



The Role of Teachers in the Development of ICT-Based Learning Innovations

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ABSTRAK

Di era industri 4.0, para pendidik dituntut untuk bisa mengembangkan inovasi pembelajaran pada setiap pertemuan tatap muka. Hal inilah yang mendorong banyak guru sekolah dasar untuk dapat menerapkan media pembelajaran berbasis teknologi dan informasi. Tujuan penelitian ini adalah mengetahui sejauh mana para pendidik mengembangkan inovasi pembelajaran yaitu melalui adanya teknologi informasi dan komunikasi (TIK). Penelitian ini merujuk pada metode fenomenologi terhadap peristiwa yang terjadi dan merujuk juga terhadap refrensi buku sebagai penguat. Penelitian ini menggunakan analisis metode kualitatif deskriptif dengan memaparkan data-data melalui wawancara, observasi, dokumentasi, serta berdasarkan referensi dari buku dan jurnal. Hasil penelitian yang dicapai adalah sebanyak 30 pengajar mampu mengembangkan inovasi pembelajaran menggunakan teknologi komunikasi dan informasi berupa zoom, google meet, terms, Edmodo, dan youtube. Penelitian ini berkontribusi bagi para pendidik dalam penggunaan aplikasi media dalam teknologi komunikasi dan informasi di era industri 4.0.

ABSTRACT

In the era of industry 4.0, educators are required to be able to develop learning innovations in every face-to-face meeting, this is what encourages many elementary school teachers to be able to apply technology and information-based learning media. The purpose of this study is to find out the extent to which educators develop learning innovations through information and communication technology (ICT). This research refers to the phenomenological method of events that occur and to book references as reinforcement. This research uses descriptive qualitative method analysis by presenting data through interviews, observations, documentation, and based on references from books and journals. The results of the research were that as many as 30 teachers were able to develop learning innovations from communication and information technology in the form of zoom, google meet, terms, Edmodo, and YouTube. This research contributes to educators in using media applications in communication and information technology in the industrial era 4.0.

INTRODUCTION

The development of information and communication technology (henceforth, ICT) in Indonesia has increased rapidly, especially in the field of education and learning for students. ICT is the most important part of the learning process. Learners will be interested in the digital-based ICT. Students' interest in learning, learning motivation, and psychological influence can increase with interactive ICT and build cognitive knowledge from students in teaching and learning activities in the classroom (Rohman & Susilo, 2019). Support in the form of adequate ICT will make the rest passionate in learning and understand every material presented by the teacher in the classroom. In the world of education, information and communication technology is a component that cannot be separated from educational activities (Baharun et al., 2020). The quality of education can be facilitated by ICT which can be accessed wide open for both teachers and students who are in an educational atmosphere. ICT relations and radars that are broad, efficient, creative, fast, and equitable will have an impact on an equitable literacy culture for both teachers and students in learning in the classroom.

In the field of education, the development of ICT can certainly provide a new dimension in terms of ability to gain literacy or reference for teachers and students. ICT is graphically able to display communicative designs in the form of text, graphics, sound, images, and films. In addition, ICT can also improve radio and television broadcasts to fix weaknesses in the millennial and digital era. Through computer, the world of education can use it as learning media. This learning media has been proven to have a positive impact on the learning process in schools, namely creating a pleasant atmosphere for teachers and students (Suwanto et al., 2022). ICT will be used more consistently in the digital era and technological developments, so that it is able to be on target and can suit the needs of generation Z who live in the rapid development of technology, and are able to meet learning objectives effectively, precisely, and imaginatively (Rahmi et al., 2019). Utilizing technology in schools is an effort to improve the quality of education. Then, there is also a classification between applications used face-to-face at school and during distance learning at home.

The development of information and communication technologies transforms the paradigm in this elementary school to be able to use Microsoft 365 that can be used to communicate with teams, power point, one drive, and several microsoft support applications of which purpose is to launch a learning process. Educators also create innovations in their use (Pratama et al., 2021). For example, in the use of power point interactive media, the teacher can be creative by providing animation in the form of links. Then students will be enthusiastic in learning as they find it interesting. This media can also be implemented in distance learning (Pratama, 2019). Teachers in this elementary school are also able to use the blended learning method in terms of carrying out teaching and learning activities which can later be adapted for both teachers and students so that generations X and generations Z are able to collaborate with each other in teaching technology. This is an important development in developing learning technology in class (Samala et al., 2019).

The Microsoft 365 that is used is one of the media in facilitating innovation in terms of learning for educators to provide teaching and learning activities that are different from other schools. The 30 educators in elementary schools in Sumenep Regency, who like challenges and want to continue learning in the midst of an increasingly modern era and the need to continue innovating in this elementary school, are committed to continue to explore knowledge. The condition of educators who are also among the X generations is an obstacle to learning innovation from continuing to develop from the latest times (Al-Ansi et al., 2021).

The followings are some previous research studies that are relevant to this research. According to Suhery et al. (2020), the role of the teacher in developing learning innovations through technology-based applications is very interesting to be applied in class. The second research conducted by Natalia et al. (2020) stated that blended learning is an innovative learning model that can be carried out by teachers during a pandemic and after the pandemic, so that teachers can develop creativity in technological innovation. The third research by Amanullah (2020) also presented smart solutions in learning in the millennial era by presenting learning innovations in outline (Moreira-Fontán et al., 2019). The role of

the teacher as a form of developing innovation in information technology-based learning will have a sustainable effect on students (Artacho et al., 2020). In previous research that has become a reference, it is stated that in the industrial 4.0 era, every educator is required to be able to master learning innovations with ICT so that they can support their duties as educators in teaching and learning activities. The aim of this research is to figure out how far elementary school teachers in Sumenep regency are developing innovation in learning with information and communication technologies so that educators can adapt to technology, because technology constantly develops in the Industrial Revolution 4.0 era.

METHOD

The type of research was phenomenology, namely describing and exploring some of the phenomena that occur with the context of qualitative descriptive research by describing a series of events that occurred in the field and adapted to the theory obtained in books (Suratman et al., 2019). It is important for researchers to focus on various matters related to the function of teachers to innovate with digital-based ICT, because it is from ICT that digitalization develops in elementary schools. The data collection technique in this study was triangulation in the form of interviews, observation, and documentation (Suwardi & Farnisa, 2018).

The technique of using interviews was by collecting conversations with 30 respondents as the source of the object being investigated. As an instrument for researching the interaction between the two parties, using semi-structured interviews between the interviewer and the interviewee becomes deep evidence. To be able to see directly using observation (direct observation) is an efficient method to be able to complete the researcher's field data with form and observation format for correspondence. The compiled format contains items about the event or behavior that will occur. The most important role in using the observation method is the observer (Li et al., 2019). Observers must be observant in observing, like observing events, motion, or processes. In the documentation method, documentation is a method that seeks data about things or from the notes, transcripts, books, letters variables, and so on (Effendi & Wahidy, 2019). Compared to other methods, this method is not that difficult as if there is an error, the data source is still the same, not changed. The documentation method also observed inanimate objects. In using this documentation method, the researcher holds a check-list to look for the variables that have been determined (Kristiawan & Muhaimin, 2019). The interview protocol is presented in Table 1. In the interview method, it is necessary to ask several questions that need to be given to correspondence. Based on these questions, we can find out the answers given by the correspondence. These interview patterns were developed to find out the extent development of information and communication technology that is developing in an elementary school that has the educators (teachers) who can develop learning innovations.

Table 1. Interviews protocol

Interview grid	Questions
Understanding of learning technology	What do you know about information technology?
	Do you use the existing facilities in information technology (ICT)?
	How do you use the existing facilities in ICT?
Availability of ICT facilities	What facilities and infrastructure are provided at this school for educators?
	Does the school provide ICT facilities for educators?
	How about the ICT facilities that provided by the school?
Utilization of ICT in the learning process	Do you use information technology for learning?
	How often do you use information technology in the learning process?
	What preparations did you do before using information technology in learning?
	How is the learning process by using ICT?
	What are the benefits of using ICT as a learning resource?
	What are the obstacles for teachers in utilizing information technology in learning?
What is the solution for educators to overcome these obstacles?	

The collection of the data was by purposive sampling technique, namely certain considerations by taking samples from data sources using purposive sampling techniques. In this study, the authors chose several respondents as data sources (Artacho et al., 2020). The validation of the data was by technical triangulation by matching the correlation between all the correspondence that answered the interviews, documentation taken based on information from the correspondence, and observations made on educators in schools who had agreed to take part in collecting research data under approved procedure (Moreira-Fontán et al., 2019). The process of drawing a conclusion based on the data obtained was by looking at the facts and data so that the conclusion can be drawn following the data obtained in the research.

RESULT

Based on a correspondence data interview with teachers at elementary schools in Sumenep Regency, it was found that information and communication technology can assist teachers in explaining the material presented to students. From the results of the interviews conducted, it was found that the use of information and communication technology by using applications made education quality in elementary schools increase in the following three years. In 2020, there were 12 teachers using Zoom, 13 teachers using Google Meet, 15 teachers using Terms, 16 teachers using Edmodo, and 17 teachers using YouTube in elementary school. Meanwhile, in 2021, 23 teachers used Zoom, 22 used Google Meet, 25 used Terms, 22 used Edmodo, and 24 used YouTube in elementary schools. In 2022, the teachers who used the Zoom application as media were 26, Google Meet were 25, Terms were 27, Edmodo were 28, and YouTube were 30 in elementary schools. Data for three years of the use of information and communication technology used by educators by utilizing application media are presented in [Figure 1](#).

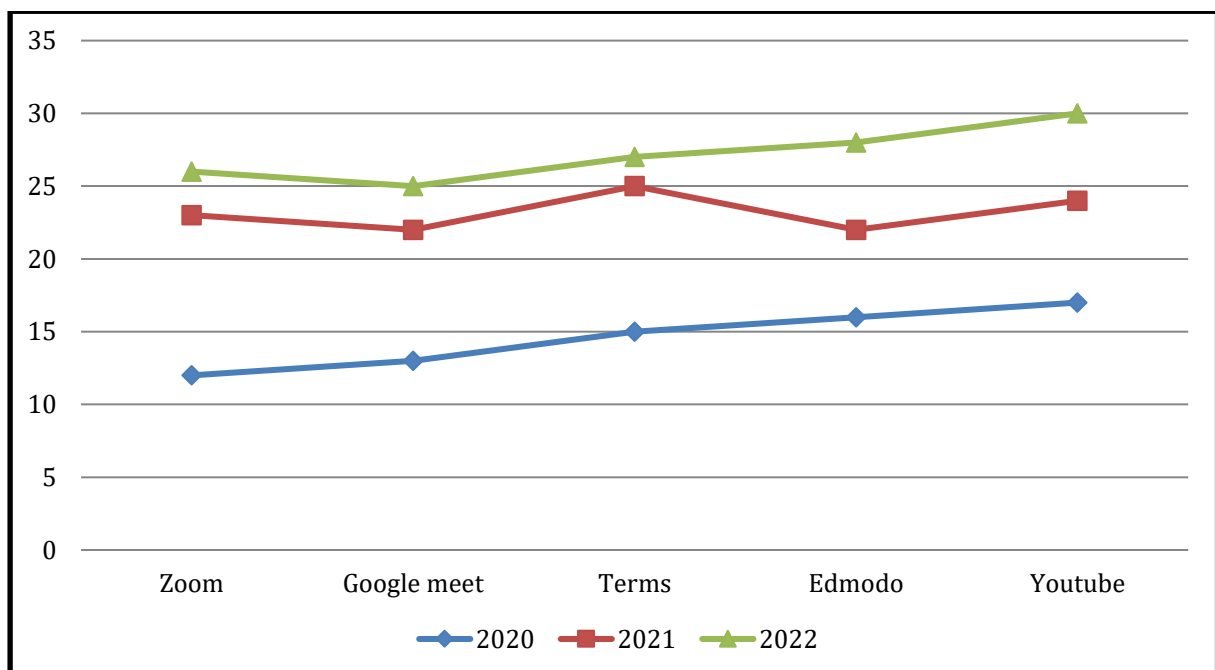


Figure 1. The Most Frequently Applications Used by the Teachers

[Figure 1](#) explains that in the past three decades, the role of applications to assist teachers in the teaching and learning is the development of learning innovations. The increasing variety of applications used by educators has spread over the three years of using these applications, and educators have learned a lot from the first users. Teachers in elementary schools are required to apply information and communication technology that works and teach each other using these applications so that the average elementary school teachers can use information and communication technology, especially in learning that is held every day, especially for teaching and learning activities.

The use of the Zoom application by teachers has increased every year, based on the results of interviews conducted, which is simpler to do during online meetings and not face-to-face. It is because Zoom application is more interactive and simpler than the others. (Illahi, [2020](#)). The Google Meet and Teams applications are applications contained in Microsoft 365 which can be used in reciprocal interactions between teachers and students (Baharuldin et al., [2019](#)).

The use of digital applications in schools aims at facilitating the learning process. Digital media have a considerable possibility to boost student interest in a subject being taught. Therefore, teachers must also adapt to existing digital tools and media. If the teacher cannot adapt to or operate the digital system, there is possibility that an obstacle or even a failure occurs in the learning process carried out and the result is that the knowledge conveyed cannot be absorbed by students. So, learning digital learning systems or at least understand and able to operate computer systems are vital for teachers (Lestari, [2018](#)). One of the capital factors in understanding digital systems is to understand the language used in the system, namely English, although not all types of learning media systems use English. Besides, the teacher needs to understand the displays of the media system. A system uses symbols in each command to make it easier for teachers to run the applications or learning media systems (Samala et al., [2019](#)).

Forced or not, it needs to be emphasized again that a teacher needs to improve his professional skills. Learning innovations carried out by teachers in developing creativity found in elementary schools are in using various applications in teaching and learning activities, even though in the process of empowering students to learn by using applications such as Zoom, Google Meet, Teams, Edmodo, and YouTube so that it can increase their interest to the planned programs. According to UU no. 20 of 2003 and UU no. 14 of 2005, the role of ICT is very important in teaching and learning activities, because it can help teachers to facilitate the learning process in the digital era and conditions of the environment amid infectious diseases, uncertainty about the spread of viruses, and pandemics.

Both school institutions run by the government or run by the private aim to educate the nation. This process requires a long time in the learning process by studying the use of applications in information and communication technology which will accelerate the learning process amid the uncertainty of pandemics and disease transmission if face-to-face meetings are implemented. The use of applications in the world of learning in the industrial era 4.0 will positively impact teachers in elementary schools so that students learn and continue to grow. But, in the process, sometimes the level of interest of students fluctuates and many students don't even have any interest at all. That is because students feel bored with the learning process that is not innovative. So, using the application of a digital system with an increase in the teacher's understanding of the system is hoped to make learning better and more enjoyable so that the interest of students will increase.

The use of applications such as Zoom, Google Meet, Teams, Edmodo, and YouTube will provide a different color in developing learning innovations that will be enjoyed by the millennial generations (Pratama, [2019](#)). On this occasion, it is discussed further about how Zoom use by educators can improve artificial intelligence created through learning platforms. Teachers using Microsoft 365, namely Teams and Google Meet, will have a positive impact on students from the millennial generation who want innovative and practical learning (Kim et al., [2022](#)). Teachers who use the Edmodo application will often provide training on questions and tutorials in working on digital-based questions and sharing competitive knowledge. Furthermore, teachers who use the YouTube platform are educators who can develop attractive forms of learning and provide challenges to students who listen to media and learning innovations made by teachers.

The existence of applications and platforms in information and communication technology also functions as a facilitator. The role of a teacher as a bridge is to provide services so that students can comfortably receive and understand teaching materials (Suratman et al., [2019](#)). So, the learning process will be more effective and efficient. ICT will create an engaging learning atmosphere because students will embrace the lesson diversity and innovation with applications that teachers use flexibly and innovatively in the industry of 4.0 era will have a good impact on primary schools in general. However, it is also necessary for parental supervision at home when

conducting online learning with the use of applications carried out by teachers in elementary schools. Parental guidance is paramount as a responsibility towards their children so that they stay on the learning path in accordance with the teacher's directions at school and give a different color when face-to-face meetings are not held. Teachers feel more challenged to use media of ICT.

The use of applications with information and communication technology is essential for educators to use during industry 4.0 so that students are able to compete with various kinds of conditions and situations that develop and require fast and precise communication techniques (Syahid et al., 2019). Educators who have knowledge of learning innovations and easily master information and communication technology will be favored by millennials or generation Z who get used in using technology and communicating quickly and competitively. Zoom and Google Meet applications are able to appeal millennials if pandemic conditions recur (Lubis et al., 2020). The Terms and Edmodo applications also provide assignments that make it easy for educators to coordinate what matters as subject development, especially for elementary school children who want to learn while playing. YouTube application for elementary school children can repeat lessons that have been completed and requires learning innovation for educators who use it when teaching and learning activities take place.

Educators who use YouTube platforms can also be motivators. The process of teaching and learning activities will be successful if the students have high motivation. Teachers using YouTube platforms have a significant role in fostering motivation and enthusiasm in students to learning (Artacho et al., 2020). Teacher is also a trainer. The education and learning process certainly requires skill training, whether in terms of intellectual or motoric skills, YouTube applications provide a different experience. In this case, the teacher will act as a coach to develop these skills. This is emphasized more in the 2004 curriculum which cover a basic competencies (Nuryana, 2019). Without training, definitely, a teacher will not be able to master basic competencies and is not proficient in skills that are in accordance with standard material. After the learning process, without a doubt, a teacher must evaluate the results. This evaluation is not only to assess student success in achieving goals in teaching and learning activities, but is also an appraisal for the success of teachers in implementing teaching and learning activities. A teacher must evaluate the results that have been carried out during these learning activities.

DISCUSSION

From the results of interviews and Figure 1 regarding the application of media by educators among elementary schools in Sumenep Regency, it was found that teachers can innovate the aspects of learning through the use of information and communication technology.

Learning Innovations

Learning innovations are innovations, ideas, goods, and methods that are felt or observed as something new or discoveries that are used to achieve learning goals or solve problems in learning. Talking about innovation (renewal) reminds us of two terms, namely invention and discovery. Invention is the discovery of something completely new, meaning the work of humans (Pamungkas et al., 2018), while discovery is the discovery of something (objects that actually existed before). In this way, innovation can be interpreted as an attempt to find something new by carrying out invention or discovery (business) activities. Every innovation is created to provide positive benefits for human life, so learning must be innovative.

In education, there is a great need for learning innovation so that the learning process is not monotonous and students are enthusiastic during learning. Learning innovations can also make students better understand the material because students who feel interested in the lesson can understand the materials well and are happy. Learning innovation seeks to improve the abilities possessed to get better results. With learning innovations, we, as prospective teachers, should be able to learn and create a learning atmosphere that is fun, exciting, dynamic, full of enthusiasm, and full of challenges. That learning atmosphere can easier for students to acquire knowledge, it can be easier for students to gain knowledge, and teachers can also instill the values that are essential to students to achieve learning goals (Baharun et al., 2020).

In elementary schools in Sumenep Regency have been many developments in learning innovations carried out by teachers. That is, the teacher at the school has used innovative learning

media like power points and audio visual (Jazlina et al., [2022](#)). Utilizing technological developments in the learning process is because education always follows the dynamic development of the times and it can increase students' knowledge well and they will be interested in the learning process. Educators in elementary schools are required to continue to be creative and innovative in teaching. Like the way, they use innovative media or good learning models. Then it will make the class atmosphere fun, not monotonous. The subject can be well received by students and students find it easier to understand. The school also has ICT subject, where students practice more in computer labs. Teaching students to operate computers and basic computer materials. Students do not fail in technology (Baharuldin et al., [2019](#)).

Information and Communication Technology

Information and Communication Technology is the result of human thought to develop certain procedures or systems and use them to solve problems in their lives. While the information that can be interpreted as news that contains a specific purpose. Humans have knowledge and experience that they want to convey to others. So that includes information. The role of information requires the presence of other parties. The word communication comes from the Latin *communicare* which means sharing or conveying news, messages or information from other parties. So it can be concluded that information and communication technology is the use of computer equipment as a tool for processing, presenting, and managing data and information based on communication equipment (Wati, [2019](#)).

It can be concluded that information and communication technology as a technology for obtaining, processing, storing, and disseminating various types of information files by utilizing computers and telecommunications was born from strong motivation to create innovation and teachers creativity so it can overcome all laziness and delays in human performance (Fitriana & Diplan, [2018](#)).

In the current era, the use of interactive information technology media is widespread, where majority of schools have used Information and Communication Technology in the learning process. In the learning process using interactive media, information and communication technology can improve teaching and learning activities more effectively. Development of education through learning innovations based on information and communication technology is a must so that education quality standards can be improved. The development of information technology is starting to have a positive impact because with the development of information technology, the world of education is starting to show quite significant changes (Herawati, [2019](#)). Many things felt different and changed compared to the previous way.

In its application, information and communication technologies in learning should be innovative and creative. Where using this interactive media can be modified by teachers to be more interesting because the world of technology has complemented students' lives. So, using interactive ICT media can inspire the students themselves to pursue learning. Such as an interactive power point media. Where in this application can be modified for another subjects. What teachers usually apply is the subject on the power point. But more innovative and creative in providing images related to learning. Adding interesting animations that still pointing to the subject to learn. Then you can innovate by adding a huge gate. The process of making in the colossal gates is a little complicated, but more interesting and can attract students' attention. And it also can include the links to open the learning materials.

Information and communication technology that can be applied in schools is the use of audio-visual-based interactive media. That is the type of media used in learning activities by involving hearing and sight in one learning process. Moving learning videos or films/motion pictures that can give messages or material evenly to students and can be accepted by students. Students can read, listen, and see well can be seen from the classroom situation during the learning process. The material in this media can show things that sometimes cannot be seen directly in the environment around students. Therefore, students are more enthusiastic in listening to the lesson. Gives a deep impression to students. Teachers can also provide opportunities for students to ask questions regarding learning material by using this audio visual. Examples of this interactive media are YouTube, zoom, terms where this media is a combination of graphics, animation, sound,

and user interactivity. Macromedia Flash is a standard application driver for a professional authoring tool used to create amazing vector and bitmap animations to create interactive, attractive, dynamic websites. This software is based on vector animation that can be used to produce web animations, presentations, games, films, as well as interactive CDs, learning CDs. Microsoft 365 also provides more and more interesting facilities that will help, makes it easier for users to learn or use this software compared to previous versions of Flash. Animations can be made simpler, faster and more attractive.

Some interactive media of ICT can be used by teachers in the learning process. Where in its use it can be useful, effective and efficient. Participants are also more interested in learning and understand the subject well. Teacher should not to bea technology stutte. Because the teacher has to follow the development of the technology that is already been used as well as can use it in learning activities. The teacher needs to improve the evolution of information and communication technology. Can manage learning more interactively by using the media. Because the goal that will be achieved can be maximum and more efficient (Anantyarta & Avanty, 2021). At the elementary school in Kabupaten Sumenep, the teacher has implemented innovation in information and communication technology-based learning. The teacher uses media power point and visual audio media in the learning process. With a projector's suggestion, the teacher can show a powerpoint in the classroom. The material is very interesting because at the powerpoint there are animations and images that make students happy. The material on the powerpoint is provided in a simple, non-circular manner. So that students directly understand the point of the lesson. And the teacher explained it. The use of this media is easy and simple (Putra et al., 2018).

Teachers at the school also use audiovisual media, such as in thematic learning. The lesson is about the state of nature abroad, the way of life of a person with a different climate from ours. Through audiovisual media, students' attention is drawn to the screen. Where it displays about the material. With this media students seem to see directly the situation there. And also the lesson about addition using pictures of fruits accompanied by explanations. Students will easily understand, and learning will be more effective and efficient.

CONCLUSION

The use of applications such as zoom, google meet, terms, and YouTube provides learning innovations for teachers who teach in elementary schools in Sumenep Regency. The use of this application continues to increase from year to year which will give color to users of information and communication technology (ICT) in the future. In the industrial 4.0 era, educators can continue to learn with various applications that have been provided in the digital world which will make education increase in line with technological developments used by humans, so that humans will be more competitive and adapt to developments in information and communication technology (ICT). The hope of the researchers is that further research will open up more opportunities for learning related to artificial intelligence (AI) where the use of information and communication technology between educators and students is more developed into algorithm adjustments and the intelligence of students in following developments in the industrial 4.0 era which continues to grow.

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