respectful and understanding atmosphere. Implementation would be a great step to foster the knowledge after the sharing and peer teaching processes accomplished. Implementation is so called actual use of innovation to what extent innovations consist of practice. This practice is expected to give positive impacts on the knowledge, skills, and attitude growth (Haryani et al., 2021; Nurhikmayati, 2019). Referring to previous study several benefits can have of implementing new knowledge are identifying potential problem, getting the right data, faster troubleshooting on the problem, reducing time needed to solve the problem, getting more satisfied customers and company growth, in this case students and schools (Hashmani et al., 2016). The last step of the model is supervision. Supervision is an action to assist and refine. Different from evaluation, supervision aims at collaborating with teachers in enhancing teaching learning processes (Hartono, 2019; Hoy & Forsyth, 1986). Focusing on the goal, the supervision applied in this model is academic supervision. Academic supervision focuses on improving teachers' pedagogical competence. By having better pedagogical competence, it is hoped that students will have better teaching learning process (Marzano et al., 2011; Suarga, 2019). However, some researches also find that supervision do not always positively affect teachers' performance. The underlying reason was because not because the act of supervision itself. Instead, the poor management and planning decisions, also the type of supervisory practices influence this moderate to low impact on teachers' performance (Hoque et al., 2020; U-Sayee & Adomako, 2021). But, as long as the academic supervision is carried out

well, there is significant positive effect on teachers' performance. There are three steps to conduct the supervision. The steps are pre-supervision, class observation, and post-observation. The pre-supervision is done before the teaching learning process run or before the teacher teaches in the classroom. During this pre-supervision meeting, supervisor explains the goal and the points observed, also explores more about the teaching plan. During the classroom observation, supervisor takes field notes which later will become the items for discussion with the teachers. At the last step, post-observation, teachers may share their reflection toward the teaching learning process. Here, supervisor can give if there are any suggestions to the teachers in a supportive manner. Based on the description above, it would be interesting to develop a collaborative training model to improve teachers' competence. Hence, this study aims at developing a Sharing, Peer Teaching, Implementation, Evaluation, and Supervision (SPIES) training model in collaborative learning material to enhance teachers' competence in 21<sup>st</sup> century learning. To analyze the effect of this training model on teachers' competence, the result of pre-test and post-test will be compared.

**2. METHOD**

This research and development (R&D) integrated with Dick and Carrey training development model (Borg et al., 2003). Borg and Gall model has ten steps, but this research will only use five steps. The steps are research and information collecting, planning, preliminary form of product developing, preliminary field testing, and main product revision. While the approach of this R&D is mixed approach, that is quantitative and qualitative approaches. The first step of Borg and Gall model R&D, research and information collection, the information of previous trainings are collected. The information includes the implementation of previous trainings, weakness and strengths of the trainings, and suggestions for the trainings. Besides that, literature studies about training theories and teachers' competence were also collected. The data was collected by having in depth interview with school principals of subject schools about previous trainings and supervision process and result. Information collection is also done by distributing survey via Google Form to 50 non-government junior high schools teachers.

From the information, the process is continued by doing data analysis. The analysis consisted of analysing material facts, concepts, laws, theories, and procedures. The second step is planning. Some activities done in this step are defining specific training goals (the ability or competence to be achieved after the training) based on data analysis at the first step; designing training model book outline, training syllabus, and training module outline; setting the validation instruments, pre-test and post-test for the training, and designing the instrument for the training process evaluation. In preliminary form of product developing step, training model book and training module is compiled based on the outline. In the training model book there are the underlying theories, product description, training steps, and guideline for school and instructors. Besides training model book and training module, instruments needed are prepared in this stage. Proceeding the research and development is the preliminary field testing. Some testings done in this stage are validating the training model and material by two validators; field tests of the training model and material with the subjects are 15 teachers from SMP Al Islam Kudus, SMP Muhammadiyah 1 Kudus, and SMP Masehi Kudus. The study was conducted in May 2023. The subjects did a pre-test, got training, and did a post-test to check if there is any difference after the training. After the field tests are done, revisions get from the validators are then used to revise the preliminary product. The result of this revision will be the main product. Other sources of this step are the validity and reliability test of the instruments used in the experiment. The validity and reliability tests are done using the Alpha Cronbach and Pearson test. To analyze whether SPIES training model has positive effect on teachers' competence, the pre-test and post-test result will be compared using Paired Sample T Test.

**3. RESULT AND DISCUSSION**

**Result**

From the research and information study of 50 respondents using Google Form, it is known that 78% teachers only apply 4C learning for 50 – 75% of all their materials. 12% of 50 teachers always apply 4C learning in every meeting. And 5 teachers of 10% from respondents rarely apply the 4C learning in their classes. Reliability statistics on preliminary questionnaire is show in Table 1.

**Table 1.** Reliability Statistics on Preliminary Questionnaire

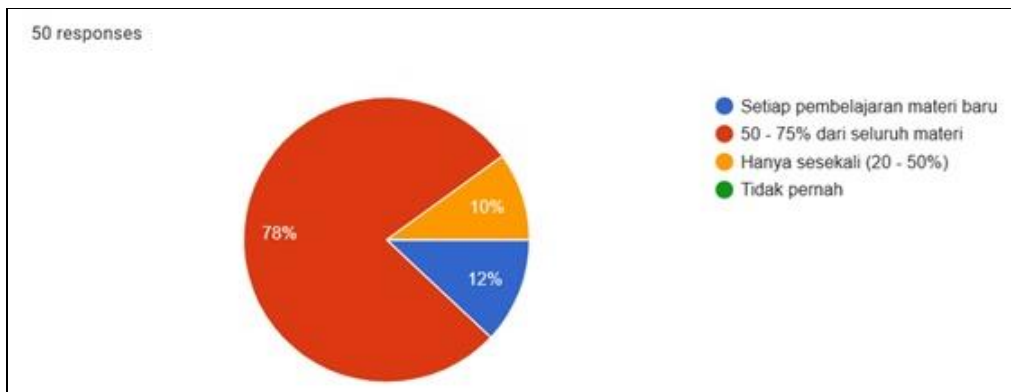
Cronbach's Alpha	N of Items
0.864	5

The result of preliminary questionnaire reliability statistics using Cronbach's Alpha is 0,864. The statistics is claimed reliable if the value is more than 0,6. Therefore, it can be concluded that the preliminary questionnaire is reliable since the Cronbach's Alpha value is bigger than 0,600 (0,864 > 0,600).

**Table 2.** Validity Statistics on Preliminary Questionnaire

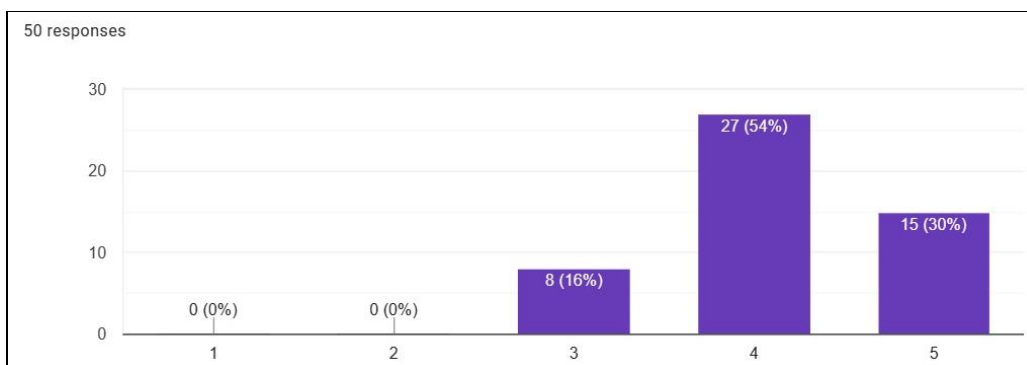
No	Item	$r_{total}$	Sig. (2-tailed)	$r_{table}$ $\alpha=0,05$	Criteria
1	P1	0.679	0.000	0,361 $\alpha=0,05$	Valid
2	P2	0.753	0.000		Valid
3	P3	0.909	0.000		Valid
4	P4	0.909	0.000		Valid
5	P5	0.809	0.000		Valid

Table 2 lists the result of validity statistics on the preliminary questionnaire. The questionnaire consists of 5 questions. An item is valid if the value of  $r_{total} > r_{table}$  and the significance value is smaller than the  $\alpha$  (0,05). And the value is considered very significant if the value is smaller than 0,01. From the table it is concluded that all the items are valid and significant because the  $r_{total} > 0,2732$  and the significance value < 0,01. Percentage of teachers applying 4C learning methods is show in Figure 1.



**Figure 1.** Percentage of Teachers Applying 4C Learning Methods in Their Classes

Base on Figure 1 show the percentage of teachers applying 4C learning methods in their classes. 78% state 50-75% covers all of material. 12 percent state every new learning material. And 10 percent state very rarely. Percentage of teachers' agreement about school facilitation on joining 4C learning training is show in Figure 2.



**Figure 2.** Percentage of Teachers' Agreement About School Facilitation on Joining 4C Learning Training

It is known from Figure 2, 30% strongly agree and 16% somehow agree that school facilitated teachers participating 4C learning trainings. In the questionnaire, there is a qualitative question about some reasons why teachers are reluctant to implement 4C learning. Most respondents answer that students' readiness for collaborative learning technique hinders them from implementing collaborative learning. Few teachers answer that they still need a time management skill. Few more teachers answer



that they run out of time to discuss all materials planned. Front layout of training model book is show in Figure 3.



Figure 3. Front layout of Training Model Book

During the interview with school principals, it is known that there are some conditions underlying causes why teachers are reluctant to apply 4C learning. The principal one of the schools, FI, stated that the trainings held so far were only for teacher representatives. So, not all teachers got the same knowledge. The principal also explained that it was not compulsory for the teachers to implement the knowledge or skills acquired from the training. Another challenge in implementing collaborative learning is because teachers still focus on material accomplishment, and not competence and skill mastery. AZ, the other principal supported this statement by saying that many times there were no monitoring and evaluation process after the trainings were done. Therefore, the training committee never check whether or not the skills taught implemented in each school. Besides that, school also almost never do a supervision related to the training result. Hence, teachers feel that it is not obligatory for them to implement their new knowledge.

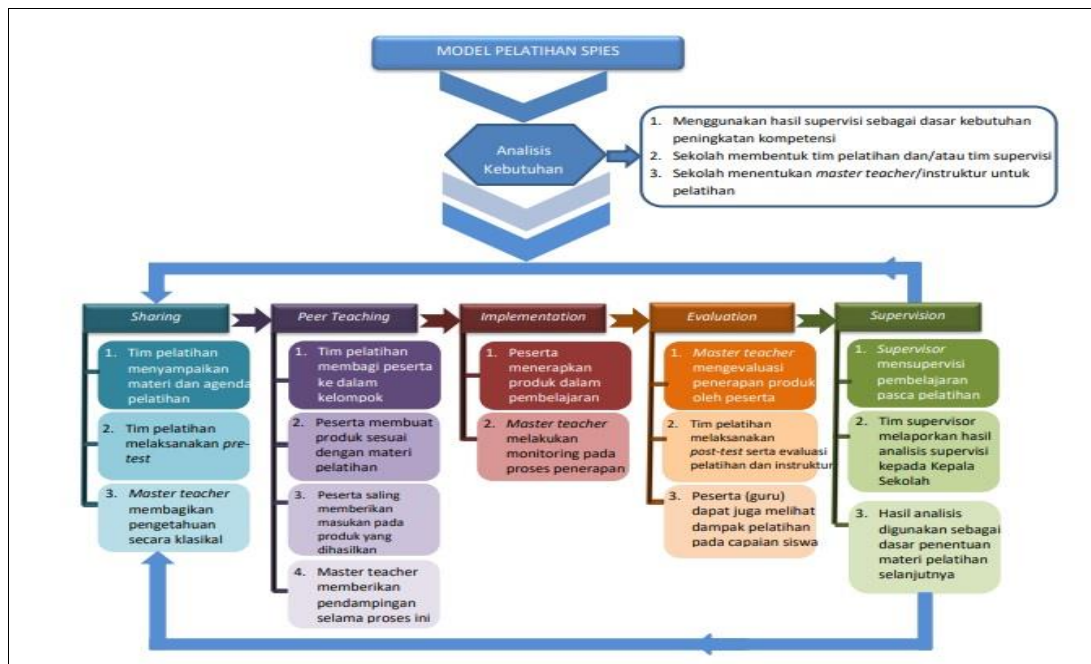


Figure 4. SPIES Training Model and Guide for Schools and Instructors

Base on Figure 4, SPIES training model consists of six steps. The steps are Need Analysis, Sharing, Peer Teaching, Implementation, Evaluation, and Supervision. Each step is equipped with explanations of

activities done by school, instructors, and training participants. The model book is also completed with examples of documents and instruments needed to implement the training model. The training model has been validated by training design experts. The percentage of feasibility is 88,24%. Suggestions for improvement from training design expert were to be consistent in the layout style and to standardize the writing template and to give more applicable explanation for the model. While the percentage of training material feasibility test by expert is 91,67%. The percentage is included as very feasible. The suggestion for the training material is mostly about the layout setting in order to be more interesting to read. Another suggestion is adding more pictures to make the layout more attractive and easier to understand. Validity statistics on pre-test and post-test questionnaire is show in **Table 3**.

**Table 3.** Validity Statistics on Pre-Test and Post-Test Questionnaire

Cronbach's Alpha	N of Items
0.954	20

**Table 3** shows the Cronbach's Alpha of the pre-test and post-test questionnaire is 0.954. The value 0.954 shows reliability of the questionnaire. It is because the value is bigger than 0.600 (0.954 > 0.600).

**Table 4.** Validity Statistics on Pre-Test and Post-Test Questionnaire

No	Item	$r_{total}$	Sig. (2-tailed)	$r_{table}$ $\alpha=0.05$	Criteria
1	P1	0.868	0.000	0.361 $\alpha=0.05$	Valid
2	P2	0.300	0.278		Invalid
3	P3	0.696	0.004		Valid
4	P4	0.790	0.000		Valid
5	P5	0.842	0.000		Valid
6	P6	0.868	0.000		Valid
7	P7	0.692	0.004		Valid
8	P8	0.842	0.000		Valid
9	P9	0.637	0.011		Valid
10	P10	0.883	0.000		Valid
11	P11	0.636	0.011		Valid
12	P12	0.574	0.025		Valid
13	P13	0.842	0.000		Valid
14	P14	0.743	0.002		Valid
15	P15	0.743	0.002		Valid
16	P16	0.766	0.001		Valid
17	P17	0.743	0.002		Valid
18	P18	0.742	0.002		Valid
19	P19	0.863	0.000		Valid
20	P20	0.863	0.000		Valid

**Table 4** lists the result of validity statistics on the pre-test and post-test questionnaire. The questionnaire consists of 20 questions. An item is valid if the value of  $r_{total} > r_{table}$  and the significance value is smaller than the  $\alpha$  (0,05). And the value is considered very significant if the value is smaller than 0,01. From the table, it is shown that only 1 out of 20 questions is invalid. This is because the  $r_{total} < r_{table}$ , that is  $0,300 < 0,361$ . And in some items, the significance is below 0,05.

**Table 5.** Normality Test of pre-test and post-test result distribution

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
pre	0.236	15	0.024	0.842	15	0.013
post	0.235	15	0.025	0.854	15	0.020

Base on **Table 5**, the result of the normality test for pre-test and post-test results shows that Sig. for pre-test is 0,13 and for post-test is 0,13. Data distribution is normal if the Sig. value is more than 0,05. The table shows that both pre-test and post-test results are above 0,05. The results are  $0,13 > 0,05$  and

0,20 > 0,05. Therefore, it is concluded that pre-test and post-test data are normal. Distribution of participants' pre-test and post-test results is show in Figure 6.

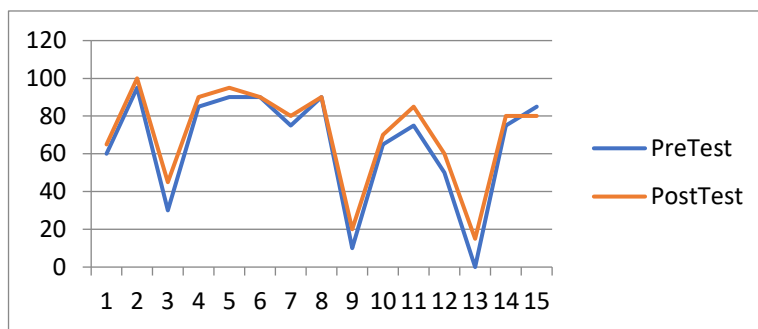


Figure 6. Distribution of Participants' Pre-Test and Post-Test Results

Figure 6 is the graphic of the participants' score distribution for pre-test and post-test. The graphic shows there is difference between the pre-test and post-test of collaborative learning comprehension achieved by the participants. The blue line represents pre-test result and the red line represents post-test result. Visually, the difference between the two lines is majority the participants get higher post-test individual scores compared to individual pre-test scores. Although there is one participant got higher the pre-test results are higher than the post-test results and one participant got the same result for pre-test and post-test. Paired samples statistics is show in Table 7.

Table 7. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre	64.67	15	29.729	7.676
	post	71.00	15	26.063	6.729

Table 7 shows the mean, the amount of participants, standard deviation for pre-test and post-test results. The mean for post-test is higher than the mean of pre-test. The standard deviation and standard error mean of post-test are lower than the pre-test. Paired samples correlations is show in Table 8.

Table 8. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pre & post	15	0.991	0.000

Table 8 shows the correlations of pre-test and post-test. The value is 0,991. This means that two tests are correlated positively and significantly. Paired samples test on pre-test and post-test results is show in Figure 9.

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pre - post	-6.333	5.164	1.333	-9.193	-3.474	-4.750	14	.000

Figure 9. Paired Samples Test on Pre-Test and Post-Test Results

Table 9 shows the result of paired samples test from the pre-test and post-test results. The effect of SPIES training model can be evaluated by comparing probability value  $\alpha = 0,05$  with significance value (Sig.). The Sig. (2-tailed) is 0,000. It is lower than the  $\alpha = 0,05$  ( $0,000 < 0,05$ ). Hence, the training shows a positive impact on participants' comprehension on collaborative learning.

**Discussion**

This situation is in tune with the principal respondents' interview result. The principal stated that teachers already participated in 4C learning trainings. Yet, the implementation is still limited. According to

the principals, some teachers still emphasize on the material accomplishment than skills mastery. The principal also explained that the lack of monitoring and evaluation on the training result implementation can be one of the reasons. Another reason of not implementing collaborative learning was some teachers still do not have the knowledge and skills to implement this as not all teachers participated in trainings. The preliminary research questions show that teachers already got trainings. However, due to some conditions, teachers are still reluctant to implement the knowledge. The training procedure that only aims at adding new knowledge and information do not encourage the teachers to implement the knowledge and information. This result is in accordance with previous study stated that a new training strategy is needed to enforce teachers to have better competence. A more communicative and interactive training is needed (Ocampo, 2021).

The training syntax in SPIES training model adapt a more collaborative technique. As the first step is need analysis. The need analysis aims at getting information on the training materials needed by teachers. School principal or supervision team may use the supervision result from the previous semester to decide the materials (Andriani & Wibawanta, 2020; Ussarn et al., 2022). From need analysis, school principal also will be able to appoint the instructor or the so called master teacher. It is hoped that the master teacher who is also a teacher will boost the establishment of sharing knowledge culture. Sharing knowledge activity will help the people in a school to be more competitive. Restating previous study sharing culture can foster the habit of getting new knowledge and apply it in an organization (Huie et al., 2020). Hence, the organization will keep innovating. Here, it is adaptable for school situation. So, the teachers will not be reluctant to new knowledge. Instead, teachers will be more motivated in implementing better teaching competence. To start the training, the participants took a pre-test on collaborative learning. Then, it was proceeded by the training process. The sharing step also will give example of collaborative learning technique. Previous study describes that one kind of social interaction and typical learning process that involve active and constructive learning is called collaboration (Saenab et al., 2019). The next step is peer-teaching. The peer teaching process put the master teacher and the teachers as participants at the same level. This situation then is beneficial on participants' material comprehension, motivation, and socialization (Paul et al., 2021; Ullah et al., 2018).

Implementation becomes an important part since it gives the opportunity for the teachers to try the new knowledge in a real situation. From the implementation then teachers can reflect whether or not they are successful in implementing the new knowledge, the challenges they face, and the possible troubleshooting (Haryani et al., 2021; Hashmani et al., 2016). During this stage teachers will practice the knowledge they got from the sharing and peer-teaching process. In the implementation stage, the master teacher keeps accompanying the teachers to encourage and motivate them. Along with this step is the evaluation process. Evaluation keeps the learning process measured (Divayana et al., 2017; Sumyadi et al., 2020). Therefore, school can decide whether the training process is successful or not. The last but not least step is supervision. This step situates the school to be involved in the teachers' competence development program. Here, school represented by a supervisor can do a monitoring on the teaching learning process after teachers get new knowledge or skill. From the objective, the supervision applied in this step is academic supervision (Kurniawan et al., 2018; Purnama, 2021). From the supervision result, school can do another analysis on skills/competence or materials needed to improve teachers' ability.

The impact of training on the participants' comprehension of collaborative learning can be evaluated from the result of the pre-test and post-test. From the data it can be seen that there is difference in the pre-test and post-test results. The majority participants got higher scores in the post-test compared to the result in the pre-test. Only one participant got the same result and one participant got lower post-test score than the pre-test score. According to the paired t test using SPSS 26 application, the value of Sig. (2-tailed) is below 0,05 ( $0,000 < 0,05$ ). SPIES training model has been validated by experts with the feasibility rate of 88,24%. This number is included in very feasible. While for the material feasibility check, the percentage is 91,67%. This number is also classified as very feasible. Based on the validity checks by experts, SPIES training model and material are feasible to be implemented.

#### 4. CONCLUSION

According to the result and discussion, it can be concluded that SPIES training model with a collaborative learning material is feasible to be implemented to improve teachers' competence in 21<sup>st</sup> century learning. Furthermore, extensive trial results of the pre-test and post-test also show a change in the material mastery. The post-test result has higher mean value than the pre-test result. Besides, from statistical analysis, it is known that there is significant impact of the training to the test result. This result shows that SPIES training model with collaborative learning material is effective to increase teachers' competence.



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