



# The Role of Information Technology in Advancing Education in the 21st Century

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## A B S T R A C T

The purpose of writing this article is to describe the role of information technology in education. Through education, especially for facilitators in the form of teachers, of course, they are given more burdens and obligations to carry out teaching and learning activities along with following increasingly rapid technological developments so that they are not left far behind. Especially at this time, the prospective young generation in the form of students is no strangers to using and accessing technological facilities that are very developed at this time. This type of research is a literature review. The literature review is a method used to describe a finding or theory as further research material that is obtained and used as a reference or basis for an activity in the preparation of a framework of thinking and also taken from the formulation of relevant problems. This method is quite systematic and explicit because it is carried out by identifying, evaluating, and synthesizing a work of research results and ideas that have been previously carried out by researchers and practitioners. In line with advances in information technology, many activities can be carried out using information technology networks. Information technology can be used as a good source of learning because information technology can access various learning resources in the form of writing, images, videos, sounds, and software, all of which can be downloaded and stored so that distance learning is also possible.

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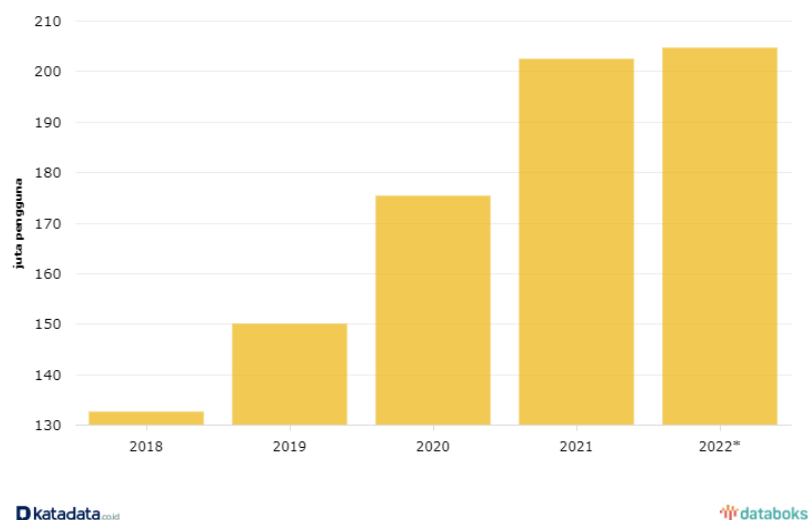
## 1. Introduction

Currently, Indonesia is in the phase of facing the industrial revolution 4.0 where this industrial revolution is followed by the rapid development of globalization as well as digitalization which is increasingly spreading to occupy the most important position in today's life. The rapid development of globalization is certainly a big challenge for all communities, especially those in Indonesia because to deal with the globalization phase, of course, competent and quality human resources are needed, which of course is not only in terms of cognitive aspects. To form and increase the quality of human resources, a container in the form of education is needed. Through the education of human resources, who are the future generation of the nation, facilitators, namely teachers, are assigned and educated to be able to face the future, especially in the era of globalization and facing digitalization which is growing all the time.

Education is also required to keep abreast of technological developments because the era of globalization of digitalization cannot be separated from the development of technology as the main actor. Through education, especially for facilitators in the form of teachers, of course, they are given more burdens and obligations to carry out teaching and learning activities along with following

increasingly rapid technological developments so that they are not left far behind. Especially at this time, the prospective young generation in the form of students is no strangers to using and accessing technological facilities that are very developed at this time.

Of course, the younger generation is more fluent and understands technological developments (Komariah et al., 2020) both social media and entertainment media are accessed through technological developments, especially the internet. Especially in this day and age where information technology in the form of smartphones has become a basic need for everyone, even the younger generation themselves because it is also a medium for communicating. Because of these advances, it would certainly be better if information technology was able to contribute more to the world of education and contribute to advancing the world of education in Indonesia so that the younger generation remains technology literate, especially for a more positive direction and open new insights for students because as we know In essence, knowing in the curriculum compiled by the government still tends to be conventional in which one of the teaching materials is only from books (Sari & Rachmawati, 2017) so that here teachers need to innovate learning activities by taking part in contributing to technological developments in learning activities teach.



**Figure 1.** Number of internet users in Indonesia

Indonesia is one of the countries with the largest population of information technology users in the world. According to the, We Are Social report, there are 204.7 million information technology users in the country as of January 2022. That number is a slight increase of 1.03% compared to the previous year. In January 2021, the number of information technology users in Indonesia was recorded at 202.6 million. The trend of number of information technology users in Indonesia has continued to increase in the last five years. When compared to 2018, currently the number of national information technology users has jumped by 54.25%. (Katadata, 2020). Meanwhile, the penetration rate of information technology in Indonesia reached 73.7% of the total population at the beginning of 2022.

It was recorded that the total population of Indonesia was 277.7 million people in January 2022. From the data above, it can be seen that technology is not new in the eyes of the younger generation so that to instill and bringing the world of technology to the younger generation is not a difficult and taboo thing because essentially in this current era technology has become a basic need for the younger generation and the older generation. But the important point is how education can contribute to teaching and learning activities, especially in the world of education, and not only as a means of entertainment and just for fun. Because it is undeniable that there are still many people who are controlled by technology even though technology should be controlled by humans and most

importantly for things that are positive and affect the future to be able to create quality human resources.

Quality education will be able to integrate and collaborate learning activities with the development of information technology so that students are not left behind with the development of information technology. Of course, the responsibilities and demands of teachers are getting heavier because the teacher must first master a little more about the development of information technology before combining it with teaching and learning activities so that teaching and learning activities remain effective even though they use technology in it (Sintawati & Indriani, 2019).

Because there are a lot of negative stigmas associated with the integration between technology and learning because it considers technology to be able to replace the position of teaching materials and facilitators in learning activities when in fact it is how to use information technology as additional teaching materials so that the materials and knowledge obtained are not only fixed by one source. The development of this information technology can be used as a new teaching resource and also as a medium for delivering material by the teacher if the teacher can run it properly (Iqbaluddin, 2020). This is because by accessing information technology and good and right many things can be accessed on the internet, especially to open new horizons for students so that they can change their point of view as well as to increase interest in learning so they don't tend to get bored by looking at books. only (Wahid & Marizakertaningtyas, 2018).

## 2. Research Methods

This type of research is a literature review. The literature review is a method used to describe a finding or theory as further research material that is obtained and used as reference material or the basis for an activity of preparing a framework of thinking and also raised from the formulation of relevant problems (Cahyono et al., 2019). This method is quite systematic and explicit because it is carried out by identifying, evaluating, and synthesizing a work of research results and ideas that have been previously carried out by researchers and practitioners. The writing method used in writing this article is a qualitative research method. According to the type of data and the approach used, this research produces data in the form of narratives or descriptions in the form of words. Descriptive studies are then analyzed which aims to collect various information about a phenomenon or symptom that occurs, namely the situation as it is based on the author's observations. The source of data used in this study is secondary data which is data collected and obtained directly from reliable sources without any processing in it either statistically or non-statistically. Then the object discussed in this study is the general condition of education and also the role of educational technology in contributing to education, especially in Indonesia, which is facilitated by teachers. So that the object of research can be used as well as the main problems that will be discussed in this article. Qualitative research methods can describe various phenomena on subjects and objects that are the subject of in-depth discussion (Darmalaksana, 2020). The data analysis method used is the findings of previous research in the form of theories that are used as quotations to support the ideas of each author. This qualitative analysis method is not intended to test a hypothesis but provides an overview based on three stages

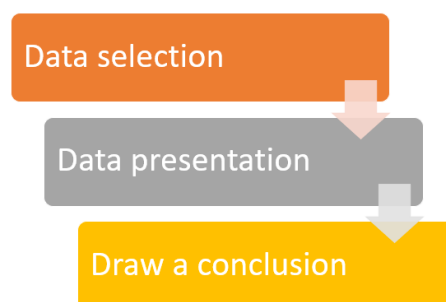


Figure 2. Research stages

## 2.1. Data Selection

This stage is the process of selecting and transforming the data generated by the author into a narrative form for analysis. At this early stage, the data are selected and sorted to be used as reference sources and relevant references so that they are worthy of being quoted for transformation and good interpretation. The data required here is secondary data which is taken directly from trusted and accredited sources. The data were selected by the authors to complement the arguments presented at each important point of the structure of the scientific article.

## 2.2. Data Presentation

Then after being collected, the researcher will group each collected data into several categories based on the theoretical basis or literature review presented, namely in this study the author describes every important point that has been read into several sub-chapters. so it is easy to conclude. The data after being collected will be grouped for a further explanation based on real ideas from the author. The idea is an explanation of any data that has been collected, of course following the title and the problems raised. The explanations discussed must use language and rules following enhanced spelling and use scientific language that is easy to understand.

## 2.3. Draw Conclusions

At this stage, the author makes a comparison between the sub-chapters with previous studies so that they can draw conclusions and find out whether there are differences in the author's analysis with other authors. The conclusions obtained are an overview of the results of the literature review as a whole and the interpretation of the data that has been collected of course the conclusions represent the entire text content of the articles that have been prepared following the rules and mechanisms of writing scientific papers.

## 3. Results and Discussion

Interconnection Network or commonly called information technology is a network component that is very wide and is connected internationally. This means that every computer in the world has the right to be connected to information technology networks. Most people use information technology to access information and data and communicate with colleagues. According to (Maxmanroe.com, 2019) Information technology is a communication network that is globally connected to computers in parts of the world even though they have different operating systems and machines. In line with that, (Lantoro, 2018) states that information technology is a global network consisting of interconnected networks. This global network consists of millions of networks of every company, agency, government, organization, and individual. Then according to Laudon and Laudon (2010: 51), information technology is a global network that uses a common level to connect millions of different networks. Based on the above definition, it can be concluded that information technology is a network that is formed globally and connects all computers in the context of business, education, government, and personal needs.

In line with advances in information technology, many activities can be carried out using information technology networks. Information technology can be used as a good source of learning because information technology can access various learning resources in the form of writing, images, videos, sounds, and software, all of which can be downloaded and stored so that distance learning is also possible. Moreover, Indonesia is currently facing the COVID-19 pandemic, where learning before the new normal era is carried out online or online where learning is carried out regularly. Virtually between teachers and students are only facilitated by technology in the form of the internet and some online teaching materials. So here information technology has become a major player in the implementation of online learning (Al, 2021) while learning is still ongoing because the only place used during learning is to maximize the use of technology, of course, under the supervision of the

teacher. Some indicators of the use of information technology in the world of education, especially learning are as follows. According to Adri (in Setiyani, 2010: 120) 4 information technology activities can be used as learning resources, including browsing, resourcing, searching, and e-mailing. Four activities in the use of information technology can be described further as follows.

1. Browse

Browsing or surfing is a universal term used when you want to browse the virtual world or websites. The appearance of the website is very aesthetic and attractive because it shows the text, pictures, and even animation. Information technology users use a tool called a browser to run browsing. Many types of browser applications are available for free and are familiar, such as Google Chrome, Mozilla Firefox, UC Browser, and others. With some of these browser applications, several search engines can be accessed in which several keywords can be used to access what you are looking for. His contribution to the world of education is certainly very important because typing in one keyword will certainly bring out a lot of material needed from various sources, be it scientific articles, books, news bulletins, and other official websites which can of course be used as new teaching materials for teachers and students. Of course, it must be sorted from trusted sources because many blogs do not have reliable sources so it is not recommended to be used as reference reading material. For example, in learning physics, namely mechanical waves where students require additional references about transverse waves so that when they type transverse waves on Google, many references and pictures will come out which are certainly more interesting than teaching materials in the form of books.

2. Resourcing

Resourcing is an activity to make information technology a learning resource. This means that information technology functions as a data warehouse that is used to obtain data and information related to the teaching module informed. The data and information related to the web address to be visited as the source of the teaching module has been known in advance through the data provided. In this indicator where information technology is used as a place and source of learning apart from books for students so that it adds more insight and also increases enthusiasm for learning because many things are not obtained in books but are on the internet As shown above, it appears on the Google Scholar site where the site is a special site for accessing journals and books according to the keywords we want to search for. After that, various references come out that can be downloaded in PDF form and can be accessed at any time without using the internet network so that they can be used as new literacy materials related to the material we want. Not only in Indonesian Of course also international sources can be accessed by entering keywords according to the language we want.

3. Search

Searching is the process of looking for educational references to fulfill the module to be informed to students. In this case, all data related to the data source is not yet known, so that through a search engine, it can be one of the available means to find the desired data. Search engines contain databases of billions of global sites. Simply by entering the keyword, then the search will be tried and the search engine will show some web links accompanied by a short description. Many search engine apps are provided by certain sites in information technology, the famous ones include Google, Yahoo, Altavista, and so on.

4. Email (communicating)

E-mail is a very popular application since information technology was originally introduced because this tool can connect information communication between people or between industries, e-mail is popular because it provides an easy and fast method of sending data. Not

only that, but it can also handle small notes, to large files in the form of file attachments. E-mail in this context can be used as a medium of consultation and communication between educators and students because with the encouragement of this e-mail, the tutorial process and brainstorming can be done anywhere and anytime.

Riyanto (2012) states that the intensive use of information technology can encourage students to study harder and get more information and knowledge because from information technology that is used optimally, students can more easily understand the material and school assignments obtained. in the classroom so that it is possible to improve learning achievement. The utilization of information technology will help students to be able to optimize their abilities. Information technology students can search for and find various information as well as what is desired as a source of knowledge needed so that students can be motivated to study harder and then be able to improve learning achievement to the maximum.

#### 4. Conclusion

Technology is not a new thing in the eyes of the younger generation so to instill and bring the world of technology to the younger generation is not a difficult and taboo thing because essentially in this era technology has become a basic need for the younger generation and the older generation. But the important point is how education can contribute to teaching and learning activities, especially in the world of education, and not only as a means of entertainment and just for fun. Because it is undeniable that there are still many people who are controlled by technology even though technology should be controlled by humans and most importantly for things that are positive and affect the future to be able to create quality human resources. Quality education will be able to integrate and collaborate learning activities with the development of information technology so that students are not left behind with the development of information technology. In line with advances in information technology, many activities can be carried out using information technology networks. Information technology can be used as a good source of learning because information technology can access various learning resources in the form of writing, images, videos, sounds, and software, all of which can be downloaded and stored so that distance learning is also possible. Moreover, Indonesia is currently facing the COVID-19 pandemic, where learning before the new normal era is carried out online or online where learning is carried out regularly. Virtually between teachers and students are only facilitated by technology in the form of the internet and some online teaching materials. So here information technology has become a major player in the implementation of online learning while learning is still ongoing because the only place used during learning is to maximize the use of technology, of course, under the supervision of the teacher. The utilization of information technology will help students to be able to optimize their abilities. Information technology students can search for and find various information as well as what is desired as a source of knowledge needed so that students can be motivated to study harder and then be able to improve learning achievement to the maximum.

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