

## The Role of Rationality and Technological Change in Learning Process

Harisa Mardiana<sup>1</sup>, Haris Kaisar Daniels<sup>2</sup>

<sup>1</sup> Technology Information, Universitas Buddhi Dharma, Tangerang, Indonesia

Email: [harisa.mardiana@ubd.ac.id](mailto:harisa.mardiana@ubd.ac.id)

<sup>2</sup> Indonesia Indicator, Jakarta, Indonesia

Email: [haris@jkt1.ebdesk.com](mailto:haris@jkt1.ebdesk.com)

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**Abstract.** My goal in examining the role of rationality and technological change in the learning process is to investigate knowledge, the use of technology, especially in the classroom and belief from lecturers in following the changes in learning. The problems in Indonesia are that lecturers have difficulty in adopting technology and indeed need improvement, and some lecturers are even weak in technological knowledge, development of knowledge, lecturer's belief that the lecturer will never be able to change which will be complicated education on Indonesian campuses. The method used in this research is a quantitative method and is supported by a semi qualitative method using a Likert scale. Data collection was taken from 129 respondents who as lecturers spread throughout Indonesia from January 2018 to early May 2018; questionnaires were distributed using Google Form via email, Whatsapp, Facebook Messenger. The result of this study is that there is a relationship between rationality and technological change in the learning process. The author found small changes from several lecturers in using technology, even though technology became one of the tools in learning. Changes in the lecturers believe that they are difficult to adopt technology due to old age.

#### Keywords:

Rationality of

Knowledge;

Technological Change;

Rationality of Belief;

Learning Process

#### Corresponden author:

Jalan Imam Bonjol 41 Karawaci Ilir, Tangerang, Banten 15115

Email: [harisa.mardiana@ubd.ac.id](mailto:harisa.mardiana@ubd.ac.id)



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## INTRODUCTION

Technology has changed the whole lives systems including education. The expanded to access the education is easier and the opportunity to get the education through the Internet for formal education is available online worldwide. Access to learning opportunities is unprecedented in the scope of technologies (Wu, 2016). As the changes to all systems and sectors, the agreement comes

by having recognition and acceptance of reason to use technologies as the source to find the knowledge and the value of systems guides to action ( Perrotta, 2017). Rationality is defined as the self-reflective, intentional, and appropriate coordination and use of genuine reason in generating and justifying beliefs and behavior. In term of technological change is the decision to include rationality that technology will help the society in globalization (Jonas, 1979). In Kompas.co on

13, May 2017 wrote that Chairil Abidin as the member of Indonesia Academic of Science (AIPI) mentioned the rationality of lecturers towards knowledge, technological change, and belief in change needs improvement. Some lecturers have difficulties in integrating technology into the learning, also the attitude changing towards technological and their belief that changing will innovate them in their lives. The lack of knowledge and skills to use advanced technologies is the obstacles in conducting research, such as discrepancy in teaching time, research, budget constraints, research facilities and incentives that are unattractive to researchers. The average of lecturers competence also contributed to the test result in 2015 was only 53.02% and 56.69% lack in pedagogy and 44% had lower score incompetency. Another point is the language factor is a major obstacle to Indonesia at the global level, particularly in health and medicine. The knowledge and behavior of the value system for lecturers is the problem to have the rationality and technology change. As the previous researcher Wang et. al., (2010) defined that the use of technology is classified as an instinctive step of the national stage. From the instinctive stage, the importance of technology in modern learning should be aided by a complete application. The rationality of lecturers in using this stage becomes a powerful effect; the lecturers' trust in learning using technology can optimize the educational objectives. Another previous researcher Perrota (2017) stated that lecturer behavior as an individual psychological perspective considers that culture and self-interest are calculated in the progress of learning. Emotional and rationality reflect the quality of psychological actualization that lecturers have in using technology. Based on the previous researchers, the author argued that technology changes rapidly and it causes the cultural ideology of teaching has changed in order to be functioned. The correlation and causal of learning process need to be renewal and by having technological changes and lecturer's belief the learning process can further develop well. The purpose of the research is to minimize the gap of technological change in the learning process and to strengthen the lecturer's knowledge and skills by having belief that the lecturer can change.

## **Grand Theory of Rationality And Technological Change**

### **Philosophical Rationality in Learning Process**

A conception of rationality as a goal of education is proposed that incorporates the complementary strengths and avoids the limitations of the developmental and thinking skills approaches. Rationality is defined as the self-reflective, intentional, and appropriate coordination and use of genuine reasons in generating and justifying beliefs and behavior ( Moshman, 1990). Philosophically, rationality is a justifiable goal of education, not only because it is a means to worthwhile ends but because it is an important end in itself and because it can be promoted via non-indoctrinated value (Wang, Wang, Liang, & Xiao, 2010 ). The progress of rationality is to provide the postulates continuity multiple interactions of domain-specific development stages, the learning of specific thinking skill and the content-specific knowledge. To use technology, the lecturer must change the habit of acting, which means to the fact of reality as the consequences. The researcher Landauer, J & Rowlands, J (2001) stated that rationality is in self-interest because the only way to achieve desired outcomes is to act according to reality. To understand reality, one must use reason consistently. Any deviation can have long-term problems since one's knowledge is often derived from one's previous knowledge. Jonas, H. (1979) defined that technology is vital to man's existence-material, mental and spiritual that have sense and quality of life, fate and man's environment in which involved in the technological enterprise as it extends in magnitude and depth. According to Moshman, (1990) indicated that the approach of education emphasizes adapting the instruction to the learner's current level which construed in development term such as concrete operational learner in using knowledge development. Moreover, Wang, Li et. al., (2010) stated that some educational stress attention to the whole individual including social, emotional and personality factors. In the rational stage, education establishment is not only using the best teaching environment but also optimize the use of methods to get the most powerful effect in class based on the specific educational goal.

Based on the scholar opinions, the author of this research stated that knowledge contents need to be selected and instructed carefully and the tools should be used appropriately in order to get the educational result. Rationality is a goal of education is provided in postulates continuing multiple interactions of domain-specific developmental, the learning of specific thinking skills and content-specific knowledge.

### **The nexus between Technology and Learning Process**

Technologies used to improve and facilitate learning which can be found everywhere. The integration between lecturer and technology in education system indicates with the respect of lecturer in using technology in the classroom. The lack of integration of technology and the lecturer is found on the research from Collis, B (1994) indicated that the high level of interest in educational technology research, but to complete the dissertation in the area during the study is very little. Besides, there is a very little cross-reference to educational technology in its subject index as both volumes represent the leadership of educational technology. And in Indonesia, Datta, et al., (2016) from AIPI or Indonesia Academic of Science stated that the key constraint to Indonesia lecturers is to have good knowledge of technology. It seems that technology is a barrier and burden, such as the infrastructure, accommodation to the link of technologies itself. The lack of knowledge and skills to use advanced technologies is the obstacles in conducting research, such as discrepancy in teaching time, research, budget constraints, research facilities and incentives that are unattractive to researchers.

On the other hands, the benefit from technology can extend and enhance to the lecturers and students in enabling to produce the task or graphing data. In addition, technology tends authenticity to campus tasks because the products of students' efforts are more polished, schoolwork which is important will be easier and to find the sources will save the time (Means & Olson, 1994). Many campuses have given the opportunity for the lecturers to learn the introduction of technology. The challenge of planning and implementing technology-supported activities has provided a context in

which the initial lack of knowledge is not the problem anymore and embarrassment, the lecturers are eager to share their developing expertise and learning from one another. For example, as they search the links among the instruction goals, the curriculum, and technology's possibilities, they collaborate more, reflect more and engage more in dialogues ( Datta, et al., 2016). At the same time, for technology to work effectively, it should only be incorporated in the classroom if it is appropriate for a given instructional task. Also, technology can only be an effective teaching tool if teachers participate in decisions to adopt technology ( Waddell, 2015). This is because teachers have belief, the responsibility of facilitating instruction and incorporating technology at the classroom level, yet many campuses administrators tend to make decisions related to technology adoption/training without consulting lecturers. The causal link of the use of technologies has the greatest effect which the information that is needed will be used for the content of learning it means that technology is making difference.

### **METHOD**

This research is to conduct fixed mixed method which it is to determine the role of rationality and technological change in the learning process. The implement of technological change into the lecturer's knowledge and skills will give an impact to the learning process. Therefore, it provides alternative strategies for the learning process which increasingly adapt to the change of technology due to the demands of faculty and students.

The selection of sampling was applied to 129 respondents and the questionnaires have been spread through Google form from January 2018 through early May 2018. Data collection techniques regarding qualitative were collected to be interviewed for 2-3 hours in May 2018. Data research is taken from the literature review, observation, and descriptive analysis. Questionnaires had been developed by the author of a semi-structured interview which is conducted by the author.

The portion of this research was created and deployed about lecturer's knowledge and skills in technologies, lecturer attitude in facing the change of learning by technology,

lecturer’s belief to improve them in deepening knowledge and skill of technology. Prior to the research, an extensive exploratory phase was conducted in order to better ascertain that issues of importance to users of technologies in the learning process.

This research was used for 3 different types of questions are about the role of rationality and technological change in the learning process. The questionnaires are used to the questions from [1] strongly disagree, [2] disagree, [3] agree, [4] strongly agree. 129 respondents for the research and the interview were given to 8 lecturers regarding the role of rationality and technological change in the learning process.

This section is a brief explanation prior to the study an extensive exploratory phase was explained in order to accomplish the hypothesis. The study research issues of

importance to check 3 different dimensions to divide into hypothesis.

The hypothesis of the research: (1) Finding the problem of rationality in knowledge and skills for lecturers in technologies (Q); (2) Finding the problem of rationality in the attitude of lecturers in technology and facing the change of learning by technology (S); (3) Rationality of lecturer’s belief to improve themselves and deepening knowledge and skills of technology (R)

The hypothesis of this research is:

Ho: All correlations are zero

H1: At least one canonical correlation is not zero

Criteria of conclusion: The null hypothesis is rejected at the level of significance  $\alpha$  (0.05) if the test statistic was  $>sig.$  0.05

**Conceptual Framework**

**Set Variable Independent**

Q (Knowledge) → X1

S (Attitude towards Tech) → X2

R (Belief to improve) → X3

**Set Variable Dependent**

Learning by Technology → Y

**Figure 1. Conceptual Framework**

The equation model used for the correlation is:  $X1 + X2 + X3 = Y$   
 Knowledge + Attitude towards Technology + Belief to improve Self = Learning by Technology

**RESULT AND DISCUSSION**

**Results of Reliability Test**

From the data is found of the reliability test from each category:

Table 1. Reliability for each category of Learning Process

Variables	X1	X2	X3	Y
X1	0.764			
X2		0.647		
X3			0.724	
Y				0.803

From data above it is indicated that reliability for four variables X1, X2, X3, Y. Variable X1 is for knowledge of the lecturers. X2 is for the attitude lecturer's toward the technology, X3 is for belief, it is the lecturer's belief that technology is enabling the learning process; Y is for the learning process in the classroom. Variables X1, X2, X3, and Y are

above 0.600 and it is indicated that the questionnaires of these variables are reliable.

Next, it is shown the scatterplot to find out the test of multiple regressions which is tested about X1, X2, X3, and Y; the assumption of the test will find out on scatterplot below.

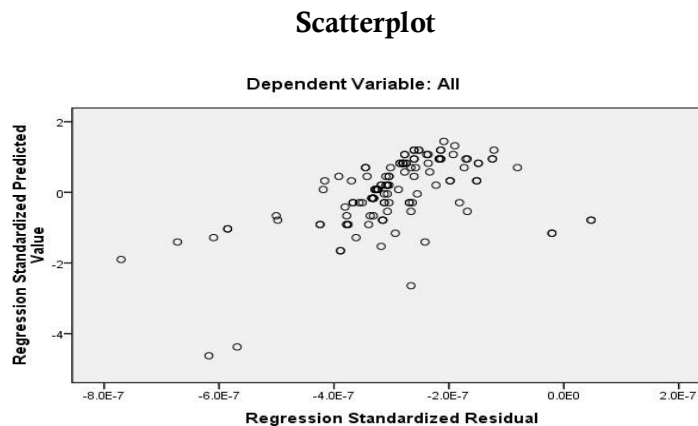


Figure 2. The result of multiple regression scatterplot

The result of the test is on the multiple regression model showed that there is a positive linear relationship between X1, X2, X3, and Y. And the relationship is strong and the points of plot spread above and below the

zeros on the Y-axis, it is shown that the scatterplot of multiple regressions is positive and strong.

Then, the research will test with multiple regression

Table 2. the relationship between X1, X2, X3, and Y<sup>b</sup>

No	Variables	R	R Square	Adjusted R Square	Change Statistics	
					F change	Sig. F change
1	X1 (Knowledge)	0.761 <sup>a</sup>	0.578	0.575	174.235	0.000
2	X2 (Attitude)	0.763 <sup>a</sup>	0.582	0.579	176.703	0.000
3	X3 (Belief)	0.758 <sup>a</sup>	0.574	0.571	171.277	0.000
4	Y (Learning Process)	1.000 <sup>a</sup>	1.000	1.000	3.753	0.000

1. a. Predictor (Constant), Knowledge (X1)

2. a. Predictor (Constant), Attitude (X2)

3. a. Predictor (Constant) Belief (X3)

. b. Dependent variable: Learning Process (Y)

technology such as computer, PowerPoint, excel and others from the computer.

Based on the table above, it is indicated that the relationship between X1 and Y is 0.76; it is shown that it has a strong relationship and the simultaneous contribution of variable X1 and Y is 0.578 or 57%. Other 42.2% is from somewhere else. In 42.2% the author has interviewed some of the lecturers and they have difficulty in receiving the technical knowledge and the skill of using

The formula:

Ho: the competency of X1 and Y has no relation.

Ha: the competency of X1 has relation to Y

From the formula above it is shown that the significance of the test is shown that the

probability value of the test (Sig. F Change) or  $p < 0.001$  and  $p < 0.05$ . It is indicated that  $H_0$  is rejected and  $H_a$  is accepted. The conclusion, there is a relationship between knowledge and the learning process. The result is accepted.

Based on the second variable, (X2), it is indicated that the relation between X2 and Y is 0.763 and it showed that the effect is very good. And the simultaneous contribution of variable X2 and Y is 0.582 or 58.2% which is good enough and other 41.8% is from somewhere else. The probability value of the test (Sign. F change) or  $p < 0.000 < 0.05$ . The result, there is a relationship between attitude towards technological change and learning process. The interview with some of the lecturers found that the most difficult thing is the skill of using a computer. Some of the lecturers have denied using computer because they think that they do not need this skill anymore because they think that they are old. The result is accepted.

The third variable (X3), it is indicated that the relation between X3 and Y is 0.758, and it showed that the effect of relation is very good. And the simultaneous contribution of variable X3 and Y is 0.574 or 57.4% which is good enough and other 42.6% is from somewhere else. The probability value of the test (Sign. F change) or  $p < 0.00 < 0.05$ . The result, there is a relationship between belief to technological change and learning process.

Some of the lecturers (42.6%) believe that they do not need the change, and the belief of change is difficult to adjust. The result is accepted.

The fourth variable is X1, X2, X3, and Y. It is indicated that the relation between X1, X2, X3, and Y is 1.00 and it showed that the effect is best. And the simultaneous contribution of variable X1, X2, X3, and Y are 1.000. It means that there is the best contribution to the learning process by having rationality and technological changes in the learning process. The probability value of the test (Sign. F change) or  $p < 0.00 < 0.05$ . The result is there is the best relationship for rationality and technologies change in the learning process. Even though the value rationality and technological change are 1.000, but some of the lecturers may not change their habit to have better teaching. They believe that they are good enough to teach in the class. The result is accepted.

## Discussion

From the result above, all lecturers (129) indicated to have a good relationship between rationality and technological change in the learning process. The role of rationality is accepted toward the technological change in the learning process. From the interview that the author had taken last May 2018, had agreed to change their attitude, belief to technology. They had gained their knowledge by having learned from the Internet, training and reading some books. In paradigm pluralization of rationality, the order content believes based on differentiation of knowledge, attitude, and belief. (Welsch, 2000). Rational choice is a view of human behavior to have some changes in knowledge and technology adoption which they believe that the change will bring the most incredible outcome (Rogers, 2003). From data above is shown that lecturer agreed to change themselves to teach in the classroom. The relationship between knowledge and learning process is indicated to have a strong relationship. It means that the role of rationality and technological change is already transformed. Even though the contribution of knowledge is 57.8%, but the author found that some of the lecturers have difficulty to adopt the technological knowledge and they just ignore to adopt the knowledge. Some of the lecturers need more time to adapt in gaining their knowledge of using technology.

When lecturers are given opportunity and resources to experiment with computers, they may improve their technical proficiency and their goal, that is reduce perceived costs and increase perceived benefits (Zhao & Frank, 2003). It is stated that the attitude intention does not translate into actual use of technology, especially when the lecturers are analyzed through observation approach, the technology has evolved significantly for more than two decades which influencing the adoption of innovations (Selwyn, 2010); (Straub, Keil, & Brenner, 1997). The result above about attitude towards the technological change is 0.763 which is very good and the simultaneous is 58.2% and other 41.8% is from others. It means that lecturers intended to change the attitude towards the technology since the technology has been there and needed for the learning process. And 41.8% could be from the environments around the lecturers to change themselves

otherwise they lecturers may leave behind the other and the teaching method.

As technology has become one of the backbones of the present globalized society, it requires specific and differentiated attention to understand exactly the social situation. All lecturers need to establish a single item to mingling themselves and technology, in order to comprehend the transforming power of technological dimensions on their own. All lecturers have pointed to change and the point of change is the process to change the core of belief. With the judgment to create and believe a judgment, means belief. It needs careful judgment to find the core belief of changing and to throw away the fear to create the act of changing (Gonzalez, 2005) ( van Warmerdam, 2017). From the result above, the variable X3 is indicated to belief and it showed that the relation between X3 (belief) and Y (learning process) is 0.758 and it means that the effect of relation is very good. Lecturers have belief in themselves to change to technological when the lecturers have belief in themselves, the technological change is easier to adjust. Even though the simultaneous contribution of variable X3 (belief) is 57.4% which is good enough, but it may be some lecturers are not sure to have technological change, it proved to 42.6% the change is from somewhere else. But the probability value of the test (Sig. F change) or  $p < 0.00 < 0.05$  showed that the relationship between belief to technological change and learning process is accepted. It is stated that lecturers understand that they need to change the belief. But to adjust the changes need more times. In other words, they are not sure that it is the right way of the learning process. In meantime, the lecturers will adopt the technological with their capability (Lanauer & Rowlands, 2001).

The lecturers involve and respect the innovation which refers to a specific technological change in the learning process and empowers themselves to achieve the change with enthusiastically. When lecturers are given the opportunity and resources to experiment with computers, they may improve their technological change (Rogers, 2003). The first change comes from campus, the activities in realizing the organizational goals, whilst implementation is practical or the process of delivering innovation. Change is an ongoing process of delivering an

innovation (Fullan, 1991). The campus management clearly affects the lecturers to response as a subject leader in teaching and learning in the classroom. The relationship between lecturer's knowledge, attitude to technological change and belief in change is major components to successful implementation. The support mechanism is required to achieve an improvement in practices and procedures of teaching (Means & Olson, 1994). The result of the research above showed that the relationship between knowledge, attitude to technological change and belief have a strong impact on the learning process. The role of rationality and technological change in the learning process are engaging and empowering the lecturers to use the technologies in the classroom. The importance of knowledge to learning is one of the fundamental principles that the lecturers employ to build students understanding prior to formal and informal experience ( Gee, 2012). The attitude of technological change is characterized to conceive the direction of technological in function of the specific factors and feature that is possible for the development of the learning process (Queraltó, 2005). As data result of the research above, the role of rationality to technological change in the learning process is shown that variable X1 as knowledge, X2 as attitude towards the technological change, X3 as belief in changing to learning process have the best effect. The R square is 1.000 and the simultaneous contribution from lecturers to the learning process is 1.000. It means all lecturers eager to change in teaching and learning process. The probability value of the test (sig. F change)  $p < 0.00 < 0.05$ . The relationship between rationality and technological change in the learning process has the best value (1.000). So, the role of rationality and technological change in the learning process is the progress of 21<sup>st</sup>-century education process.

## CONCLUSION

Technology is changing rapidly in modern time, and the learning is changing due to technological change. Lecturers need to gain knowledge in order to adapt and adjust the technology, the approach of education emphasizes the instructional

adjustable and the learners will develop a concrete operational learning development. Having gained the knowledge is taken from training, reading the books and the Internet.

The attitude of technological change will have involved in the innovation of the learning process. Lecturers' empowerment to change themselves gives good opportunity to experiment with the computers and it will improve them to technological change. Even though the first change is from campus, the lecturers must realize that the activities of the learning process are the organizational goals with the implementation of practical and process of delivering the innovation. The campus management clearly affects the lecturers as a subject of a leader in teaching and learning.

As the lecturer belief that the change is needed, it will bring the system change and the learning will improve. Belief is one of the hardest things in changing mind and it needs more time to adapt and adjust the changing process of learning.

Some of the lecturers have ignored in gaining their knowledge, technological change and belief for the learning process. The author thinks that the lectures feel too old to learn new technology, even though technological change is needed to learn nowadays.

Having good knowledge, attitude to technological change and belief are the role of rationality in the learning process. Rationality keeps the role of the learning process in educational systems. By having a role in the learning process, the rationality is one of the most important factors in education systems.

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