Conference Paper

The ICT Skills of Senior or Vocational School Teacher in Jakarta and Lampung

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Abstract.

This research aims to understand the ICT skills and application of senior or vocational school teachers in terms of their educational level, teaching experience, training participation, school accreditation, and region. The method used in this research is a survey. The population of this research are teachers from senior high schools and vocational high schools (whether public or private) that have been accredited a minimum B and are located in the Jakarta and Lampung. Multistage random sampling was used as for sampling. The total sample are 468 teachers from Jakarta and 374 teachers from Lampung. Data were collected through a questionnaire and documentation. Multiple regression was used for the data analysis. The results showed a significance of 0.00 which means there was a weak relations with the R value of 0.311. Partially, the use of ICT is influenced by the level of education, teaching experience, training participation, and regional characteristics. The use of ICT is not influenced by the school's accreditation. The use of ICT is very personal and doesn't have any relation to school characteristics. In addition, the use of ICT in Jakarta which is the capital city is higher than Lampung.

Keywords: ICT, teacher, region

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1. Introduction

ICT is related to socio-economic development, business, and education. In education, it is defined as a series of activities and technology that are in form of IT and telecommunications unit [1]. The main problem being faced by teachers are related to how to integrate ICT with education and economy [2]. Teachers need to be able to integrate ICT in learning. They are expected to be a professional who have qualified in science and technology. Therefore, teachers' role to develop and educate Indonesia's golden generation in the 21st century will be achieved [3]. ICT literacy for education consist of ICT skills and knowledge required for educational purposes both at the individual and organizational level. The skills are the basis for modern society to reinvent teaching and learning in the technological age [4]. The use of ICT in learning is more meaningful [5]. The use of ICT such as the internet and multimedia is criticial to create an effective yet

integrative learning [6]. ICT creates the education system more productive, attractive, provides stronger instruction and is able to massively expand educational opportunities and create an information-rich learning environment [7]

Teacher's role is a vital component affecting the school system. The use of ICT is not only a modern equipment, but also changing the teaching model of teachers, teachers play a role in class organization, teaching and learning processes and interactions that occur [8]. Some aspects of teacher ICT competencies consist of mastering of ICT devices, understanding of the design of teaching materials development using ICT, and methods of using ICT devices in the classroom [9]. The use of ICT in learning depends on the concepts, expectations and assessments used [4].

Responding to the industrial era 4.0, it is expected that teachers will always improve their competency and professional development in a sustainable manner, by participating in various training programs, seminars individually or collectively. Annually, the student learning experience changes and improves, so the way teachers teach also need to adapt. The use of ICT could improve teachers to be more professional [6]. The competencies for using ICT are needed to develop other competencies such as personal, pedagogical, social, and professional competencies in accordance with national ministerial regulations no 16 of 2007 on Teacher Competence [2]. Teachers need to learn how to use software because they will increase productivity in terms of learning outcomes [10].

There are 4 levels of ICT use in schools. The first level is the school has provided computer facilitation but does not have a network. The second level is the school has provided more adequate computer facilitation but the usage hasn't been intensive depending on active teachers only. The next is level 3, computers are connected to Local Area Network (LAN). The highest level is level 4, the school has already provided advance equipment and good connections for learning. Study shows that schools that integrate ICT as innovation have an improvement in the teaching and learning process [8]. Moreover, students' interest in using technology in learning is higher then lead to the graduation rate is higher as well [11]. Learning process that uses ICT as a medium has improved learning outcomes [12]. The integration of ICT in schools will be successful if the preparation of good equipment and facilities has succeed as the key to technology-based learning [13]

Unfortunately, the use of ICT by teachers has not been encouraging. Teachers still has not maximized the existing software [11]. Teachers are not ready to use technology-based media because of their limited knowledge and skills [14]. Most teachers take advantage of word processing and look for software productivity software, but they

have to learn how to use the software because it will affect learning output. [11]. The level of the ICT competency of teachers in Indonesia is adequate and needs to be improved, especially teachers in remote areas.

Problems that often arise in the application of ICT in the world of education is related to the insufficient funds and other supporting resources for ICT investment [2]. The previous study shows that from 60 senior high school teachers in Jakarta have understand the use of technology for education in accordance with the industrial revolution 4.0 [14]. However, teachers in rural areas, though they already have a good perception of ICT, but in its have limited access towards application. In addition, training is needed to be able to use ICT in learning [5]. The improvement of ICT equipment is accelerating but the adoption between institutions is relative in its use [15]. For example, the study of computer lab completeness in secondary education units in two different characteristics, in a city and regency. In Kendari city have 64.71%, while in the regency level are just a half of them, which is 39.29% [16]. In rural area, teachers have difficulty implementing ICT in the teaching and learning process at their schools, this is due to the absence of infrastructure, both computer laboratories, internet networks, to the mastery of teachers [17]. The support of the central and local governments in its utilization is needed in order to achieve an improvement of teachers' ICT competency [18]. In other country such as Vietnam, problems faced in learning English using ICT are: lack of ICT competency and ICT training, limited finance, and short teaching duration in class [19]. Therefore, researchers are interested in understanding the effect of education, teaching experience, training experience, school location and school accreditation on the use of ICT. Considering the extent of differences in the use of ICT for teachers in the capital city and provinces level.

2. Method

The method used in this research is a survey. The population of this research are senior high school and vocational high school (whether public or private) which have been accredited (minimum B), the school must be located in the Jakarta and Lampung.. The sampling technique used in this study was multistage random sampling. The sample of 468 teachers in the capital city and 374 teachers in the province were be determined. The research was collected through a questionnaire and documentation. The data were analyzed using multiple regression. The effect of dependent variable Y and the independent variable X is described as follows:

X_1= the level of education

X_2= teaching experience (years)

X_3= training experience

X_4 = school location

X_5= school accreditation

Y= the use of ICT

Before running the regression, the data were tested through the classical assumptions there are normality test, multicollinearity test, heteroscedacity test, and autocorrelation test.

3. Results and Discussion

3.1. Result

The X variable consists of education level, teaching experience (years), training activities undertaken and school accreditation. The teachers' education level consists of two levels, there are bachelor degree and master degree. The length of teaching experience is divided into 4 intervals there are less than 10 years, 11-20 years, 21-30 years and more than 31 years. Training activities carried out in the last 5 years from 1-4 training times. For the school accreditation divided into A and B. The characteristic of school's location are school in capital city (Jakarta) and province (Lampung). The respondents characteristic from two different region are shown on table 1.

The level teacher's education level in the capital city is higher than in the province level. There are 71 percent of teachers who have bachelor level of education in the capital city meanwhile there are 78 percent in the province. Teachers' education level in the capital have more master degree level of education compared to those in the province which is 29 percent rather than 22 percent. The next category is the teaching experience (years). The length of teaching is divided into 4 intervals, generally both of the region have almost the same pattern. The first interval is less than 10 years, the second interval is from 10 – 20 years, the third is 21 – 30 years, and the las tis more than 31 years. The highest frequency is on the 2nd and 3rd intervals. The mode of frequency is between 10 and 29 years. Between the capital city and the province have almost the same graph pattern. Teachers in the capital city have more training participation with a total of 2 and 3 times compared to teachers in the province. The number of schools accredited A in the capital city is 91% while in the province it is only 68%, while the accreditation of B in the capital is 9% and 32% in the province. The graph of comparison between the capital city and province is shown as follows.

TABLE 1: Independent Variable.

X Variable	Capital city %	Province %
Level of education		
Bachelor degree	71	78
Master degree	29	22
Teaching experience (years)		
< 10	17	6
11-20	35	47
21-30	35	39
>31	14	8
Training participation (times)		
1	56	66
2	33	24
3	6	4
4	5	5
School accreditation		
A	91	68
B	9	32

The use of ICT is drawn by collecting the data about to what extent it is applied in learning and self-development. The first application is Microsoft Office. The results shows that the use of Microsoft office for learning process in province areas was slightly higher than Jakarta. Teachers in the province 91% use Microsoft office for learning activities while in Jakarta 88%. The next application is Microsoft PowerPoint, the percentage of teachers using Microsoft PowerPoint presentation in the capital city were higher. There are 76 percent teachers in the capital city use power point presentations, while in the provinces are only 68 percent. This finding implies that teachers in the capital city are more advance in the use of multimedia technology for learning process. The capital city's teachers as much as 29 percent use multimedia while in the province are only 25 percent. Teachers in the capital city also get used to apply image editor applications in learning. There are 19 percent of teachers in the capital use image processing while in the province are only 12 percent. Lastly, teacher in the capital city also often use of evaluation programs such as in kahoot and google form in learning process. There are 35 percent teachers in the capital use the evaluation program while in the province are only 14 percent.

Normality test results are met in accordance with the provisions following the diagonal line.

There is no multicollinearity symptom if the tolerance value is> 0.1 and the VIF value is <10. The calculation results shows the tolerance and VIF values as follows.
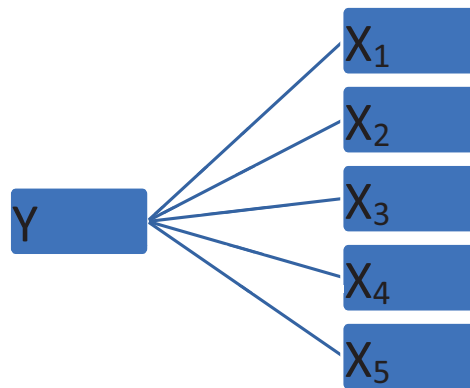
X_1 = the level of education
X_2 = teaching experience (years)
X_3 = training experience
X_4 = school location
X_5 = school accreditation
Y = the use of ICT

Figure 1: Use of ICT.
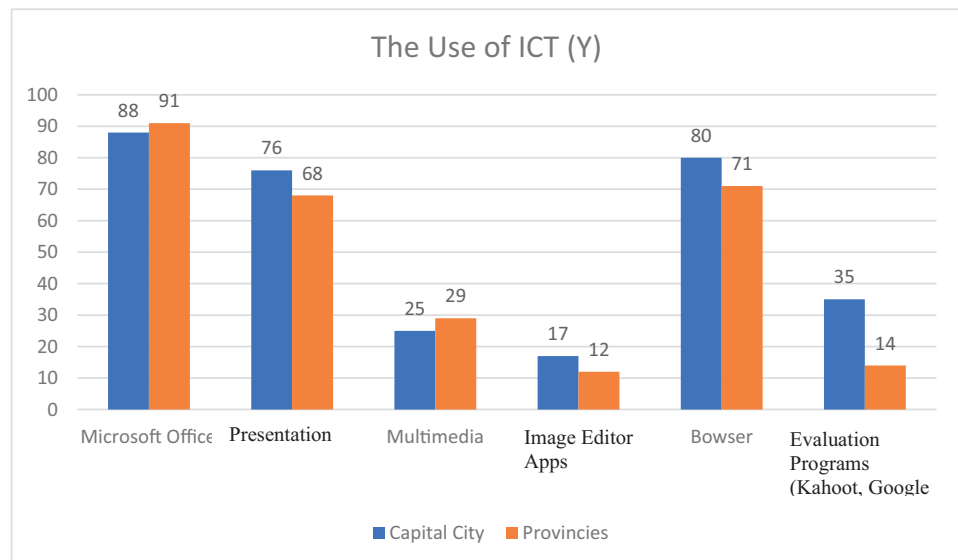
Figure 2: Normal P.Plot of Regression.

The tolerance value for the seven variables is greater than 0.1 and the VIF value is smaller than 10. The conclusion is that there are no symptoms of multicollinearity.

The autocorrelation test cannot be done considering the number of samples is 842, the existing table is Durbin Watson with a maximum sample size of 200. So it is difficult to do it based on the available tables.

Partial t test is done to see the effect individually between the independent and dependent variables. The basis for decision making of partial t test multiple regression based on the significance value. If the sig value <0.05, it means that the independent

TABLE 2: Tolerance and VIF values.

Variabel Independent		Collinearity Statistics	
	Tolerance	VIF	
Level of education	.929	1.076	
Teaching experience (years)	.970	1.031	
Region	.763	1.311	
Training participation	.941	1.063	
School accreditation	.887	1.128	

variable (X) partially affects the dependent (Y). These are the results of the partial correlation test.

TABLE 3: Partial t test.

Independent Variable	Sig	Captions
Level of education (X_1)	0.014	Have an effect
Teaching experience (years) (X_2)	0.017	Have an effect
Region (X_3)	0.000	Have an effect
Training participation (X_4)	0.000	Have an effect
School accreditation (X_5)	0.835	Have no effect

Partially the independent variable education (X_1), teaching experience (X_2), region (X_3) and training participation (X_4) affect the use of ICT (Y), while school accreditation (X_5) has no effect on the use of ICT (Y). The basis for the simultaneous F test are based on the sig value <0.05, it means that the independent variable (X) simultaneously affects the dependent variable (Y).

TABLE 4: Anova Test.

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	145.852	5	20.836	12.706	.000[b]
	Residual	1367.687	834	1.640		
	Total	1513.539	841			

If it's seen from the ANOVA table, the sig value of 0.00 is smaller than 0.005. It can be concluded that the independent variables (education, teaching experience, school accreditation, region, and training) influence the dependent variable (ICT use).

The next is about to what extent or how strong is the influence of the independent variable towards the dependent variable. It can be seen from the R value, the calculation result of the R value of 0.311 is classified as weak. It can be concluded that there is an effect of ICT use on the variables studied, although the relationship is weak. The use of

ICT for senior and vocational teachers in the areas studied is lacking. Referring to the ICT approach framework, teachers in this study area are only at the first stage. The ICT approach framework is shown on the Figure 3.
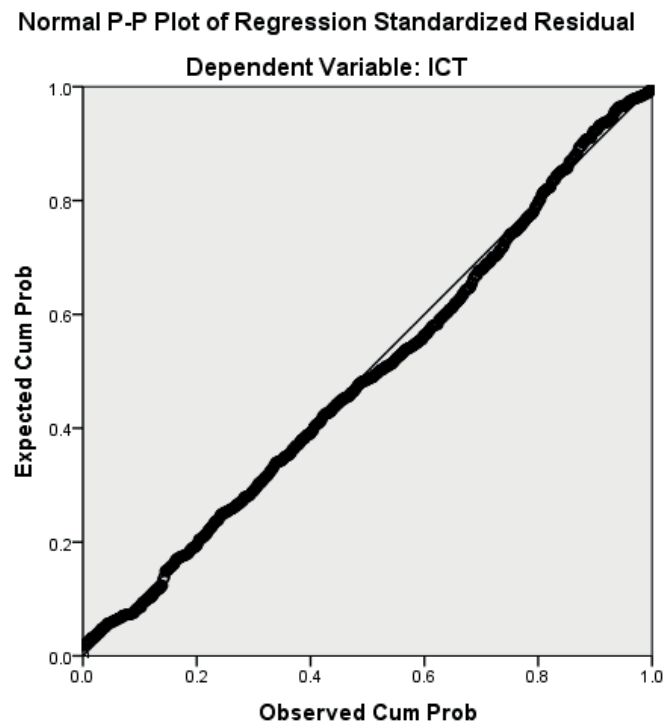

Figure 3: ICT-CFT Approach Framework [2].

3.2. Discussion

The teachers' education level in the capital city mostly has achieved more master education rather than in the province. The number of teachers in the capital city are able to continue their masters because the opportunity to do it is more open. The are numerous universities in capital city compared to in the provinces providing opportunities for teachers for their further studies (the capital is 57 universities, in the province 17 universities have postgraduate programs). Teachers can continue their studies in postgraduate programs with various majors of interest. Moreover, universities are offering employee class / intensive class / Saturday - sunday programs, providing adequate opportunities for teachers' further study. The level of education affects the use of ICT for teachers. Teachers who have a master's degree have more mastery over ICT than bachelor degree. The education process makes teachers more familiar with some ICT software than those who do not carry out further studies.

The number of years of teaching experience are relatively the same among the capital and province. Their length of teaching accumulates in 2 and 3 intervals between 11-30 years. The length of teaching affects the use of ICT. The longer teaching, the better teachers use of ICT become. This is slightly different from the previous studies. The length of teaching does not affect the teachers' belief in using of ICT, the longer the teaching, the less confident in using ICT [20]. The dilemma that arises in the field, from the various efforts that have been carried out to help teachers get to know ICT, is stuck on the way, the causes are; 1) the anxiety of making as mistake, which may lead to ruin the media; 2) feeling old enough to apply the technology and the perception it isn't useful; 3) lack of understanding of English as the main language of technology; 4) the bustling outside the ICT lessons [21]. Teachers who have the status quo as the senior ones usually keep maintaining traditional learning process and giving up ICT to the junior teachers [22].

The regional level differences will affect the use of ICT. Teachers in the capital city are better at using ICT than teachers in the province. Vocational school teachers in Deli Serdang district have been limited in computers facilitation with a ratio of 1: 100, 1 computer with 100 students [21]. Regional teachers rarely use laptops and supporting infrastructure is still lacking [23]. ICT barriers in teacher learning are procedural: (1) Internet connection is often unstable. (2) Electricity often blackout. (3) Limitations of ability and knowledge to design ICT-based learning activities due to lack of ICT-related training. (4) Less able to follow the rapid development of technological advances (5) Inadequate number of laptops and projectors in schools. (6) The schools do not have a computer and / or a language laboratory. (7) Limited time for teachers to find information or to design their own learning media. [5].

The differences in training participation will affect the use of ICT. The more training, the more knowledge gained and lead to a betterment in the use ICT. However, the training which provides a specific skill or expertise have barely done, for example the application of ICT. This type of training is important, especially teachers who are still illiterate about technology [21]. The implementation of action research from a workshop will improve the ICT skills of teachers in learning process [24]. For example, teacher training for mathematics subjects can use software, Genius Maker Free Education, 3D Grapher, SPSS, Graphic Calculator, Encarta, Microsoft Mathematics and so on. [25]. There are external factors affecting the use of ICT include insufficient time for course planning [26]. There is a need for macro media flash training for senior and vocational teachers [27]. This type of training is oriented to make an interactive power points [21].

The special role of ICT can be used for improving the quality of multimedia practice, providing individual teacher training for teachers who have difficulty, connecting teachers to the wider community so they can collaborate [6].

School accreditation does not affect the use of ICT. Teachers who teach in schools with A accreditation are not different from teachers who teach in schools with B accreditation. Schools with A accreditation are certainly superior in terms of infrastructure including the existence of a computer laboratory. The completeness of the computer laboratory does not affect the use of ICT. The possibility of a computer laboratory exists but is not maximized in learning activities because they are barely used. The previous study also said the same. Schools located in capital city in India have computer laboratories, but they are not regularly used by teachers and students [28].

The mastery of ICT can be used for capturing the abilities of teachers in learning and self-development. Microsoft Word functions to make documents, letters and others for teaching and learning activities. Almost all teachers use this to make lesson plans, compile teaching materials, make tests and so on. Teachers use this application on all devices, both laptops and computers. This basic ability is needed by the teacher in order to make reports on learning activities. Teachers use the most Microsoft Word product software for learning activities [10]

The PowerPoint program is also used by the teacher for teaching and learning activities. The teacher can show the material in the form of points which can be accompanied by pictures, illustrations that attract students interest. The highly usage of presentations in the capital city is due to the complete support facilities. The teachers have their own device in the form of a laptop that is used for classroom teaching activities. Almost all high school classes in the capital have LCD installed. The advance facilitations of this infrastructure means that the percentage in the capital is higher than in the province. The previous studies, schools located in Vietnam rural areas that teachers need to borrow computers for the implementation of learning with PowerPoint presentations [19].

The readiness and completeness of facilities will expedite the process of teaching and learning activities. If the LCD equipment is carried out in a mobile manner, there will be problems when the installation process takes a long time. Therefore, it's better if the LCD equipment is available steadily each class. However, not all classes in the province are equipped with LCDs, so that when the teacher is going to use it, it takes time. The limitations of LCD means that teachers have to take turns when using it. The previous studies about supporting facilities in the implementation of ICT in education units in Iran [29]. Rural teachers use power points only 16 percent, often 33.9 percent [5]. Many state

schools receive only a small amount of subsidies from the government, so they cannot buy computers and maintain them. In addition, the majority of students do not have computers at home and only use computers at school. The difficulties in implementing ICT in schools include technological barriers, teacher rejection, student rejection, and poor school technology systems. This difficulties need to be overcome with school habits and culture, leadership abilities, and technology management systems [22].

The highly usage of multimedia in the capital city is due to the complete support facilities. The use of instructional videos that are widely distributed in the media are used by the teacher as a learning resource. A major finding of the study is that teachers utilize word processing and research software (browsers, search engines and plug-ins) very well in their lessons while other productivity software (spreadsheet, presentation, database, graphic, digital audio and digital video editing) [10]. Rural teachers sometimes use CDs, DVDs in learning as much as 29 percent and never use them as much as 24 percent. Teachers in rural areas have never used video in learning process as 37 percent [5].

Image editing software (Corel Draw, Photoshop) has functions for drawing and editing images or photos. Image editor software has simple editing functions to complex features. There are two types of images produced by an image editor, namely bitmap images and vector images. In general, the use of image processing is only barely done by teachers in Indonesia whether in the capital city and provinces. Compared to the teachers of senior high school teachers, the use of image editing software is mostly done by vocational teachers, especially those related to graphic design. The students from vocational school are mandated by the teachers to use this software as an ability that they must have. Image processing skills become provisions for vocational school students to be applied in the world of work. The skill of using this software is even become a subject for students in vocational school. For example, the subjects of respondents who teach Information and Computer Techniques in one of the vocational schools.

The use of a browser is needed to find various information and learning resource materials. A high speed of internet connection is needed. The use of the internet today is non-negotiable in the industrial era 4.0. The results showed that Jakarta teachers were higher in using browsers for learning. As many as 80 percent of the teachers in the capital city teach using browser while in the provinces are only 71 percent. In general, internet usage is higher due to availability of strong devices and connections. The use of browsers, search engines, and google is mostly used by teachers in learning process [10]. For example, the previous studies about learning English in Vietnam is hampered by

unstable internet connections and low equipment [19]. Students experience a shortage of gadgets and internet connections, slow public servers and high costs hamper the use of ICT [30]. Common problems in the use of ICT are low speed, unstable signal, viruses, and poor computer conditions [31]. Schools must have internet access, computers and training for teachers [22]. Schools have internet subscriptions that are shared by teachers. Schools buy computers and create networks for the learning process [32].

Students of some schools can use the internet independently for learning activities. The internet can facilitate the process of finding information cheaply and quickly. The use of the internet can be used anywhere and anytime [22]. In addition, the use of ICT provides faster information, updates data easily, connects separate areas [28]. Rural students can access information about urban areas quickly and easily as well as teachers [22]. Students' accesses knowledge and information through TV, digital media, cable network, internet and social media i. e. Facebook, Twitter, WhatsApp, Linkedinn, Igo, Line, WeChat etc [33]. The use of ICT has better results for knowledge content and increased understanding, and higher learning outcomes [8].

In general, the use of evaluation programs in the capital city is higher because they have wider opportunities for teachers to adapt to something new. The use of quizzes such as Kahoot, Quizzes, Google Form must be supported by the availability of tools from each student. This result is in line with research which states that capital teachers use evaluation applications in learning process better as much as 59 percent [14]. For students who do not have gadgets cannot participate in this evaluation process. The average high school student in the capital city has a gadget so that it will facilitate evaluation activities through this application. Continuous and Comprehensive Evaluation (CCE) helps students and teachers use the technology so that learning is more attractive [33]. In rural areas, teachers never gave quizzes, online games / tasks as much as 67.7 percent [5] Teachers can easily and quickly recap evaluation results with google form. The use of this application reduces the use of paper as an evaluation instrument. For example, the use of Kahoot, Quiziz also provides variations in assessment activities so that students have high learning motivation. There is motivation and competence in drill and practical software games that are very relevant to today's world [10].

Comparing the capital city to the province, the percentage of using ICT is less superior. In general, the usages of ICT for senior and vocational teachers in the capital and provinces are still low. When connecting the percentage with several variables it has a low relationship. This low relationship is due to limited ICT in learning. The use of ICT is still in the early stages / literacy, curriculum and assessment at the basic level, integrating simple learning, basic equipment, elementary level classroom

management, professional development at the digital literacy level [2]. When it is related to Sustainable Professional Development, the teacher's ICT usage is still at the first stage. Sustainable professional development has 3 competencies: Technology literacy; Knowledge creation related to Complex Problem Solving; and Knowledge creation related to self-management [3].

4. Conclusion

Simultaneously, the level of education, teaching experience (years), training participation, regional characteristics and school accreditation have an influence on the use of ICT. The results showed a significance of 0.00, there was an effect even though it was weak with an R value of 0.311. Partially, the use of ICT is influenced by the level of education, teaching experience (years), training participation, and regional characteristics. The use of ICT is not affected by the schools accreditation. The use of ICT is very personal, not related to school status. In relation with the regional characteristic, the use of ICT in the capital city is higher than the province. The high level of ICT mastery in Jakarta is due to several factors, there are; Higher levels of education and more training are followed. In general, the results of the study show that teachers in the capital city and provinces are still in the first stage (out of three stages) of using ICT. It is hoped that the results of this study will be used as a reference for the use of ICT at both region at the capital and provincial levels to be even better by holding training and completing the facilities and infrastructure s(computers, software, LCD, internet network) needed by teachers and students. So that the use of ICT increases at stage 2 or 3 in the near future.

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