Skills and Ict Science Learning Toward Teachers' South Coast District

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Abstract: This research focuses on studying about the differences of science' teachers proficiency on ICT's utilizing for learning process based on schools location and teachers' education. Finding out the contribution of knowledge, attitude, and ICT's skills toward ICT utilizing on science learning process. The study shows, there are significant differences between high school science' teachers in urban and rural areas (t=-5,094, p=0.00). Furthermore, there are notable dissimilar finding between under graduated science' teachers and postgraduated science' teachers (t=-3,617, p=0.00). 4 (four) independent variables have major roles to the skills of science teachers' on ICT utilizing for learning process, which is 43.0 percents. Teachers' attitude toward ICT contributes the highest roles (35, 3 percents), these are followed by teachers' attitude on ICT utilizing (3, 4 percents), teachers' knowledge on ICT utilizing (2, 3 percents), and ICT facilities (2, 0 percents). Keywords: knowledge, contribution, attitude, skill, ICT utilizing, science learning. Categories: ICT learning contributions of attitude_ knowledge_ skills and ICT facitilities

1. INTRODUCTION

The based learning in practical teaching process has been exameaned by Chang (2001). The purposes were to find out how web based learning helps teachers in increasing students understanding during learning process and enhance learning progress among students. Aduwa-Ogiegbaen, S. E. and Iyamu, E. O. S. (2005) stated that there is universal recognition about ICT utilizing in education. When we encounter globalization era where information through satelites and internet affect the spread of information globally. Nigeria is a country which international digital disparity due to its insignificant efforts to integrate ICT in its high school curriculum. Along with that, Milinković dan Pikula (2013) revealed that computerized teaching provides the most adequate respons for teaching integrity in junior high school that requires didactic transformation methods program contents toward their connection and integration. Jung et al. (2002) exameaned the

relationship among academic, collaborative spirit and social interaction in relation to learning satisfaction, engaging and attitude toward learning environment and web based learning. Law et al. (2002) had proven that students have been more positive, they tried to facilitate information literacy skills by using internet, they were able to create web page to present their assigment. In additions, they attempted to think critically, to learn from various resources, moreover and to learn from their community through respect each other ideas. ICT has developed teachers' knowledge and professionalism, their skills and ability to broader their subject knowledge, has facilitated planning and preparation for more effective teaching learning. In order to drive ICT's classroom integration, teacher has been identified as a major factor in constructing classroom integration. Therefore, teacher is facilitator and promoter in ICT's learning environment, (Jegede, 2008).

2 LITERATURE REVIEW

Teachers Competency on Computing

According to Bordbar (2010), teacher's competency on computing is primary predictor in ICT's integration on learning. It is proven that majority teachers who have negative attitude or netral toward ICT's integration on learning process are those who do not have adequate knowledge and skills to make informed decision (Al-Oteawi, 2002). Argued that teachers who have computing experiences are more confidence about their ability to use it effectively. Jones (2004) agreed to this point of view. He said that teachers competencies are directly associated to confidence. In order to succeed on starting and implementing education technology at school, teacher's roles, such as, their supportive attitude, their skills and their personal knowledge, are crucial. Among those factors, teacher's attitude and confidence in relation to technology affect the success of ICT's integration on teaching learning (Hew & Brush, 2007). When teachers are positive about technology implementation in education, they obviously offer constructive understanding of ICT's adoption and integration into learning process. Teachers assurance of technology affects their acceptance in technology utility, thus it potentially influences ICT's implementation into classroom (Huang & Liaw, 2005).

Effective Integrated ICT's Utilizing Is Rarely Occur

The obstacles are frequently drawback the effectiveness of ICT's utilizing in exploiting its interactive. As consequence, effective integrated ICT's utilizing is rarely occur. Teachers should be able to upgrade their skills and broader their knowledge, thus, ICT based science learning can be implemented. However, according to Osborne et.al (2003), teachers' trainings for classroom's ICT utilizing appears to be more succeed compared to other learning.

As the enhancement of internet utilizing, initiation to web based teaching learning method is expected to emerge various teaching learning methods in order to achieve the learning objectives. This inevitable changes constrains educational institution to have IT and ICT skills, in that order, students are able to gain knowledge in effective ways and are able to compete in the work place when they graduate. A research about learning effectiveness on 21st century which emphasizes on teachers innovative pedagogic practices on science learning leads to learning modernization. Ćurčić , M et, al (2018) stated that statistic indicator has confirmed the assumption that software integration and individual contribution are more efficient and easier to achieve learning, to extend quality and quantity of students' knowledge and to boost enthusiasm in learning Science and Match, thus it shows that this teaching learning models are favorable. Law et al. (2002) had proven that students are positive, they tried to expand their information literacy skills through internet utility, they created web page to presents their assignment. Students engaged in web medium learning process generates creative and critical students, moreover, it also extend the learning pace among students (Chang 2001).

Teaching Learning Approach

Saunders (2003) research revealed that web based teaching learning approach can be fun and be able to promote students attentiveness as the web meets all learning resources requirements. Rodriguez (2003) stated that various strategies and approaches have been implemented in library research about internet utilizing as learning tools among students. Victor (2004) from IBM, has defined that e-learning as innovation technology utility and learning model that change people and organizations ways to acquire skills and new knowledge. Jenkins & Lonsdale, 2007 research showed that "utilizing digital facilities in higher education is in progress, however, it offers new innovation for students to present their assigments and to understand learning process in higher education" (McLellan, 2007). It exerts student to be competent in ICT in 21st century (Jakes & Brennan, 2005). For them, learning is a group of work that involves information changes, whether individual or within group interaction. Get a significant difference science process skills and learning outcomes between the two experiments-it

is recommended that science teacher must be agile in various a teaching approach that is oriented towards using ICT in teaching (Osman K, Vebrianto.R 2013) This study shows the dominant and special direction of self-efficacy. This shows gender differences and shows a contribution to the use of ICT in science learning (Krause M.Pietzner.V, Judy Dori. Y, Eilks,I 2017)

Teaching and Learning Fasilites

Rhynard (2002) in his research about Web, said that web is a teaching strategy in 21st century where more students involve in teaching learning process more knowledge can be gained. Study about brain, media, video games, technology and interactive computer programs, present information about how students are motivated to learn. Carroll et al. (2003) argued that one of obstacle faced by institutions and universities nowadays is new technology utility using digital facilities. One of the key to solve this problem is; they started to set conventional cources that was trained by reconstructing pedagogic approach and added information technology in delivering cources. Jung et al. (2002) had studied about correlation among academic, spirit of collaboration, and social interaction to learning satisfaction, engagement, attitude toward learning environment and web based learning. Academic interaction comprises interaction among students and learning resources through internet, aside from students and science teachers' interaction. Social interaction among students and science teachers occur when science teachers adjust the strategies in order to develop student's engagement. Research showed that interaction among collaborative group is very high. Moreover, student demonstrated positive attitude changing toward active learning process. Link to other scholars in the same field or interdisciplinary, will strengthen network academic which indirectly create an extensive impact in sharing knowledge. Previous study had been showed that social media significantly influence willingnesss to share knowledge (Jolaee et al., 2014).

Developing Countries Have Used Technology

Free trade among South East Asia countries, which is known as AFTA (Asean Free Trade Area), is finally enacted. It means that products and workers from South East Asia countries have free access into Indonesia and vice versa. The question is 'Is Indonesia ready to compete with its neighbours?' The competition is there, Indonesian people have to be ready to face it. A number of developing countries have used technology, primarily for communication, therefore, unsurprisingly, they have used advance ICT, including for teaching learning activities, for both higher and lower education. However, technology utility in education should be guided by virtuous educational principals (Kilfoil, 2015). Furthermore, Lovat dan Mackenzie (2003), argued that quality of the teachers is essential roles in upgrading students outcomes compared to other related teaching learning factors, including school environment, such as; resources, curriculum, and assessment practices, or school environment, such as; school culture and school organization's culture. Aside from fixing local product, human resources skills surely need to be upgraded too. In this context, teachers' skills and ability adhere to ICT development. Advanced development of ICT emerges challenges for science teachers (biology, physics, and chemist) as changing agents in knowledge delivering, this is a sign that innovation on teaching learning is prerequisite and obligation for them. The latest advancement shows that ICT is fastening tools to spead and save information and then facilitated to acquire new knowledge (Lechner dan Boli 2000). Additionally, UNESCO (2002) report, in " teacher and teaching in a changing world" revealed that radical implication of ICT to conventional teaching learning methods was predicted that there would be transformation process of teaching learning so did teachers and students in accessing knowledge and information. Horton, (2000) said that ideas about global network utility as learning facilities has emerged numerous things, previously was only CBT (Computer-Based Training) and then become WBT (Web-Based Training). Internet advancement has been existing since 1999. There has been many ICT's

training since then. According to Kearsley (2000), ICT's based learning has brought significant impact to teaching learning process, particularly science.

Research Purpose

This research focused on; a) studying about the differences of science teachers' skills on ICT utilizing in learning process based on school location and teachers' education, b) finding out about contribution of knowledge, attitude, and ICT's skills toward ICT utilizing on science learning process.

Objective of this research:

1. Are there any differencies about science teachers' skills on science learning process based on schools location,

2. Are there any differencies about science teachers' skills on ICT's utilizing toward learning process based on teachers' education.

3. How are knowledge, attitude, and ICT's skills contribution toward ICT utilizing on science learning process.

Conceptual Framework

On learning, particularly ICT based science learning in High School in West Sumatra, only occur if science teachers have adequate knowledge, attitude and skills as well as adequate ICT's facilities. Systematically, rasionale of this study divided into some sub variables. There were science teachers demography's variables consist of education, school location and working experience; knowledge variables consist of knowledge about ICT, science teachers' knowledge about computer applications; teachers' attitude variables consist of science teachers' attitude toward ICT, and science teachers' attitude toward ICT utility; ICT facilities variables consist of computer facilities, internet and printer; teachers' skill on ICT utilizing in science learning process variable and teachers' skills on providing teaching materials based on ICT, can be explained in following conceptual
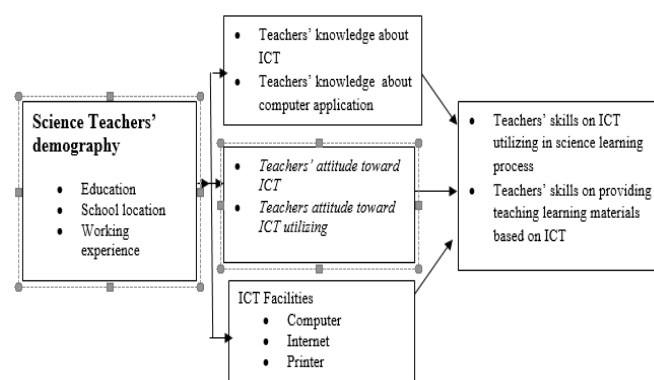
framework:

Figure 1: Conceptual Framework

3. METHODS

General Background of Research

The research was carried out by using instrument as primary data collection. There were nine variables involve in this research, they are; teachers' attitude toward ICT, teachers' attitude toward ICT utilizing, ICT based learning facilities, teachers' knowledge about computer applications, teachers' knowledge about ICT, computer applications' utility, teachers' skills on ICT utilizing, and teachers' skills in providing learning materials based on ICT. The instruments were targeting high school science teachers in West Sumatra

Sample of Research

The samples of research consisted of 300 science teachers, they are biology, physics and chemist science teachers. Respondents profile based on gender: male: 80 (26, 6%), female 220 (73, 4%), education level: under graduated 199 (66, 3%) and based on teachers' experiences: 119 (39, 7%) 0-15 years experiences, 113 (37, 6%) teachers who have 16-30 teaching experiences and 68 (22, 7%) have > 30 years experiences.

Research Methods and Statistical Analysis

This research was conducted by using nine variables instruments. First part was teachers' attitude toward ICT consist of 14 statements, second variable was about teachers attitude toward ICT utilizing; 17 statements, third variables was

ICT's facilities on ICT's based learning consist of 9 statements, fourth variable was teachers' knowledge about computer applications, fifth variable was teachers' knowledge about ICT, there were 23 statements, sixth variable was computer application utility; 11 statements, seventh variable was teachers' skills on ICT utilizing, eighth variable was teachers' skills on ICT based learning process; 6 statements, and ninth variable was teachers skills in providing learning materials based on ICT; 6 statements. All of items were applying likert 1-5 scales. Point 1 = "strongly disagree (SD), point 2= very disagree (VD), point 3= disagree (D), point 4= agree (A) dan point 5 = "very agree (VA)". Instrument reliabilities applied Cronbach Alpha point = 0, 73 up to 0, 92 coefisien Cronbach Alpha= 0, 60, were around usable by some moderate writers and accepted by educational studies.

Analysis was conducted by using SPSS Programs version 17. Logical validity to instruments were applied before data collecting by reviewing from 3 (three) science teachers and instrument reliability through Alpha Cronbach instrument points. Data analysis employed was analysis inferency t-test, multiple regression (stepwise)

4. FINDINGS

The differences of teacher's skills on ICT utilizing based on schools location. In order to look at the differences between two variables in an analysis, t-test can be used as it is seen on the following table.

Table 1: t-test assessment the differencies of science teachers' skills on ICT utilizing in learning based on schools' location in Senior High school

Variable	independent assessment sample t-test				
	School Location	n	Mean	t	Sig
Science Teachers 'skill on ICT utilizing	Urban Rural	180 120	3,65 4,22	- 5,094	0,00

*Sig. p< 0.05

Table 1. Describes t-test assessment about science

teachers skills on ICT utilizing in learning based on schools location of Public Senior High Schools in West Sumatra. It shows that there are significant differences between High School science teachers in Urban and Rural areas (t=-5,094, p=0.00). Based on t-test assessment (p=0.00<0.05), there are notable differences about science teachers skills on ICT utilizing in learning between urban Public High School science teachers and Public Senior High Schools science teachers in rural areas, where mean score of urban Public High School science teachers (mean score= 3,65) compares to mean score of rural Public High School science teachers (skor mean=4,22), in other words, rural Public High School science teachers' skills on using ICT in learning is higher than urban Public High School science teachers.

The differences of teachers' skills on ICT utilizing based on education the next part explains about differences analysis of science teachers' skills on ICT utilizing based on teachers' education, as it is seen on following table 2:

Table 2: t-test assessment the differencies based on teachers' education in learning at Public Senior High School, West Sumatra

Variable	independent assessment sample t test				
	School Location	N	Mean	t	Sig
Science teachers skills on ICT utilizing	under graduated	180	3,17	- 3,617	0,00
	post graduated	120	4,86		

*Sig. p< 0.05

T-test assessment about Public Senior High School science teachers skills on ICT utilizing in learning based on teachers education in West Sumatra revealed that there are significant differences between under graduated Public Senior High School S science teachers and post graduated Public High School science teachers (t=-3,617, p=0.00). Based on t-test assessment (p=0.00<0.05), there is notable differences about the skills of science teachers on ICT utilizing in learning

between under graduated Public High School science teachers and post graduated Public High School science teachers, mean score of under graduated Public Senior High School science teachers(mean score = 3,17) compares to post graduated Public High School science teachers (mean score=4,86) on the other words, the skills of post graduated Public High School science teachers on ICT utilizing in learning is higher compared to the skills of under graduated Public High School science teachers.

How are contributions of attitude, knowledge and science teachers ICT facilities toward skills on ICT utilizing in learning. Table 3 explains about Multiple Regression Analysis (Stepwise) that were distributed to all high school science teachers' respondents in West Sumatra. Multiple Regression Analysis step by step 'stepwise' involved 5 (five) independent variables, they are; science teachers' attitude toward ICT, science teachers' attitude on ICT utilizing, science teachers' knowledge about computer applications utilizing, science teachers' ICT facilities. Analysis shows that 4 (four) variables demonstrate contribution or significant effect (sig.p< 0.05) toward skills on ICT utilizing in learning variable, as in table 3.

Table 3: Multiple regression analysis elemen attitude, knowledge, science teachers' facilities on ICT toward skills on ICT utilizing in learning.

Independent variables	B	Error	Beta	T	Sig	R^2	Contribusion
Science teachers' attitude toward ICT	0,560	,115	,272	4,877	,000	,353(a)	35.3
Science teachers' attitude on ICT utilizing	1,836	,560	2,070	3,279	,001	,387(b)	3,4
Science teachers' knowledge in utilizing computer applications	-1,603	,514	-1,981	-3,117	,002	,410(c)	2,3
ICT facilities	0,222	,090	,155	2,461	,014	,430(d)	2,0
constant	28,019	3,716		7,541			

Multiple R   = 0.185
Quadrat R   = 0.430
Error   = 3,716

Table.3a Variant Analysis

Resource	Total quadrat	Degree of Independency (DI)	MeanQuadrat	F	Sig.
Regression	2121,801	4	530,450	16,711	,000 (d)
Residual	9364,279	295	31,743		
Total	11486,080	299			

Table 3 describes that from 5 (five) independent variables, they are; science teachers attitude toward ICT, science teachers attitude on ICT utilizing, science teachers knowledge about computer application utilizing, ICT facilities for science teachers in high school, 4(four) variables display significant contribution or effect toward skills on ICT utilizing in science learning for 43.0 percent's. The highest variable that contribute to ICT utilizing skills in science learning is science teachers attitude toward ICT (35, 3 percent's), teachers attitude on ICT utilizing for 3, 4 percent's, teachers knowledge in computer utilizing 2, 3 percent's and science teachers ICT facilities contributes for 2,0 percent's.

The research revealed correlation between skills on ICT utilizing in science learning variable and other groups of independent variables, which is 0.430 (Multiple R). Degree of variants in variables which significantly related to other independent variables can be explained through Multiple R that describes regression model with R2 is 43, 0 percent's.

The highest primary contribution to science teachers' skills on ICT utilizing in science learning is science teachers' attitude toward ICT (β=0,272, t=4,877 and sig. =0.000), which effects for 35, 3 percents. It can be seen if attitude of science teachers toward ICT is added for one unit, so science teacher's skills on using ICT will increase for 0,277 unit. Second highest contribution to science teachers skills on ICT utilizing in science learning is science teachers' attitude on ICT utilizing (β=2,070, t=3,279 and sig. =0.001), it effects for 3, 4 percent. It is shown when science teachers' attitude on utilizing ICT is added for one unit, thus science teachers' skills on ICT utilizing will increase from 2,070 unit.

The third variable that provides contribution to the skills of science teachers on using ICT in science learning is science teachers' knowledge about computer applications (β=-1,981, t=-3,117 and sig. =0.002). it can be seen when science teachers' knowledge on utilizing computer applications is added for one unit, then science teachers' skills on ICT utilizing will increase for -1,981 units.

The fourth variable that gives contribution to science teachers' skills on ICT utilizing in science learning is ICT facilities (β=0,155, t=2,461and sig. =0.014). it can be seen when ICT facilities of science teachers is added for one unit, thus science teachers' skills on ICT utilizing will increase for 0,155 unit.

Value of R = 0.185 describes correlation between science teachers' skills on ICT utilizing variable and linier combination among those four insign variables. Value of R quadrat (R2 = 0.430) presents correlation steps and contribution or effect among chosen independent variables that influence science teachers skills on ICT utilizing. Through table 3a, variant analysis shows value of F =16,711, (DI=4, 295) sig on level p (sip=0,000) <001. As the explanation that value of R2 = 43,0 percent's, skills on ICT utilizing in science learning is science teachers attitude toward ICT (35,3 percent's), teachers' attitude on ICT utilizing 3,4 percent's, teachers' knowledge on computer utilizing 2,3 percent's and science teachers' ICT facilities

contributes for 2,0 percent's. Over all, those four variables have contributed or affected science teachers skills on ICT utilizing that are able to construct equal regressions as follows:

Y= 28,019+ 0560 X1 + 1,836 X2 + (-1,603 X3) + 0.222 X4+ 3,716

Y= Science teachers' skills on ICT

X1=Science teachers' attitude toward ICT

X2= Science teachers attitude on ICT utilizing

X3= Teachers knowledge on computer utilizing

X4= Science teachers' ICT facilities

Error   = 3,716

Constant = 28,019

3 CONCLUSION AND DISCUSSION

Object of this research is studying about the differences of science teachers' skills on using ICT in learning process based on school location. SPSS analysis found that there are significant differences in science teachers' skills on ICT utilizing in learning between urban Public High School science teachers and rural Public High School science teachers, mean score of urban science teachers is higher than rural science teachers, in other words, in term of science teachers' skills on using ICT in learning, it demonstrates that science teachers' skills in rural Public High School is higher compared to Urban Public High School. According to Ali, Haolader, and Muhammad (2013) described that in new millennium, there are rapit advancement in computer utility. Multimedia and internet widely facilitate teachers and students to operate, to save, to manipulate, to get information, to boost independent and active learning. Horton, (2000) said that ideas about global network utility as learning tools has emerged numorous things, previously was only CBT (computer based Training) then become WBT (Web based Training). The advance of internet has existed since 1999 and there have been many ICT trainings since then. Based on t-test assessment, there are notable differences about science teachers' skills on ICT utilizing in learning between under graduated

Public High School science teachers and post graduated SMAN science teachers. Under graduated Public High School science teachers' skills are lower compared to post graduated science teachers. It means that in term of science teachers' skills on ICT utilizing in learning, post graduated Public High School teachers are higher than under graduated teachers. Furthermore, Lovat and Mackenzie (2003), stated that teachers' quality plays important roles in enhancing students achievement compares to other factors related to teaching learning, including school environment such as resources, curriculum, and assessments, or school environment such as school culture and school organization's culture. A number of developing countries, nowadays, use technology primarily as communication tools, therefore, undoubtedly that developing countries have started to use the advance of ICT, including for teaching learning activities, both in higher education and lower education. However, technology utilizing in education should be guided by virtuous education principles (Kilfoil, 2015). According to Kearsley (2000), ICT based learning brings significant impact to teaching learning process particularly in science.

There are five variables; science teachers' attitude toward ICT, science teachers' attitude on ICT utilizing, science teachers' knowledge for computer applications, ICT facilities for science teachers in high schools. 4 (four) variables impose contribution that effect significantly to skills on ICT utilizing in science learning for 43, 0 percents. The highest variable that shows contribution to skills on ICT utilizing in science learning is science teachers' attitude toward ICT, and followed by other variables such as teachers' attitude on ICT utilizing, teachers' knowledge on computer utilizing and ICT facilities. Hew & Brush, (2007) said that in order to succeed on starting and implementing education technology at school, it relies on teachers roles, whether teachers' supporting attitude, teachers' skill and their personal knowledge. Some factors that affect the success of ICT's integration in learning are; teacher's attitude and confidence to technology. If

teachers are positive about education technology implementation, they will facilitate meaningful vision about ICT's adoption and integration into learning. Teachers' confidence of technology gives impact to teacher's acceptance in technology utility, in addition, it affects teacher's ability in implementation of ICT into classroom (Huang & Liaw, 2005).

The research result provides information about ICT skills' differences among science teachers who are teaching science in urban and rural high schools. In term of science teachers skills on ICT utilizing in learning, post graduated Public Senior High Schools science teachers are higher compared to under graduated Public High School science teachers. There are four variables that effect science teachers skills on ICT utilizing, they are; science teachers' attitude toward ICT, science teachers' attitude on ICT utilizing, teachers' knowledge on computer utilizing and ICT facilities for teachers. Jenkins & Lonsdale, 2007 showed that "digital facilities utility in higher education is developing, however, it offers new innovations for students to present their assignment and to understand learning process in higher education. Furthermore, Rodriguez (2003) research revealed various strategies and approaches have been used in library research about internet utilizing as learning tools among students. Science teachers' attitude toward ICT and science teachers' attitude on ICT utilizing, have given contribution to teachers skills on ICT utilizing, this is similar to Law et al. (2002) had proven that students' attitude is positive, they strived to upgrade their information literacy skills by using internet, they created web page to present their assignment.

Acknowledgments

research completion

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