

# Perception of Innovation Characteristics: Adoption of E-Learning in Vocational Schools of Indonesia



Cahyaningsih, Lantip Diat Prasajo, Husaini Usman

**Abstract:** *This study aims to identify patterns of e-learning utilization (information sources, the introduction of e-learning before in Vocational Schools, begin to recognize e-learning in Vocational Schools, begin to use e-learning in Vocational Schools, frequency of e-learning usage, duration of e-learning learning and the relationship between subject matter and e-learning) in the Vocational School. It also aims to identify the perception of Vocational School school residents regarding the use of e-learning according to the eight characteristic components of IT adoption innovation. The sample in this study was a Vocational School teacher consisting of 30 teachers. Sampling using a purposive sampling technique. Data collection methods by survey and interview. Reliability testing uses Cronbach's alpha. Data analysis techniques with descriptive analysis. The conclusion of this study is that the perception of the characteristics of teacher innovation towards e-learning adoption in Vocational Schools as a whole is high at 3.76. The highest component of perception of innovation characteristics is the relative profit of 4.19. The lowest perception component of e-learning innovation characteristics is imagery, 3.55.*

**Keywords:** *Perception of Innovation Characteristics, Adoption E-learning.*

## I. INTRODUCTION

The paradigm shift in education that was initially centralized to decentralized had consequences in the management of education, especially at the school level. This broad autonomy should be balanced with changes that are oriented towards the overall performance and participation of the related educational components, namely teachers and students (Sutrisno, 2010). Improved performance is also included in the change in learning concepts.

Learning that was centered on the teacher as the only source of knowledge, became student-based learning by giving students the freedom to access learning resources through the Internet (Suyanto, 2005). Tung (2000) in Suyanto (2005) said that after the presence of teachers in the true sense, the Internet will be a supplement and complement in making teacher representatives who represent important learning resources in the world.

The internet is part of Information Technology (IT), where IT is taken advantage of by the government at the end of this decade to improve its business processes. IT offers an opportunity for governments to deliver information and services better (Wahid, 2010).

E-learning as innovation is perceived as something new for individuals and other adoption units (Rogers, 2003). If we pay attention to human behavior, whether we realize it or not, an idea is said to be measured only from the time it was first used or invented. The perception of the novelty of innovation for an individual is determined by the reaction of the individual to innovation. Rogers (2003) adds that knowledge about IT innovation creates uncertainty about its impact on the minds of people who adopt. It can be said that the adoption of the use of e-learning is a perception of the characteristics of innovation. Thus there needs to be a study of how much perceptions of the characteristics of the adoption of e-learning as an innovation in the field of education.

IT has become a necessity in all fields. In the business world known as e-business or e-commerce, in the world of government known as e-government and for the world of education known as e-learning (Ali et al., 2008). E-learning is a form of government innovation in the use of IT in the field of education. Rosenberg (2001) in Suyanto (2005) emphasizes that e-learning refers to the use of Internet technology to deliver a series of solutions that can enhance knowledge and skills.

The process of changing IT adoption also has an impact on the world of education (Fani and Purwoadi, 2003). Especially the adoption of the Internet for learning or e-learning in schools. At present, 110 elementary, junior high and senior high schools in DIY have implemented ICT utilization programs (Kompas.com, 2011). The application of ICT programs in elementary, junior high and high school / DIY is a continuation of the ideas of the Provincial Government of DIY, which in 2007 declared itself as a cyber province with the implementation of the Jogja Learning Gateway (Kompas.com, 2011).

Vocational School as one of the schools in DIY that applies IT e-learning, is a vocational school that has three expertise programs namely Electrical Installation Engineering (Accredited B), Automotive Mechanical Engineering (Accredited B) and Informatics Engineering (Accredited A / SSN). School The Vocational School has produced many graduates whose outcomes have been IT experts in the institutions that shelter them and were often invited as training instructors at the Yogyakarta Technical Training Center (BLPT).

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Thus it can be said that the Vocational School is a private vocational school that is quite marketable in the midst of rapid competition with other public and private schools in Gunungkidul.

The advantages above have not been able to encourage teachers to further optimize the use of IT in the teaching-learning process and for self-development. In accordance with the mandate of Permendiknas No. 16 of 2007 concerning teacher competencies especially in pedagogical and professional competencies. Based on a brief interview with two IT experts in the Vocational School, teachers who use e-learning in their learning are still less than 50%, while various kinds of training on IT such as Lectora, website creation and others have been carried out. Even teachers are facilitated in owning a laptop. However, there are still many teachers who have not utilized e-learning in the teaching and learning process. Rejection of change is an attitude that arises in the process of organizational change both from individuals and groups who oppose or reject the change (Robbins, 2003). The adoption of new technology carries risks and uncertainties. People in countries with high levels of uncertainty reject, risk-averse and do not support change and have lower adoption rates for new technologies or innovations (Wahid, 2010). Seen from the intensity of the teacher uploading material, questions and assignments of students to use e-learning is relatively small. This becomes a very dilemma where IT experts at YAPPI Vocational School are experts who are often invited as instructors in IT training courses at the provincial level. Therefore, it is important to study the use of e-learning as a learning resource and media. The adoption of IT e-learning as a source and learning medium is needed to improve effectiveness in learning and improve teacher performance with the aim of increasing the competitive advantage of vocational schools that have superior competence in Informatics Engineering.

## II. LITERATURE REVIEW

### Perception of Innovation Characteristics

Perception of innovation characteristics or better known as Perceived Characteristics of Innovation (PCI) developed by Moore and Benbasat (1991) consists of eight constructs to estimate intentions of technology adoption (Wahid, 2010). The eight constructs developed by Moore and Benbasat (1991) are derived from five characteristics that facilitate the adoption of Rogers (2003), namely: relative advantage, suitability, complexity, observability, and easy to test. Image (image) is a derivative of the relative benefits, while the observed results (result demonstrability) and visibility (visibility) is a derivative of observability (observability). As a final characteristic, Moore and Benbasat (1991) add voluntariness. Relative advantage (relative advantage), is the level of use of innovation that is felt better than before innovation. According to Kwon and Zmud (1987), the relative profit is the level of adoption of an innovation perceived as something that is of greater benefit to the organization than maintaining the current conditions.

Compatibility is the level of use of innovation when it is in accordance with existing cultural values and beliefs, past and current experiences, and the needs of potential adopters. According to Rogers (2003), conformity is the extent to which innovation is perceived to be consistent with existing values, needs and past experiences of potential the adopters. Easy to test (trialability) is the level of use of innovation

where innovation can be tested. Ease of use (ease of use) is the level of use of innovation when innovation is perceived as something that is easy to use. Plouffe et al. (2001), states that ease of use is the level where innovation is easy to learn and use. Visibility is the level of use of innovation where innovation can be seen with the five senses. Plouffe et al. (2001), defines visibility as the degree to which an innovation appears to be felt during its spread through a user community.

Results demonstrability is the level of use of innovation when the results of the innovation can be observed and can be communicated to others. Moore and Benbasat (1991) define that outcome observance is the level at which the benefits and usefulness of innovation are actually felt by potential adopters. Image (image) is the level of use of innovation which is felt to be able to improve one's image or status in the social system. Volunteerism (voluntariness) is the level of use of innovation where innovation users are seen as volunteerism.

Compeau et al. (2007) developed the eight characteristics above into ten characteristics. Compliance is divided into three characteristics according to those introduced by Karahanna et al. (2006), where the three characteristics reflect conformity to the preferred work style, values, and previous experience. But in the last PCI model, Compeau et al. (2007) omit the preferred work style characteristics since the validity of the construct is low. Compeau et al. (2007) also divide the observability of results into two characteristics, namely easy to communicate (communicability) and measurability. Easily communicated shows the ease with which the results of using innovations can be easily described to others. Measurability indicates the degree to which the impact of innovation can be measured. The development of these PCI characteristics is illustrated in Figure 2.1 below in the evolution of the PCI category by Compeau et al. (2007).

### Adoption of Information Technology

Adoption of Information Technology is defined as the use of computer applications in both software and hardware to support operations, management, and business decision making (Utomo, 2001). The adoption of technological innovation is described as a three-phase series that includes initiative, adoption, and implementation (Thong, 1999 in Rahab, 2009). The initiative phase deals with the collection and evaluation of technological innovations. The adoption phase involves making decisions about the adoption of technological innovations. While the implementation phase involves the implementation of technological innovation in business. The diffusion of innovation not only occurs at the individual level but also at the organizational level (Rogers, 2003). The decision to adopt an innovation in an organization is determined by the leader of the organization and all members of the organization. The types of innovation decisions according to Rogers are as follows: Optional innovation decisions: are decisions to reject or adopt those that are directed at individual independent decisions in an organization or social system; Collective innovation decisions: the decision to reject or adopt an innovation in an organization is based on the consensus of all members; Authority innovation-decisions: the decision to reject or adopt innovation is based on several members of the organization who have higher strength, status, and experience than other members of the organization.

The types of innovation decisions above are also very influenced by the process of innovation adoption. Rogers (2003) divides the stages of innovation into five stages as follows: (a) Stage of Knowledge, which is a phase where individuals do not have information about the innovation. In order to provide this information, communication channels are needed to provide information to individuals. This communication channel can be a formal or informal channel; (b) The Persuasion Phase, in this phase, individuals will actively look for more detailed and accurate information about these innovations. In this phase, the individual will consider the five elements of innovation previously described; (c) Decision-making stage, at this stage the individual determines whether to adopt or reject an innovation. If it is felt that the innovation is able to provide added value to him, then most likely the innovation will be adopted; (d) Implementation Phase, this stage is the phase where individuals have adopted innovation and used it in their lives. At this stage also the adopter will evaluate the adoption results and continue to study the innovation more accurately; (e) Confirmation Stage, at this stage the individual will seek confirmation whether the decision he made was correct or not. An evaluation will be conducted to determine whether the adoption will continue or be rejected.

**E-learning**

The definition of e-learning is very broad and varied. In table 2.1. The following are the definitions of e-learning from various opinions.

**Table 2 Definition of E-learning**

Source	Definition of <i>E-learning</i>
Sutanta (2009)	<i>E-learning is a learning process using Information and Communication Technology (ICT) as a tool that is available whenever and wherever needed so that it can overcome the constraints of space and time</i>
Daryanto (2012)	<i>E-learning is an electronic learning process, what is meant here is not merely electronic equipment, but also includes methods and media, how we share knowledge and knowledge, download subject matter, upload assignments, conduct discussions with teachers/lecturers and so on, carried out electronically.</i>
Gilbert & Jones dalam Surjono (2007)	<i>E-learning is the delivery of learning the material through electronic media such as the internet, intranet/extranet, satellite broadcast, audio/videotape, interactive TV, CD-ROM, and computer-based training (CBT).</i>
Ali et al. (2008)	<i>E-learning includes various applications and processes such as computer-based learning, web-based learning, virtual classrooms, and others. Meanwhile, on-line learning is part of technology-based learning that utilizes the Internet, Intranet and extranet resources.</i>
Rosenberg (2001) dalam Suyanto (2005)	<i>E-learning as the use of Internet technology to distribute learning materials, so students can access from anywhere</i>
Riyanto et al. (2006)	<i>E-learning is intended as an effort to make a transformation of the teaching-learning process in schools into a digital form that can be bridged by Internet technology.</i>

**III. RESEARCH METHODS**

Research conducted by these researchers is a qualitative descriptive study. According to Cooper and Schindler (2008), descriptive research is a research study used to describe phenomena related to a subject or population to estimate the proportion of a population that has certain characteristics. This descriptive study was chosen because the purpose of this study was to describe matters relating to the perceptions of Vocational School school residents towards the adoption of e-learning Information Technology at the school.

Data collection methods used were surveys and interviews. The survey method uses a self-administered survey, which is a self-managed survey by distributing questionnaires directly to respondents and filled in by relevant respondents (Cooper and Schindler, 2011). The questionnaire used was a PCI model developed by Moore and Benbasat (1991) with a closed question model with a Likert scale. The questionnaire contained respondents' demographic data and questions about: (1) relative benefits, (2) suitability, (3) easy to test, (4) ease of use, (5) visibility, (6) observability of results, (7) imagery, and (8) volunteerism.

The interview method uses a list of questions to resource persons relating to the implementation of e-learning in the school, namely the Principal, Deputy Principal of the Curriculum, and Information Technology teachers who are responsible for e-learning at the school and other subject teachers. The entire interview results are recorded in a complete transcript and as is. Interview transcripts were arranged in chronological order to facilitate analysis.

This research was conducted at the Vocational School, so the sample taken was the school residents namely teachers. The sample for the survey was 30 teachers with a variety of subjects that were taught. The interview sample consisted of six people including the principal, curriculum waka, IT teacher and other subject teachers. This study uses two methods, namely survey and interview methods with different validity and reliability tests. Test the validity of research instruments in the survey method, namely face validity, which is a measurement of validity where the indicator "makes sense" as a measure of the constituents of others, especially the scientific community (Neuman, 2011). Reliability testing uses Cronbach's alpha. The alpha value that can be accepted depends on the purpose of the research.

**Table 3 Cronbach's alpha eight PCI characteristics**

Variable	Cronbach's alpha
• Relative advantage	0,864
• Compliance	0,765
• Easy to test	0,536
• Ease of use	0,590
• Visibility	0,690
• Observation of results	0,817
• Imagery	0,805
• Volunteering	0,902

Source: Primary data processed (2013)  
Analysis of the results of the interview is needed to obtain information about the use of e-learning in the school.

According to Yin (2011), the process of qualitative data analysis is carried out in five stages, namely: Compiling, recording interviews arranged into written transcripts so that it is easy to observe data; Disassembling, the second step is breaking up transcripts and grouping data into categories according to research objectives; Reassembling, rearranging data and presenting data to see patterns and situations that actually occur. Patterns are seen from data obtained from knowledge sources and compared to data obtained from knowledge recipients; Interpreting, interpreting what and how the situation occurs for each group of data; concluding, draw conclusions based on a description of the data patterns that have been presented.

IV. RESULTS AND DISCUSSION

The data collection method in this study was the distribution of questionnaires to 30 teachers as respondents in the Vocational School and interviews with 6 teachers who were related to the research objectives. Most respondents know e-learning from interactions with other teachers (28%), only a few know e-learning since they were in college (2%).

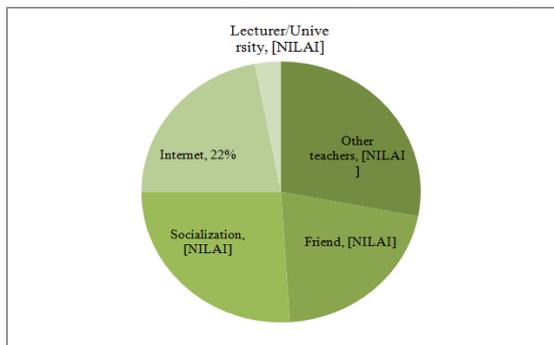


Figure 1. Percentage diagram of respondents' e-learning resource introduction

Based on the diagram above, it can be said that the process of sharing knowledge in the school is going quite well, according to Schwartz (2006), sharing knowledge focusing on human resources and individual interactions. Although the majority of respondents (53%) had never known e-learning before teaching at a Vocational School, since the launch of e-learning at a Vocational School in 2008, the majority of respondents (90%) knew immediately and the majority of respondents (80%) started using it in a short time with the launch of e-learning at the school, namely 2006 - 2010. The frequency of use of e-learning in learning the majority of respondents (40%) is often with most respondents (37%) using it for 1 hour to 2 hours a day. This could be due to the fact that the majority of respondents (40%) considered that the relationship between e-learning and high-learning subjects was high.

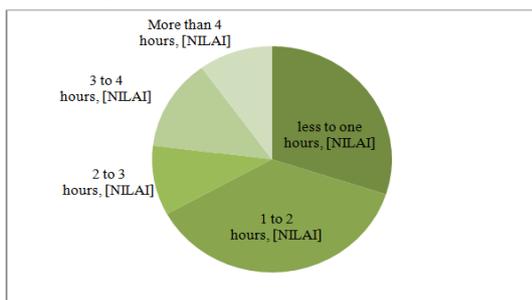


Figure 2. Age range of respondents

The decision to adopt an innovation in an organization is determined by the leader of the organization and all members of the organization (Rogers, 2003). During this time the decision to adopt innovation in the school is still an optional innovation-decision, which is the decision to reject or adopt an innovation based on the independent decisions of individuals in an organization (Rogers, 2003). This means that the decision to use e-learning still depends on the individual itself, although a number of efforts to encourage teachers to use it have been made such as training and facilitating laptops for teachers.

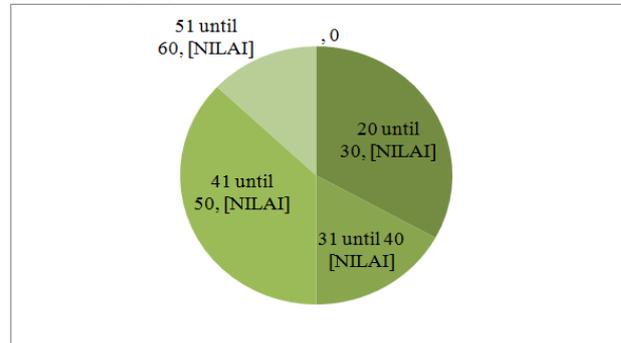


Figure 3. Frequency of use of e-learning

Based on the e-learning frequency that is still 50%, it can be said that the respondent took the decision to receive e-learning, as seen from the perceived value on the component of a relatively large profit of 4.19, but for the decision to use it was still said to be moderate namely 3, 37. Thus, it can be seen that the stage of adoption of innovation in the school is still in the stage of decision making, etc., the individual determines whether to adopt or reject an innovation. If it is felt that the innovation is able to provide added value to him, then most likely the innovation will be adopted (Rogers, 2003). And the decision at the school is to adopt/accept innovation, that is e-learning, but respondents have not fully entered the implementation stage, ie individuals have adopted innovation and used it in their lives (Rogers, 2003).

Based on Figure 3 above, it can be said that respondents who use actively are only 50%. Respondents who often and always use e-learning in their learning are teachers majoring in IT, while those who rarely and sometimes are teachers from non-IT majors. This rare use is caused by facilities for non-IT majors that are not yet available as well as material that not all can be delivered using e-learning.

Analysis and discussion in this chapter are how big the perception of teachers in Vocational Schools on the use of e-learning is based on eight components of the characteristics of IT adoption innovation. The eight characteristics are (1) relative advantages; (2) conformity; (3) easy to test; (4) easy to use; (5) visibility; (6) observability of results; (7) imagery; and (8) volunteerism. Statistical descriptions of the results of the study are shown in table 4.

Table 4. Descriptive statistical analysis of eight variables

Variable	Number of Items	Mean	Standard Deviation
• Relative advantage	8	4,19	0,44
• Compliance	8	3,63	0,40

• Easy to test	9	3,74	0,36
• Ease of use	8	3,79	0,41
• Visibility	8	3,69	0,51
• Observation of results	5	3,76	0,51
• Imagery	7	3,55	0,69
• Volunteering	6	3,73	0,51

Source: Primary data processed (2013)

For the criteria for Likert scale interval values are shown in table 5 below.

**Table 5. Criteria for Likert scale interval values**

Interval	Kriteria
1 To 1,8	Very Low
1,9 To 2,6	Low
2,7 To 3,4	Medium
3,5 To 4,2	High
4,3 to 5,0	Very High

Based on table 4 it can be seen that the level of respondents' perceptions of the use of e-learning in SMK YAPPI Gunungkidul on the relatively large profit component is 4.19. Of the eight components of perception of innovation characteristics that exist, this component of relative profit is the greatest. This means that teachers at SMK YAPPI Gunungkidul feel that the existence of e-learning in the school provides benefits and better conditions than before using e-learning. E-learning makes it easier for teachers to access more interesting learning resources, as well as saving time in the learning process and reducing travel costs because with e-learning learning can be done remotely (Wahono, 2005). In the e-learning module, Bali Polytechnic (2009) mentions e-learning allows people to learn at any time in any place, by minimizing lost work time and also allowing content to be updated quickly.

Some teachers consider that e-learning in the school is in accordance with their wishes, which includes the values adopted, experiences and needs of adopters (Rogers, 2003). However, some other teachers consider it not yet according to their wishes. Some teachers who think that e-learning is in accordance with their wishes are teachers who come from IT departments. Respondents' perceptions of the adoption of e-learning in these schools in the easy to test component were large at 3.74. This means that e-learning in the Indonesian Vocational School is easy to test and teachers are also given the opportunity to try e-learning before actually adopting it. The trial was conducted during the training on e-learning. All teachers are given the opportunity to get to know e-learning and practice to create learning media to fill in the e-learning.

Respondents' perception of the adoption of e-learning in vocational schools on the visibility component is large at 3.69. This means that e-learning in the school can be felt and seen by the five senses (Rogers, 2003). Plouffe et al. (2001) added that the innovation seemed to be felt during its spread through a user community. The user community here can be interpreted as friends of allied teachers in the school or teachers in one department, for example between IT teachers.

Respondents' perception of the use of e-learning in the image component is moderate, namely 3.55. This means that there are some respondents who think that using e-learning will improve the image or status of a person in the social system. Respondents' perceptions of the use of e-learning in the medium volunteer component are 3.37. This means that some of the respondents in the use of e-learning at

the school were done voluntarily. Some of the other teachers in this study have not used e-learning in intensive learning, but because of the encouragement of the leaders or principals, they decided to adopt.

## V. CONCLUSION

Based on the data collection and analysis conducted in the previous chapter, several research conclusions can be drawn, namely:

1. The pattern of e-learning utilization in Vocational Schools is as follows:
  - a. Sources of information on the use of e-learning in Vocational Schools mostly come from other teachers. Only a small proportion of teachers are familiar with e-learning since they were in college.
  - b. Most teachers have never known e-learning other than e-learning in Vocational Schools. This is in line with the results of interviews with respondents who mentioned that the Vocational School is one of the schools that used e-learning earlier than other schools.
  - c. Most teachers begin to recognize and use e-learning in Vocational Schools from 2006 to 2010. This means that it does not take long for socialization, ie in 2008, until the teacher decides to adopt e-learning in Vocational Schools.
  - d. The frequency of use of e-learning in Vocational Schools between teachers who are actively using (frequency is often 40% and always 10%) with teachers who are less active in using (rarely frequency 20% and sometimes 30%) is almost the same.
  - e. The duration of using e-learning is at most between 1 hour to less than 2 hours
  - f. Most teachers consider the relationship of e-learning in Vocational Schools with the subject matter being taught is high.
2. Perceptions of teacher characteristics towards the adoption of e-learning in Vocational Schools as a whole are high. The highest component of the perception of innovation characteristics is relative profit. This means that teachers at the school accept e-learning as an innovation that provides benefits rather than before using e-learning. The lowest perception component of e-learning innovation characteristics is an image. This means that the use of e-learning is considered able to improve the image of teachers in schools although there are still other aspects that can improve the image of teachers in addition to the use of e-learning.

## SUGGESTION

Suggestions that can be given to the Vocational School based on the conclusions outlined above are:

1. Vocational Schools as schools that have high levels of IT e-learning adoption, then these schools should increase the use of e-learning in learning by teachers. To improve the use of e-learning for teachers, the things that principals can do as policymakers are to improve infrastructure for non-IT majors so that non-IT teachers can also intensively use e-learning, for example by providing LCDs in each class.

permanently, adequate databases, optimal servers both in the speed of access and security guarantees, and system managers specifically appointed to manage e-learning so that they are always up to date and in accordance with needs.

2. As a school that becomes a reference for other schools in the use of e-learning, the Vocational School is expected to develop the web-based teaching material into a CD which can then be marketed more broadly, as well as a promotion it also increases the competence of teachers in making their own learning media more interesting.

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