Implementation of E-learning Through Teacher's Self-Efficacy and Their Technology Readines

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Abstract: E-Learning Implementation in schools has been compulsory especially in the era of post-Covid19. Teachers should have an ability to deliver the education to their students towards e-learning because of the government's requirement these days to avoid infection that should be done through distance learning. In this article, several factore were hinted as contributed factor for teacher to adapt newer technology especially in e-learning adaption. Self-efficacy is believed the important factor because it could raise their satisfaction toward their jobs as an educator. Other than that, technology readiness that divided into four main factors, i.e. optimism, innovativeness, discomfort and insecurity were also contributed as meaningful factors to achieve better education through e-learning adaptation. Three variables, namely self-efficacy, optimism and innovativeness factors had positive impact, where the other two, specifically discomfort and insecurity had negative impact that could affect e-learning implementation.

Keywords: E-learning, Teachers, Education Adaptation, Technology Readiness

Introduction

One of the programs in Sustainable Development Goals (SDGs) that adopted by all UN member State since 2015 in Education area could be completed by Achieving inclusive and quality education for all. This goal achieved through completion of all girls and boys in free primary and secondary schooling by 2030, whilst it also aimed equal access to affordable vocational training, gender and wealth disparities elimination, and universal access to a quality higher education. Government in Indonesia took serious action by providing all means

with tremendous amount of national budget (raise about US$9,1 Billion from US$29,2 billion in 2016 to US$38,3 billion in 2021) (Okuonghae et al., 2022).

Students aged 5-24 years in Indonesia whose spent most of their time in school activities, find that in order to learn and interact with others and to increase lifeskills, they have to spend additional time outside school. The activities carried out can have a positive or negative impact on their education. An activity can have a positive impact if the activity is useful and supports the learning process. In education field, technology is no doubt becoming an important role as a media to support the curriculum system and is expected to spur and improve the education quality. After the Covid19 pandemic, Classes which prior to the digital era were restricted to lectures, face-to-face discussions, and physical objects, now have a digital toolbox for each teacher and student, ranging from engaging devices to teach the students to online courses and digital textbooks. In respond to that, the government even had to issue a School From Home (SFH) policy where learning activities are diverted from Face-to-face to full or partial online activity because of current situations that do not allow to carry out activities directly in school (Kholiq et al., 2021).

On the top of that, imbalance technology development is still occurred where generally only urban people have better access to technology while people in rural still could not get good computer access, fast internet networks and good telephone service (Strover, 2001). In addition, according to Pusdatin Kemendikbud, technological inequality between large schools and regions and limited resources for the use of educational technologies such as the internet bandwidth and data plan became a challenge for Indonesia during the third phase of Covid-19 pandemic recovery (Ssenyonga, 2021). **Error! Reference source not found.** below indicated the market size of the e-learning market worldwide in 2014 and 2022 forecast. In 2016, the global e-learning market was worth 165.36 billion U.S. dollars and is projected to surpass 243 billion U.S. dollars at a 5.08 percent CAGR in 2022.
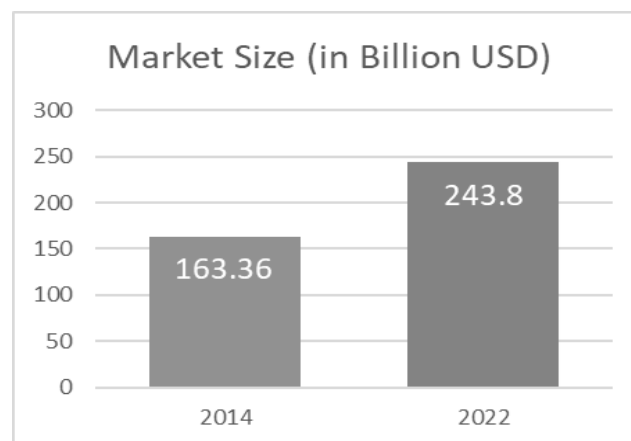

Figure 1 Size of e-Learning market in 2014 and 2022 in billion U.S. Dollars

From Indonesian population census in 2020, Based on the latest population census data, most of Indonesian people or about 27,94 % are belonged to Gen Z, while 25.8 percent of Indonesians are millennial generation. Indonesia is expected to have a faster rate of development in the next decades because of this age structure that has a relatively young population (Badan Pusat Statistik Indonesia, 2020a). The age demographic in Indonesia can be seen in **Error! Reference source not found.** below.
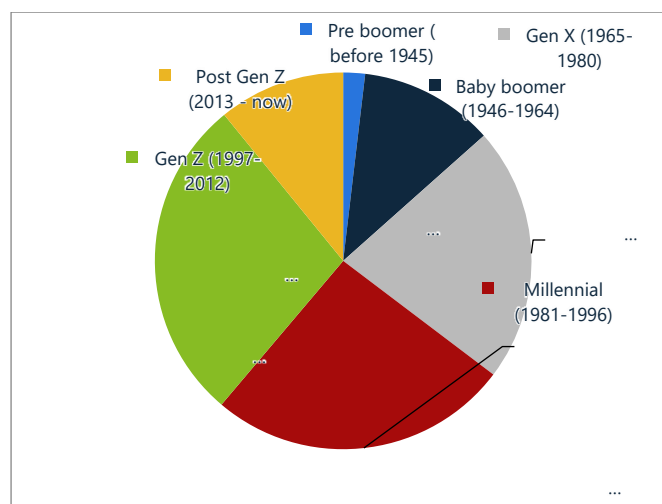

Figure 2 Age Demographic in Indonesia 2020

As technology evolved, so that the user growth. From **Error! Reference source not found.** below we can see that in last 10 years, users of information technology devices raised significantly, not only based on their residences, but also in term of gender. In Indonesia, the number of female users from 15-24 is slightly more than male user since 2013 up to now which means that females technology user is considered more capable to use technology devices rather than males. People who lived in rural area started to significantly being information technology literate from only about 17 % in 2011 to 79 % in late 2020. and this is good news since Indonesia consisted of more than fifteen thousand islands respectively (Tejedor et al., 2020).

To achieve better learning through technology, or e-learning, decent infrastructures of broadband technology, devices, and connection are needed. As for smartphone user, Indonesia is estimated to reach 199.2 million users in 2021 and now the fourth-largest smartphone market worldwide after China, India and the US. In 2020, about 78.2 percent of all households in Indonesia had used the internet (Huangfu & Nobles, 2022). This number has been increasing steadily and with the increasing number of smartphone users and plenty of

affordable data plan options, more will be using the internet in the next years. This make implementation of e-learning technology easier than before because e-learning technology rely on the internet connection.
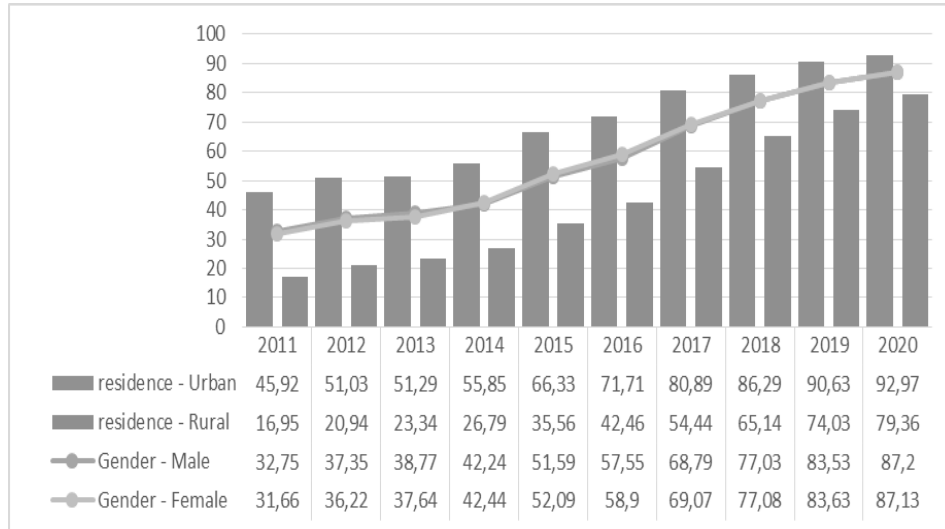

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
residence - Urban	45,92	51,03	51,29	55,85	66,33	71,71	80,89	86,29	90,63	92,97
residence - Rural	16,95	20,94	23,34	26,79	35,56	42,46	54,44	65,14	74,03	79,36
Gender - Male	32,75	37,35	38,77	42,24	51,59	57,55	68,79	77,03	83,53	87,2
Gender - Female	31,66	36,22	37,64	42,44	52,09	58,9	69,07	77,08	83,63	87,13

Figure 3 Percentage of Information Technology Users based on residence and gender

Educators or teachers as the primary factor of learning process held important key to e-learning adaption of their students. The number of techers from primary schools to high schools and vocational schools in Indonesia as shown in **Error! Reference source not found.** below indicated that the number of total teachers in each categories decreased 2017 except the number of primary school teachers that raised since then as well as the number of university lecturers in Indonesia like in **Error! Reference source not found.** below (Rifai & Rombot, 2023; Sulaeman et al., 2022).
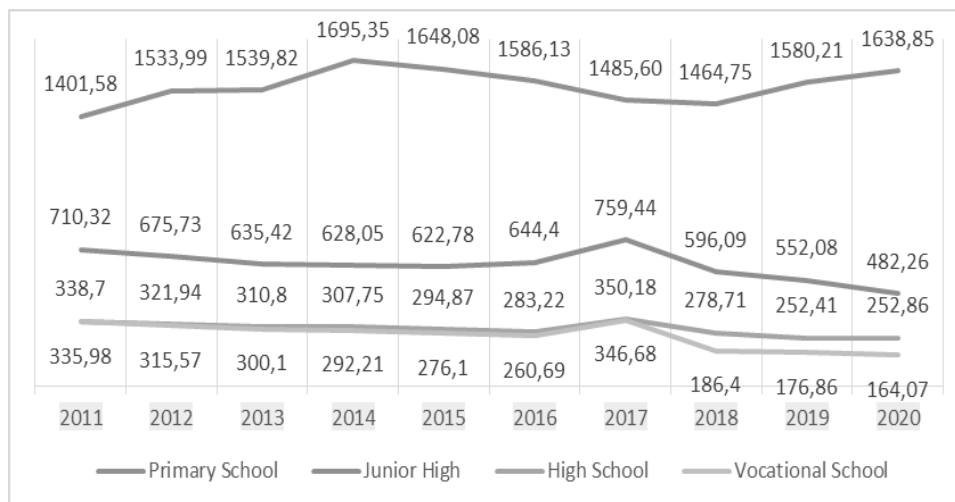

Figure 4 Number Teacher in K-12 education in Indonesia (in 1000's)

Currently, the median age of Indonesia is about 31.1 years old (CIA, 2020) which means that most of teacher in Indonesia belongs to millenial generations that can adapt to technology changes better. So the learning process could be achieved throughout the optimal use of technology devices. To ensure the best outcome of learning process throghout the technolgy use especially E-Learning, teacher must have good both self-efficacy and technology readiness. This article examined how self-efficacy and technology readiness factors affected e-learning implementation in high schools in Indramayu, Indonesia.

Research Questions in this research is as follows:

1. Do teacher efficacy and technology readiness factores affected e-learning implementation?

Research Method

This research used Nemothetic approach that involved seeking general laws and rules existing in the nature. Typical research procedures as to the approach in question are: experimenting, inspecting and correlating, whereas the approach-related characteristic methods are the following: interviews, surveys, observations, experiments and tests. (DŹWIGOŁ, 2018). Data was collected from questionnaires that consisted of several variables i.e Teacher's Self Efficacy, Technology Readiness Index, and E-Learning Implementation with total 59 questions. Total respondents are 160 from several high school across West Java Indonesia (Amoah et al., 2021; Najmi & Khan, 2017).

Analysis method used in this research was Partial Least Square-Structural Equation Modelling (PLS-SEM) to estimate causal relationship among variables (Lin et al., 2020). This particular PLS-SEM used variance-based approach which os appropriate for this study. The software used in this research is Smart PLS 3.0 to estimate the research's model (Kante et al., 2018). The following analytical procedures were divided into two stages, which the first one was reliability and validity of Data assessment, and the next stage was the structural model itself (Alhassany & Faisal, 2018; Bushashe, 2023; Dahri et al., 2023)

Framework Resarch made in this article consisted of 6 variables, i.e 5 independent variables Teacher's Self Efficacy (X1), Optimism in Technology (X2), Innovativeness (X3), Discomfort (X4), Insecurity (X5), and 1 dependent variable E-Learning Implementation (Y). The basic conceptual model can be seen Figure 5 below:
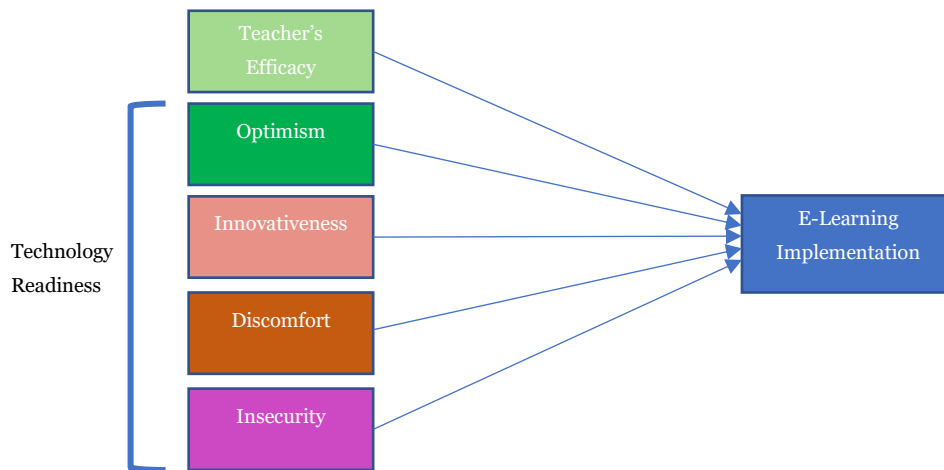
Figure 5 Conceptual Model E-learning Implementation

As explained above, each of variable had total 59 indicators which breakdown as instruments as follows: Teacher's efficacy (X1), Optimism (X2) and Discomfort (X4) had each 10 indicators, innovativeness (X3) had 7 indicators, insecurity (X5) had 9 indicators, and E-Learning Implementation had total 13 indicators. Description of each indicators can be seen in the **Error! Reference source not found.** below:

Table 1 Variables and Indicators

Variable	Name	Indicators	Instrument
X1 EFFIC	Teacher's Self Efficacy	X1_01	I have confidence in my ability to do my job
		X1_02	There are some task required by my job that i cannot do well
		X1_03	When my performance is poor, it is due to my lack of ability
		X1_04	I doubt my ability to do my job
		X1_05	I have all the skills needed to perform my job very well
		X1_06	Most people in my line of work can do this job better than i can
		X1_07	I am an expert at my job
		X1_08	My future in this job is limited because of my lack of skills
		X1_09	I am very proud of my job skills and abilities
		X1_10	I am very threatened when others watch me work
X2 OPTI	Optimism toward Technology	X2_01	Technology gives people more control over their daily lives

		X2_02	Products and services that use the newest technologies are much more convenient to use
		X2_03	You like the idea of doing business via computers because you are not limited to regular business hours
		X2_04	You prefer to use the most advanced technology available
		X2_05	You like computer programs that allow you to tailor thing to fit your own needs
		X2_06	Technology makes you more efficient in your occupation
		X2_07	You find new technologies to be mentally stimulating
		X2_08	Technology gives you more freedom of mobility
		X2_09	Learning about technology can be as rewarding as the technology itself
		X2_10	You feel confident that machines will follow through with what you instructed them to do
X3 INNOV	Innovativeness	X3_01	Other people come to you for advice on new technologies
		X3_02	It seems your friend are learning more about the newest technologies than you are
		X3_03	In general, you are among the first in your circle of friends to acquite new technology when it appears
		X3_04	You can usually figure out new high-tech products and services without help from others
		X3_05	You keep up with the latest technological developments in your areas of interest
		X3_06	You enjoy the challange of figuring out high-tech gadgets
		X3_07	You find you have fewer problems than other people in making technology work for you
X4 DISCOM	Discomfort	X4_01	Technical support lines are not helpful because they don't explain things in terms you understand
		X4_02	Sometimes, you think that technology systems are not designed for use by ordinary people
		X4_03	There is no such thing as a manual for a high-tech product or service that's written in plain language

		X4_04	When you get technical support from a provider of a high-tech product or service, you sometimes feel as if you are being taken advantage of by someone who knows more than you do
		X4_05	If you buy a high-tech product or service, you prefer to have the basic model over one with a lot of extra features.
		X4_06	It is embarassing when you have trouble with a high-tech gadget while people are watching
		X4_07	There should be caution in replacing important people-tasks with technology because new technology can break down or get disconnected
		X4_08	Many new technologies have health or safety risks that are not discovered until after people have used them
		X4_09	New Technology makes it too easy for governments and companies to spy on people
		X4_10	Technology always seems to fail at the worst possible time
X5 INSEC	Insecurity	X5_01	You do not consider it safe giving out a credit card number over a computer
		X5_02	You do not consider it safe to do any kind of financial business online
		X5_03	You worry that information you send over the Internet will be seen by other people
		X5_04	You do not feel confident doing business with a place that can only be reached online
		X5_05	Any business transaction you do electronically should be confirmed later with something in writing
		X5_06	Whenever something gets automated, you need to check carefully that the machine or computer is not making mistakes
		X5_07	The human touch is very important when doing business with a company
		X5_08	When you call a business, you prefer to talk to a person rather than a machine.
		X5_09	If you provide information to a machine or over the Internet, you can never be sure it really gets to the right place.
Y EL-IMP	Y:E-Learning Implementation	Y_01	Online learning promotes students' motivation in learning
		Y_02	During online learning, students have the opportunity to interact with each other
		Y_03	Online courses provide clear instructions to ptomote students' comprehension

		Y_04	Online learning provides for teachers' formative assesment and feedback
		Y_05	Online learning utilizes a wide range of learning sources to support learning (link to websites, articles, videos, etc.)
		Y_06	During online learning, students are able to ask questions and receive explanatory feedback from teachers
		Y_07	Online learning platform provides clear contact information of instructors or institution for students who need support
		Y_08	During online learning, students and teachers interact and communicate effectively
		Y_09	Online learning provide students with activities to develop critical thinking
		Y_10	Online learning provides clear instructions to task submission
		Y_11	Online learning promotes students' active engagement in group tasks and discussions
		Y_12	Online learning courses delivery are interesting and engaging
		Y_13	Online learning promotes autonomous learning environment

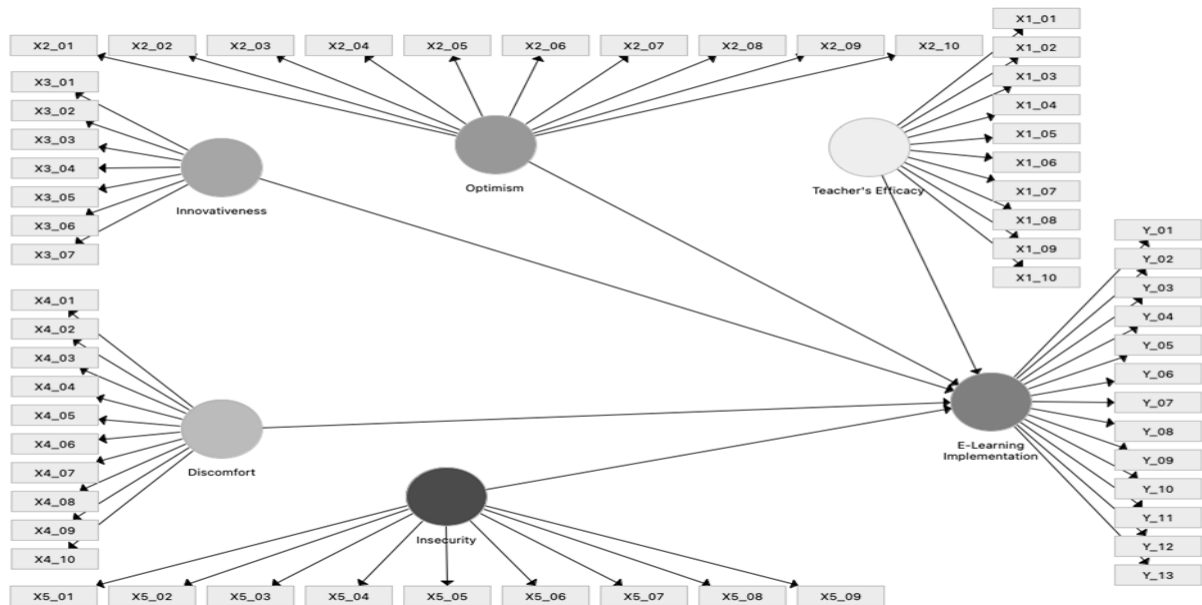Final Model of this research that used every indicator can be seen as follows :

Figure 6 Research Model with indicators

Result and Discussion

Below are respondents demographic which are all teacher whose workplaces across West Java, Indonesia with age range and school level:

Table 2 Respondent Demographic

| Work places	Age Range	Elementary	Junior High School	School Level High School	Vocational High School	Grand Total
Brebes		8%	0%	0%	0%	8%
	21 - 30	2%	0%	0%	0%	2%
	31 - 40	4%	0%	0%	0%	4%
	51 - 60	3%	0%	0%	0%	3%
Cirebon		0%	0%	0%	1%	1%
	31 - 40	0%	0%	0%	1%	1%
	41 - 50	0%	0%	0%	1%	1%
Indramayu		11%	4%	27%	3%	45%
	21 - 30	1%	2%	8%	1%	12%
	31 - 40	4%	1%	8%	1%	14%
	41 - 50	3%	1%	8%	1%	13%
	51 - 60	3%	0%	3%	0%	5%
	> 60	1%	0%	0%	0%	1%
Jakarta Utara		1%	0%	0%	0%	1%
	21 - 30	1%	0%	0%	0%	1%
Kab. Cirebon		2%	0%	0%	0%	2%
	51 - 60	1%	0%	0%	0%	1%
	> 60	1%	0%	0%	0%	1%
Karawang		4%	0%	1%	1%	5%
	21 - 30	1%	0%	0%	1%	1%
	31 - 40	2%	0%	1%	0%	3%
	41 - 50	1%	0%	0%	0%	1%
Kota Jakarta Timur		1%	0%	0%	0%	1%
	21 - 30	1%	0%	0%	0%	1%
Kuningan		20%	5%	1%	0%	26%
	<21	0%	0%	1%	0%	1%
	21 - 30	2%	3%	1%	0%	5%
	31 - 40	3%	2%	0%	0%	4%
	41 - 50	7%	1%	0%	0%	8%
	51 - 60	9%	0%	0%	0%	9%
Majalengka		8%	1%	0%	1%	9%
	21 - 30	2%	1%	0%	0%	3%
	31 - 40	4%	0%	0%	0%	4%
	41 - 50	1%	0%	0%	1%	1%
	51 - 60	1%	0%	0%	0%	1%
Pati		1%	0%	0%	0%	1%
	31 - 40	1%	0%	0%	0%	1%
Sumedang		1%	0%	0%	1%	1%
	21 - 30	0%	0%	0%	1%	1%
	41 - 50	1%	0%	0%	0%	1%
Grand Total		55%	10%	29%	6%	100%
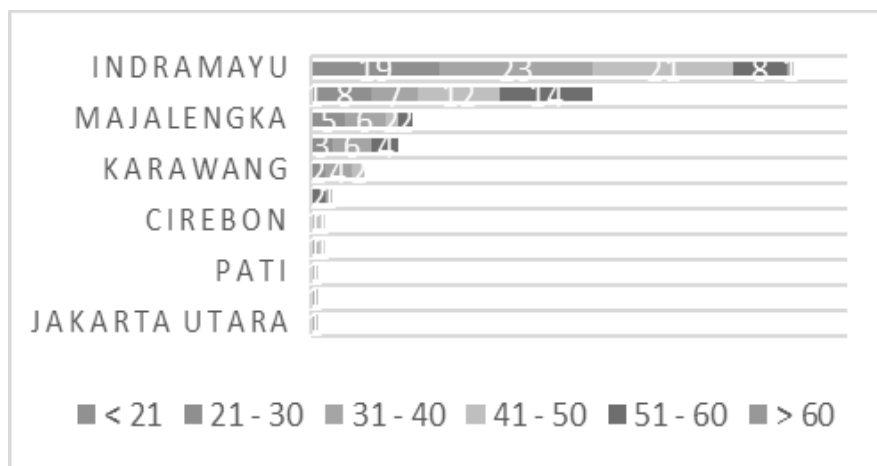
Figure 7 Demographic

As for hyphoteses tesing, we used both partial least square equation modelling and bootstrapping with software SmartPLS(Ringle et al., 2015a). The result included in this model is as follows :
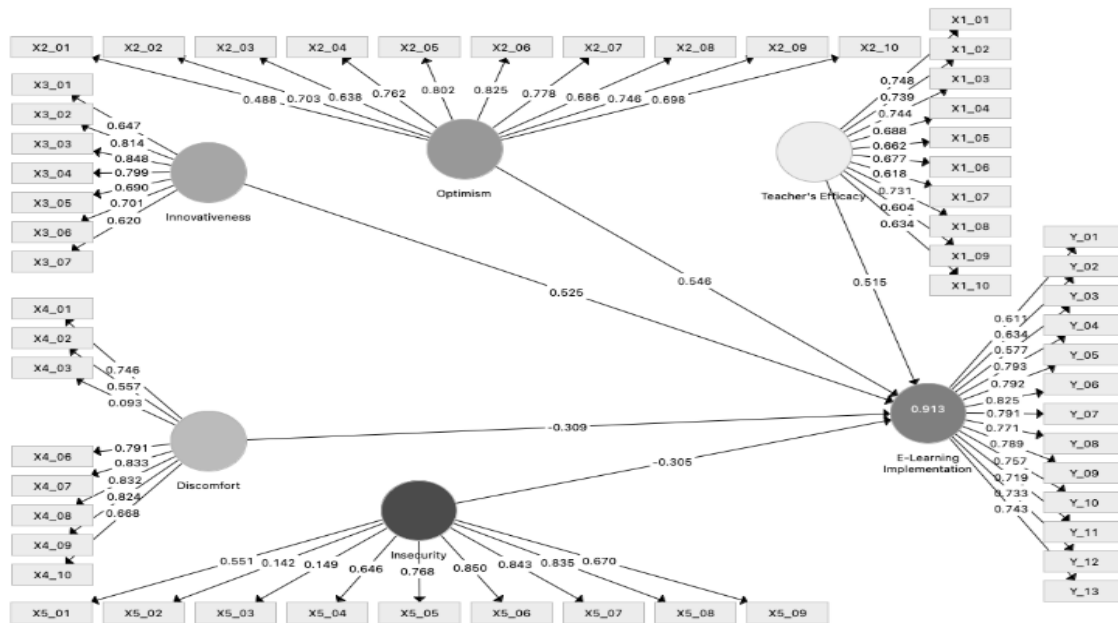

Figure 8 Path Coefficient Result

Evaluation method for instrument's model used in this article were validity and reliability test using Crocnbach's Alpha, rho_A and Composite Reliability for reliability test to prove its consistency and Average Variance Extracted (AVE) as validity test to prove data's legitimateness. The result can be seen in **Error! Reference source not found.** below:

Table 3 Validity and Reliability Test

Validity and Reliability Test	Cronbach's Alpha	rho_A	Reliability Result	Composite Reliability	Average Variance Extracted (AVE)	Validity Result
X1_Teacher's Efficacy	0,877	0,888	Passed	0,899	0,571	Passed
X2_Optimism	0,893	0,899	Passed	0,913	0,516	Passed
X3_Innovativeness	0,858	0,877	Passed	0,891	0,541	Passed
X4_Discomfort	0,831	0,876	Passed	0,878	0,502	Passed
X5_Insecurity	0,810	0,869	Passed	0,854	0,537	Passed
Y_E-Learning Implementation	0,929	0,932	Passed	0,939	0,544	Passed

Table 4 PLS Result Analysis

Path	Coefficient	Sample Mean (M)	STDEV	T-Stat	p
X1_Teacher's Efficacy -> Y_E-Learning Implementation	0,515	0,516	0,046	11,171	0,000
X2_Optimism -> Y_E-Learning Implementation	0,546	0,536	0,084	6,474	0,000
X3_Innovativeness -> Y_E-Learning Implementation	0,525	0,524	0,047	11,163	0,000
X4_Discomfort -> Y_E-Learning Implementation	-0,309	-0,311	0,09	3,421	0,001
X5_Insecurity -> Y_E-Learning Implementation	-0,305	-0,292	0,108	2,831	0,005
	R Square	**R Square Adjusted**			
Y_E-Learning Implementation	0,634	0,632			

Validity and Reliability Test :

The result of validity and reliability showd each value of testing including cronbach's alpha (>0,7), rho_A, composite reliability and AVE value had passed (>0,5), which means that this model suffice to validity and reliability.

Hyphoteses Testing:

Based on calculated result, we have equation as follows:

$$EL\_IMP = 0{,}515 EFFIC + 0{,}546 OPTI + 0{,}525 INNOV - 0{,}309 DISCOM - 0{,}305 INSEC$$

From

Table 4 PLS **Result Analysis**

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X5_Insecurity -> Y_E-Learning Implementation	-0,305	-0,292	0,108	2,831	0,005
	R Square	**R Square Adjusted**			
Y_E-Learning Implementation	0,634	0,632			

we can conclude that all independent variables have t-statistic > t-tables with significant values > 0,05. It means that all alternative hypotheses (H_a) are accepted.

Conclusions

Teacher's Self-efficacy in this research has positive effect toward E-learning implementation because every teacher must have a good efficacy to learn and thus transferred their knowledge better to their students especially through the e-learning. This is according to previous research by Klassen & Tze (2014) that said in order to achieve student's academic best result, teacher with high levels of self-efficacy offered higher result. This is corresponded with this paper, where good self-efficacy teacher have eager to learn new things. As said in research by Bandura (1977) that self-efficacy could developed social and cognitive to drive the change of behavior, for teacher themselves and also their students.

Technology readiness index especially from optimism factor has positive impact in this research this is due to the feeling of the teachers of the museum to learn new technologies in order to master elearning and then to teach their students. It is stated in previous research by Parasuraman (2000, 2015) that said optimism has contribute important factor toward implementation of new technologies, which in this case is e-learning implementation. Teacher's optimism factor could affect the will of their students to know better technologies that suited their needs.

Innovativeness contributed positive effect in this research too because based on previous research that said innovative people can acted as resource of informations and also as a teacher either directly or indirectly to others to keep in touch with newer technologies. Teachers with innovativeness can give the idea to their students to raised the creativity. Towards E-learning implementation, innovative teacher could also helped the student to add more functionality and creativity in distance learning without sacrificing the quality of education.

Effect of discomfort could decrease the speed of e-learning implementation. It is obvious because teacher whose feeling is discomfort towards distance learning, could not deliver best

result in education where they spent their time complaining about the difficulty of new technologies. It could affect student's passion to learn, especially through e-learning because they still trying to grasp the new way to learn and in this case, teacher as the key to comfort them to raise their confidence to study better.Stated in their research that discomfort feeling could be a hindrance to newer technology adaptation.

Last factor in technology readiness is feeling insecure. This factor has negative effect toward implementation of e-learning, especially in this research. Feeling insecure means they feel afraid to try new technology because they thought that they would break something. It is caused by the lack of information and inconfident feeling about new technologies. Teacher with age > 45 years old sometimes hard to adapt the fast-paced incoming technologies and it could affect their student that could cause them afraid to try something new. E-learning adaption should avoid this feeling to make the student absorb the education without afraid to make mistakes.

Limitation

This article had several limitations, i.e the number of respondents that only came from several schools in West Java. Also the difference type of E-Learning softwares or apps that implemented in each schools. The age gap between teacher, and also the readiness level of every teacher could also be as factor that should be paid attention. Last factor, the future works can add another variables that could affect E-Learning Implementation especially in schools with wide-range of teacher variety backgrounds.

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