THE BARRIER FACTORS OF VOCATIONAL SCHOOLS TO IMPLEMENT ONLINE LEARNING FOR MATHEMATICS STUDY

Bambang Kandiawan[1], Massila binti Kamalrudin[2], Safiah binti Sidek[3]
[1] Vocational High School Batik 2 Surakarta, Jawa Tengah, Indonesia.
[2, 3] Institute of Technology Management and Entrepreneurship, Universiti Teknikal Malaysia Melaka
Email: [1]bbkandiawan1963@gmail.com; [2]massila@utem.edu.mys, ; [3]safiahsidek@utem.edu.my;
[3] massila@utem.edu.my
BAMBANG KANDIAWAN, University of Technology Malaysia

ABSTRACT: *In practice, mathematics learning in vocational high school or sekolah menengah kejuruan (SMK) in Indonesia is already qualified, the problem is only when using online applications or e-learning to enhance the quality of teaching, facing some difficulties of experiences or finding some barriers. The purpose of this research is to explain some of the constraints or obstacles in the learning of mathematics in vocational schools. Some barriers encountered include (1) human resources factors that poor experiences to apply learning in Mathematics Learning Online, (2) poor facilities and infrastructure factors to implement Online Learning in learning mathematics study. The research appears based on the findings in the field that the results of the students learning mathematics at SMK are less satisfactory. This writing hopefully gives a few solutions to be applied so that the obstacles that occur can be resolved.*

Keywords: learning, barrier factors to learning, online learning.

I. INTRODUCTION

The world today has entered the era of globalization with information technology which is growing very rapidly. The development of information technology can enhance performance and enable a wide range of activities can be implemented quickly, precisely, and accurately, so that will increase productivity. In addition, the development of information technology has also influenced many aspects of life, one of them is education. Information technology has been functioning as a support of science. Therefore, information technology can be used to help and support reliable and skilled human resources. In the achievement of these goals, the utilization of information technology is largely determined by the precision of the use of its strategy. Information for education and knowledge can be obtained via the internet, and it is already used also it has many benefits for improving the quality of education and knowledge in a variety of countries including in Indonesia.

By having support with information technology, improving the quality of education and knowledge, especially in the subjects of mathematics can be directed and advanced, one of them with e-learning. It is s learning system that utilizes excess – the excess of which is owned by the internet, which is used as a medium of transfer of knowledge. A system that gives freedom of time, and place and it is not just a teacher-oriented teaching. Although it has been realized that online learning could help to improve the quality of education and knowledge, however, it is not fully applied in most Vocational Schools (Sekolah Menengah Kejuruan or SMK). Because there are still many factors of obstacles to implementing online learning in mathematics study.

This writing is focused on how the factors and constraints experienced by vocational schools (SMK) to implement e-learning in learning mathematics. The focus of the research was elaborated into two sub-focus, namely: 1). What are the barrier factors of human resources (HR) experienced by SMK to implement online learning on mathematics study?

2) What are the barrier factors of infrastructure experienced by SMK to implement e-learning in learning mathematics?

3) What solutions should be done to overcome this problem?

This research aims to examine and describe the factors and constraints of human resources (HR) experienced by schools to implement e-learning in learning mathematics, and constraint factors of infrastructure experienced by schools to implement online learning on the learning of mathematics.

The theoretical benefits of this research are; that it may a contribution to the field of mathematics education. In particular, this research is an alternative support addressing the factors and constraints for schools that will implement online learning on the mathematics study, to look for a better solution.

The practical benefits of this research are by giving a conceptual contribution to mathematics education to both informal and formal educational institutions, teachers, and learners on the learning of mathematics by applying online lessons.

II. THE FOUNDATION OF THEORY

According to Waller and Wilson in Syaiful Muzid, [1] Online Learning or Electronic Learning began at the end of the 1970s. Online learning or E-learning is learning that utilizes information technology and Communication (ICT) mainly for transforming the learning process between educators and learners. The main goal of this technology is improving the speed and not sitting for a limited time and a place to access information. Learning activities can be easily done by learners anytime and anywhere and are considered safe by the learners. The limits of space, distance, and time are no longer a complicated problem to solve. The things that are needed in the implementation of online learning are the awareness of all parties both institutions, professors, and also students about the

importance of e-learning, willingness, and capabilities as well as human resources, facilities, and infrastructure, information is always up to date, quick access and (expected to free), and dissemination [2]. A few constraints are being experienced to implement e-learning in learning mathematics, among other factors, as well as human resources and infrastructure factors. When this constraint factor can be handled properly then the use of e-learning in learning can be done fairly.

Previously, there used to be research with the title "a Knowledge-skills-Competencies E-Learning Model in Mathematics" performed by Giovanniana Albano [3] gives the conclusion that after using online learning, students can improve the way they are in resolve mathematical lesson problems, and they even may enhance their learning interests and can change their views toward mathematics study.

Poppy Yaniawati [4], in research entitled "E-Learning Models to Improve the Competence of Teachers and the Results of Learning Math at the School in the Countryside" concluded that the e-learning system was created using an application *Module* with material learning materials for mathematics can motivate student learning. Research results by Isham Ismail, et al. [5], show that there is no issue in putting online learning into practice if the student has a computer and has access to the Internet. Because most of the students are very skilled in surfing the Internet.

The biggest technical problem appears when students are trying to download the subjects from specific portals, it is found very time-consuming due to very slow internet access. This can lead to feelings of frustration on students.

Grohan and Pauline [2], in his research entitled Teaching Effectively with Online Learning stated that although e-learning used in teaching has not been accepted wholeheartedly. In the United Kingdom,most of the Collegeshave used ILT (information learning technology) to make learning more fun and interesting. But online learning or e-learning is still having limitations. They illustrate that some of the concerns can be associated with integrated technology into the curriculum of vocational schools. Integrating technology into the curriculum as a hallmark of good quality in learning, it can lead to stress on teachers as they strive to be better.

III. RESEARCH METHODS

The research includes qualitative research with approach case studies that give an overview of the factors and constraints to implementing e-learning in learning mathematics. According to Moleong [6], qualitative research is quite complicated in some cases. The researcher is a planner, and implementer of data collection, analysis, and interpretation of data, and in the end, this should be the research results of the rapporteur.

The subjects in this study were mathematics teachers and the students of vocational schools or SMK. The method in this research data collection is using in-depth interviews, observation, and documentation. Informants are teachers and students of SMK. The technique of data analysis is done interactively by modifying a given concept [7]. Activities in designing data analysis are data collection, data presentation, data reduction, and withdrawal of the conclusion.

IV. RESULTS AND DISCUSSION

A. The Barriers Factors of Human Resources to Implement Online Learning

Research results indicate that the factor of human resources constraints experienced by the Vocational Schools to implement e-learning on the learning of mathematics, arethe mathematics teacher and students. In General, most mathematics teachers with a background in mathematics teacher education at vocational high schools are entitled degree of S-1. Most of them are experienced teachers of mathematics in the vocational school since 1991. If it is any training, particularly in the field of mathematics education, most of the teachers are always participating, both before and after becoming a teacher.

Based on the results of the research, the teacher is the most important factor in the execution of learning, because teachers manage other factors so that the learning process runs optimally. Similarly, to implement online learning, the teacher is the one who is deciding materials for implementing e-learning. Teachers need to master how to communicate and deliver materials for Online Learning very well. There are differences in teaching Conventional with Online LearningOnline learning or electronic learning i.e. learning by using electronic devices through online communications [8]. Based on the theory to implement online learning, a teacher must be able to master the use of ICT in fact must be able to access the internet. But almost the majority of the teachers at vocational schools have not mastered it so that it became one of the constraints to implementing online learning in learning mathematics.

The other human resource that can be a constraint to applying online learning is a student. Basically, all the students of vocational schools are very enthusiastic and participate

actively at the moment following the learning of mathematics. This indicated the presence of good responses from students; students often ask the teacher when they feel less clear about the teaching material.

The habit of learning mathematics at vocational schools (SMK) has been good so far, usually when learning is processed, the teacher explains while carrying some props of learning. So the students will more easily understand the material described by the teacher. However in the process of learning, students in vocational schools still rely on the presence of the teacher to deliver the material, they don't have enough access to use the other media as a substitute for the presence of teachers in delivering the material to them. It is not only teachers who are becoming constraints to implementing e-learning. Vocational School students become constrained to implement online learning in learning due to the still lacking understanding of the use of ICT is primarily for accessing the internet. Human resources must have the ability to implement online learning. This is per the opinion of Karryn and Hillbert [9] say that the things that are needed in applying online learning are the willingness and ability of human resources.

B. Barriers Factors of the Infrastructure and Facilities to Implement Online Learning

Based on the research results some classrooms in most vocational schools are already completed with the support of electronic devices, such as; whiteboards, televisions, tables, and chairs of study. But some certain facilities are still lacking support for the implementation of online learning in mathematics lessons.

According to Albert [10], the technology used to deliver learning material in this e-learning can be a computer, LAN

(Local area network), WAN (wide area network), internet networks, CD ROM, etc.

It can be noted that the implementation of online learning in the classroom, should be completed with such technologies, at least one computer for one student. However in a classroom in most vocational schools, technologies to support the application of online learning is not found. The space of most libraries is already available. The books are available and considered completed. Good primary books, textbooks, or hand-out books. The books also included the mathematics and ICT books. Therefore libraries in some vocational schools have support for the implementation of e-learning though merely increased the understanding of students of SMK on ICT through the available books.

The other facility and infrastructure that became an obstacle to the implementation of online is the laboratory of ICT. The presence of ICT laboratories at SMK is quite good actually. The types of equipment that are available in the room lab are also quite adequate. There are computers, LCDs, and a few other supporting tools. Therefore this is the only ICT Lab room that is quite sufficient to carry out mathematical learning using online learning. Despite that Lab of ICT is also one of the constraints of the school to implement e-learning due to the limits of the number of computers in the ICT lab is still considered less if compared to the number of students who need it. So in this case, the ICT instruments in this area are insufficient. This can also lead to poor motivation of students regarding ICT learning. The explanation above is a reflection of the existing infrastructure in most vocational schools. The infrastructure has less support for the implementation of online learning.

V. CONCLUSION

A. Summary

The factors and constraints of human resources experienced a few vocational schools to implement e-learning in learning math covers mathematics teacher and students. The human resources constraints so that nearly all the few vocational schools has not been fullest in applying online learning because neither good mathematics teachers nor the students are still not enough to be able to implement it, both on learning math or learning the others. Teachers have not been so understanding towards the things that must be mastered to implement online learning, one of which is the use of the website. Likewise, the teachers and students still are not been familiar with using ICT in the learning process. Students still need mentoring and guidance from teachers to be able to utilize online learning lessons.

Factors of infrastructure constraints experienced by most of the Vocational Schools with online learning applications include classrooms, a library, a laboratory, and ICT. The facilities and infrastructure constraints so that it has not been fullest in applying online learning when learning mathematics study, because it doesn't support the facilities for implementing online learning.

B. SUGGESTION

Based on the results of research done at vocational schools, regarding constraints to implementing e-learning in learning mathematics then submitted some suggestions as follows:

1. The Department of Education or the education agencies should provide socialization or training programs to teachers as well as students on the implementation of online learning so that teachers and students become motivated to implement online learning.
2. Schools should implement online learning as the strategic measures, both in the short and long term to ensure continuity of the implementation of online learning at schools daily. This can be done by excavation and identification of information regarding the implementation of online learning, either by utilizing online learning consulting services or doing adoptions (benchmark) of other schools that already implemented online learning successfully.
3. Mathematics teachers should be more open, and more willing to attend some training in any field, not only training in mathematics education. Especially associated with ICT Training.
4. Students should be able to keep motivated to improve the quality of learning in the field of ICT, to better prepare for any process of learning on ICT-based materials.

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