

STUDIES ON EDUCATION, SCIENCE, AND TECHNOLOGY 2021

Editors
Dr. Mack Shelley
Dr. Ismail Sahin



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PREFACE

Education, science, and technology disciplines at all levels have never been more important, more exciting, or more crucial for its broader impacts on human society. The need for advanced technical skills is increasingly pressing to address climate change, combat COVID and other diseases, enhance the infrastructural built environment, grow food sources to feed an expanding planetary population, make new scientific discoveries, and interface synergistically with the arts, humanities, and social sciences. Teachers/instructors/mentors/professors need to be proficient in the best ways to convey knowledge and motivate the next generations of productive and engaged citizens of an increasingly diverse planet on which its human inhabitants must learn to confront and surmount increasingly difficult challenges to survival and prosperity. Students need to be focused on honing their learning skills and adapting to an ever-evolving global economy demanding always higher levels of technical proficiency. Students also need to be free to pursue any and all areas of interest without interference from cultural, political, ideological, or faith-imposed limitations. Policymakers need to provide the financial and human resources to fuel the engine of education, and they must create the maximum possible latitude for both those who teach and those who learn to pursue science, technology, engineering, and mathematics to their limits. This book contributes to addressing these needs and to suggesting potential solutions from multiple global perspectives. Adaptability of instructional methods, relevance of instructional content to students' lived experiences, and sensitivity to the mental and physical demands imposed on students must be hallmarks of education.

The book is divided into three sections related to studies on education, science, and technology. Each section includes three chapters. The chapter's contributors are from the following countries: the United States, Germany, Greece, Indonesia, the United Kingdom, Russia, and Malaysia. This diversity brings an international perspective to the book.

The first section starts with the chapter titled "Access to Learning: Reality or Mirage in an Increasingly Virtual World?" by Beth Godett from the United States. This chapter examines inequities of opportunity, the problems of adapting education's brick-and-mortar digital resources to home-based Zoom and asynchronous classrooms, and possibilities for reform. The second chapter titled "Portfolios as Formative Assessment in Applied Mathematics: Influences of Portfolios on the Teaching-learning Process" is written by Edeltraud Gehrig, Annika Kanzinger, and Joerg Zender from Germany. The chapter highlights the role and potential of portfolios in the examination process and the motivation by individual coaching, consideration of the learning level, and the (self-selected) individual goals of the students.

The last chapter of the first section includes a chapter titled “Integration of Digital Technology and Educational Planning for Teaching and Learning Religion in Higher Education Institutions” by Ioanna Komninou and Christos Papakostas from Greece. This chapter describes the fulfillment of learning theories in distance learning, emphasizing in applications in the field of religion and discusses the available technological tools, their selection criteria, and the required skills to properly use them.

The second section involves chapters on science. The first chapter of this section is titled “Athlete Students' Anxiety Levels on Physical Activity and Performance during the COVID-19 Pandemic” by Syamsul Gultom, Baharuddin, Dina Ampera, and Dewi Endriani from Indonesia. This work focuses on attribution theory to determine how athletes attribute their success and failure Performance during the COVID-19 Pandemic. Another study titled “A Study of Present-day Women’s Family Status in China: Intimate Relationships among Chinese Post-90s Couples” by Anran Li from the United Kingdom explores Chinese post-90s women’s family status in contemporary society in China and the gender role ideologies of post-90s generation changes on the premise of a rich material and broad knowledge. The chapter titled “Recurring Emotions and Coping Mechanisms of Parents with Children having Autism” by Nicole Marie C. Pascua and Cherry Amor Dizon from Phillipines looks at Filipino parents’ recurring emotions and grieving experiences that trigger it while raising a child with Autism Spectrum Disorder (ASD).

The last section involves chapters on techology. The chapter titled “The Role of Educational Technology in the COVID-19 Pandemic” by Eva Faridah, Indra Kasih, and Rudi Hartono from Indonesia shows and discusses the importance of educational technology and information systems for educators and learners in conducting online lectures during the COVID-19 pandemic. While the chapter titled “On a Novel Approach to Undergraduate IT Education” by Mikhail Lavrentiev and Marina Derzho from Russia and Alex Shafarenkofrom UK introduces a new collaborative programme in Computer Science developed by academic staff of the universities of Novosibirsk, Russia, and Hertfordshire, UK who formed an initiative group for this development, the last chapter titled “Locating Visual Arts Instruction in Malaysian Higher Education: COVID-19 Epoch” by Lilian Lee Shiau Gee from Malaysia explores art students' acceptance of online learning during Malaysia's COVID-19 pandemic.

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SECTION III - STUDIES ON TECHNOLOGY

Chapter 7 - The Role of Educational Technology in the COVID-19 Pandemic

Eva Faridah , Indra Kasih , Rudi Hartono 

Chapter Highlights

- The purpose of the chapter to show the importance of educational technology and information systems for educators and learners in conducting online lectures during the COVID-19 pandemic.
- The presence of the COVID-19 outbreak has an impact on various sectors. This chapter focuses on the education sector.
- The world of education is also required to adjust to situation and conditions caused by the COVID-19 pandemic.
- Currently, millennials must be observant in choosing a job. As a result of the development of technology old jobs become lost and also emerged new professions that were previously unthinkable.
- With the rapid development of technology makes the learning process faster and more effective.
- Especially in education during the COVID-19 pandemic there is communication and interaction indirectly, namely through the internet.
- The problem of online lectures in the COVID-19 pandemic requires a good learning strategy. In this case, the use of educational technology as the implementation of informationsystem is needed both by educators and learners.

Introduction

The Information and communication technology (ICT) as part of science and technology in general constitutes all interconnected technologies and retrieval, collection, management, storage, and information. The development of information technology is very large, especially in our country. It is growing with information and communication technology that can make it easier for someone to learn and get the information we need where and whenever we need it. In the world of education, the development of information technology began to have a positive impact because with the development of information technology in the world of education that began to shift to significant changes. ICT consists of three main components, namely there is technology, both information, and third communication. By using smartphones and laptops, we can use all three components into one. Therefore, this device is called an ICT device.

Information and Communication Technology (ICT). All activities that use technological devices are also called information and communication technology. Information and communication technology is divided into three parts, namely technology is a means whether it is hardware or hardware or software or software used to help us. Next there is information that is processed into news that can give us a certain impact. Communication is the process of exchanging information and data through the sending and receiving of messages from two or two or more people. We need to know, that ICT is different from IT or information technology. If it is IT, we will focus more on processing existing information and become an important data. ICT is divided into 3 parts, namely technology, information and communication. For example, data analysis of results from the sale of toast in our class bazaar, or the result of data obtained when finished summarizes the results of online classes. The following, are some examples of information and communication technology in everyday life, namely computers, laptops, tablets, and, smartphones, internet use, radio, television, telephone, cable phones, satellites, and also video conferencing.

Many things feel different and change compared to the way that developed before. Distance and Time today are not a meaningful problem to gain knowledge. Many applications are created to facilitate from technology sources. In areas, the process of obtaining information is still limited (in rural areas) because Indonesia is spreading information and communication technology has not been fairly evenly distributed. Now it is only in big cities that have easily

enjoyed and utilized the facilities available. Thus, the development of education becomes hampered and also uneven for some communities. The Internet as one of the media of learning and information and knowledge search can be easier and maximal even though internet access in Indonesia itself is not fully felt by everyone.

Zoom Meeting

Since the COVID-19 pandemic, it has hit almost all countries around the world, including Indonesia. Policies for WFH (Work from Home) apply to companies, organizations, and institutions that allow it to be carried out. This is to reduce social and physical contact (Social Distancing) so as to minimize the spread of COVID-19. WFH policies require employees and students to work and study from home. Due to the limitations of contact and face-to-face communication, video conference is the choice.

With video conferences, employees and students can connect, discuss, and conduct meetings and webinars so that work and activities can still be done. Although many obstacles occur but this is a new choice and culture that may continue to be used in the present and the future. To conduct video conferences, there are various platforms that can be used for free and paid such as Zoom Meeting, Google Meet, GoToMeeting, Teams, and others. The most popular and widely used zoom because its features and needs are more complete than others. Zoom Meeting features Meeting, Webinar, Recording, Share Screen, to Zoom Room. For more details, see the following understanding, features, and how to use Zoom;

Zoom is a video conferencing service that allows users to chat online by utilizing cloud computer technology and 256-bit TLS encryption. Zoom was developed by Zoom Video CommunicationsCommucations, Inc. Based in San Jose, California, United States. Zoom was founded by former Cisco Webex executive Eric Yuan in 2011 and launched publicly in 2013. With Zoom, users can connect with each other, conduct meetings and webinars, chat, to have discussions in a Channel. Zoom is an alternative to working and learning remotely from many organizations and institutions around the world. OS support for Zoom services is also very diverse ranging from MacOS, Windows, Linux, iOS, Android, Web App, to extensions for Google Chrome and Firefox.

Zoom provides two conversation options, which are free for 100 user meetings with a

maximum limit of 40 minutes. While the paid, Zoom provides needs that can be tailored to the user. The price is quite affordable, between \$15-100 per month. In its development, in 2017 Zoom's status as a company became a unicorn with an evaluation of a valuation that reached \$ 1 billion. Even since the beginning of 2020, the use of Zoom services has continued to increase due to the COVID-19 virus pandemic that is spreading around the world.

There are several things to understand and pay attention to when using Zoom. Some Zoom services have different functions and needs, such as Zoom Meeting for online meeting needs from anywhere. Zoom Webinars for Webinar Events needs such as campuses, schools, or institutions by inviting many people to participate. Zoom room for different indoor meetings has more complete functions and tools. Of these services, all have the following basic features:

1. Audio and Video Support: As a video conference service, of course Zoom support with HD (High Definition) Audio and Video. In a meeting, the need to talk and meet face to face is certainly needed, although on some occasions many users turn off audio and video functions to maximize listening. In addition, speaking alternately will be better so as not to disturb other speakers. Many Indonesians are still middle to lower so that the use of video features is more reduced due to the limitations of internet quotas. Considering the longer the use of video features also affects the internet quota that quickly runs out.

2. Share Screen: In a meeting, sometimes users need to make a presentation to explain the purpose and intent. Most presentations are usually in the form of PowerPoint (PPT) slides to make it easier to explain. Well, Zoom itself supports with this kind of feature, where users can take advantage of the Share Screen feature. What is a share screen? Share Screen is a Zoom feature that allows users to share computer screens, opened documents, files accessed online (Google Drive, Dropbox, Microsoft OneDrive, etc.) to share a second camera. This feature not only works for document presentations, but more than that.

3. Scheduling (Schedule): Before meeting, an admin can create a meeting schedule in advance. This is so that users who will participate know and can get ready to follow it. When creating a meeting schedule, admins can set dates and hours as desired for the meeting limit between 30 minutes - 14 hours. For the free version, admins can only have a time limit of up

to 40 minutes, while the premium version has a longer time limit.

4. *Security:* Speaking of security, any communication and data shared through Zoom will be encrypted using 256-bit TLS encryption. Many media outlets inform that Zoom is potentially unsafe. Many controversies occurred, but Zoom continues to make improvements and developments to make all services and features safe to use.

5. *Chat:* Zoom also presents a Chat feature so that users can discuss each other when conducting meetings or webinars. Interestingly, all the chats are stored in a history so that users can see it again. Users can also submit files, screenshots, and documents within. All files will be stored for 10 years, and after that time is up, the files are automatically deleted from the server.

6. *Recording:* When meeting, admins can also record and save it on the computer. This feature is very important so that every meeting that is done can be watched again or when there are other users who can not join can still see it. The recording file is automatically saved to the computer, but if the user wants to save to the cloud then the admin needs to upgrade to the premium plan for between \$40 and \$500.

7. *Reactions:* Need reactions in a meeting or discussion? Take it easy, Zoom presents reactions feature to make the atmosphere feel fun and fun. In sending messages (chat) in Zoom without meeting there is also a reactions feature so that users can provide reactions to other users that are interesting and exciting.

Google Meet

The outbreak of the COVID-19 pandemic around the world made many activities such as business, employment, and education turn to digital. This becomes something new by forcing many people to use the internet in communicating. The WFH (Work from Home) policy has been set by the government to reduce the spread of COVID-19 but still do work from home.

Google Meet, Zoom Meeting, Skype, Cisco Webex, and others are the options to keep meeting online. Zoom meeting is one of the most widely used meeting programs today. In April 2020, Zoom Meeting had up to 300 million daily users. This is the reason why some platforms also develop and add meeting features. One of them is Google which is also serious

in improving Google Meet features and services. The combination of features between Google Hangouts and Google Chat makes Google Meet the second choice, in addition to Zoom Meeting. Curious about Google Meet, see the understanding, features, benefits, and how to use Google Meet below; online video conferencing/meeting services developed by Google. The Google Meet service is a combination of Google Chat and Google Hangouts with development more devoted to online meetings. In October 2019, Google Hangouts discontinued its classic version and users were able to switch to using Hangouts for a more modern version.

Google Meet was secretly introduced in February 2017 for iOS (iPhone) users. The following month, Google Meet was publicly introduced and can be accessed in access through web browsers, iOS, and Android. In the free version, users can meet with a maximum number of 100 participants. While the premium / business version, users can meet meetings from 100 to 250 participants. Anyone with a Google account can create meetings or participate in online meetings. For security reasons, the host has full access to a meeting. Hosts can refuse to sign in and delete users during the meeting. In April 2020, Google has also added a dedicated noise-cancelling audio feature for business plans. For privacy reasons, Google also states that it does not record or store video meetings for ad targeting. But information from the Meet privacy policy analysis, Google reserves the right to store the duration of the call, the participating users, to the IP address of the user. Google Meet presents a myriad of features and benefits to maximize users in conducting online meetings.

Google Meet's featured features:

1. Users can join a meeting via the web, Android app or iOS (iPhone).
2. Integration with Google Calendar that allows users to create meeting schedules.
3. Allow users to share screens for document, spreadsheet, or presentation presentation needs.
4. Chat feature is available so that users can have discussions or send text messages during meetings.
5. Hosts have full access to deny or allow users to connect.
6. Calls are encrypted so that security is more secure.
7. G Suite plans have access to many improved features such as recording, attendance tracking, retention, and greater cloud storage.

In addition to integration with Google accounts, Google Meet presents a variety of features that allow users to meet online, presentations, chat, and recording. Google Meet strives to deliver services and features according to users' wants and needs. However, Google Meet is also not separated from its shortcomings.

Advantages of Google Meet:

1. Easy to join. Joining a meeting on Google Meet is fairly easy; participants can join through the web, Android application or iOS.
2. Access using a Google account. The majority of Android users have a Google account so access to Google Meet will be easier and faster, without having to register.
3. The meeting time is quite long. Meetings on Google Meet can last for 60 minutes (free). This is much better than zoom meeting which is only 40 minutes.
4. Connect to Google Drive. Google Meet integrates with Google Drive for storage of recording files and documents and documents if needed. Users who choose the G Suite premium plan can record and record results stored in Google Drive.

Disadvantages of Google Meet:

1. The free version does not support recording. Unfortunately, the free version of Google Meet is not available recording feature. Unlike Zoom Meeting and Skype which in the free version is available recording feature.
2. Sharing the screen feels heavy and slow. When doing a presentation by sharing the screen through a browser, the computer feels very heavy. It may take a computer with better hardware specifications so that the presentation feels smooth.
3. Unable to change background screen. Some video conferencing services have featured to change the background screen so that visualization looks more attractive. Unfortunately, Google Meet does not yet provide this feature.
4. There is no Desktop version of Google Meet yet. Until now, there is no desktop version of Google Meet which means that meetings through the computer must be done through a browser.

Generation of Technology

Millennials are a generation that is around 18-30 years old. They are called native or native generations to technology, because since birth they have known technology. With its

capabilities in the world of technology and existing facilities, this generation has many opportunities to be far ahead compared to previous generations. But some research shows that they tend to focus more on a lifestyle of freedom and hedonism, like things that are instant and do not appreciate the process.

In the midst of this phenomenon, not a few also success achieved by those who are able to take advantage of the development of this technology. Millennials can be very creative in utilizing technology. Even a lot of money can come into its own if they are able to adapt quickly. Look at the profession of being a YouTuber. They can earn a lot of money by uploading videos with a certain number of viewers. Names like Atta Halilintar, Ria Ricis and many others are examples of this generation's boundless creativity. On the contrary, those who do not fight in this competition will be crucified by the times.

Currently, millennials must be observant in choosing a job. As a result of the development of technology old jobs become lost and also emerged new professions that were previously unthinkable. Rhenald Kasali mentions some of these professions for example: baristas, bloggers, web developers, apps creator/developer, smart chief listener, smart kettle-kettle manager, big data analyst, cyber troops, cyber psychologist-psychologist, cyber patrol, forensic cyber crime specialist, smart animator, game developer, smart control room operator, medical sonographer, prosthodontist, crowdfunding crowd funding specialist, social entrepreneur, fashionista and ambassador, BIM developer, cloud computing services, cloud service specialist, dog whisperer, drone operator and so on. This profession was born because of the direct impact of technology as well as the impact of the behavior or lifestyle of technology users.

The new job of course requires skill and intelligence. In this era with all the sophistication of technology, the level of competition is also getting higher. The quality and performance of humans is also required to be higher. Millennials must be able to adapt quickly, learn and get better quickly and navigate agile and precisely to be able to solve every problem, have high creativity and a strong work ethic, because they have to compete with more qualified human resources on a global scale. If you are able to compete, success will be the answer. The ability to use technology becomes the ticket to success in career and future, as well as evidence of the success of the nation's children in welcoming progress.

The back and forth of this nation lies in the hands of millennials who have a tough mentality, intelligence, and skills in utilizing information technology. They number about 81 million. This means that almost 32% of the total population in Indonesia. Can they be the determinants of the nation's progress? This is the biggest challenge for millennials in Indonesia.

Educational Technology

Educational technology is now very much developed. With the rapid development of technology makes the learning process faster and more effective. We still remember to get a reading in the form of a book is very difficult, especially in remote places. They could only rely on their teachers as the sole source of matter. In contrast to now, the development of technology has brought many changes to the world of education. Call it technology that plays a very important role is internet service. Just type a word related to the information we want to search on the web search engine, then quickly we will get the information. Here are some definitions of educational technology:

Educational technology is a systematic way of designing, implementing, and evaluating the overall process of learning and learning in the form of specific learning objectives, based on research in learning theory and communication in humans and using a combination of human and non-human learning resources to make learning more effective. Thus, since the 1970s and 1970s, there has been a view that humans (in this case, teachers) are not the only source of learning.

According to Cutchall (1999), educational technology is the research and application of behavioral science and learning theory by using system approaches to perform analysis, design, development, implementation, evaluation and management of the use of technology to help solve learning and performance problems. The main goal is the utilization of technology to help solve learning problems and human performance.

Educational technology is a field in facilitating human learning through the identification, development, systematic organization and utilization of all learning resources and through the management of all of them. Formal objects according to this understanding are how to facilitate learning.

Technology Education is a complex integrated process encompassing people, procedures, ideas, means and organizations for analyzing problems and designing, implementing, assessing and managing problem solving in all aspects of human learning. The formal object of educational technology is solving the problem of human learning. It is done by analyzing the problem first, then implementing, assessing and managing the problem solving. Educational technology is the study and practice of ethics in an effort to facilitate learning and improve performance by creating, using or utilizing, and managing appropriate technological processes and resources. Obviously, the main goal remains to facilitate learning (to be effective, efficient and engaging) and improve performance.

Based on the above definitions it can be concluded that:

1. Educational technology is a discipline (field of study)
2. The term learning technology is used interchangeably with the term educational technology.
3. The main purpose of learning technology is o to solve learning problems or facilitate learning; and o to improve performance;
4. In realizing it using a sistemi approach (a holistic / comprehensive approach, not a partial approach);
5. Educational technology areas can include activities related to analysis, design, development, utilization, management, implementation and evaluation of both processes and learning resources.
6. Learning technology is not only engaged in school but also in all human activities (such as companies, families, community organizations, etc.) as far as efforts to solve learning problems and to improve performance.

Educational Technology during the COVID-19 Pandemic

Education is the most important element in educating children bang-sa, as expressed and implied in the opening of the Constitution of the Republic of Indonesia year 1945 (NKRI Constitution 1945) in the 4th alinia, then described in article 31 paragraph (1) reads "Every citizen is entitled to education" and paragraph (3) reads "The government strives and implements national educators, which increases piety and piety and noble morals in order to educate the life of the nation regulated by law". The law that regulates is Law No. 20. In 2003 about the National Education System (SISDIKNAS) in the tenth paragraph (31) specifically

explained the description of Distance Education (PJJ). This verse explains that PJJ is held on various pathways, levels of the type of education using various forms, modes, supported by learning facilities and services and assessment systems guaranteeing the quality of graduates in accordance with national standards of education educators.

So, this is a milestone for the development of PJJ in Indonesia, after a long journey in the end the PJJ system is recognized as the main educational alternative in the national education system, with the nature and special education of PJJ is considered to have the same potential as the existing education system. PJJ was first implemented at the Open University (UT), based on this that to implement PJJ online in the time of the COVID-19 pandemic there is no problem because there is already a legal umbrella.

Talking about the educational process of educators can not be denied by the existence of educational technology and information systems because sociologically basically humans in achieving their life goals always communicate, interact, and adapt to others as well as the natural environment, either directly, or indirectly. Especially in education during the COVID-19 pandemic there is communication and interaction indirectly, namely through the internet. Education is a business that is carried out deliberately, regularly and planned with the intention of changing human behavior in the direction desired. If during the education process there is no change theof learners, then the failure of education, so that the learning strategy is required with educational technology.

The application of educational technology in the learning process is intended to learn more effectively, efficiently, meaningfully for the lives of people learning. Therefore, there are products that are deliberately made, and there is the discovery and use of it, through the development of communication and information technology is very massive lately, has offered a number of possibilities that were initially unimaginable can reverse way many people think by taking advantage of the benefits. These include overcoming the problem learning or online lectures in the COVID-19 pandemic. In this case it is necessary intelligence for educators and learners to set learning strategies considering conventional or face-to-face conventional learning cannot be implemented.

Agree or disagree, whether or not we have to deal with Technology, especially information technology, is because it has affected our daily lives. We should not "stutter technology"

many research results show that "whoever is late master information, then late also has the opportunity to advance" as said by Green (2020): "People who master or termed as *nouvau information riche* It will further increase their knowledge and skills towards information technology, while people who are left behind by information as *information poor* are increasingly marginalized because of their lack of visibility, so that they do not receive their basic needs services such as education, health and economy, which leads to difficulty improving living standards."

Information is already a commodity like as another economic item so the role of information becomes bigger and more real in the modern world. This is understandable because society is now heading to the information society (science society). The social structure of information society is formed with the character of a creative and multifunctional networked society. This value is embraced by the community in this era related to creativity and knowledge maximizes the utilization information technology, therefore it does not become something special that many universities offer or open a department of information systems / information technology such as at the University of Dirgantara Marshal Suryadarma (UNSURYA), Jakarta.

Literature Review

Educational technology is the study and ethics of practice to facilitate learning, improve performance creating, using, managing the management technological processes according to resources. Educational technology is also a systematic way of evaluating the overall process of learning with specific learning objectives, based on research in learning theory and communication in humans, using a combination and learning resources from humans as well as non-humans to make learning more effective. Educational Technology is seen as a visual learning medium in form of films, images, and media displays that feature subject.

Educational Technology is a complex process that is integrated including people, procedures, ideas, tools and organizations to analyze problems and design, implement, assess, manage problem solving in all aspects of human learning. "Educational technology is an applied discipline, meaning it develops based on the needs in the field namely learning needs" (Prawiradilaga & Siregar, 2004). The utilization of education is planned and implemented properly will help produce resilient as expected.

Information systems are a combination of information and communication technology with the activities of people who use these technologies to support operations and management. "Information and Communication that is educational in nature is to increase knowledge and work skills, increase awareness and insight, besides that information and communication are also a means of social contact to increase social intimacy, which can foster a process of cooperation and sensitivity between cultural values and social ethics" (Prawiradilaga & Siregar, 2004). Therefore, information systems cannot be denied to create an information society or modern society with knowledge creativity so that they can carry out the use of information technology.

Daniel Bell (McQuail, 2000) was the first expert to introduce the term information society because it relates to the emergence of many information-based economic sectors at the end of the industrial society. Based on Daniel Bell's terminology, McQuail describes the information society as: "Those that have become dependent upon complex electronic information networks and which allocate a major portion of their resources to information and communication activities" (Tahir, 2013).

Online Lectures are lectures conducted online and supported by information and communication technology, in this case the internet. Online lectures or non-face-to-face lectures, students are not required to come to campus regularly. Online lectures are also one of the means of interactive learning. Lecturers and students can communicate using the internet. Lecturers can provide lecture material, either in the form of files, videos, or writing (text).

With online lectures, a lecturer can also teach in several places at the same time. Students can get lecture material in the form of files or readings from the lecturer concerned. Online Lectures contain Open Content, namely learning materials that can be used together. Online Lectures can also be Mobile Learning (Mobile Learning). Students can attend lectures anywhere and anytime, as long as they have an Internet connection. Some lecture materials after being downloaded can be accessed even if there is no internet connection. In the online system, students still have a "face-to-face" schedule with the lecturer. In addition, discussion classes in chat rooms are also regularly held. In online lectures, several systems can be applied, including:

E-Learning: E-learning is one of them. Lecture facilities that provide features or display icons that can be used to access materials, tasks and projects from the lecturer concerned. E-learning can be defined as learning facilities and support by utilizing Information and Communication Technology (ICT). E-learning is also a type of teaching and learning that allows the appearance of teaching materials to students using internet media, intranets, or other computer network media. E-learning refers the use of internet technology to deliver a series of solutions that can improve knowledge and skills. Therefore, it can be concluded that

E-learning is a learning system online media with the use of technology and communication used to convey materials or teaching materials from lecturers in improving knowledge and skills the student. "E-learning is composed of two parts, namely 'e' which stands for 'electronica' and 'learning' which means 'learning'. So, e-learning means learning by using help of electronic devices. So, in its implementation, e-learning uses the services of audio, video or Computer devices or a combination of the three" (Basri & Amelia, 2018). The use of E-learning cannot be separated from the use of the internet, the use of E-learning in the process of lectures where lecturers and students must use and utilize E-learning as a means to share information related to the of lecture materials, assignments, quizzes and discussion forums. One of the goals of the application of E-learning in lectures to increase student so that learning achievement will be better results.

SPADA (In-Network Learning System): SPADA (Online Learning System) is implementation of distance education implementation at universities that aims to access to quality learning. With the online learning system, SPADA Indonesia provides opportunities for students from one particular college to be able to follow a certain quality course from another college and the learning outcomes can be recognized equally by the college where the student enrolled. "Two-way communication in the SPADA lecture program between lecturers and students will be better because of the increasing number of communication media options available. Communication media allows instructors or lecturers to provide lectures directly via video conference or recording. Then, in the next process, students can play back the video or footage repeatedly as learning material if there is material that is difficult for students to understand" (Efendi & Wahidy, 2019).

Blended Learning: Blended learning is advantages of learning that is done face-to-face and virtually. Blended learning is a facility of defenders that combines various ways of delivery,

teaching models, and learning styles, introducing a variety of media options of dialogue between facilitators and people who get taught. Blended learning is also a combination of face-to-face teaching and online teaching but more so than that as an element of social interaction. In the Blended Learning model, you can interact directly in the form of direct discussions in the pros and learning of teaching and learning. "The existence of pro-gram lectures with Blended Learning, the lecture schedule will be flexible so that students can balance academic and non-academic activities" (Efendi & Wahidy, 2019).

Nation of Constructivism: The Nation of Constructivism is the the new theory of learning with shifts that occur, because of the advancement of information and communication technology is things that are very in line and strengthen each other. Constructivism and computer technology separately together have been Offer new opportunities in the teaching and learning process both in the classroom, distance learning, and self-study. Information can solve the problem and draw relevant conclusions the computer in this case will play a role in providing services through the process collectingand compiling information, inquiry and collaboration. "The ideas and principles of learning that exist in the Nation of Constructivismivism have such explicit about the need for a technology-supported learning environment" (Prawiradilaga & Siregar, 2004)

The presence of the COVID-19 outbreak has an impact on various sectors (Akerson & Carter, 2021; Jackowicz & Sahin, 2021; Paudyal & Rana, 2021; Sahin & Shelley, 2020). This study focuses on the education sector. According to the World Health Organization (WHO) began with a crowd of news about the COVID-19 virus, a novel coronavirus called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), in December 2019 in the city of Wuhan, China, more precisely has a connection with the wholesale market in Wuhan COVID-19 patients who experience symptoms such as acute respiratory disorders such as fever, cough, even shortness of breath, initially come from traders, market employees or regular visitors. "Novel coronavirus or new virus from the corona family can be spread in just a matter of minutes through droplets or even by touching the surface of an object that has previously been in contact with someone who has problems with the problem" (Toquero, 2020).

The withdrawal of ling-kungan samples showed the results that the market in Wuhan City had a role in the initial amplification of this novel coronavirus. Then the market closure occurred

on January 1, 2020 and WHO set world public health emergency on January 30, 2020. The spread of SARS-CoV-2 is widespread around the world, including in Indonesia which announced two cases of COVID-19 positive patients on March 2, 2020. Since then, there has been a rise in positive patients and even the death rate caused by the novel coronavirus which President Joko Widodo to issue a large-scale social restriction (PSBB) policy to prevent and reduce the spread of COVID-19 by the end of March 2020.

The enactment of the United Nations caused restrictions on the activity's community outside the environment where they live. The term online lectures are widely used by the educational community, supported by the use of digital and internet tools that are signs of methods of work. The world of education is also required to adjust to situation and conditions caused by the COVID-19 pandemic.

Although the younger generation is currently adept at using technology, especially digital but the division of technology is not only limited to access or use of technology, but about the ability to integrate technology digital technology in meaningful social practice so as to benefit from its social practices. Therefore, it is important that young people adopt a critical and proactive attitude towards digital technology, i.e. they must critically consider how it can and should, not just accept the current state of being (Iivari et al., 2020). Educational facilities and educators also need insights and practices in the use of digital technology. As with the PSBB restricts and even prohibits the existence of Teaching and Learning Activities (KBM) directly. All activities are diverted at home using digital technology and the internet.

Thomas L. Friedman predicts that in the future students simply sit in front of a computer connected to the internet anywhere, can already do lecture process even though it does not state the specifics of COVID-19, only a very famous comment from him, namely the statement that "The World Is Flat." This shows that the longer a country's borders with other countries disappear. Including education can be felt by everyone through the process of teaching with the internet, one of which is online lectures, thus encouraging lecturers and students to be more creative and effective and build a wide network with various people both in the field and between fields of in various parts of the world (Kusnayati et al., 2020).

Advances in information and communication technology in such a rapid way raise greater opportunities for lectures to explore various information data so that they can build

knowledge with the help of internet media and create a learning environment that can provide variety of options that are able to stimulate lectures or learning to optimize cognitive, affective, and psychomotor potential, will indirectly affect the tasks of educators and learners, in KBM. Based on the description above, the problem of online lectures in the COVID-19 pandemic requires a good learning strategy, in this case the use of educational technology as the implementation of information system is needed both by educators and learners in KBM online, therefore the problem in this study is "How to Technology" Education Information Systems can be carried out in online lectures in the time of COVID-19 pandemic?" The purpose of this chapter is to study and show the importance of educational technology and information systems for educators and learners in conducting online lectures during the COVID-19 pandemic.

Analysis and Problem Solving

This research uses descriptive content analysis study. This method uses content analysis intended to describe the content of particular information or text (Munirah, 2005) analysis is carried out various scientific articles related to online lectures during the COVID-19 pandemic, both from books, scientific articles obtained through journals and from other sources related to the problem. Then the paper is arranged systematically and based on scientific rules, the presentation of writing is in the form of a description or description.

Results

Speaking of Pen-technology

Education as the implementation of information systems (information and communication technology) in online lectures during the COVID-19 pandemic cannot be denied because of third wave of human civilization by Alvin. Toffler is referred to as information society because this civilization was then the beginning of the emergence of a society that most of its members made information as one of the main needs in his life, through electronic media in other words the internet. There is a belief that the internet provides vast opportunities and the creation of what Kenichi Ohmae refers to as "The Borderless World." According to Ohmae (in Budiyanto, 1991) the geographical and political boundaries of the nation state are irrelevant and no longer needed.

Technology is changing the system of information such as internet, making messages disseminated instantly and quickly, the dynamic nature of the internet, making internet-based online media deliver messages quickly. In addition, the channels are available many, so the number of sources of information is many and diverse. This is what makes the source of information available to anyone looking for it to change the response to the media (Kharisma Nasionalita, 161, 2014). This media will be able to be carried out properly according to its function, if there is adequate infrastructure let alone connected with the geography of Indonesia. The government has tried hard to provide information and communication services for all regions in Indonesia which include Western Indonesia Time (WIB), Central Indonesia Time (WITA), and Eastern Indonesia Time (WIT) through the Palapa Ring.

In terms of leadership that initiated the process for the construction of the Palapa Ring, the palapa ring development planning contained in Presidential Regulation No. 96 of 2014 was initiated by President Susilo Bambang Yudhoyono. Then the initiation was continued by the next leader, namely during the reign of President Joko Widodo. During this reign a good scheme was established in which there was a risk sharing between the government and the private sector. The Minister of Communication and Information was appointed as the Person in Charge of the Cooperation Project (PJPK) (Oniwati & Juwono, 2019). With the mission of "Merdeka Sinyal" to unite Indonesia through the internet, on October 14, 2019, Indonesian President Joko Widodo inaugurated the operation of Palapa Ring Project. Fiber optic backbone network project along the 12,128 kilometers were built by the government through the Telecommunications and Information Accessibility Agency (BAKTI) of the Ministry of Communication and Information.

Indonesia still has a lack of connectivity including 149,400 public service points consisting of educational facilities, local governments and even health facilities. The regions experiencing this are known as 3T (Lagging, Leading and Outermost) (Siswadi, 2020). This fact invites public demands against the government to answer and address problem of limited communication their territory. Satellite training is one of the answers and the solution provided by the government in dealing with 3T areas. The operation of the Palapa Ring satellite is expected to answer Indonesia's geographical challenges to provide a comprehensive terrestrial network. With the extent of Indonesia, the Palapa Ring will cover areas divided into three categories of categories, West (Riau Province, Riau Islands, Jambi Province and West Kalimantan Province), Central (North Sulawesi Province, Central

Sulawesi Province, Southeast Sulawesi Province, North Maluku Province and East Kalimantan Province), and East (East Nusa Tenggara Province, Maluku Province, Papua Province, and West Papua Province) (Student, 2020).

Now in the third civilization, where technology has an important role in aspects of human life, especially the need to access and distribute information and communicate, insights and supporting tools are needed to fulfill it. Indonesian society is currently often included in the category of digital society (digital society), namely people who in carrying out their activities are fixated on digital technology. Especially with the COVID-19 pandemic that hit the world, forcing everyone to access digital technology, move physical documents into digital files, communicate face-to-face into online conferences or online meetings and even physically shop for goods and food, switch to using online applications, where things -it can be implemented with the support of the internet.

Dynamic development demands efficiency and effectiveness on everyone. The presence of technology and the internet that supports it should be used optimally, especially for the development of each individual and the surrounding environment. Supporting tools oblige people to be creative and innovative. The reach of the internet which can cover every corner of the geographical area in Indonesia, accompanied by information dissemination about technology and the internet will make it easier for Indonesian people to access information and communicate through various digital technology media, making individuals interactive with one another. As long as digital transformation proceeds dynamically, various applications or media emerge. In the field of education, driven by the COVID-19 pandemic situation in Indonesia, online applications and tools have emerged to support digital and virtual teaching and learning activities using various teaching methods with innovative content such as teaching using images, audio, animation, video, and electronic book (e-book) or electronic book.

The internet, which allows humans to operate in cyberspace without limits, presents various advantages in the world of education. Digital learning has both beneficial and detrimental impacts in several aspects. Beneficial because it can contribute to minimizing individuals who do not continue their education, improve the performance of education personnel in hard-to-reach areas while at the same time reducing educational disparities between students in remote and remote areas and students located in urban areas, as well as with technology

and internet that support, virtual education can be done anywhere and anytime. While the detrimental impact is seen from how students are often distracted when virtual teaching and learning runs, teaching preparation can last longer by preparing material that previously used physical books to be converted to digital then making links (links) for meetings, attendance and assignments virtually, there is an opportunity for this to happen violation of Intellectual Property Rights (HAKI) for the work of educators and misuse of technology.

Virtual education through online media by utilizing the internet network that can access teaching applications such as Google Classroom, Google Meet, Zoom, WhatsApp groups, as well as Youtube, which provide live chat facilities between educators and students, provide flexibility in the time and location of teaching. However, the innovation and variety of applications and media offered does not guarantee that the teaching process will run smoothly or even better than direct KBM. This depends on the situation and conditions as well as the learning strategies made by the educator. The success of the teaching and learning process cannot be separated from how individual students accept the content and methods presented by the educator. According to Nakayama (in Dewi, 2020) even though it is easy to access electronic literature in e-learning, the learning environment and individual characteristics of students indicate that not all will succeed in carrying out and receiving online learning.

A few obstacles are also experienced by educators as well as educational institutions. Distance learning, which requires educators to be familiar with technological equipment and digital features in order for the teaching and learning process to take place, is considered quite tiring, especially for those educators who are less able to understand and operate digital technology, thus requiring assistants or assistance in preparing and implementing virtual learning. Preparation of digital teaching and learning materials is also an issue in itself, which takes a long time compared to normal teaching and learning materials.

Giving assignments or quizzes digitally at each KBM meeting session becomes a challenge for educators because in practice, assignments and quizzes. Digital technology restricts educators from writing specific and comprehensive textual instructions for students working at home. Also, in preparing learning links, where some applications involve mastery of coding (Google Forms) which is somewhat complicated.

In distance learning, educators must be able to predict what challenges will be faced by students and what are the right solutions to overcome them. Therefore, virtual conferences or meetings are held between educators and institutions to answer existing problems regarding virtual learning using zoom and youtube. Migration from the traditional education system, namely through face-to-face to a more modern education system with the use of digital technology and online is required to occur for educators as well as educational institutions (Bao, 2020).

In Indonesia, both educators from private institutions and state institutions, both experience challenges in implementing online learning, especially since the start of the online learning system is relatively short and lacks proper counseling. Educators need adjustments in new routines, negotiating about teaching and learning time with students or even parents of students, making weekly lesson plans for each student, as well as assessing and evaluating the work of each student. One of the challenges is the lack of tangible and physical resources in the homes of students, which are usually prepared by institutions at their respective schools or campuses.

This makes educators and institutions to come up with solutions that can overcome these problems. As in practice classes, the institution will invite students back to school or campus with a limited number to prevent the spread of the COVID-19 pandemic and make shifts for each student who will hold practical classes with a warning that each individual in the room follows the policies and procedures, sterilization rules for the prevention of COVID-19 (washing hands with soap or sanitizer, wearing masks and face shields, maintaining distance). "Learning through digital technology virtually with the use of internet or online networks has hit the world of education like a tsunami" (Goldschmidt & Msn, 2020).

The worrying weakness with online learning is that when educators or parties from institutions are unable to communicate or contact students during quarantine as a method of implementing PSBB and mentally, students often find online learning easy so they choose to be indifferent in following the KBM process (not bringing materials, wearing untidy or polite clothes, eating during the KBM, less interactive in the question-and-answer session). Educators are worried that if there is no intervention to motivate educators and institutions, it will be more difficult for both parties to overcome these problems if in the future educational facilities are opened normally and return students to their normal routines.

Distance learning by utilizing digital technology and the internet can provide benefits for students, especially for those who enjoy learning independently without noise and interference from the outside environment with learning carried out in their respective homes. Such students will be more active and productive compared to their situation in the classroom which sometimes does not guarantee the order and silence they want. So that they will contribute optimally, even enthusiastically with the tasks given by educators. Flexibility in choosing a time and location is certainly felt in virtual learning by utilizing varied methods and content in the implementation of teaching and learning activities that can help educators and students connect with each other. In various obstacles and difficulties during the online education process, an evaluation from educators is needed to complete and fill educational aspects such as the process of knowledge, morals, skills, intelligence and aesthetics (Dai & Lin, 2020).

Online lectures are a solution needed by educators and students during the COVID-19 pandemic with existing applications where each educator has a strategy in the online lecture process, so that it doesn't get boring quickly as in the use of the Zoom application in collaboration with audio and visual support lecture material. If the lecture runs for 150 minutes, equivalent to three semester credit units, it is the teacher's job to divide the time into 50 minutes of delivering material using digital presentations. Along with the video showing, then followed by 50 minutes of giving interactive space (question and answer and discussion) between educators and students, as well as among students, then the last 50 minutes for giving assignments in the form of digital quizzes using the Google Form application, which support to spread links containing questions about the material presented by educators in the lecture session.

Quizzes and interactive discussions are intended as motivation for students to be more appreciative of time and be able to think creatively and innovatively in utilizing the right technology for the advancement of science. Educators need to know that the material that will be delivered online must be in accordance with face-to-face material, besides that online lecture learning media must be able to facilitate students to actively build knowledge through interactive discussion forums. In the end, the evaluation of the implementation of online lectures can be measured by the assessment that is available on the online media.

Along with the development of this learning technology, internet-based PJJ is basically favored by generation Z. This generation is also often referred to as the internet generation, consisting of children born in 1995-2009; this generation was born in an era of increasingly sophisticated technology so that their learning styles are different. Generation Z's learning styles are audio-visual, dependent on technology, easy to understand examples that are more accurate, concrete and useful. So that the purpose of online lecture learning can be conveyed properly, then one of the innovations used is to use online media wisely, in accordance with learning objectives. Thus, educators act as motivators, facilitators and supervisors according to the level of education.

Conclusion

Information in this case is information and communication technology, cannot be separated in online lectures during the COVID-19 pandemic because the spread of SARS-CoV-2 has spread widely throughout the world, including in Indonesia which announced two cases of positive COVID-19 patients in March 2, 2020. Since then, there has been an increase in positive patients and even deaths caused by the novel coronavirus which prompted President Joko Widodo to issue a large-scale social restriction (PSBB) policy to prevent and reduce the spread of COVID-19 at the end of March 2020.

The enactment of the PBB causes restrictions on people's activities outside the environment where they live. The term Working from Home (WFH) is widely used by the community, supported by the use of digital tools and the internet which are signs of a shift in working methods. The world of education is also required to adapt to the situation and conditions caused by the COVID-19 pandemic.

Virtual education through online media that utilizes internet networks can be done by accessing teaching applications such as Google Classroom, Google Meet, Zoom, Whatsapp groups, and Youtube which provide live chat facilities between educators and students providing flexibility in teaching time and location. However, the innovation and variety of applications and media offered does not guarantee that the teaching process will run smoothly or even better than direct KBM. This depends on the situation and conditions as well as the learning strategies made by the educator.

As in practice classes, the institution will invite students back to school or campus with a limited number to prevent the spread of the COVID-19 pandemic. The schools will make shifts for each student who will hold practical classes with a warning that each individual in the room follows the policies and procedures, sterilization rules for the prevention of COVID-19 (washing hands with soap or sanitizer, wearing masks and face shields, and maintaining distance). Hence, good cooperation is needed between institutions, educators, and students, as well as their parents.

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Education, science, and technology disciplines at all levels have never been more important, more exciting, or more crucial for its broader impacts on human society. The need for advanced technical skills is increasingly pressing to address climate change, combat COVID and other diseases, enhance the infrastructural built environment, grow food sources to feed an expanding planetary population, make new scientific discoveries, and interface synergistically with the arts, humanities, and social sciences. Teachers/instructors/mentors/professors need to be proficient in the best ways to convey knowledge and motivate the next generations of productive and engaged citizens of an increasingly diverse planet on which its human inhabitants must learn to confront and surmount increasingly difficult challenges to survival and prosperity. Students need to be focused on honing their learning skills and adapting to an ever-evolving global economy demanding always higher levels of technical proficiency. Students also need to be free to pursue any and all areas of interest without interference from cultural, political, ideological, or faith-imposed limitations. Policymakers need to provide the financial and human resources to fuel the engine of education, and they must create the maximum possible latitude for both those who teach and those who learn to pursue science, technology, engineering, and mathematics to their limits. This book contributes to addressing these needs and to suggesting potential solutions from multiple global perspectives. Adaptability of instructional methods, relevance of instructional content to students' lived experiences, and sensitivity to the mental and physical demands imposed on students must be hallmarks of education. The book is divided into three sections related to studies on education, science, and technology. Each section includes three chapters. The chapter's contributors are from the following countries: the United States, Germany, Greece, Indonesia, the United Kingdom, Russia, and Malaysia. This diversity brings an international perspective to the book.

