



## Teachers' Perception toward the Obstacles of E-Learning Classes

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### Abstract

This study aims to describe the teacher's perception of the obstacles in the implementation of e-learning in the learning process and the recommendation to solve the problems. This research is a qualitative descriptive study. The research subjects were two teachers who taught at a University in Yogyakarta. The research data collected through in-depth interviews, which were analyzed descriptively by using interactive techniques. The Interactive analysis is done by collecting data, reducing data, presenting data, and drawing conclusions. The results of the data analysis show that two teachers were not too familiar with e-learning, so they still have many obstacles in the teaching process by using e-learning. There are several obstacles, such as obstacles in teaching by using e-learning as devices, teachers' knowledge, time management, and students' motivation. In order to run e-learning entirely, then these obstacles should be solved first. There are two teachers suggest overcoming the obstacles, such as training for the teachers, and repairing the facilities of the institution.

**Keywords:** teacher's perception, e-learning, obstacles of e-learning classes

## **Introduction**

These days, accepting the material is not only in the classroom that was taught by the teacher but also in an online class. The development of technology can help the teacher to explain the materials for the students. The Internet offers a broad spectrum of content that is easily accessible to teachers and students' fingertips (Joshi and Kaur: 2011). Currently, many universities that had applied technology-based learning system in the world. The name of the technology is e-learning. According to Epignosis (2014), the first e-learning programs were on information sharing without enough interaction among the students. Technology-based e-learning includes the use of the internet and other vital technologies to create materials for learning, teach learners, and also regulate courses in an organization (Fry, 2001). It means that the role of technology is significant to support the learning process.

Feldman and Zucker (2002) explain that the online teaching-learning process is one of the new percepts through the internet. They assumed that instruction based online covered wherever and whenever communication. They believed that the process should be taken the plane in online condition. In line with Barbara Means (2007), online learning is complementary with the broader classification of expanse learning, that encompasses earlier technologies such as correspondence courses, educational television, and video conferencing. Internet is a perfect device of learning that proposes flexibility and expediency to students at the same time offering endless opportunities for innovate teaching (Moos and Azevedo, 2009; Huddleston and Pike, 2008; Zhang et al., 2004; Wang and Wang, 2009; Hardaker and Singh, 2011; Macharia and Pelsler, 2012). It means that the process of learning and teaching can be delivered through online learning in every situation. Online learning will become one of the ways to share materials.

Related to approaches to online learning, Feldman and Zucker (2002) determine types of approaches in learning-based online known as learning of synchronous and learning of asynchronous. Learning of synchronous is defined as the doctrine with the combination in real situation and condition through the Internet. Its characteristics contain device like the direct message, shared whiteboard, connecting data of audio and video, the media for distributing, looking up the online presentations. Learning asynchronous is defined as the learning process that can postpone the time. Possibly the best-known context of this term is "Personal time management" referring to the set of habits, rules, and recommendations on how to manage one's time effectively and do as much work as possible within the given amount of time (Covey, 1990).

Many researchers investigated the advantages of e-learning in the learning process. The main advantage of the e-learning process is that students can learn

where they want, when they want and at their own pace (Šolc et al., 2012). The broad study superiority attended to what the students' needs that should be covered. There are many ways and the suggestion that can advance to increase the students' ability. Wlodkowski (2005) claims that "learners learn more using computer-based instruction in comparison to traditional classroom methods." The students are more interested in the current method than the old method. Macharia and Pelsers (2012) stated that learning materials by using technology in the high level complete extraordinary intuition about the causes which affect students' acknowledgment about e-learning. The study supplied much thinking for the management of the high level for distribution and introduction of the goal of technology in the learning process. In conclusion, computing technology should be available and easy to access. Besides that, the conditions and aspect of the chief in the learning place have a crucial role in the achievement in electronic learning dispersion.

There are several factors that affect the success of e-learning goal. They are e-learning system that would support the students in the higher level toward the result of the learning that in line with (Hiltz, 1998; Hardaker & Singh, 2011; Wang & Wang, 2009; Macharia & Pelsers, 2012). The new method of learning (e-learning) becomes more suitable than direct learning, the level of communication and the time to comment is excellent, along the best planning of the course be able to clarify the physical conditions to the development of knowledge (Chen and Yang., 2006). It means that e-learning is beneficial to teach and to learn about something. In a higher level of education, electronic learning is needed to encourage the process of learning and will dispose of academic formation around the kingdom. Tinio (2002) stated that the educational effectiveness of ICTs depends on how they are used and for what purpose. Investigators had made much intensity on its purpose, but just a little considered on the prejudices of electronic learning.

Using technology in the learning and teaching process need some devices to support the success of the study. Ovide (2013) cited that the role of e-learning as an important tool for preserving the culture, language, and history of indigenous people. Some obstacles involve with device for e-learning. The students and the teachers should prepare the device. It is as the primary point to implement electronic learning method. Some equipment that should be there, they are Smartphone, laptop, and network connection. Wong and Looi (2011) investigated the influence of mobile devices on seamless learning. Seamless learning refers to a learning model that students can learn whenever they want to learn in a variety of scenarios and that they can switch from one scenario or one context to another easily and quickly (Chan et al., 2006, Wong & Looi, 2011). Scientific backing of the performer is an imperfection in the distinction of the learning ambition to get the achievement and the use of e-learning technology genuinely. The enormous ambition is dealt with by incomplete asset in the foundation and

technical support (Reeder et al., 2004, p. 91-92). All these applications should be combined and connected by one electronic learning situation so that they can be accessed. However, the needs are the combination and the network in of different tools.

One of the private universities in Yogyakarta had implemented e-learning by the teachers in the learning process. Not all of the teachers had applied electronic learning to their teaching process and learning process. Electronic learning becomes a new thing for the teachers who do not know it before. Although the implementation of e-learning has begun, in reality, it is tough to be implemented by the teachers. The teachers will find the hindrance in implementing it. Akhdar (2006) explained that obstacle is any physical or nonphysical barrier that prevents the use of a computer in teaching. Hindrance has the same meaning as an obstacle. In achieving the purpose, the hindrance should settle first. It is needed to introduce e-learning to some teachers. Some teachers will confuse how to apply it. Some teachers will find the obstacle to apply electronic learning to the process of teaching and learning.

Every teacher has their perception of implementing e-learning. Perceptions are to spark off similar behavior (Bargh et al. 1996). Perception is the thought about something that has been done, and it can be expressed by attitude. Teachers' perceptions form a significant component to describe the environment of the learning process (Lee & Tsai, 2005). It means that the role of teachers' perception can give influence to the student's behavior. A primary reason for teachers' perception study is that a learner's behavior is known as a result of his/her beliefs (Ajzen & Fishbein, 1980; Cooney, 2001). Teachers' perception will be part of learning evaluation to get successful learning. Wilson and Cooney (2002) investigated that as the 1980s context has been increasingly known as suitable to learn the teaching process and learning process and that the teacher's perceptions in fact from where the activity happened.

Based on the explanation above, the authors are interested in describing the teachers' perception of the obstacles of e-learning classes. The research questions of this study are (1) what are the teachers' obstacles in e-learning classes? (2) what are the suggestions can be supposed to overcome the obstacles of e-learning classes?

## **Method**

The method used in this research is a descriptive qualitative method. This research focuses on obtaining data through interview. Besides the interview, literature study also was done in order to compile the research previously done to university teachers. In using this method, the researchers tried to reveal the behavior and perception of the participants towards a particular topic.

## Participant

The participants of this research were e-learning teachers in the one private university in Yogyakarta, Indonesia. There were two e-learning teachers in University. The researcher meets them there. They were chosen because they have taught English for about ten years. The researcher recognized the two e-learning teachers. The researcher used random sampling technique to choose the participant. They will be interviewed by the researcher to know their obstacles and their suggestion in applying e-learning for teaching.

## Instrument

The researcher used interview guidelines to interview e-learning teachers. The interview guidelines contain semi-structured questions. The researcher interviewed the teachers based on the interview guidelines and some questions that can appear in the interview process.

## Results

### The Teachers' Obstacles in E-Learning Classes

Several themes emerged from the data analysis of interviews. The teachers' obstacles in e-learning classes and how to increase the teachers' knowledge to solve the obstacles can be shown from the transcript of interviews. There are some questions that have been asked by the researcher to the interviewee. The questions are semi-structured. Several themes will be shown below.

Table 1. Teachers' obstacles in e-learning classes

Teachers' obstacles	Interview 1	Interview 2
1. Device for learning		
a. Internet connection	T1: "...when we open internet, sometimes it can't be accessed, switch off suddenly..."	T2: "... Miss, this can't work, the sound can't be played... "
b. Software availability	T1: " ...the features of handphone and laptop are still not optimal..."	T2: "applying e-learning is complicated, not all of the students have supporting device..."
c. Students' ability to operate the device	T1: "... there are still many difficulties in online classes..."	-
2. Teachers' Knowledge		
a. How to apply e-learning application	T1: "...for the teacher, e-learning as the new thing and it make us to learn more..."	T2: "... the teacher are still have difficulties in applying e-learning, when the students ask to the teacher, the teacher is confused..."

Teachers' obstacles	Interview 1	Interview 2
3. Time Management	T1: "... with e-learning is helpful, when the students are learning during 100 minutes, it is very limit, so that the learning process need adding time..."	T2: "...maybe the time, in the class, the time is limit to practice because they are busy yo overcome their problem in e-learning..."
4. Students' motivation	T1: "... as the student sometimes they feel "ah it is not important". So, many students claim that it is not important..."	T2: "...when we open the internet, we need the connection together, sometimes it can shut down suddenly, it can not be accessed..."

T1: Teacher 1, T2: Teacher 2

Table 1 shows that the teachers' obstacles in e-learning classes have four themes. The first, device for learning that contains three sub-themes. The second, teachers' knowledge that contains one sub-theme. The teachers' said that teachers' knowledge of e-learning application is the key to achieve the goal of the study. E-learning is a new thing for them. The third, time management is still difficult to apply in the e-learning class. The fourth, the teachers said that the students' motivation is not stable.

### **Suggestions to Overcome the Teachers' Obstacles**

Table 2. Suggestions to Overcome the Teachers' Obstacles

Suggestions	Interview 1	Interview 2
1. The teachers need the training to train their skill	T1: "...the teacher should study more..."	T2: "there should be a training for the teacher..."
2. The teachers need guidance from an expert	-	T2: "...when the teacher feel confused, they need to consult to the teacher who are more understand..."
3. The teachers should be aware of the technology	-	T2: "...the teacher should be aware with the technology in this era..."
4. The teachers should have good attitude toward the students' response	T1: "...the teacher should be patient toward the students' response the students in the learning process..."	-

T1: Teacher 1, T2: Teacher 2

Table 2 shows several themes of recommendation to overcome the teachers' obstacle. E-learning method is still new for the students and the teachers. In applying it, the teachers need the training to train their skill. They still found some difficulties, and they still need to guide by the expert. The interviewee recommended the other teachers. As e-learning teachers, they should be aware of the technology. Before applying e-learning, they should be given training. It will

affect to achieve the learning goal. Then, the teachers should have good attitude toward the students' response in learning English by e-learning.

## **Discussion**

As many results, the teachers' perception of the obstacles of e-learning stated that e-learning is still a new thing for them. The researcher had collected the data from interviews and literature study. Some findings found by the researcher. They are the teachers' obstacle of e-learning classes and the recommendations to overcome the teachers' obstacles. The findings will be discussed below:

### **The Teachers' Obstacle of E-Learning Classes**

E-learning becomes something new in the classroom. The teachers should be able to implement it into the classroom. Tinio (2002) stated that the educational effectiveness of ICTs depends on how they are used and for what purpose. It is not easy to be applied because the teachers still learn about e-learning. They faced some obstacles when they implemented it. According to Akhdar (2006), an obstacle is any physical or nonphysical barrier that prevents the use of a computer in teaching. They feel challenging to apply it while they hope the learning process can run effectively.

### ***Device for E-Learning***

In implementing e-learning needs a device to encourage the process of learning can run effectively. The appearance of the device was vital because it could not run without a device for e-learning classes. Ovide (2013) cited that the role of e-learning as an important tool for preserving the culture, language, and history of indigenous people. Some obstacles involve with device for e-learning.

### ***Internet Connection***

The main advantage of the e-learning process is that students can learn where they want, when they want and at their own pace (Solc et al., 2012). E-learning does not require investments in infrastructure on the user's side if a computer and internet access is available. One of the problems in the device is an internet connection. Every place has different strength of internet connection. It can be from the facilities in the campus. On the other hands, it can be from their connection in their device. Feldman and Zucker (2002) explain that online teaching and online learning as a new program sent doctrine through the internet network.

It related to the findings that two teachers said that the learning process needs a secure connection. If there are some problems with an internet connection, the students were busy to handle their device. Internet connection has an essential role, and it will give effect to the learning process. If the

connection can run effectively, the teacher and the students do not have a problem with the internet connection.

#### *Software Availability*

Software availability is a kind of software that should be provided in the device. The software will be used to apply the material from the teachers. The enormous ambition is dealt with by incomplete asset in the foundation and technical support (Reeder et al., 2004: 91-92).

It can be summarized that the device should have software available to support the learning process. If the software unavailable, the application cannot be downloaded. It will influence the learning process cannot be run.

#### *Students' Ability to Operate the Device*

The ability to operate the device is needed to know by the teacher. It can show how far the students can operate the device. Wong and Looi (2011) investigated the influence of mobile devices on seamless learning. Seamless learning refers to a learning model that students can learn whenever they want to learn in a variety of scenarios and that they can switch from one scenario or one context to another easily and quickly (Chan et al., 2006, Wong and Looi, 2011). They are still having difficulties in operating the device. Macharia and Pelsers' (2012) that learning materials by using technology in the high level complete extraordinary intuition about the causes which affect students' acknowledgment about e-learning. The teachers still found the difficulties of students in operating the device.

As a result, the students still feel confused about e-learning. There is a feature that is not provided in the laptop and handphone. It is because every device should provide the application. So, the students and the teachers are still having difficulties in operating the device. Both of them still need to learn more about the technology of e-learning classes. The device should be appropriate with the standard of the software that used to download application in e-learning.

#### ***Teachers' Knowledge***

Every teacher should have good knowledge and good understanding. It is because of the understanding of the students based on the teachers' understanding of the materials and applying them into the class.

Teachers' perceptions form a significant component to describe the environment of the learning process (Lee and Tsai, 2005). It means that the assumption of the teachers toward the e-learning is fundamental. Moreover, in order to success, higher educational institutions must accept, implement, and adopt technological advancements, including e-learning. The teachers should know how to apply e-learning application. In fact, the teachers still have a problem with it.

Based on the findings, the teacher thought that e-learning is still something new, and they still have low awareness of the technology. Technology is essential to be learned. The teachers should have awareness toward the technology because if the teachers do not know about it, they will be confused with an e-learning application. So, the teachers should study technology to make it accessible in the teaching process.

### ***Time Management***

Time management is one of the teachers' obstacles that should be overcome. Possibly the best-known context of this term is "Personal time management" referring to the set of habits, rules, and recommendations on how to manage one's personal time effectively and do as much work as possible within the given amount of time (Covey S, 1990). The teachers should be able to divide time based on students need. The new method of learning (e-learning) becomes more suitable than direct learning, the level of communication and the time to comment is excellent, along the best planning of the course be able to clarify the physical conditions to the development of knowledge (Chen et al., 2006). It means that the time of learning can be gained by online learning and offline learning.

Based on the finding, the teachers said that learning English need more practice while the time for one meeting is 100 minutes. The students should learn English by using e-learning, but they still have some problems to run the application. They should be able to divide the time both of studying English and operating e-learning application. So, the teachers need to manage the time in order to make the students learn English effectively. Not only learn how to apply e-learning but also learn to practice English. The learning process can be done by face to face and online learning. It depends on the teachers in dividing the time.

### ***Students' Motivation***

Wlodkowski (2005) claims that "learners learn more using computer-based instruction in comparison to traditional classroom methods." The motivation of the students can appear from the way of the learning process. Macharia and Pelsler (2012) stated that learning materials by using technology in the high level complete extraordinary intuition about the causes which affect students' acknowledgment about e-learning. The way of teaching by technology can increase the students' motivation and decrease the students' motivation.

Another finding of the study, the students operated the application, and they faced some problems. When they tried to solve the problems, they could not face it. They felt that it is not essential. So, students' motivation can be influenced by where they study and the tools that they used. The teachers are just facilitators to guide the students in using the tools. The ability of the students also can influence in operating the tools. In the beginning, the students would feel interested, but if they have some problems, their motivation will decrease.

### **Suggestions to Overcome the Teachers' Obstacles**

Teachers have many obstacles in e-learning classes. They did not want other teachers to have the same problems. So, they gave some suggestion to other teachers at the university. Wilson and Cooney (2002) investigated that as the 1980s context has been increasingly known as suitable to learn the teaching process and learning process and that the teacher's perceptions in fact from where the activity happened.

The teachers said that training is essential to support the teacher in teaching by using e-learning. It can help the teachers to know more about e-learning. Training is not only learning about how to apply e-learning but also learn about the technique or teaching method. The students need a fast response of the solution from the teacher. So, training is needed by the teachers who will teach by using e-learning. They should understand first about the technology of e-learning. It can help them to explain the materials if the students feel confused. Training also can make the teachers keep their attitude and encourage them to study more.

### **Conclusion**

The study revealed that e-learning still not familiar with the teachers and the students. The teachers faced several obstacles in the implementation of e-learning. The obstacles come from the device of learning. The quality of internet connection and software availability is needed to support the learning process. If the device has good quality, the students will easier to operate the device. The other obstacles are teachers' knowledge and time management. The teachers are still not familiar with e-learning. They still need to learn how to implement e-learning in teaching and learning process. Therefore, they still difficult to manage the time. This condition can affect the students to control their motivation. In overcoming the obstacles, the e-learning teachers give some suggestions. The teachers should be aware of the development of technology. Training from the experts of e-learning is needed to train the teachers to implement e-learning in the classroom and online classroom. The teachers are not only learning how to implement e-learning but also the teachers should know the attitude in using e-learning. It can be used to face the students' response.

This study has certain implications for future research. The teachers should aware of the development of technology by joining a training of e-learning. By following the training, the teachers will have a broad knowledge. However, it can be used as an evaluation in implementing e-learning for online class and offline class. Besides, the students and the teachers should have appropriate device in following e-learning classes.

## References

- Ajzen, I., Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice-Hall.
- Akhdar, A. (2006). *Reality of the Use of Computers and Obstacles to their Use in Al Amal Academies' and Programs' Elementary Level Curricula*, MA thesis, King Saud University, Unpublished MA thesis, Kingdom of Saudi Arabia.
- Arikunto, S. (2005). *Manajemen Penelitian [Research Management]*. Jakarta: RinekaCipta.
- Barbara Means, Y. T. (2007). *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies*. Center for Technology in Learning, U.S. Department of Education.
- Bargh, J. A., Chen, M., Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology*, 71(2), 230-244. <https://doi.org/10.1037/0022-3514.71.2.230>
- Bogdan, R. C., Biklen, S. K. (2007) *Qualitative Research for Education: An Introduction to Theory and Methods*. 5th Edition. Boston: Allyn & Bacon.
- Chen, C. C., Wu, J., Yang, S. C. (2006). The efficacy of online cooperative learning systems, the perspective of task-technology fit. *Campus-Wide Information Systems*, 23(3). <https://doi.org/10.1108/10650740610674139>
- Cooney, T. J. (2001). Considering the paradoxes, perils, and purposes of conceptualizing teacher development. In F. L. Lin (Ed.), *Making Sense of Mathematics Teacher Education* (pp. 9–31). Dordrecht: Kluwer Academic Publishers
- Covey, S. (1990). *The 7 Habits of Highly Effective People*. New York: The Free Press.
- Epignosis. (2014). *E-learning concepts, trends, applications*. San Francisco.
- Feldman, R., Zucker, D. (2002). *Teaching and Learning Online – Communication, Community, and Assessment*. University of Massachusetts.
- Fry, K. (2001). E-learning markets and providers: some issues and prospects. *Education + Training*, 45(4/5), 233-239. <https://doi.org/10.1108/EUM0000000005484>
- Hardaker, G., Singh, G. (2011). The adoption and diffusion of eLearning in UK universities: A comparative case study using Giddens's theory of structuration. *Campus-Wide Information Systems*, 28(4), 221-233. <https://doi.org/10.1108/10650741111162707>
- Hiltz, S. R. (1998). *The virtual classroom: Learning without Limits via Computer Network*. Nor Wood, NJ: Albex Publishing Corporation.
- Joshi, R., Kaur, G. (2011). Role of internet in a language classroom. *Journal of Technology for ELT*, 1(4).
- Lee, T. S., Tsai, H. J. (2005). The effects of business operation mode on market orientation learning orientation and innovativeness. *Industrial Management & Data Systems*, 105(3-4), 325-348. <https://doi.org/10.1108/02635570510590147>
- Hardaker, G., Singh, G. (2011). The Adoption and Diffusion of eLearning in UK Universities: A Comparative Case Study Using Giddens's Theory of Structuration. *Campus-Wide Information Systems*, 28(4), 221-233. <https://doi.org/10.1108/10650741111162707>

- Huddlestone, J., Pike, J. (2008). Seven key decision factors for selecting e-learning. *Cognition, Technology & Work*, 10(3), 237-247.  
<https://doi.org/10.1007/s10111-007-0102-z>
- Macharia, J. K., Pelsler, T. G. (2012). *Key factors that influence the diffusion and infusion of information and communication technologies in Kenyan higher education*. *Studies in Higher Education*, (ahead-of-print), 1-15.
- Moos, D. C., Azevedo, R. (2009). Learning With Computer-Based Learning Environments: A Literature Review of Computer Self-Efficacy, *Review of Educational Research*, 79 (2), 576-600.  
<https://doi.org/10.3102/0034654308326083>
- Ovide, E. (2013). Intercultural Education with Indigenous Peoples and the Potential of Digital Technologies to Make it Happen. In F. García-Peñalvo (Ed.), *Multiculturalism in Technology-Based Education: Case Studies on ICT-Supported Approaches* (pp. 59-78). Hershey, PA: Information Science Reference.
- Reeder, K., Macfadyen, L.P., Roche, J., Chase, M., (2004). Negotiating culture in cyberspace: participation patterns and problematics. *Language Learning and Technology*, 8(2), 88-105.
- Solc, M., Legemza, J., Sutoova, A., Girmanova, L. (2012). Experiences with Utilizing E-learning in Education Process in University Environment. *Procedia – Social and Behavioral Sciences*, 46, 5201-5205.
- Syafi'i, A. 2005. *Metodologi Penelitian Pendidikan [Educational Research Methodology]*. Surabaya: Elkaf.
- Tanzeh, A. 2004. *Metode Penelitian Praktis [Practical Research Methodology]*. Jakarta: PT Bina Ilmu.
- Tinio, E. (2002). ICT in education. Available in <http://www.eprimers.org>
- Wang, W. T., Wang, C. C. (2009). An empirical study of instructor adoption of web-based learning systems. *Computers & Education*, 53(3), 761-774.  
<https://doi.org/10.1016/j.compedu.2009.02.021>
- Wilson, M. S., Cooney, T. J. (2002). Mathematics teacher change and development. In G. C. Leder, E. Pehkonen, G. Torner (Eds.), *Beliefs: A hidden variable in mathematics education* (pp. 127-147). Dordrecht: Kluwer
- Wlodkowski, R. J. (2005). Adults in Modern Society are on a Lifelong Educational Journey. Available from <http://userpages.umbc.edu/~koconne1/605TheAdultLearner/elearning.htm>
- Wong, L.-H., Looi, C.-K. (2011). What seams do we remove in mobile-assisted seamless learning? A critical review of the literature. *Computers & Education*, 57(4), 2364–2381. <https://doi.org/10.1016/j.compedu.2011.06.007>
- Zhang, H., Keung, J., Kitchenham, B., & Jeffery, R. (2008). Semi-quantitative Modelling for Managing Software Development Processes. 19th Australian Conference on Software Engineering (ASWEC 2008), Perth, WA, pp. 66-75.  
<https://doi.org/10.1109/ASWEC.2008.4483194>