

Enhancing Teachers' Capacity in Implementing Internet Literacy Education through Experiential Learning

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Abstract— As increasing the application of information technology, awareness of internet literacy is acquiring crucial for teachers. On the other hand, Indonesia is still in infancy in supporting educator capability on utilize global information through internet. We arranged a training module named *The Smart People for Smart Schools* to provide experiences to secondary high school teachers in exerting the internet in educational practice purposes. This study also examined validation of the module that benefit to improve teacher efficacy in implementing the internet literacy education to the students. Participant of this research were 25 teachers from 10 public secondary schools. Instruments used are *Scale of Internet Literacy Education for Teacher* and *Test of Internet Literacy Education*. Content and empirical evaluation of the module were conducted through professional judgment and untreated control group design with dependent pre-test and post-test samples. Data analysis using Aiken's *V* indicated that the module has adequate validity ($v > 0.70$) and independent sample *t*-test showed the significance effect of the training.

Index Terms— digital learning, experimental research, professional development, self-efficacy.

I. INTRODUCTION

Livingstone & Helsper (2010) in their research revealed that adolescents' opportunities to interact through the internet gave a lot of benefits, although there were still risks. A number of research, whether in Indonesia or various countries, also found risks of bad effects from internet use in children and adolescents. Risks of bad effects found were addiction (Kuss et al., 2013); cyberbully (Jadambaa et al., 2019); problems in everyday functions, interpersonal relationship, and emotional well-being (Anderson et al., 2017). Bad effects of internet use for adolescents could even cause double effect. Students with internet addiction are at risk to experience cognitive distortions and negative academic behaviors (Saavedra, 2022). Internet addiction could also cause academic performance decrement (Stavropoulos et al., 2013).

An effort to maximize internet technology in school education gave rise to the concept of smart schools in school management as a response to the development of technology use. The term smart came up to depict man's ability to manage technology as a supporting tool for practicality and welfare, not the other way around as source of threat (Eger, 2007). Therefore, smart school (smart campus) requires more than just the availability of digital facilities or internet connection at school, but more on the support circumstances of the educational development. Smart schools implement teaching and learning practice in dynamic systematic management to facilitate students to the Information Age (Taleb & Hassanzadeh, 2015). The schools can satisfy the demand of education user, and can supply the best service for mobile office, mobile teaching and life. A smart school is also indicated by a safe, stable, green, efficient campus, and being

as integral part of the smart earth (Nie, 2013).

Various skills is needed to realized smart school. In addition to operating technology, internet literacy skills is also needed by children and adolescents, especially to block out the negative impact of internet because of inequality in age and experience compare to adult internet users (Leung & Lee, 2012). The urgency for education and supervision of internet literacy for middle school students in Indonesia were also found by Amalia (2016) from the fact that there were many teenagers who have not implemented internet communication ethics. Eventhough the Indonesia Ministry of Education has launched school literacy movement, the same previous program only focused on technical competency of students in using the internet (Amalia, 2016). The students' limitation in processing digital information indicates that internet literacy skills are critically to be trained through learning and school environment.

Referring to that goal, teachers are strategical components as agents of change. The problem found in the field was about the gap existed between the availability of facilities and teachers' ability in optimizing internet as a learning resource. Teachers' ability in accessing the internet is required to supervise students' learning using the internet. In other words, digital skills are needed by teachers to direct school residents to use the internet wisely, or what is called as internet literacy skills.

II. LITERATURE REVIEW

A. Internet Literacy

Internet literacy is not limited to the capability in employing the advantage of the internet. The competence of internet literacy requires critical and analytical dimensions

(Bauer & Ahooei, 2018). Internet literacy refers to the ability to access, analyze, evaluate, and create online content. This ability is considered necessary not only to protect children from the negative influences of the media, but also to decrease the inequality in information and to help children fully participate in creative and social activities (S.-J. Lee & Chae, 2012). Teachers' ability in using internet literacy as professional task in the classroom is described through teachers' ICT competencies: (1) the individual competence, is the effective use of hardware and software in teaching; (2) the critical media competence is to be able to select critically appropriate media to support the teaching learning process; (3) the life-long learning competence is also the extension in the teacher's repertoire of available media for supporting learning processes; (4) the competence to guide teaching-learning in order to get a successful completion for students; (5) the competence to design of teaching-learning arrangement is the competence to be able to design and develop materials and ways of working with the new media (Jans, 2009; Zwaneveld & Bastiaens, 2010).

The preliminary study gave a portrayal on teachers' knowledge and skills in internet literacy, which was still lacking and it made them feel unable to implement internet literacy education to the students. Interviews with teachers and principals shown that in every school there were only 2 to 5 teachers, or around 10-25% teachers in each school, that had used the internet in their learning. Teachers felt they had inadequate ability to design interactive learning because of less introduction to learning applications. Teachers also had limited knowledge on how to guide students in searching the information in the internet safely and effectively, and then accessing information trustworthily and ethically. Teachers even stated that they had not yet given education to students about ethics in communication in the internet due to the limitation of knowledge and capacity on the subject. Teachers also experienced difficulties in communicating with students when they tried to guide the students on internet use that are risky for them. Depiction of efforts to improve teachers' skills in using communication and information technologies were revealed in interviews with the head of education department and staff of technology and communication office. So far, the trainings given to the teacher were only about information and communication technology (ICT) skills, but not about internet literacy education. On the other hand, smart school can only be realized if teachers have had digital literacy and self-efficacy in integrating ICT in learning (Abdullah, 2008)

B. Self-Efficacy

Bandura (2012) stated that to act and achieve results, an individual not only needs knowledge, but also efficacy. In the context of internet literacy education, it can be said that teachers need to have self-efficacy to carry on the task of internet literacy education. Self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations (Bandura, 2009). Self-efficacy is also defined as individual's evaluation

of their abilities to do certain task (West et al., 2013). Self-efficacy had been proven to have a strong influence toward self-regulation, motivation and achievements, whether when the individual went to the process of learning, or in the context of work performance (Schunks & Pajares, 2009).

People's beliefs in their capabilities vary across activity domains and situational conditions rather than manifest uniformly across tasks and contexts in the likeness of general train. Regarding the sources of self-efficacy, people's beliefs in their capabilities are developed in four ways (Bandura, 2009, 2012): (1) mastery experiences, which are experiences of successes that provide authentic evidence of whether one can muster whatever it takes to succeed; (2) vicarious experiences, are other people's experiences that act as social model, formed through how the model act, expressing thoughts, the model's ability to convey knowledge, and their of teaching others about the strategies in completing tasks or managing demands for the environment; (3) social persuasion, is a source of efficacy gained through verbal persuasive reinforcement from other people; (4) physiological and emotional states, are evaluations of the self-capacity influenced by the physical and emotional conditions interpretation.

C. Experiential Learning

A number of previous researches had shown success in improving teachers' self-efficacy through training by optimizing self-efficacy sources in the learning processes (Kelley et al., 2020; Velthuis et al., 2014; Yoo, 2016). Based on the background of the conditions found on the field, this research focused on the improvement of teachers' skills in internet literacy education in the form of a training module named Smart People for Smart Schools Instructional Module. One of the practical approaches that applies learning through real-life experience for adults is experiential learning developed continuously by David. Experiential learning is a process of constructing knowledge that involves a creative tension through experiencing. This process is portrayed as an idealized learning cycle which occurs in a cycle consisting of four phases Kolb (Kolb & Kolb, 2018; 2017; Lehane, 2020):

- a. **Concret experience (feelings, kinesthetic responses)**
In this phase the individual learns something directly through active participation of the learning materials and not learning about the material.
- b. **Reflective observation (watching, analyzing)**
This phase is when the individual think critically of their learning experiences.
- c. **Abstract conceptualization (critical thinking)**
In this phase the individual connects their learning experiences with theories or basic concepts of the material.
- d. **Active experimentation (doing)**
In this phase, the individual test the result of their learning when applied in a new situations. The experiential learning cycle is illustrated in Figure 1.

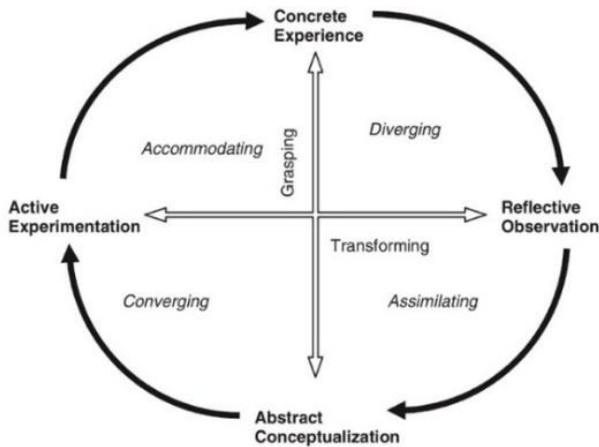


Figure 1. Experiential Learning Cycle

Teachers' self-efficacy in this context could be built through transfer of knowledge and experience about teachers' activities online and also driven by experience of support between teacher colleagues (Prior et al., 2016). The Smart People for Smart Schools training was proposed to be an evidence-based intervention for the development of the teacher profession in internet literacy. Therefore a module which could be applied in teacher training based on internet literacy education is needed. Based on the theoretical basis explained above, the aim of this research is to develop and validate the Smart People for Smart Schools Training Module to improve teachers' efficacy in delivering internet literacy education at school. This research was constructed to give theoretical and practical contribution for psychological practice about the effect of training in improving self-efficacy related to the educators' professional competence. The hypothesis of this research is that the Smart People for Smart Schools Instructional Module is valid in improving teachers' self-efficacy in giving internet literacy education.

III. METHOD

There were two variables in this research, the Smart People for Smart Schools training as the independent variable and teachers's self-efficacy in internet literacy education as the dependent variable. Smart People for Smart School is an internet literacy education training that run based on the module the researcher had made. Self-efficacy in this research is the teachers' believe of their ability to think, feel, self-motivation, and do the necessary action in delivering internet literacy education to students.

The participants of this research were representatives of teachers from a number of middle schools in the Sleman Regency, consist of ICT teachers, counseling teachers, and other subject teachers. The research participants were selected using several criterias namely: (1) able to operate a laptop/computer; (2) able to access internet; (3) active users of smartphone; (4) has a personal email and social media account and active in using it for interactions. Participants were divided into 2 groups, the experimental and control groups.

The phases in this research follows the model in the module development according to Russel (2021) include: (1) determining the module's goal; (2) constructing the measurement instruments; (3) analyzing and determining performance achievement; (4) constructing activities and media practiced in the module; (5) testing the module in the field; (6) determining the module's validity. The Teachers' Efficacy in Internet Literacy Education Scale was constructed in the research based on the aspects of digital literacy competence for teachers (Jans, 2009; Zwaneveld & Bastiaens, 2010). This scale has seven gradation of responses which reflect the degree of strength of the subjects' believe. The design of the scale had been tested to 59 respondents of middle school teachers. It was revealed that the scale was reliable and the items had different rate > 0,3 which meant the items were differential sufficient. The final scale was consisted of 50 selected items. Analysis using SPSS showed that the tested scale had a Cronbach's Alpha reliability coefficient of 0.976 and it can be said that the scale had good reliability.

The module's validity test is done on it's content validity and functional/empirical validity. This module content validity in this research was proved through professional judgement by 6 practitioners and scholars who have expertise and experience in the field of education, psychology, as well as internet literacy education and training. The functional/empirical validity test was done by testing the module in the field for 2 days. The testing was done in the method of the quasi experiment using the untreated control group design with dependent pretest and posttest samples model. In this design there are two groups, the experimental and control group. The experimental group is the one receiving treatment. The dependent variable of groups are measured in before treatment (pre-test) and after treatment (post-test). The result of pre-test and post-test from both groups were compared to identify the effect of treatments to the dependent variable.

IV. RESULT

Research participants were 25 teachers from 10 public middle schools. Description of research participants in the experimental and control group can be seen in Table 1.

Table 1. Distribution of Research Participants

Characteristics	Experimental Groups	Control Groups	Total
Gender			
Male	3	2	5
Female	10	10	20
Age			
20 – 30 years old	2	4	6
30 – 40 years old	2	3	5
40 – 50 years old	9	6	15

Characteristics	Experimental Groups	Control Groups	Total
Subjects			
Information and Communication Technology (ICT)	4	3	7
Counseling	4	3	7
Science, Social Studies, Math, Language (Bahasa, English, Javanese).	5	6	11

Evaluation on the module was through professional judgement done in the aspects of compatibility of contents, learning methods, and trainer characteristics with the module's goal; material delivery plot; use of language; the module's display; and the instructional method in each session. Result of general testing using the Aiken's V method toward the Smart People for Smart Schools training module is presented in Table 2.

Table 2. Evaluation of the Module's General Aiken's V Validity Coefficient

Aspects	Validity Coefficient	Conclusion of evaluation
The module's display	0,821	Accepted
Compatibility between the goal of the training with the materials	0,750	Accepted
Compatibility between the materials with the trainer's and facilitators' characteristics	0,785	Accepted
Compatibility between the training's goal with the approach and delivery method of the materials	0,785	Accepted
Introduction & explanation about the module and training	0,714	Accepted
The plot for the deliverence of materials in the sessions.	0,785	Accepted

From the data in Table 2, it can be concluded that the evaluation of the Smart People for Smart Schools module in general had Aiken's V values ranging 0,714-0,821. Aspect that had not yet met that criteria was the introduction & explanation about the modul and training with 0,714 in score.

The module's content validity in each session were also evaluated in detail. The evaluation included the aspects: (1) substance, evaluating the compatibility between the session's goal with the material content; (2) use of language, that is

evaluating the explication on the use of written language in the material and the activities' procedure to be understood; (3) instructional method, which is evaluating the plot, effectivity, as well as time allocation for the activities to reach the sessions' goal. Evaluation result of each of the module's session is presented in Table 3.

Table 3. Validity Coefficient (Aiken's V) of each of the Module's Session

Sub Module	Material substance	Language	Instructional Method
Introduction session	0,875	0,916	0,833
Session 1. New Media Culture	0,708	0,791	0,750
Session 2. Digital Global Citizenship	0,875	0,916	0,916
Session 3. Internet Literacy in Communication	0,916	0,875	0,958
Session 4. Internet Ethics	1,000	0,916	0,958
Session 5. Communicating effectively using Digital Native	0,958	0,958	0,875
Session 6. Kahoot! Fun Quiz	0,833	0,916	0,916
Session 7. Thinglink: Interactive presentation	0,958	0,916	0,958
Session 8. Designing Learning	0,875	0,875	0,875

Based on Table 3, the validity coefficients range around 0,708-1,00. Score result that was still insufficient based on the Aiken's criteria was the material substance in Session 1. This result showed that as a whole the substance of the material content, use of language, as well as the instructional method in the module's sessions also had good validity.

The qualitative evaluation of the module was received from the comments written by the raters. In general, the module is potentially regarded to encounter the needs of teachers, and it is compatible with the experiential learning approach. The raters concluded that the modul was strongly recommended. Several improvements were executed by the researcher based on the recommendations from raters as well as observational notes in the implementation process, which was the addition of material explanation and time allocation for activities.

The module's functional/empirical validation was accomplished in several statistical analysis phases. The first was manipulation check by analyzing the difference of Knowledge Test scores before and after treatment in the experimental group using the paired sample t-test. The value

resulted $t = 5,390$ and $p = 0.000$ ($p < 0.05$). It determined that there were significant differences in the participants' knowledge about internet literacy education between before and after training. In other words, The Smart People for Smart Schools Instructional Module was empirically proven effective to improve teachers' knowledge on internet literacy education.

Normality test was done as an assumption test procedure that the data was parametric. Result of the normality test in the pretest and posttest self-efficacy score can be seen in Table 4.

Table 4. Result of Normality test using the Shapiro-Wilk Method

	Statistic	df	Sig.
<i>Pretest</i>	0,963	25	0,482
<i>Posttest</i>	0,980	25	0,877

From Table 4 it is known that the result of Shapiro-Wilk normality tes the self-efficacy pretest score with $D(25)=0.963$ and $p > 0.05$ and self-efficacy posttest score with $D(25) = 0.0980$ and $p > 0.05$ had normal percentage.

To prove the effect of training toward self-efficacy, a few analysis were done. First was differential test of efficacy score before treatment. The early condition of teachers' efficacy score in internet literacy education between the experimental and control grop was measured using the pretest. The differential analysis of the early condition was done using the independent sample t-test differential test on both groups' teacher efficacy pretest scores. Analysis result showed $t = -0.099$ and $p = 0.922$ ($p > 0.05$). This analysis result indicated participants' self-efficacy in the experimental group as a whole was the same with control groups' in the early condition before treatment.

In the next step, efficacy score differential test was done for the condition before and after treatment. The analysis used was the paired sample t-test differential test. In the experimental group value of $t = -2,773$ dan $p = 0,017$ ($p < 0,05$) was obtained, which meant that there was a significant improvement in self-efficacy score between before and after treatment. While in the control group value of $t = -0,075$ and $p = 0,942$ ($p > 0,05$) was obtained, which meant that there wasn't any difference in self-efficacy score in the control group. The next analysis was done using the independent sample t-test on the efficacy score between the experimental and control group after treatment. Based on the result of the analysis it was obtained value $t = 2,120$ and $p = 0,045$ ($p < 0,05$). The result could be interpreted that the experimental group's level of self-efficacy in internet literacy education after treatment was different (higher) compare to the control group's level of self-efficacy. Furthermore, effect size calculation was done to the experimental group's internet literacy knowledge scores. According to Myers (2013), effect size score needs to be known on differential test to know the amount of impacts that could be produced by a variable.

Effect size calculation with the Pearson method on the experimental group's efficacy score between before the treatment and after the treatment resulted in $r = 0,625$ ($> 0,5$). This score falls in the large effect category. While effect size with the Pearson method in the experimental group's knowledge test scores, between before and after treatment resulted with $r = 0,841$ ($> 0,5$). This score also falls in the large effect category. From the result of the analysis, it showed that there was an increase in self-efficacy in the internet literacy education in the experimental group. While the self-efficacy in the control group didn't experience any improvements. In other words, the Smart People for Smart Schools had been proven empirically to improve teachers's self efficacy in giving internet literacy education.

In addition to validity test, the evaluation was also done for the trial of the training implementation. Evaluation was filled by 15 training participants. The analysis using the Aiken's V method is presented Table 5.

Table 5. Evaluation of the Module Implementation

Evaluation Components	Koefisien Aiken's V
Training materials	0,825
Material relevance with the goal fo the training	0,900
Activities (games, discussion, creation) in training	0,950
Benefit of the materials	0,875
Learning processes	0,875
Time used for each activity	0,825
Duration of training	0,950
Achievement of training goals	0,875
Rooms used	0,925
Food and Beverages	0,950
Supporting Facilities (LCD, audio, etc)	0,825

Analysis result from the evaluation data of the training implementation showed Aiken's V coefficients range from 0,825 to 0,950. With 15 raters, Aiken (1985) requires a minimum coefficient of 0,51 which means the training is satisfactory.

V. DISCUSSION

The content internet literacy education in the schools are interdisciplinary involving various disciplines like media literacy, education and teacher technology, as well as psychology. The basic content planned to be delivered to teachers was media literacy. Psychology became the framework of the constructing the module because self-efficacy, which is the dependent variable in this research, is a psychological attribute. This research measured and justified the training as a psychological-educational intervention. To

produce a module that aimed to improve self-efficacy, this research constructed a module by applying theories of the psychology of learning and conducted a validity test.

The results of this training correspond with the theories underlie. They proved that self-efficacy could be improved through training. Particularly in the field of internet literacy, improvement in teachers' self-efficacy can be obtained through sharing of experiences in using internet as well as experiencing success whether from themselves or related with the success of fellow teachers (Lee & Tsai, 2010). The achievement of the training goals was also supported by compatibility and conditioning in: (1) the participants' needs; (2) learning purposes; (3) training schedule and time; (4) preparation of location and facilities; (5) the characteristics of the participants; (6) effective trainers; (7) effective delivery techniques; (8) comprehensive implementation; (9) services; and (10) evaluation of the implementation (Kirkpatric & Kirkpatric, 2007). In accordance with that, the Smart People for Smart Schools Instructional Module applied principals that optimize sources of self-efficacy to fulfill the learning goals. According to Bandura (2009), self-efficacy can be improved through relevant personal experience, the experience of an influential person, verbal persuasion, as well as supportive physical and emotional condition. The construction of the module in this research applied theories of sources of efficacy with explanations as written in Table 6.

Table 6. Application of Sources of Self-Efficacy in the Smart People for Smart Schools Module

Sources of Efficacy	Application in the Module
Relevant personal experiences	<ol style="list-style-type: none"> The training activities give chances to experience through games and role play which will be reflected. A chance to practice the skills that have been learned with the help of tutorials from trainers
Experience of an influential person	<ol style="list-style-type: none"> Experiences trainers in their field of experties as a role model for participants. Experiences shared by trainers and the chance to discuss with trainers empower the participants' understandings. The chance to learn, train, and share experiences with fellow teachers increase the participants' knowledge and skills.
Verbal persuasion	<ol style="list-style-type: none"> The chance for participants to receive feedbacks from trainers as well as words of appreciation that reinforce motivation. The posters that is set up in the room are filled with encouraging words for participants to keep learning.

Sources of Efficacy	Application in the Module
Physical and emotional condition	<ol style="list-style-type: none"> The training activities in several session are packaged in the form of games that activate physics and fun. The selected trainer is able to deliver the session attractively, humour, and friendly A conducive room Sufficient resting to avoid fatigue

The description in Table 6 explains the application of self-efficacy sources theories in the Smart People for Smart Schools Instructional Module that is expected to improve the participants' efficacy in internet literacy education.

The findings of this research show that teacher's self-efficacy in giving internet literacy education improved as the knowledge raised. A study conducted in Indonesia by Serriawati (2017) found a similar finding, that teachers' mastery of ICT corresponds with self-efficacy in learning, as well as self-efficacy in online teaching (Lee & Ogawa, 2021). In this research, ICT skills were included in the training materials designed to improve teachers' efficacy. The result of this research also corresponds with the review findings of Røkenes & Krumsvik (2014) revealed that teacher candidates' abilities in designing learning using ICT could be improved by a training. It indicates the urgency of digital education had been concerned, but not yet related to the internet literacy. Therefore, the instructional module of this research could be a specific reference that targets the urgency of internet literacy education. In addition, research in the field of psychology that analyze the effect of training using the experiential learning approach to improve teachers' self-efficacy had numerous times been done. This thesis also found significant improvement in teachers' self-efficacy through training conducted based on experiential learning approach. Similar findings were shown by Toombs et al. (2022).

The new perspective resulted from this research in the improvements of teachers' self-efficacy in internet literacy education. It is never found before. The findings also indicated the importance of teachers' improvement in various competencies. With global challenges that keeps on progressing, teachers need enrichment in teaching skills using interdisciplinary resources. The training in this research not only gave technical skills in the use of internet application for learning, but also integrated with literacy and communication education application. This integration completed the skills needed by teachers to improve the school readiness toward the smart school era. This could be achieved through the cooperation between the researcher and practitioners in various mastery.

This research had several limitations technically and methodologically. More or less they could influence the outcome of the measurement. Technical obstacles faced were

about the time and computer provided in the training process. Those obstacles had inhibited the running of Session 6 and Session 7 which focused on the making of online learning source. It was planned in the module there would be an activity to show the participants works. But the presentation opportunity unfortunately had to be limited to only for some participants. This might had influenced the improvement of the efficacy score considering the chance to show participants' work was part of the source of self-efficacy.

Other things that could had influenced the efficacy score after treatment was the time the posttest was given. Posttest in the self-efficacy aspect was supposed to be given 1-2 weeks after the training. The time interval is needed to give chance for participants to internalize the knowledge and awareness they received and practice it. Due to the school schedule, participants could not apply the training lesson learned because schools were facing end of semester tests and continuing with school holiday. Other than loosing the opportunities to teach, the chance for participants to interact with students were also very limited. This limited time of interactions could reduce the chance for participants in going through the phase of active experimentation in the experiential learning.

VI. CONCLUSION

Based on the result of this research it can be concluded that the Smart People for Smart Schools training module was valid content wise and functional/empirical wise in improving teachers' self-efficacy in internet literacy education. From the findings of this research and the discussion, some suggestion presented. In context of the topic, internet literacy competencies are a vast theme to be further developed, especially in the context of education nowadays. Therefore for the next researches, the issue about internet topic is highly recommended to be explored. The research could dig deeper to teacher development, or highlight students' competencies. The module produced from this research could also be used even further, being developed or adjusted to be applied for students or educators in other levels or grades. To do research in similar topics, there are several important notes that needs attention for the next researcher.

The methodological limitation in this research was the selection of samples for the research participants which wasn't fully controlled by the reseracher. The selection of this research's samples was obtained by the schools principals based on the criterias presented by the researcher. As a consequence of this sampling selection, several conditions hard to be controlled by the researcher. Concerning methodology, the next researcher could optimize more on the number of samples and the training condition, as well as manage the timing for the measurement for the more accurate research design and analysis.

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