

Effectiveness of online GIS training on increasing professional competence of geography teachers

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Abstract. The change in the implementation of face-to-face learning to online during the Covid-19 pandemic requires teachers to adapt the learning system. In the Geographic Information Systems (GIS) subject, the delivery of GIS material to students often remains theoretical, lacking practical application. To address this, teacher self-development efforts are needed to support the competency improvement during the online class by participating in training. This study aims to analyze the effectiveness of online GIS training for geography teachers. The method used is descriptive analysis with a qualitative approach and data collection using literature review and interviews. The results found that teacher participation in training acts as a form of professional self-development, enhancing teacher's knowledge and professional competence. During the pandemic, various trainings can be easier to follow, in addition to maintaining distance, online training can also bridge the barriers of distance and location of implementation. Online GIS training in particular can still improve teacher competence, but there are obstacles for some teachers who are lacking in managing information technology tools. The role of the presenters as well as the detailed training modules will greatly help the training objectives to be achieved.

1 Introduction

Change is a necessity. But sometimes for some people do not expect change because it can cause problems. Problems can be explained as deviations between what should happen and what actually happens, between theory and practice, between rules and implementation, and between planning and implementation [1]. Problems can arise from the discrepancy between experience and reality. For example, the learning process is generally face-to-face, now with e-learning it will cause problems for some teachers who do not follow the development of information technology.

Online learning design in terms of students is expected to reach students more broadly because it is not tied to location and makes it easy to be accessed from anywhere. But in reality, not all students can access online learning smoothly. Or if viewed from the level of effectiveness which may not be the same as face-to-face learning. From here you can find the source of the problem, what is the problem that needs to be changed or what is the problem after the change occurs.

Covid 19 is a type of corona virus. The corona virus has been found since 1960. 10%-30% of this type of virus causes the common cold. SARS and MERS-CoV also come from a type of coronavirus. At the end of December 2019, a new corona virus emerged which was initially referred to as SARS-CoV-2, which was later agreed to be named Covid19 (an acronym for coronavirus disease 2019) by WHO. Covid19 was first identified ¹in the city of Wuhan, which is the capital of the Hubei province in China. The first time the Covid-19 case cluster was detected was on December 26, 2019 and the cases continued to increase until they spread to many countries, including Indonesia [2].

WHO has declared Corona as a pandemic. The determination of this status is related to the speed with which the corona virus spreads widely. The declaration of the corona virus or Covid-19 was carried out to trigger government governments around the world to prepare emergency preparedness plans to protect the public. Many countries have taken concrete steps to prevent the spread of the corona virus, with their respective policies, such as lockdowns and mass testing. One of the policies of the Indonesian government in tackling the spread of the virus

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is by continuing to educate the public and implementing social distancing principles to break the chain of virus spread [3].

This policy has an impact on education in Indonesia, especially in the learning process in schools. The government has temporarily suspended the face-to-face learning process at all levels of education until conditions are declared conducive. Even though schools are closed, learning is still carried out through distance learning, in accordance with the direction of the Ministry of Education and Culture (Kemendikbud) through the Circular Letter of the Minister of Education and Culture Number 4 of 2020. In this distance learning, all elements of education are required to remain able to facilitate learning so that remain active even without face to face. Teachers as the main element in formal education are encouraged to adapt to the implementation of learning that originally used conventional face-to-face methods and switched to online learning [4].

Online learning makes teacher demands increase. In addition to having to adapt to the new learning system, teachers must find ways to manage online classes to keep them running effectively, take advantage of available digital platforms, and be creative in overcoming obstacles that will certainly be different from the face-to-face learning process as usual. Teacher innovation and creativity are needed in packaging teaching materials and developing learning methods to attract student enthusiasm. For this reason, self-development efforts for teachers are needed that can support teacher competency improvement during the distance learning process.

The positive aspect during the pandemic is that there are many activities that can be done online where these activities can be carried out without problems of distance and location. Self-development activities for teachers such as seminars and online training can be easily found during the pandemic. Time to attend seminars and training is also more accessible because most educational institutions implement the WFH (work from home) system.

The development of an increasingly dynamic era demands the development of the best human resources in their fields. The advantages of human resources can be seen from the education system. Teachers are at the forefront of the education system. As the main mover in the education system, teachers are required to have several competent competencies and become professionals. The role of the teacher is no longer only as a teaching staff but also must be able to become a facilitator for the development of students.

In the Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers, it is explained that competence is a set of knowledge, skills, and behaviors that must be possessed, internalized, and controlled by teachers or lecturers in carrying out professional duties [5]. From the description, it appears that competence refers to the ability to carry out something that is obtained through education. Teacher competence refers to rational performance and actions to meet certain specifications in the implementation of educational tasks. It is said to be rational because it has direction and purpose, while performance is a real behavior in the sense that it is not only observable but includes something that is invisible.

Competence is the main component of professional standards in addition to the code of ethics as a regulation of professional behavior set out in certain procedures and supervisory systems. Competence is defined and interpreted as a set of effective behavior related to exploration and investigation, analyzing and thinking, as well as paying attention and directing someone to find ways to achieve certain goals effectively and efficiently. Competence is not an end point of an effort but a process that develops and learns throughout life.

Teacher competence is related to the authority to carry out their duties. The teacher's task in this case is related to using the field of study as learning material that acts as an educational tool, and pedagogical competence related to the teacher's function in paying attention to the behavior of students learning [6]. The results of the combination of various types of abilities that can be in the form of knowledge, skills and behavior are manifested in the form of teacher competencies that must be mastered by teachers in carrying out their professional duties. Teachers are required to be professional in their fields regardless of their employment status or class.

Professional teachers will produce quality educational processes and outcomes in order to realize Indonesian people who are knowledgeable and have noble character, as mandated by the National Education System Law (UU Sisdiknas No 20 of 2003) [7]. The competence of the teacher itself includes pedagogic competence, personality competence, professional competence and social competence. One of the competencies that must be possessed by a teacher is professional competence. Professional competence is mastery of learning materials broadly and deeply, which includes mastery of curriculum material in school subjects and the scientific substance that overshadows the material, as well as mastery of the structure and scientific methodology [8].

Each of these sub-competencies has its own essential indicators. Sub-competence mastering scientific substance related to the field of study has essential indicators; understand the teaching materials in the school curriculum, understand the structure, concepts and scientific methods that overshadow or are coherent with the teaching materials; understand the relationship of concepts between related subjects; and apply scientific concepts in everyday life. Meanwhile, the sub-competence of mastering scientific structures and methods has essential

indicators in the form of mastering research steps and critical studies to deepen knowledge/materials in the field of study.

Teacher professionalism is one of the efforts to improve the quality of education. Professional teachers will produce good students too. A teacher can be said to be professional if he is able to lead students in learning to find, manage and solve problems related to knowledge, attitudes and values of life skills. With professional competence, teachers have the task of directing student learning activities in order to achieve the learning objectives that have been set [9, 10]

Teachers are required to be able to manage the learning process starting from the preparation stage to evaluation and can be good facilitators for students who have diverse characters. For this reason, teachers must constantly improve their abilities regarding the development of subject matter to be presented, classroom management, the use of information technology and other capabilities that can support improving the quality and performance of teachers so that it will have an impact on improving the learning process better.

Improving teacher performance has the most important position in an effort to improve the quality of learning which will have an effect on the quality of graduates and will affect the achievement of national education goals [11]. Improving the quality of teachers as an effort to increase professional education personnel aims to make teachers always develop in line with the development of science and technology. Efforts that can be made by a teacher in the context of self-development to improve his professionalism can be done by participating in training activities, training or seminars.

Teachers need professional training to broaden their horizons and improve their skills. Teacher participation in self-development activities is expected to increase motivation to improve performance, learning methods or as a refresher of knowledge and information. The training will be more beneficial for teachers if teachers have a lifelong passion for learning. Teachers can develop their competencies through learning from various training programs from school and outside of school [12].

The analysis of the study of geography can be distinguished from the analysis of other sciences seen from the point of view or approach. The basis for the analysis of geographic studies is the spatial approach. So that the Geographic Information System (GIS) plays an important role in conducting geographical studies spatially. GIS has been computerized to make it easier for users to analyze geographic studies. GIS can also help in making decisions or policies in an area after conducting an assessment. The presence of GIS technology has increased the role and existence of geography in the academic and practical world, especially in solving spatial, environmental and regional studies and problems.

Geographic Information System (GIS) is a system consisting of hardware and software that can manage geographic data through a computerized process. GIS is an information system that can be used to process spatial and attribute data into new spatial (spatial) information. GIS can be used as a tool in the study of geography. The ability of GIS can analyze phenomena on the earth's surface with data on certain phenomena. Spatial analysis carried out by GIS can be used as a strong basis for a decision making or making a policy [13].

The ability to master GIS management is very much needed by both teachers and students, especially at the secondary school level. In geography subjects for SMA/MA level, this GIS material is found in class X and class XII. The basic competencies that must be met by students who are closely related to GIS material are making a thematic map of a province and/or one of the islands in Indonesia based on an earth map in class X. While in class XII, the related basic competence is presenting a thematic map based on remote sensing image processing and Geographic Information System (GIS) for regional potential development and environmental health [14].

The results of initial observations of several geography teachers show that there is still a lack of basic competence achievement related to GIS material by applying GIS technology. Submission of this material to students is only limited to theory without any direct practice. This is because there are still many teachers who do not understand how to manage GIS technology to be applied in learning. For this reason, this study attempts to further analyze the effectiveness of online GIS training in improving the professional competence of geography teachers. From the results of this study, it is expected to be able to analyze the effectiveness of online training in GIS studies in particular, and can be a source of further information on the role of online training in improving the professional competence of geography teachers.

2 Methods

The method used in this research is descriptive analysis with a qualitative approach. Descriptive research is research that seeks to describe a symptom, event, event that is happening at the present time. Descriptive research focuses on solving actual problems as they were at the time the research was carried out. Data collection in this

study was carried out by literature study, observation and in-depth interviews. Research subjects for interviews were conducted with several geography teachers who had attended online GIS training.

3 Results and Discussion

Training is an integral part of education, is a process of coaching or a means of self-development to train oneself to achieve a certain level of competence in order to improve performance and self-quality, especially in the world of work. The result of the training is a change in the form of an increase in several things, including certain knowledge, skills, attitudes or behaviors. With the variety of objectives to be achieved from a training, it is necessary to first determine what is the main target in a training. The training implementation plan that has been prepared from the beginning can produce a training procedure and technical that makes the training carried out effectively and efficiently in accordance with the expected goals.

Along with the times and technological advances, some activities that generally gather a lot of people can be carried out digitally in the network. Some of the stages and things needed in the learning process can already be applied online, such as references to the material being taught, learning media, teaching and learning activities, making assignments and even the assessment process or evaluation activities. Training activities and seminars become a means of self-development, especially for teachers in studying technological developments that are applied in the learning process. The easy implementation of distance learning nowadays makes the implementation of training and seminars as a means of self-development more affordable. The existence of online training and seminars makes training participants able to study with a more flexible time and place, it can even be done without leaving the workplace with a choice of types of training and seminars according to their needs [15, 16].

Professional teachers are teachers who have the required competencies to carry out educational and teaching tasks. Competence here includes knowledge, attitudes, and professional skills, both personal, social, and academic. Becoming a professional teacher is greatly influenced by the level of expertise and education he or she takes. Teachers can develop their competencies through learning from various training programs both from school and outside of school and it will be even more useful if the teacher has a passion for learning to develop his potential [17].

The results of this study found that teacher participation in training was a form of self-development and refreshment of knowledge and information and could increase professional competence. The results of a literature review from several previous studies regarding the effect of training on increasing teacher competence show the results that training has an effect on teacher professionalism. Furthermore, based on the research on improving the professional competence of teachers, it was found that the response of the teachers after attending the training was very positive which was indicated by the great enthusiasm when doing independent work practices and presentations. In addition, teachers also experienced an increase in the understanding of learning from the training materials presented. Training activities for teachers have a very broad beneficial effect because an increase in teacher competence will have an impact on improving the quality of learning.

In online training, it was found that training activities can also improve the understanding and professional competence of teachers. During the pandemic, various trainings can be easier to follow, in addition to maintaining distance, online training can also bridge the barriers of distance and location of implementation. The design of online training reaches more participants more broadly because it is not tied to location and makes it easy to be accessed from anywhere. However, several obstacles were found in its implementation because not all training participants were able to smoothly access online training. This is because there are constraints in terms of the network such as an unstable signal when training activities take place [18, 19].

Online GIS training can still improve teacher competence, especially teacher professional competence. In relation to the study of Geographic Information Systems (GIS), which is a system to be able to manage geographic data through a computerized process, the smooth implementation of GIS training requires participants to download programs used in GIS analysis and be able to operate information technology devices. Obstacles in the implementation of online GIS training were found especially for some teachers who were lacking in managing information technology tools. The speed of managing different information technology devices for each teacher also needs to be a concern in the implementation of training that uses a set of information technology. The use of different devices between teachers, the internet network in various locations of teachers in different trainings, and the ability to manage devices and follow instructions that are not the same demand more attention from presenters in online GIS training. The existence of a module in the training will facilitate the learning process in a training that requires direct practice as in this GIS training [20].

Based on the results of interviews with geography teachers who had attended basic GIS training during the pandemic, it was found that online basic GIS training had provided increased competence for teachers. Online GIS training during the pandemic provides an opportunity for teachers to be able to improve their competencies even though there are differences in implementation locations. Researchers found several differences for teachers who had previously operated a GIS program with those who operated for the first time during the training activities. Teachers with a younger age range or recent graduates can easily follow the training process and work independently on assigned tasks. This is supported by the introduction of the study of Geographic Information Systems, which was obtained while in college, and has received hands-on practice using programs that support GIS studies. The development of learning in higher education with the development of information technology as well as more complete campus facilities are the main supporting factors for increasing the competencies possessed by graduates.

Meanwhile, senior teachers who have not received direct practical learning during their teacher education, have had some difficulty in completing independent tasks given during the training. Teachers who are new to the computerized GIS management program suggest that face-to-face training will make it easier to overcome the different obstacles in each device. Despite experiencing several obstacles in the training process, the enthusiasm to develop themselves and add new knowledge made the teachers to keep trying to complete tasks during the training. The role of the tutor who provides additional time and task consultation for each teacher also has a very big influence on the teacher in understanding the material and assignments given. The existence of this online training remains a great opportunity to improve teacher competence, especially in professional competence.

4 Conclusion

Teacher participation in a training is a form of self-development and refreshment of knowledge and information and can improve professional competence. Online training can still improve the competence of a teacher. During the pandemic, various trainings can be easier to follow, in addition to maintaining distance, online training can also bridge the barriers of distance and location of implementation. Online GIS training in particular can still improve teacher competence, but there are obstacles for some teachers who are lacking in managing information technology tools. The role of the presenters as well as the detailed training modules will greatly help the training objectives to be achieved.

Based on the process, analysis and conclusions of this study, it is hoped that further research can be more extensive in developing the role of online training for teachers. Online training providers need a structured training system design that can be accessed by all training participants, an evaluation system for the process and progress of participants and a feedback process from online training providers. Further research can also be done in terms of developing training modules so that they can be studied and practiced in online learning or independent learning. Later, in addition to training aimed at teachers, direct training can also be developed for students to increase knowledge about spatial analysis through Geographic Information Systems.

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