

Strengthening Youth Digital Literacy: Answering the Future Challenges of Job

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ABSTRACT

Strengthening digital literacy, especially among young people, is crucial, given the widespread use of digital devices in all aspects of life. In the workplace, the use of digital technology has revolutionized work and how people perform their tasks. Digital devices and robotics have replaced many traditional manual tasks. The 2020 World Economic Forum report revealed that the use of digital devices in various occupations has increased over the past decade. Digital devices and robotics have replaced many manual tasks. The use of digital devices in various work activities has been shown to increase resource efficiency. This study has shown that, to face a world dominated by digital devices, improving digital literacy is crucial, especially among young people, who are key actors in the future workforce. Therefore, it is recommended that learning activities at various levels of education focus more on strengthening digital literacy so that future generations are better prepared to face the challenges of the future job market.

Keyword: digital literacy; automation; future challenges of job

INTRODUCTION

World Economic Forum (WEF 2020) revealed that the growth of digital technology has made many routine jobs replaced by machine and robotic technology (World Economic Forum, 2020). This situation triggers high unemployment rates at the level of routine work, which are mostly filled by workers with secondary education backgrounds. This condition makes the employment sector in Indonesia face a very serious threat, because 87.24% of the workforce in Indonesia has a secondary school education background. Most of them work in the routine and manual work sector (BPS, 2026a). The WEF report (2020) revealed that at present and in the future, various sectors of routine and manual work are very vulnerable to automation. Thus, in this sector that the potential for unemployment on a large scale becomes a very serious threat (World Economic Forum, 2020).

The latest report released by BPS per January 2026 reveals the open unemployment rate for the 15 - 19 years old (those who have just graduated from high school), and 20-24 years old (those who have just graduated from higher education), each at 23.34% and 14.35% (BPS, 2026b). This data shown that employment problems are mostly in the young population group. The data released by BPS revealed the importance of strengthening competence and work skills, especially for the young population. Job seekers, especially the young age group; must understand the various new challenges that occur in the world of work in the future, so that they can equip themselves from an early age with various competencies and skills needed by the world of work in the future.

The use of digital technology in the world of work has changed jobs and the way people do their jobs. Various types of routine work activities that have been done manually have been replaced by robotic technology devices. The more work activities are carried out using digital technology devices. Digitization of work activities is unavoidable, because it is proven to be able to create work efficiency and effectiveness. This is what causes the loss of old work activities that were done manually to be replaced with the emergence of new work activities based on digital technology (Fernández-Macías, E. Hurley, 2017).

Various work activities are currently carried out mostly using digital devices. For this reason, all workers are required to have adequate skills by using digital technology devices. Therefore, the level of digital literacy of the young generation, which will fill the world of work in the future, is a very crucial issue and must be the concern of all parties.

Do prospective workers already have adequate digital skills, so they can answer the challenges of the job market in the digital era? This is the main challenge that must be answered by job seekers, and must be a major concern for the world of education, in order to prepare prospective graduates, who have the knowledge and skills specifications as demanded by the world of work.

This study aims to elaborate on how digital technology has transformed various human activities, particularly in the workplace. Furthermore, it also aims to explain how digital technology will transform the world of work in the future. Finally, the study will explain the urgency of mastering digital technology for young people.

METHOD

This study uses a literature review to address its objectives. Various previous studies are presented to explain how the presence of digital technology has transformed human activities, particularly work activities. Data reported by the World Economic Forum and the Future Jobs Report are used to explain the various changes in the world of work as a result of the presence of digital technology. Finally, this study explains the urgency of mastering digital technology for young people.

RESULT AND DISCUSSION

Digital technology as the driver of change

Currently, we use various digital devices for various activities. By optimizing cloud computing technology, we can collaborate and share data that can make a job done effectively and efficiently. Digital technology is like a smart machine, if we can use it optimally, it will increase work productivity. With digital technology, various artificial intelligence devices can be developed, such as robotic technology that will support certain job operations with a very high level of speed and accuracy so as to increase work productivity (Annunziata & Bourgeois, 2018). Digital technology tools can also be used to analyze data more carefully and in depth, so that it will broaden the horizons.

Marr (20 April 2020) in his review for Forbes Magazine revealed the presence of various digital technology-based devices and their various impacts, which will greatly determine human life in the future, as follows (Marr, 2020):

- a. Artificial intelligence, AI and machine learning tools. The increasing ability of a machine to be able to analyze a data that we have prepared and act intelligently has changed human life. Artificial intelligence that is currently used by many people is a data search engine. Through a data search engine, we can search for any data we need. With this data search engine, everyone has equal access to the latest information and knowledge. With a data search engine, we can also access various kinds of products that we want to buy through an online shopping application. The existence of this artificial intelligence device has put people in an equal position, as long as they are willing to be active in searching for data and information. Artificial intelligence tools can even understand and perform analysis through data from a pre-prepared algorithm. From the data on the sale and purchase of goods, for example; Artificial intelligence tools can remember consumer consumption behavior patterns and make analysis of what their preferences are. This is an example of the impact of artificial intelligence devices that make it easier for everyone to access

information (Acemoglu & Restrepo, 2018). Electronic payment systems, social media, chatbots that are able to provide information automatically to customers, and google maps and ride-hailing applications are popular examples of artificial intelligence tools that are widely used by the public in this era.

- b. Use of the internet for all life activities (Internet of Things, IoT). IoT refers to the increasing number of artificial intelligence devices connected to internet devices. These devices continue to collect and transmit data, which in turn will further strengthen the growth of data and artificial intelligence tools that are increasingly accessible to everyone (big data). The existence of IoT has helped paramedics to collect heart rate data, detect sugar levels, check temperature, and various other health data. These various data are then stored on a large scale, which is then known as big data in the health sector. By utilizing big data, paramedics no longer need to record health data manually. All health information is stored in a database and sent to an internet network to carry out tasks according to an algorithm system that has been prepared in advance. With this way of working, medical analysis activities can be carried out more quickly and accurately. With the same pattern of work, at this time a car has begun to be developed which is equipped with certain sensors that can read the traffic situation, and can be programmed to walk to the desired place by the passengers. It's like auto pilot on an airplane. In short, with IoT, various life activities will be able to be connected to each other, so that it will be more effective and efficient. IoT is increasingly presenting the presence of increasingly intelligent spaces and places. This is because physical spaces – such as homes, offices, and even entire cities – are becoming increasingly connected, smart, and accessible.
- c. Availability of large-scale data and increasingly sophisticated data analysis engines (big data and augmented analytics). Big data refers to the exponential growth of data, making it easier for everyone to access data about anything and everything. In today's era, as long as someone is willing to actively search for data; then he will acquire knowledge as desired. Everyone in today's era has the same opportunity to be smart, progress, and develop; as long as they are actively seeking and studying data that can be accessed easily, cheaply, and quickly. With artificial intelligence tools, data analysis activities in the current era are increasingly sophisticated and provide more complete and in-depth information (Byundyugova, T.V. Babikova & Kornienko, 2021). With these increasingly sophisticated data analysis tools, everyone can work with increasingly complex and diverse data bases.
- d. In the future, more people will work accompanied by robotic technology. Today's Robotic Technology is much smarter than ever. Robotic devices in today's era seem to have the ability to respond to their environment and perform tasks without human intervention. In certain industries, the future of work is likely to involve humans capable of collaborating with robots. So now it is known that there is the term "cobot" (collaborative robot). This trend provides an important message for prospective workers to have strong digital literacy (Cedefop, 2018).
- e. Digital platforms as an inseparable part of life. Digitalization that has penetrated various sectors of life has given rise to various digital platforms to meet the needs of the community (Acemoglu & Restrepo, 2018). Basically, a digital platform is a device that facilitates various parties to transact and exchange information. Thus, the existence of a digital platform should be able to increase the productivity and capacity of the parties who interact in it. From this digital platform, we can imagine people's lives with the various activities in it. So, through a digital platform, we can imagine the existence of a shop or market with the bustle of business transactions as we feel when we are in a market or shopping center. Through digital platforms, we can imagine how lecturers and students carry out learning activities or discussions as happens in a classroom on a campus. Likewise, through a digital platform we can imagine the existence of a music concert. Examples of popular digital platforms are: Facebook, WhatsApp, YouTube, Instagram, Line, Twitter, LinkedIn, Tokopedia, Bukalapak, Ruangguru, and many others. A person, with only a smartphone and several thousand credits, through these various digital platforms can learn, trade, and create art. In today's era, to become a merchant, one does not have to own a shop. Everyone can be an artist, and to be smart doesn't always have to come to a top school. Thus, the existence of digital platforms has made everyone equal with each other.
- f. Automation process along with the development of robotic technology (Acemoglu & Restrepo, 2018). This technology is used to automate structured and routine or repetitive work activities, freeing people from routine work to concentrate on more complex and value-added work. This is part of a broader shift towards automation that will impact work activities in the industrial world in the future.

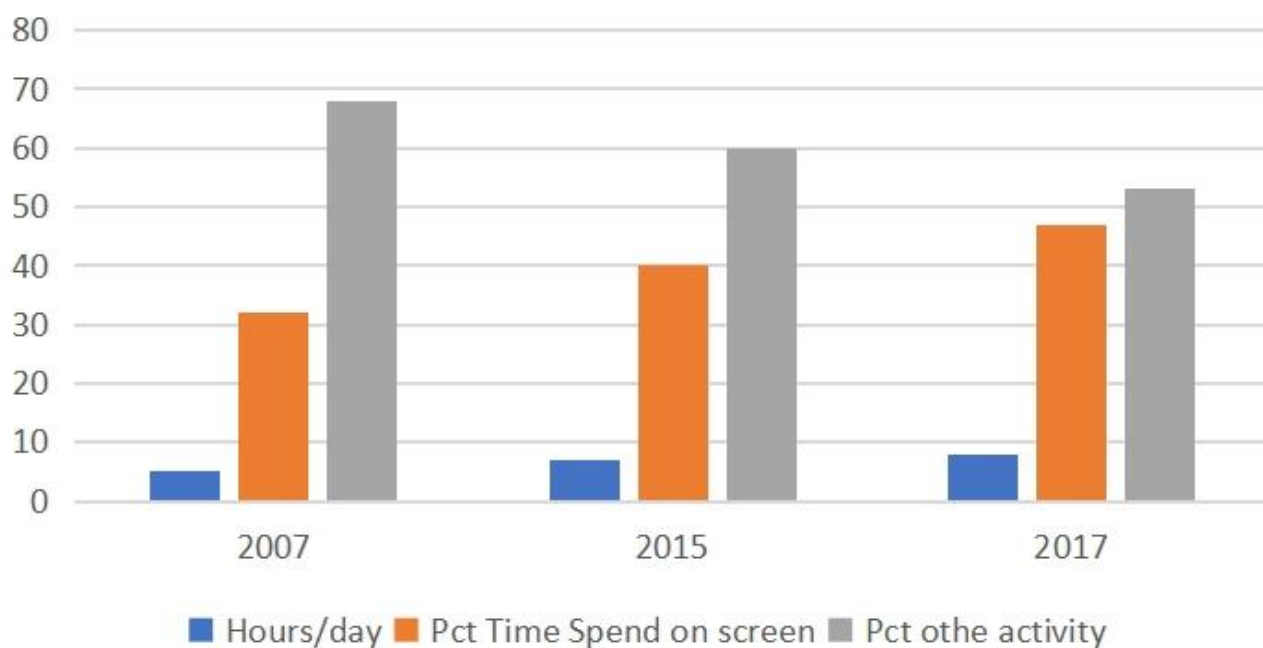
The presence of various digital devices has made various jobs that have been manual and routine in nature very

vulnerable to be replaced with robotic technology. Automation is a challenge in today's world of work (Arntz et al., 2016). AlphaBeta's study revealed that in the last 15 years the existence of digital technology followed by the presence of robotic technology has reduced the number of hours of routine work by 2 hours per week. This means that in a month, there is 1 day of routine work that is lost and replaced with robots (Alphabeta, 2017). Furthermore AlphaBeta (2017) predicts that by 2030 machine and robotic technology will take 2 hours of each type of routine work. For this reason, the development of digital technology and robotics has long been a source of anxiety for all workers.

The dependence of human activities on digital technology was also reported by WEF (World Economic Forum, 2017). In the last 10 years, between 2007 and 2017, there has been a consistent increase in the use of digital technology devices. If in 2007 there were as many as 30% of life activities supported by digital devices and 70% carried out non-digital, then in 2017 the use of digital technology increased to almost 50%. WEF data (2017) even shows that there is a very fast increase in the use of digital devices within 2 years, between 2015-2017 (see Figure 1). It should be noted that these data were reported by WEF (2017) before the global pandemic. That is, after the pandemic hit the world, and required everyone to do more activities from home (WFH), it is certain that the proportion of life activities carried out with digital devices will be very high.

The important message from these trends is the importance for the younger generation to strengthen digital skills mastery. In other words, the current generation must have strong digital literacy so that its existence will continue to be compatible with the environment in which they live. The ZDNet report explains that 92% of tomorrow's jobs require digital skills. In addition, 45% of future jobs require prospective workers who are familiar and have strong confidence to work with the help of digital devices (Barker, 2018).

Time Used in Activities in Front of a Digital Screen



Source: Adapted from WEF report, 2017

Figure 1: The utilization of digital technology in the last 10 years

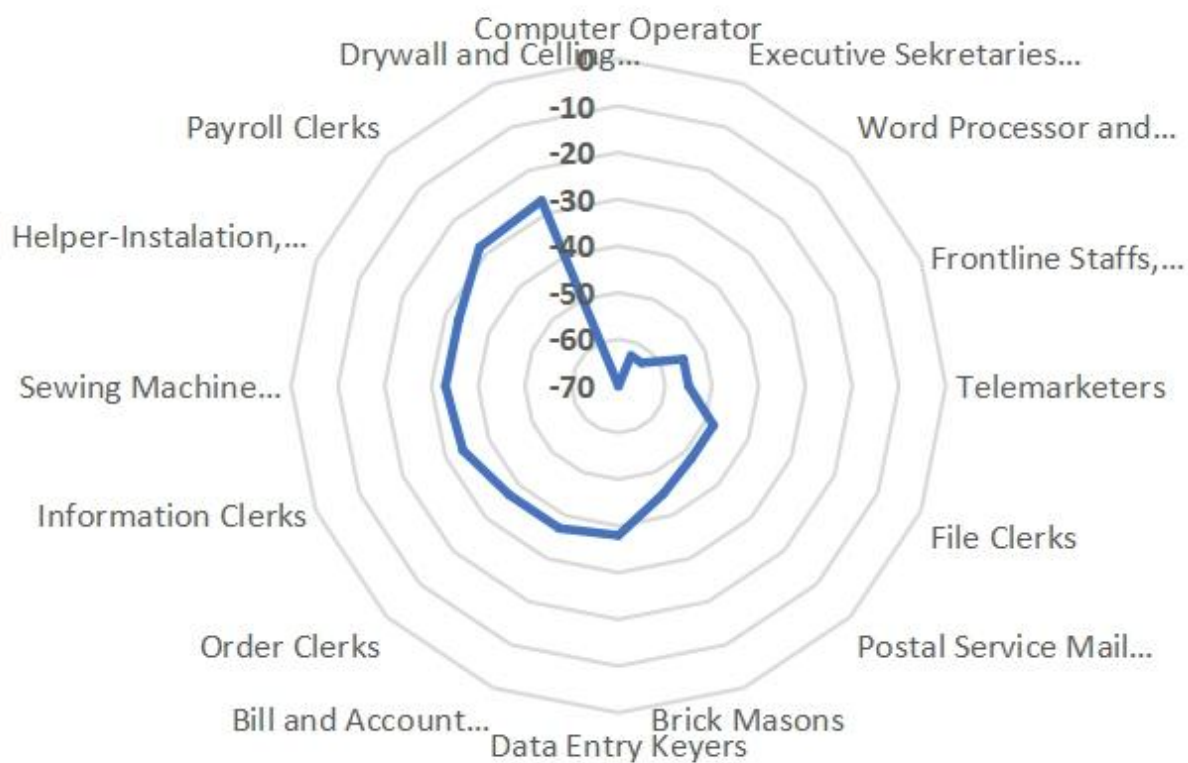
The WEF (2020) study revealed that 70% of workers in countries with an IPC of less than \$10,000 were categorized as not optimizing the use of digital technology to work from home. Indonesian workers belong to this group. World Bank data between 2017-2019 also revealed that the digital skills mastery of the Indonesian population who were actively working were respectively at a score of 4.77, 4.73, and 4.51 (scale 1 – 7), or ranked 34, 39, and 52 out of 139 countries (World Economic Forum, 2020). This means that the digital skills of the

Indonesian population who are actively working show a declining trend. The WEF (2020) and World Bank study provides a strong message about the importance of strengthening digital literacy for students.

WEF (2020) reported that there was a wide gap between current trends in life and people's readiness to face these trends. This can be seen from the trend of using digital technology in various aspects of life. The use of digital technology has triggered a paradoxical. WEF (2020) reported that while workers live in a digital world, it is fully automated; but its working behavior was still like before the digital era, still manual. This fact occurs in various countries around the world.

The WEF study (2020) shown that most workers in various countries have not been able to optimize the use of digital technology to work from home (World Economic Forum, 2020). The percentage of workers with a per capita income of less than \$10,000 who are unable to work from home is predicted to be over 70%. Meanwhile, the percentage of workers with a per capita income of more than \$20,000 who are deemed unable to work from home using digital devices is predicted to be in the range of 45% to 70%. This study shows that there is a wide gap between the skills possessed by workers and the new demands that are developing in society.

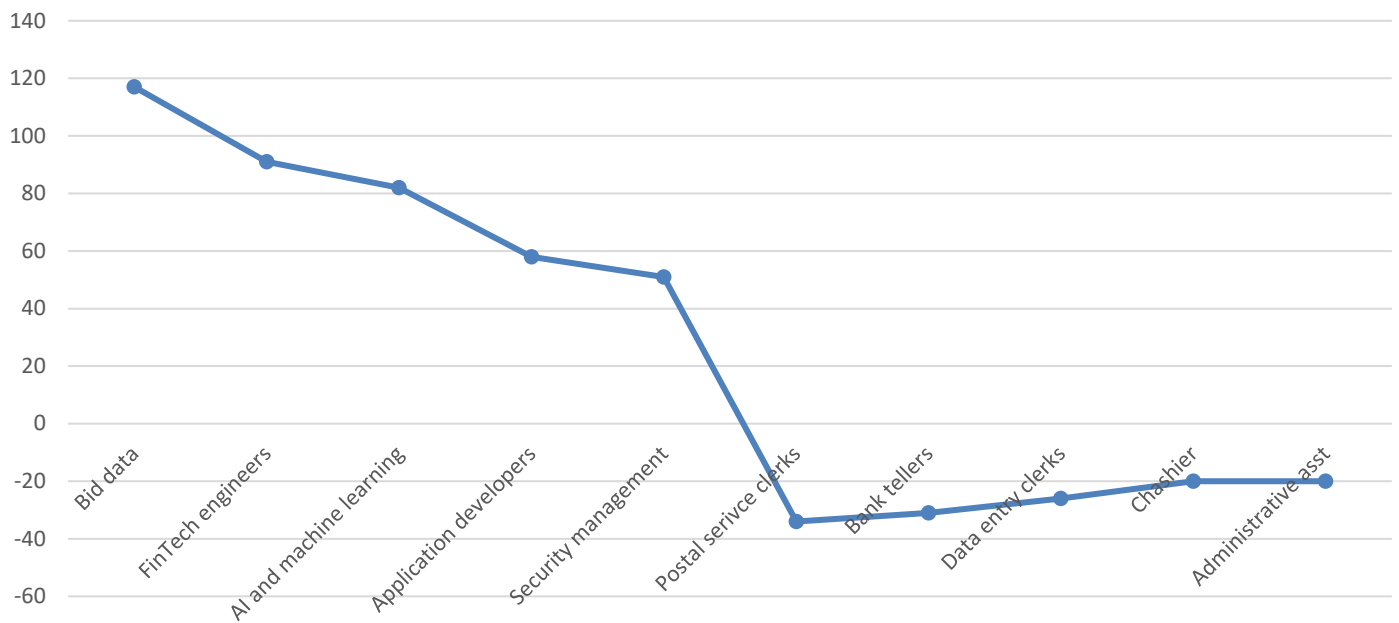
Figure 2 illustrates that the employability of workers from various countries is lagging behind the current trend in society. So, we see a lot of workers whose existence is not compatible with the demands of the world of work. This group of workers is vulnerable to the risk of termination of employment along with the use of digital technology in carrying out work activities.



Source: Adapted from WEF report, 2020

Figure 2. Types of automated work, in the period 2007 – 2018

This trend will continue over the next five years. The World Economic Forum (WEF) (2025) reports that between 2025 and 2030, jobs that will be lost and those that will grow have been identified, as shown in Figures 3. The WEF (2025) reports that routine and manual work has decreased and been replaced by digital technology and robotics (WEF, 2025). This suggests that future workers should possess digital technology skills.



Source: Adapted from WEF Future Job of Report 2025

Figure 3. Top 5 Job Growth and Decline, 2025-2030 (%)

In the digital era, the number of unemployed people is not always triggered by limited employment opportunities. Unemployment that occurs in the digital era is mostly triggered by a dissonance between the knowledge and skills possessed by workers with the demands of a new world of work that is mostly carried out with the support of digital devices (Svetlana V & Tetiana K., 2019). This emphasizes the importance for workers and prospective workers to continue to strengthen digital literacy.

The future challenges of job

WEF (2020) reports that the rate of adoption of information and communication technology by various social organizations and businesses is predicted to increase sharply (World Economic Forum, 2020). Social and business organizations use information and communication technology tools to support activities at various types and levels of work, especially for routine work. As the global pandemic emerges, the adoption of cloud computing, big data, and e-commerce technologies will become a top priority for business leaders, following trends that have been going on in previous years. Along with this trend, there is a sharp increasing need for data and information security (data encryption), robotic technology, and artificial intelligence to support work activities. These trends require workers and job candidates to have strong digital skills.

The use of robotic technology and various artificial intelligence devices in various life activities has eliminated routine work, although at the same time it also gave rise to new jobs that previously did not exist (Acemoglu et al., 2021). The urge to automate has actually started to emerge along with the development of information and communication technology which is supported by the use of internet technology to support various life activities (internet of things, IoT).

A survey conducted by WEF (2020) revealed that it is estimated that 43% of business activities will reduce the workforce as a result of the integration of digital technology and automation. It is estimated that 41% of business activities will be carried out using contract workers who will specifically carry out certain jobs because they are considered more efficient when compared to hiring permanent workers for the job. In addition, 34% of the surveyed business institutions plan to recruit a workforce capable of working using digital technology devices.

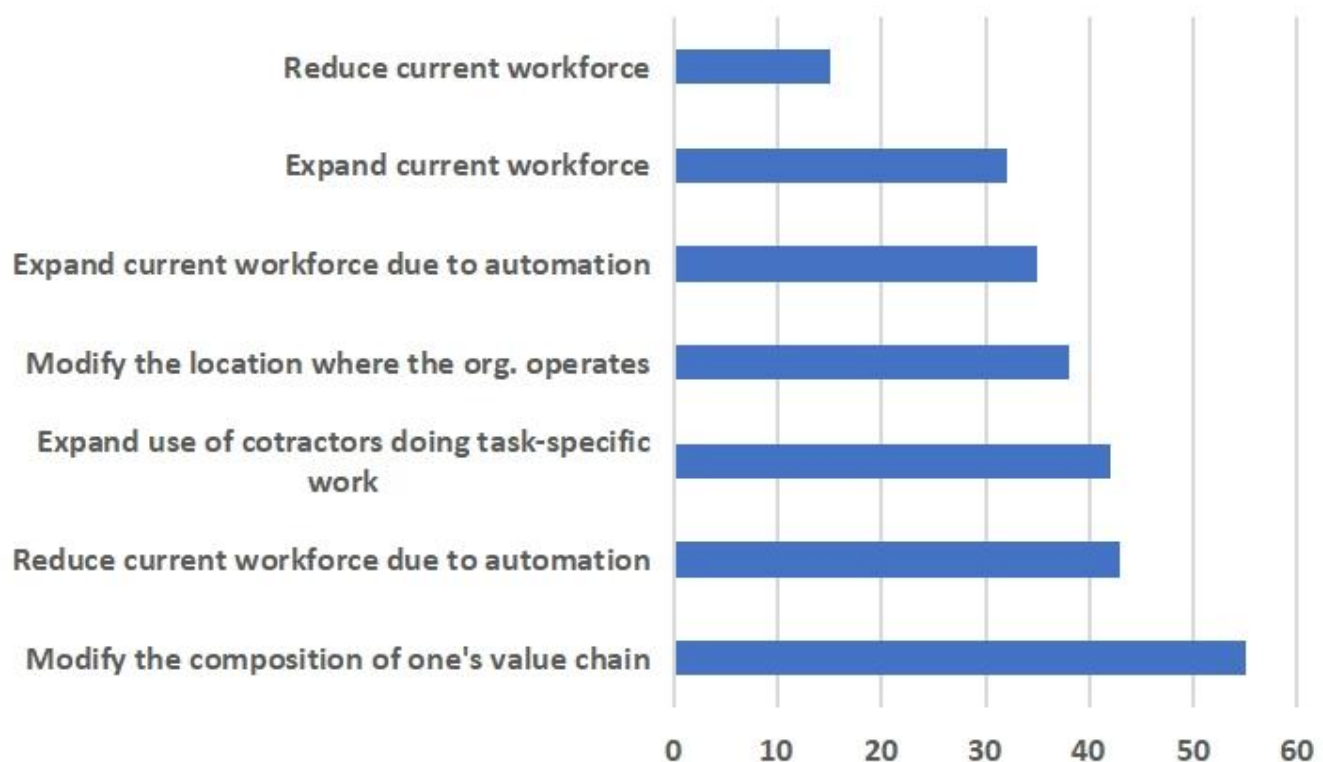
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surveyed business institutions plan to recruit a workforce capable of working using digital technology devices.

The study conducted by Prianto, Winardi, and Qomariyah (2021) by referring to the data reported by WEF (2020) explains that various routine jobs that have been done manually have been replaced by machines and robotic technology (Prianto et al., 2021). In a span of 10 years, between 2007 – 2018; there are 30% - 70% of routine work replaced by machines and robotic technology (see figure 2).

The WEF survey (2020) also revealed that between 2020 and 2025, jobs carried out using robotic technology and human labor have an equally large proportion, resulting in a reduction in working hours. Most companies will also make changes to business locations, work activity chains, and make adjustments to the number of workers required for each work unit, as a result of the increasingly intensive use of digital technology and robotic technology in the future.

The proportion of workers who carry out routine work is predicted to decrease by 6.4% (from 15.4% to 9%), and at the same time there is an increase in demand for workers with new work skills by 5.7% (from 7.8% to 13.5%). Based on these figures, the WEF (2020) estimates that by 2025, there will be 85 million routine jobs that are prone to being replaced by the latest technologies, and with that there will be 97 million new jobs based on robotic and digital technologies. By referring to the data reported by WEF (2020), Prianto, Winardi, and Qomariyah (2021) explain the various changes that will be carried out by many business actors in 2025 (Prianto et al., 2021; World Economic Forum, 2020) (see figure 3).



Source: Adapted from WEF report, 2020

Figure 4. Changes that the company expects to make in 2025

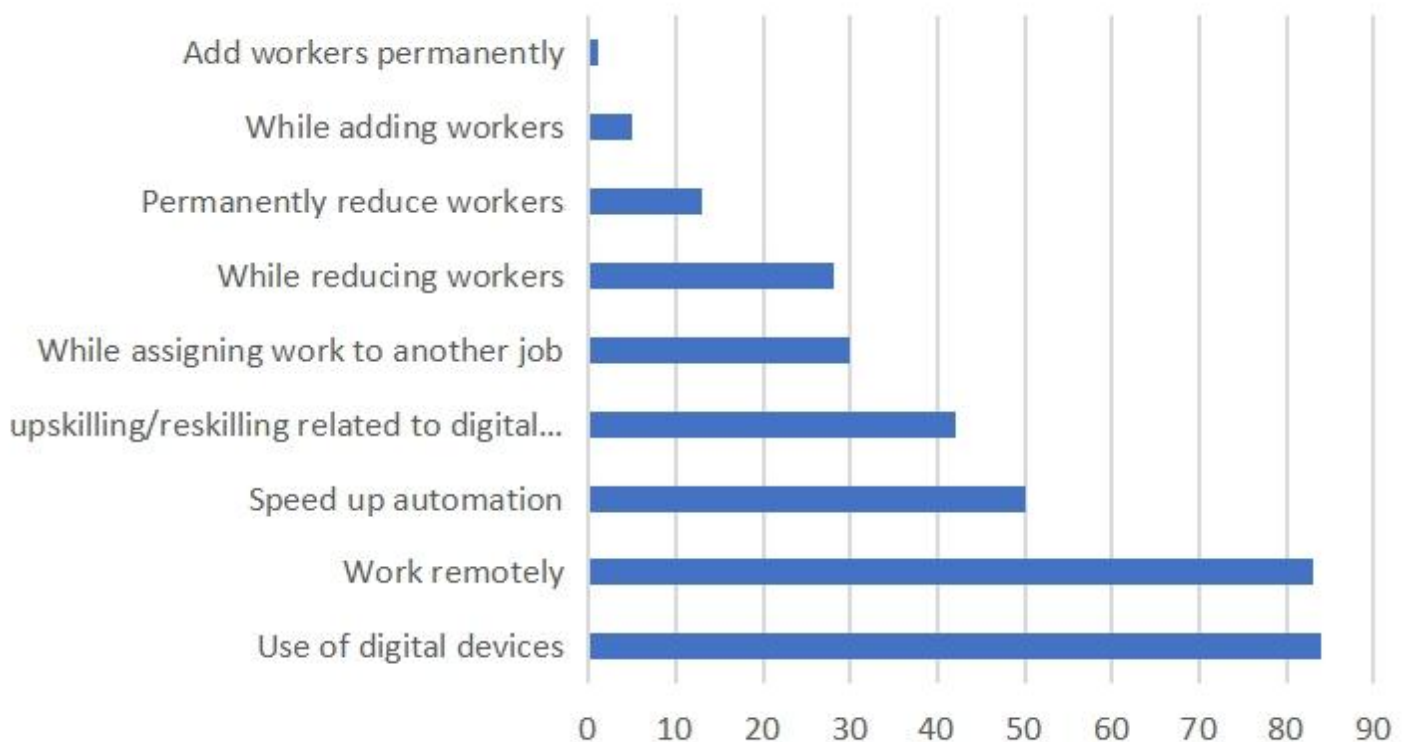
The trend of job changes has led to a very high skills gap. At this time and in the future, the world of work requires many workers and prospective workers who have critical thinking skills, analytical skills, problem solving, and self-development skills such as being independent learning, willingness to continue learning, being able to face pressure, and having good flexibility. to keep up with the changing trends that occur in the workplace.

WEF (2020) revealed that business leaders estimate that around 40% of workers need retraining in order to adapt to the demands of the new work environment. In addition, 94% of business leaders stated that they really expect

employees with new job skills specifications to be able to carry out work activities in new ways of working. The need for employees with new work skills is reported to have increased sharply, after in 2018 there was a reported increase of 65%.

The more intensive use of digital technology and robotics to support work activities, the more workers and prospective workers with higher qualifications skills are needed than the previous era. The need for professionals to fill jobs in various fields of work will be higher. Digitization of work activities allows workers to work from home. WEF (2020) estimates that the proportion of work that has the potential to be carried out remotely is 44% of the total work items. With this new trend, the ability of workers to work using digital devices is a non-negotiable condition (World Economic Forum, 2020).

Prianto, Winardi, and Qomariyah (2021) stated that the global pandemic has also prompted various social organizations and businesses to seek to provide technological resources that enable workers to quickly adapt to new ways of working based on digital technology that can be done remotely (see figure 4) (Prianto et al., 2021). The challenge is whether working remotely is able to provide a level of productivity that is equivalent to working directly in the environment of business or organizational activities. This productivity issue becomes very important, along with the increasing belief that the use of machines, digital technology and robotics is believed to be much more capable of producing business efficiency.

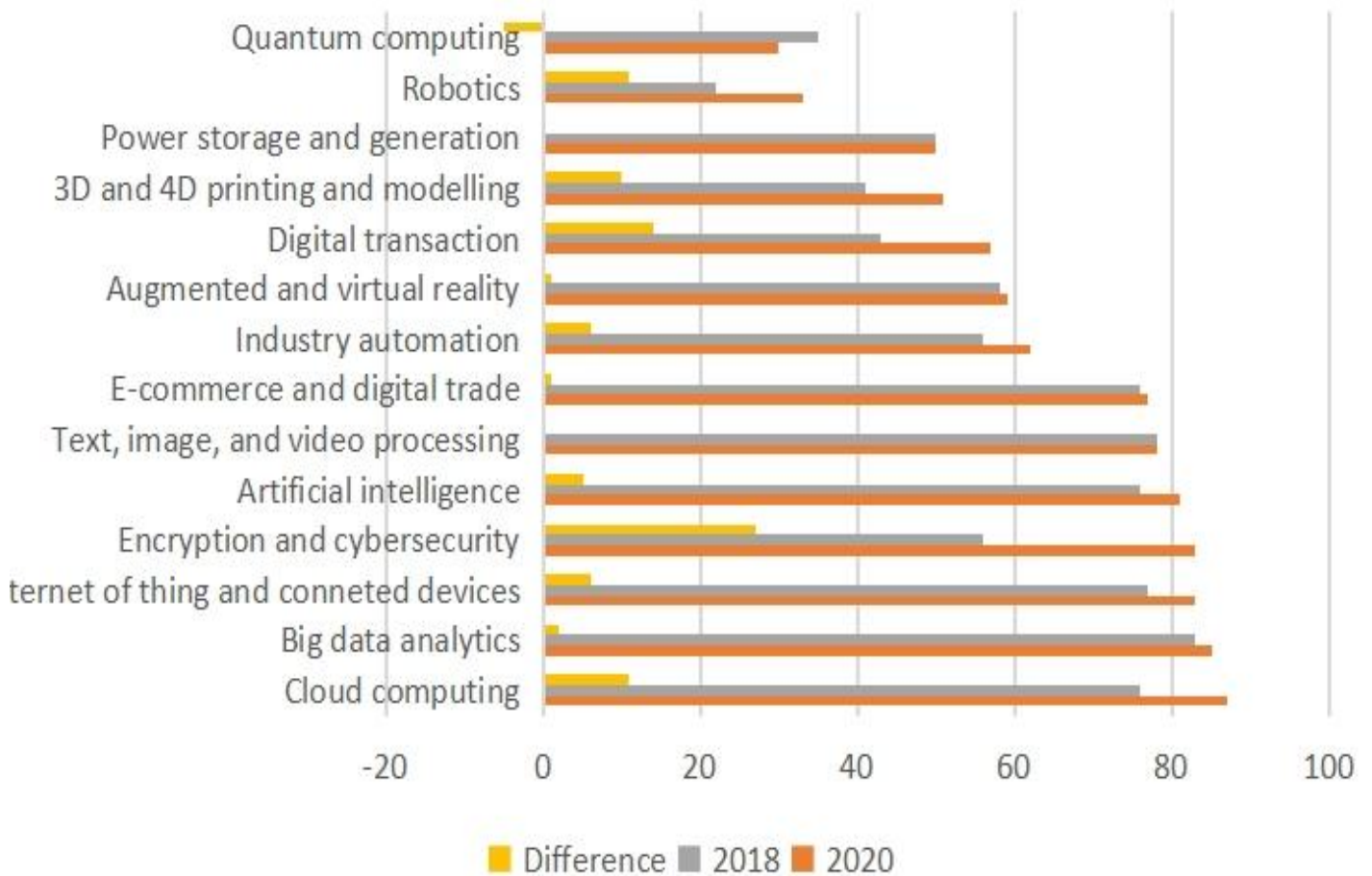


Source: Adapted from WEF report, 2020

Figure 5. Plans for adjusting business activities to respond to COVID-19

Various studies reveal that young workers or new workers, namely those who have just graduated from school; are the parties most vulnerable to the impact of the crisis caused by the use of digital technology, robotic technology, automation, and pandemics (Ding et al., 2020). This has created a new awareness among job seekers in various countries to continuously update their knowledge and skills, especially those related to digital technology. WEF (2020) revealed that there was an increase of 400 percent of job seekers to learn various digital skills needed by the world of work in this era and in the future. Many job seekers decide to study online on their own initiative. This shows the importance of recent graduates to strengthen digital skills which will be the main prerequisite for entering the future world of work which is largely supported by digital devices. Referring to the data reported by WEF (2020), Prianto, Winardi, and Qomariyah (2021) explain the various technological devices

that were most widely used for industry in 2018 and 2020 (Prianto et al., 2021; World Economic Forum, 2020) (see figure 5).



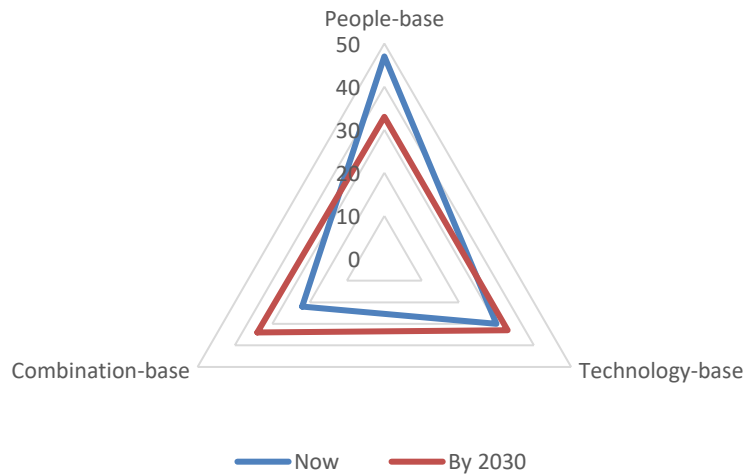
Source: Adapted from WEF report, 2020

Figure 6. Most adopted technology tools in 2025

Various future employment issues as described above illustrate the importance of mastering digital literacy for workers, so that they can continue to work in the workplace. Various economic activities in the future will be carried out more based on digital technology (Prianto et al., 2019). Therefore, anyone who does not have strong digital literacy will certainly be marginalized from economic activity in the global business community.

The more intensive use of digital technology as the main instrument in various business activities causes more work that is carried out manually to be replaced with digital technology (Cedefop, 2018). This provides an important message, especially for workers and job seekers; that mastery of digital literacy will be the main prerequisite for them to be accepted in the workplace (Frey & Osborne, 2017). Likewise, those who are currently studying, both in school and in college, must be prepared to master digital technology (Desjardins, 2018). Everyone who lives in the current era must make digital technology an inseparable part of their lives. In other words, digital technology must be learned by everyone and taught at various levels of education (Gregory et al., 2019).

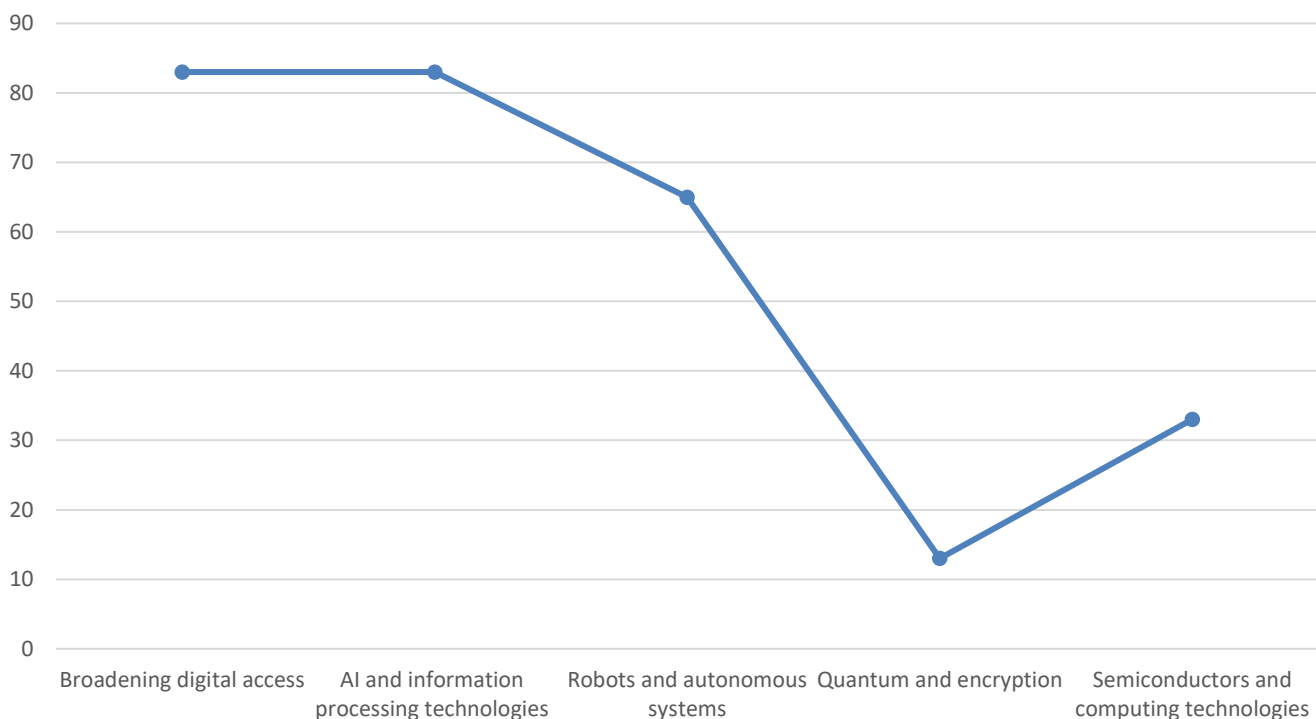
The WEF (2025) report reveals that between 2025 and 2030, manual jobs that rely on human labor will significantly decrease and be replaced by digital technology or a combination of human labor and robotics, as shown in the figure 7 (WEF, 2025). Therefore, future workers should have sufficient digital literacy skills.



Source: Adapted from WEF Future Job of Report 2025

Figure 7. The shifting human-machine frontier 2025-2030 (%)

The rapid development of robotics technology has prompted various organizations in Indonesia to transform to create efficiency, as shown in Figure 8 (WEF, 2025). Organizational transformation in Indonesia aims to respond to the dynamics of the times, with a primary focus on improving operational efficiency, providing superior public services, and adapting to technological advances. This is accomplished through structural restructuring, streamlining bureaucracy, and developing a work culture to make agencies and companies more agile and globally competitive.



Source: Adapted from WEF Future Job of Report 2025

Figure 8. The trends to drive transformation in Indonesia's organization (%)

The development of digital technology has a dual impact on the world of work: creating efficiencies and new types of jobs, while simultaneously requiring skill adaptation and increasing the risk of automation. To avoid the

negative impacts of automation, the key is to become an irreplaceable worker by honing unique soft skills, strengthening digital literacy, and engaging in lifelong learning.

The urgency of strengthening digital literacy

What is the importance of strengthening digital literacy to answer future work challenges? Indonesia is one of the countries with the largest internet users in the world (Sagita et al., 2019). Therefore, Indonesia should have a positive impact from the existence of internet-based digital technology. The existence of internet technology and its various derivatives, such as digital technology is only used for less productive purposes, not just for having fun. Various studies have revealed that in many cases the existence of digital technology is only used for having fun, does not have a productive impact, and even then causes addiction (Alkhunzain, 2019; Chi et al., 2020; Chia et al., 2017; García-Santillán, A. Espinosa-Ramos, E. Molchanova, 2021; García-Santillán A. Espinosa-Ramos, 2021).

Various recent studies have reviewed the importance of future generations to have strong digital literacy. Researchers reveal that digital literacy is an important thing needed to be able to participate in the modern world (Byundyugova, T.V. Babikova & Kornienko, 2021; Gálik, 2019, 2020; Hammons, 2020; Khanina et al., 2021). Someone who has strong digital literacy is characterized by the ability to process information, understand messages, be able to communicate effectively with others in various forms (Byundyugova, T.V. Babikova & Kornienko, 2021; Ilomaki et al., 2016).

The strong digital literacy also allows a person to optimize digital tools in creating, collaborating, interacting, and working according to ethical rules, as well as understanding when and how technology should be used effectively to achieve predetermined goals (Hammons, 2020). Someone who has strong digital literacy will usually be able to be critical when using digital devices. They are able to optimize various positive aspects, and minimize various negative impacts that may be caused by the presence of digital devices (Graves et al., 2020).

Digital literacy is a broad concept and includes a number of skills and competencies needed to live in the digital era, such as: technical competence, the ability to use digital technology to support the duties of a professional, the ability to use digital devices to support educational activities and in daily life, the ability to critically evaluate various information stored in digital devices, and the ability to work optimally using digital devices (Ilomaki et al., 2016).

According to Prianto, Winardi, Qomariyah (2019) and Byundyugova, Babikova, Kornienko (2021) someone who has strong digital literacy usually also has adequate computer literacy and media literacy (Byundyugova, T.V. Babikova & Kornienko, 2021; Prianto et al., 2019). Previous researchers have referred to digital literacy, computer literacy, and media literacy with one term, namely digital literacy. Digital literacy is the main factor that will strengthen information literacy (Khanina et al., 2021). The development of information literacy is closely related to the acquisition of digital and media competencies. In other words, a person will not be left out of information and be able to follow developments happening in the world.

Previous researchers have explained that someone is categorized as having strong digital literacy if they have various attributes, which include (Gálik, 2019, 2020; Graves et al., 2020): (1) Ability to analyze information sources; (2) Ability to determine data validity; (3) Ability to master technology to search for information on the internet; (4) The ability to understand the purpose of seeking different types of information; (5) Ability to work with up-to-date data and information sources; (6) Understanding the legal aspects and the consequences of spreading false news; (7) Ability to be skeptical of unverified sources of information.

A person who has good information literacy is characterized by the ability to understand how the realities of life work and how he must prepare himself to live in it. He is able to use information and communication technology as a source of information to develop his potential, able to use digital devices to communicate in complex environments. He is able to develop the skills to search for and evaluate information, be able to work both as an individual and work in a network, use digital devices as a medium to learn and continue to improve knowledge and skills, and continue to adapt in a constantly changing social environment. A person will be able to access information if he knows the source of the information, and has a good understanding of how to obtain the information needed to develop his potential (Byundyugova, T.V. Babikova & Kornienko, 2021).

CONCLUSION

The world of work today requires workers and job seekers to have strong digital literacy, so that in the future they will be able to work in a work environment that is increasingly using digital devices. Various new trends that exist in various business activities require not only human resources who have the competence to operate digital tools, but also the ability to develop themselves in optimizing the use of digital devices. The current era really needs human resources who are able to interact, collaborate, and communicate effectively using digital tools. At the same time, everyone who lives in the digital era is expected to remain critical of the existence of digital technology. Thus, the existence of digital technology will be optimized to develop knowledge, skills, and actively participate in a new work environment that will increasingly be filled with digital devices. Strengthening digital literacy, especially for young people as the future generation, must be a serious concern for all educational institutions in Indonesia.

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