

## The Use of ICT and Online Learning Applications during the COVID-19 Outbreak in Indonesia

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**Abstract: The use of ICT and online learning applications during the COVID-19 outbreak in Indonesia**

**Objectives:** This study aims to describe the impact of information and communication technology (ICT) and online learning applications on the quality of education during the covid-19 pandemic. **Methods:** The research was conducted in the college using a qualitative descriptive method. Data was collected through structured interviews, observation, and document analysis. **Findings:** The results showed that: first, the use of ICT and online applications in college increased during the pandemic; second, by using ICT and online learning applications, the teaching and learning process for lecturers and students become more independent, creative, flexible, and encourage students to increase their academic product; third, the academic products of lecturers and students experienced a significant increase. **Conclusion:** Understanding the magnitude of the impact of ICT on improving academic quality, can encourage the college to develop ICT.

**Keywords:** Covid-19 pandemic, university, ICT, education quality.

**Abstrak: Tingkatkan Kualitas Pendidikan Menggunakan Teknologi Informasi dan Komunikasi**

**Ditengah Pandemi Covid-19 Tujuan:** penelitian ini bertujuan untuk menggambarkan dampak teknologi informasi dan komunikasi (TIK), dan aplikasi pembelajaran online terhadap kualitas pendidikan selama pandemic covid-19. **Metode:** Penelitian yang dilakukan di perguruan tinggi menggunakan metode deskriptif kualitatif. Pengumpulan data dilakukan melalui wawancara terstruktur, observasi, dan analisis dokumen. **Temuan:** Hasil penelitian menunjukkan bahwa: pertama, penggunaan TIK dan aplikasi pembelajaran online di perguruan tinggi meningkat selama pandemi; kedua, dengan menggunakan TIK dan aplikasi pembelajaran online, proses mengajar bagi dosen dan mahasiswa menjadi lebih merdeka, kreatif, dan fleksibel sehingga mendorong mahasiswa meningkatkan produk akademik mereka; ketiga, produk akademik dosen dan mahasiswa mengalami peningkatan yang signifikan. **Kesimpulan:** Dengan memahami besarnya dampak TIK terhadap peningkatan kualitas akademik, maka bisa mendorong perguruan tinggi untuk mengembangkan TIK.

**Kata kunci:** pandemi Covid-19, universitas, TIK, kualitas pendidikan.

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## ■ INTRODUCTION

The current novel outbreak of SARS-CoV-2 coronavirus (coronavirus disease 2019; formerly 2019-nCoV), is centered in Hubei Province, People's Republic of China (Supriyadi et al., 2021) and has spread to many other countries. On January 30, 2020, the WHO Emergency Committee declared a global health emergency based on increased case notification rates at Chinese and international locations. The spread of Corona Virus Disease 2019 (Covid-19) initially impacted the world economy (Pradita & Sidik, 2020), but now impacted the education field, instead. Indonesian educational policy dilutes educational activities cause colleges must present alternative education processes for learners and those who cannot carry out the education process in educational institutions (Rahiem, 2020; Abidah et al., 2020; Tropea & De Rango, 2020; Espino-Diaz et al., 2020; Putra, 2020).

Distance learning is the process of learning that which there is no direct face-to-face contact between teachers and learners, where communication takes place in two directions bridged with media such as computers, television, radio, telephone, internet, video, and so on (Larisu et al., 2020). Conventional learning and distance learning will be effective if learners feel more comfortable and motivated to learn in the presence of communication (Ismawati & Prasetyo, 2020a; Revilla, Remojo, & Borja, 2022; Vera, Manalo, Ermeno, Reyes, & Elores, 2022). Therefore, without reciprocal communication learning will turn into indoctrination, and does not make learning a fun activity becomes a heavy burden.

Italy's experience with the use of information and communication technology (ICT) can be a better pandemic management solution and a faster recovery from national crises provided (Kainama & Latuserimala, 2022). Italy's lockdown has strict implications for society from an economic, mental, and social point of

view. New ICT can reduce the impact of the COVID-19 outbreak (Rahiem, 2020; Tropea & De Rango, 2020; Espino-Diaz et al., 2020) allowing new ways to learn, teach, work, and live. Furthermore, insights into the Internet of Things (Tropea & De Rango, 2020; Wortmann & Flüchter, 2015), intelligent tracking (Tropea & De Rango, 2020; Bissoli et al., 2019), and tracking solutions are summarized. In addition, some statistics about network traffic and learning platforms used in this lockout period are presented (Tropea & De Rango, 2020). The ability to use ICT is also needed in the industrial era 4.0 or the era of disruptive technology (Ismawati & Prasetyo, 2020).

Mastery of ICT becomes a must for generations who want to survive in this era of change. The era of technological disruption is a challenge for nations around the world, especially developing countries such as Indonesia (Ilmi, & Azis, 2020; Marsudi & Widjaja, 2019). Therefore, many scholars have concluded that Covid-19 has a significant impact on the world of education, including in the education system in Indonesia, (Rahiem, 2020; Abidah et al., 2020). In the education system in Indonesia, the pandemic has an impact on traditional and routine learning changes that emphasize the interaction of teachers and students in the classroom and outside the classroom shifting to distance learning (Larisu et al., 2020). Irhandayaningsih, 2020; Latip, 2021). However, according to (Abidah et al., 2020), this situation is in line with the vision and mission of future learning in the era of industrial revolution 4.0 and community 5.0, although it still has advantages and disadvantages. In terms of advantages, of course, online learning is not limited by space and time, especially since the government's appeal to self-quarantine, physical distancing, and social distancing.

The previous studies show that: first, the Covid-19 pandemic has encouraged people to make behavioral changes from traditional to more

modern (Nurriszka, 2016). Second, the pandemic has prompted changes in the system of direct teaching (face-to-face in the classroom) switching to virtual (Rahiem, 2020; Abidah et al., 2020; Tropea & De Rango, 2020; Espino-Diaz et al., 2020; Sholihatun et al., 2020). The teaching method uses online media, but without advanced planning such as curriculum design to adapt online modalities. Behavioral changes from stuttering technology to technological literacy will be very useful in solving problems in the disruptive era of technology.

Using ICT will reduce the impact of the spread of the covid-19 pandemic because it can reduce face-to-face meetings as recommended by the government related to compliance with health protocols during the pandemic period (Larisu et al., 2020), (Noervadila et al., 2021). ICT encourages the delivery of flexible education caused students can learn everywhere (Abidah et al., 2020). ICT assists the implementation of distance education. Distance education is a method or way students learn, and the way lecturers teach independently by minimizing face-to-face meetings. ICT is a solution for education in the pandemic era (Tropea & De Rango, 2020). ICT involves technology, engineering, and management techniques used in the control, and processing of information as well as its use, the relationship of computers with humans, and matters related to social, economic, and cultural (Rahiem, 2020). According to Espino-Diaz et al. (2020), ICT encompasses all forms of technology involved in the collection, manipulation, and presentation of data (data converted to information). ICT supports recording, storing, processing, getting back, delivering, and receiving information (Rahiem, 2020; Tropea & De Rango, 2020; Espino-Diaz et al., 2020).

The studies above show that ICT plays an important role in supporting the distance learning process to improve academic culture. However,

there have been no studies related to ICT and its impact on academic culture. This study will examine the impact of ICT on the academic culture of colleges under pandemics. This research is important for several reasons. First, the results of this study can add to the characteristics of learning-related knowledge in the pandemic era (Larisu et al., 2020). Second, the government can be a basis for consideration to make policies that can be used in solving education problems affected by the spread of Covid-19 (Abidah et al., 2020; Sholihatun et al., 2020; Noervadila et al., 2021; Baser & Rizal, 2021).

Since the research was conducted during the pandemic, the data collection method was only being done with limited interviews and was only conducted in one college. The research involving many colleges will be useful to obtain findings related to variations in learning models and technologies. Moreover, the findings of this research can be a recommendation for colleges to develop ICT, and for the government in preparing education to compete in era 4.0 (Kelly et al., 2015).

## ■ METHODS

### Participants of the Study

The research population is lecturers and students. The criteria for lecturers are those who have teaching experience during a pandemic and use learning technology, while students are taking online learning. The number of students who were sampled in this study was 15 lecturers and 25 people who were selected through a random sampling method (Pandey & Pandey, 2015).

### Research Design and Procedures

The research method in this study is included in the category of qualitative descriptive research. This design is considered appropriate because this study was conducted to describe

the use of ICT and its impact on improving academic quality without statistical testing (Mohajan, 2018).

Qualitative research methods were applied in further investigation of the process or emphasizing natural settings. By applying a qualitative study, data were collected and classified into several categories. The data were collected and classified into certain categories using a qualitative study. Information was collected using two separate methods: classroom observation and interviews. The observational procedure (reference) methodology was used to collect and analyze data. The purpose of using this framework is to collect and discuss specific findings before concluding a study.

Furthermore, related to the research procedure, the research was carried out in several stages. First, a certificate from the Vice-Rector I was secured before the conduct of the research which had to comply with the protocol health, the confidentiality of the data from the answers, and the identity of the respondent. Respondents were given the freedom to answer questions, and the delivery of the proposed intervention was indicated in a letter to the respondent. Second, after approval, the researcher personally prepared a list of structured questions and carried out a trial first. Third, after the list of questions is considered complete, interviews were conducted with 15 lecturers and 25 students using standard health protocols. Notes on the results of interviews that have been carried out are collected and checked according to the names of lecturers and students who are respondents. For confidentiality and anonymity, a code was assigned to each respondent. The answers given are collected and entered by the computer in their respective password-protected files.

### **Instrument**

For data analysis, we used primary data and secondary data. Primary data was obtained

through interviews and observation (Mohajan, 2018; Khan, 2014). Primary data are generally intended to answer research questions about ICT use by lecturers and students. Meanwhile, secondary data was obtained by conducting document analysis. Primary data is intended to obtain data related to the number of academic works in college, both the work of lecturers and students.

Furthermore, interviews were conducted to obtain data related to the use of ICT in learning, the frequency of use of this type of learning media in one semester, and the impact of using ICT on the teaching and learning process. While observations were made to obtain data related to the learning atmosphere, whether online learning processes, student visits to campus, and libraries. To complete the various data needed in this research, we also conducted a literature review of various articles and books related to ICT and the learning process during the pandemic.

### **Technique of Data analysis**

The data interviews were analyzed using descriptive statistical analysis (Creswell, 1994). In this process, descriptive statistics are used to determine the frequency of use of ICT in the teaching and learning process. The first step that must be known is what factors encourage the use of ICT that have an impact on the academic quality of lecturers and students during a pandemic. This means that the higher the frequency of using ICT by lecturers and students, the higher their academic quality. Under pandemic, We realized that the data needed would not be able to be done by interview and observance. Therefore, to complete our research data analyze documents derived from journals, books, and college documents that have been published on the internet. There are two official sites we use, namely. kemdikbud.go.id, and the official website of the college. From the official website of the Ministry of Education, we look

for data related to education policies in the era of the covid-19 pandemic, as well as various learning applications used to support the learning process. While from the official website of the college, we look for data related to the policy of the college is facing academics in the pandemic era, as well as learning models adopted and developed to support the learning process.

## ■ RESULT AND DISCUSSIONS

During the Covid-19 pandemic, colleges switched classroom learning activities to virtual or online network. Similarly, this is also done in other colleges in Indonesia (Larisu et al., 2020). The most emphasized point in learning in this pandemic era is intended to accelerate and adapt to the use of learning technology. The change from face-to-face education switches to virtual, and then the use of ICT cannot be avoided included in the source of learning as shown in online education applications. In this case, the College also develops access to online learning resources in the form of electronic with the name e-print.

Furthermore, the adaptation of related technologies to the provision of learning resources through the library also provides an online a source of learning. With the library application, students are likened to entering the house, after which the spaces that become the source of learning are already in the form of book journals or other services related to learning and education sources.

## ICT and The Quality of Education under Covid-19 Pandemic

Table 1 shows that all lecturers used applications in the learning process. Mostly, lecturers use zoom for online learning, while other applications such as google meet, google classroom is not so widely used. The most dominant use of zoom meetings is due to this media having more users in Indonesia and more familiar with lecturers. Although in practice one lecturer can use more than one application. In addition to the use of lectures and guidance, the use of zoom meetings is also often used for meetings and webinars and other meeting meetings such as academic meetings and coordination.

**Table 1.** The percentage of the use application of lecturers in academic activities for one semester

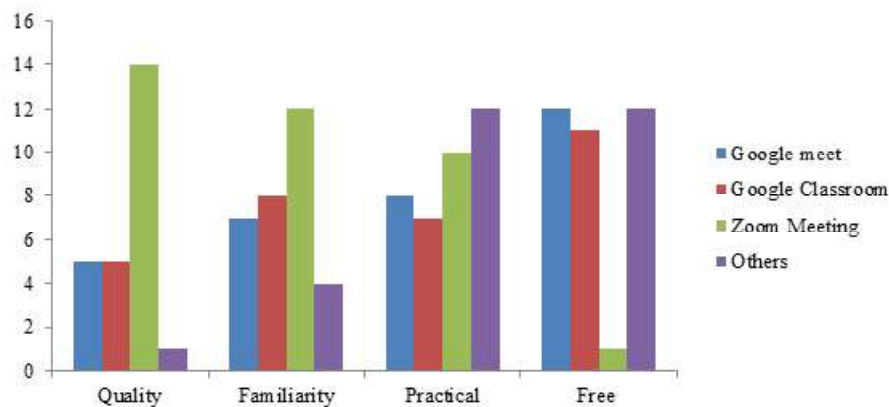
Academic Activities	Type of Applications			
	Google Meet (%)	Google Classroom (%)	Zoom Meeting (%)	Others (%)
1. Teaching	14%	11%	33%	2%
2. Supervising	3%	4%	7%	1%
3. Others	6%	6%	14%	2%
<b>Total</b>	<b>21%</b>	<b>20%</b>	<b>54%</b>	<b>5%</b>

Moreover, to support the educational processes under the Covid-19 pandemic, the college developed learning that is compatible with online learning, called the Learning Management System (LMS). LMS Learning Program is an integrated learning management system online through the application. Learning activities in

LMS, including registration and management of accounts, completion of tasks, mastery of materials, monitoring the achievement of learning outcomes, and engaging in discussion forums, consultations, and examinations/assessments. Examples of LMS, among others, are virtual classroom learning, google classroom, teacher's

room, Genius, Edmodo, Moodle, Sijar LMS Seamolec, and so on (Larisu et al., 2020; Sholihatun et al., 2020). To be flexible in the implementation of educational processes, the college developed a mixed learning model that combines the concepts of Student-centered Learning (SCL) and Personalized Learning (PL) with pole synchronous learning interaction patterns, so it is expected to be more effective in the application of teaching and learning activities.

Pole synchronous Learning is a mixed learning model. Furthermore, it is said that this model combines the concepts of Student-Centered Learning (SCL) and Personalized Learning (PL) with pole synchronous learning interaction patterns, in practice this mixed learning uses its pe5 cycle design (Planning, Understanding, Deepening, Application, & Assessment) applied to each learning. In the design of pe5 cycle learning, lecturers must plan so that the content and materials provided are appropriate.



**Figure 1.** Reasons for lecturers to choose types of online teaching applications

To support online learning, lectures and students used learning applications such as Zoom Meeting, Google Classroom, Google Classmeet, and even social media; for example WhatchApp, email, and others. There are some reasons for using these types of applications (see figure 1). The use of ICT and online learning applications is also supported by adequate internet facilities. As we know, Indonesia is the 4th largest internet user in the world after China, Indonesia, and America. Forth, the largest user of the internet means that Indonesia is very potential in the use of ICT, and can support education due to various sources on digital platforms that can only be downloaded over the internet. This is in line with Prasetyo & Sutopo (2018), Whose Industry 4.0 delivered a comprehensive transformation of the overall aspects of production in the industry through the merging of digital technology and the internet with conventional industries.

Furthermore, ICT facilitates educational programs and eliminates obstacles faced by learners with special needs. This has implications for lecturers and students, who have the awareness that learning can be done anytime and anywhere. Arguably the most vital contribution of ICT to education is ease to access to learning (Tropea & De Rango, 2020). With the creation of E-Learning platforms, search engine inventions like Google, and Web 2.0 technology, students can also easily access resources, mentors, experts, researchers, professionals, and peers everywhere.

Moreover, related to the most widely used social media platforms; Youtube, WhatsApp, Instagram, and Twitter become the top 5 (five) platforms that are often used in Indonesia. In the context of pandemics, learning through youtube is widely done by lecturers and students in college. In addition, some lecturers need learning

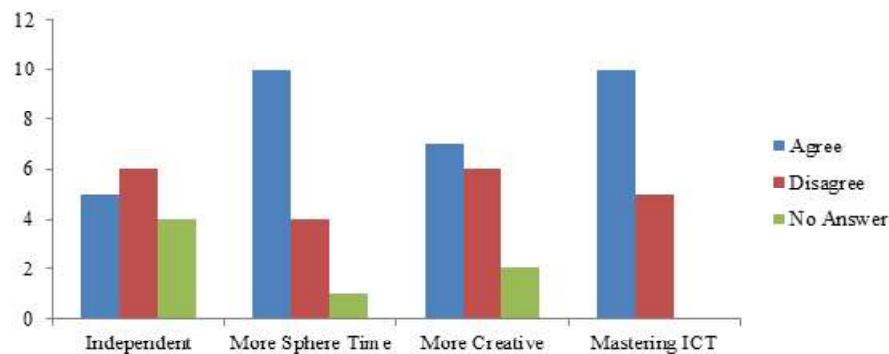


content through videos uploaded to youtube. This shows that internet-based devices can be connected in ICT. People can learn anything from mobile phones anywhere, anytime as long as there is an internet network. Thus, we can conclude that ICT has a big part in the development of academic culture colleges and in Indonesia even in the world.

### The Used of ICT and Academic Culture of Lecturers

The entire academic community shows its support for online learning. One of the main

reasons is to prevent the spread of the COVID-19 pandemic, as well as protect themselves from contracting it. However, there are obstacles to its implementation, particularly related to the mastery of ICT that supports online learning. The problems of using ICT in educational and other processes, at first burdensome and creates psychological pressure. However, over time, lecturers are getting used to it. Having used ICT, and online learning applications, the lecturers became more comfortable. There are several positive views of online learning that come from lecturers as shown in Figure 2.



**Figure 2.** Lecturer's opinion on the implementation of online learning

The accustomed use of ICT and online applications by lecturers has caused both negative and positive impacts. The negative one, especially for senior lecturers, they were no longer interested in classroom learning because it is more comfortable teaching at home. This would be a problem for college because there will be many lecturers who rarely go to campus. The conditions need to be a solution on the part of the college to restore the interest of lecturers coming to campus. On the other hand, on positive side, they were more productive in academic publications. With the change in learning patterns that were initially face-to-face in the classroom and switched to virtual or online by using ICT, the free time for lecturers was increasing. Since they have more

time, they can research, and write scientific papers. Using ICT, sources for learning materials, to create scientific articles as well as research reports can be done at home as long as internet networks are available.

In table 2, there was tremendous growth in the academic products of lecturers during the pandemic. This means that during the pandemic, supported ICT lecturers are increasingly actively writing and making scientific work. Thus we can conclude that during the pandemic period, ICT plays a role in supporting the development of academic culture. This is in line with what (Espino-Diaz et al., 2020) argue, that the transformation that takes place affects the teacher profession itself, whereas education professionals must adapt to new situations.

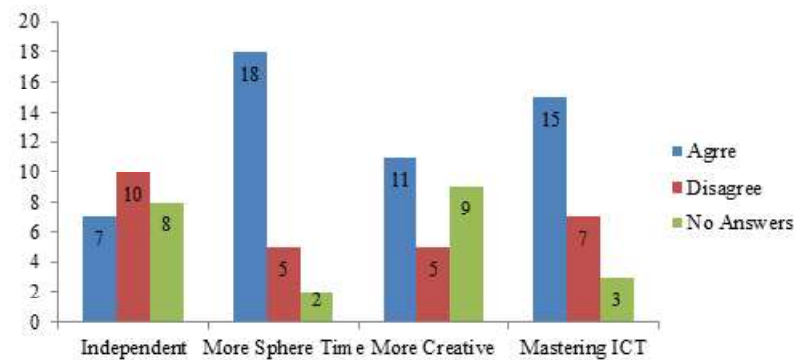
**Table 2.** Number of lecturer's articles in journals publication 2018-2021

N	Journal Types	Number of Publication			Total
		2018-2019	2019-2020	2020-2021	
1.	Non accredited National Journal	278	621	450	1349
2.	Accredited National Journal	569	793	742	2104
3.	International Journal	67	66	65	198
4.	Total	89	260	262	611

### The Used of ICT and the Academic Culture of Students

Having the implementation of distance education, many students returned to their homes. They did learn through online media, either by using zoom meetings or other online application platforms. This condition encourages students to study independently and find solutions related to the task given by lecturers in the course. Related to students' opinions on the implementation of online learning (see figure 3). Although there are positive side, online learning also has an negative impact such as the students were no

experience in social development, and be depressed (Munir, Anita, & Sefnimal, 2020). Since they rarely go to campus, the interaction of students with the campus environment, peers, and new environments becomes lost. This has implications for low social learning and life independence which is very useful for the future of students. Therefore, there needs to be a solution for colleges to keep growing social skills and adapting to new social environments.

**Figure 3.** Student's opinions on implementation of online learnings

Students must plan and deliver their classes from home, with all the logistics and technological difficulties it causes, and sometimes without adequate internet or media support. Limited interview results with students showed that at the beginning of lectures in the pandemic era, they had to learn new skills and adapt to new forms of learning, namely learning by not using classes

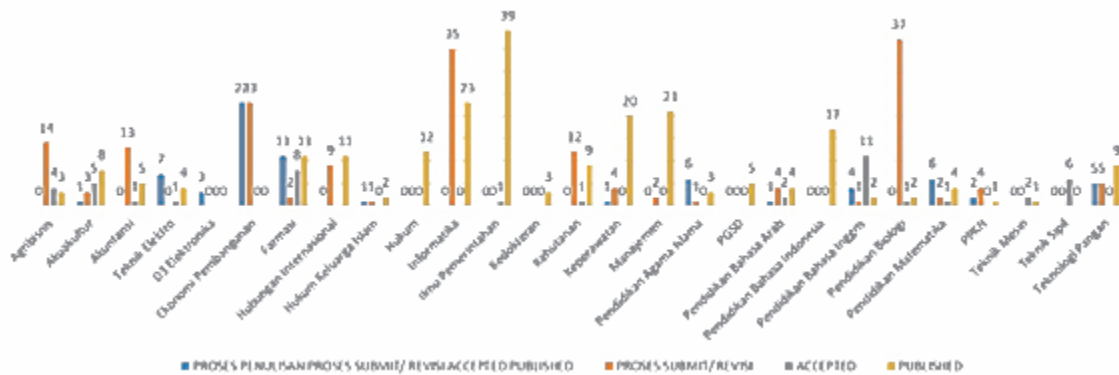
or online learning. This is in line with Abidah et al. (2020), that the Covid-19 Pandemic has encouraged awareness of the use of ICT in the learning process. Furthermore, they are aware and do not mind learning online in the pandemic era because learning can be more accessible to both students, regardless of their technological capabilities. Although some demand



compensated for not using college classes, especially the reduction in the cost of education.

Nevertheless, online emergency learning methods are widely criticized for not having good pedagogical standards, best practices, and previous work. Health emergencies require educators to race to choose which media and strategies to implement, and that will often be

introduced before being comprehensively tested. The introduction of the technology without considering its implications is an area that requires further research. Therefore according to Tropea and De Rango, technology needs to be improved and integrated with security and privacy features to make citizens trust more in technology and share more data voluntarily (Tropea & De Rango, 2020).



**Figure 4.** Number of student publication articles from twenty-seven study programs for November 2021-April 2022

Apart from the problems of students following learners in the pandemic era, the results related to scientific work are increasing. The development of journals published in Sinta-accredited journals is increasing in the pandemic era (figure 4). This fact shows that with reduced student activity on campus, the concentration of students in completing academic work is more focused so that it can produce scientific work. In addition, the graduation time comes to be better, where on average they completed their studies in 4 years. However, there are serious problems for some students, generally those who do not have the motivation to learn a lot and who cannot complete the final task because of a lack of motivation from lecturers.

In the context of internet use in Indonesia, the students are the largest users, namely 89.7%,

followed by students 69.8%, workers 58.4%, Housewives 25.3%, and others 6.7%. The large use of the internet among students is an implication of various activities carried out by students be it entertainment, socialites, or learning (Kumara, 2016). It also means that students are the most potential segment in the use of ICT which will at the same time have implications for the status of students as students who must develop scientific work as part of the academic culture in college (Rahiem, 2020; Espino-Diaz et al., 2020; Omoisekejimi et al., 2018). This can be evidenced by the large use or use of the internet to read articles (Latip, 2021; Baser & Rizal, 2021; Budiman, 2017). Nevertheless, according to Rahiem, a rapid transformation has exposed inconsistencies and weaknesses in how online learning has been or has not been

implemented in educational institutions. Furthermore, the authors also said that the implications of digital inequality should be key in policy responses to the COVID-19 vulnerability (Rahiem, 2020). The high use of ICT means that students and the public must be aware of the changes taking place in the world that has entered the industrial era 4.0 (Prasetyo & Sutopo, 2018; Wee et al., 2015). By knowing and understanding the changes that occur, students will be able to adapt to the development of the industrial world so that they can compete. The high use of ICT means that students and the public must be aware of the changes taking place in the world that has entered the industrial era 4.0 (Prasetyo & Sutopo, 2018; Wee et al., 2015).

From the description above, it can be concluded that the development of ICT in Indonesia has increased rapidly. This can be proven by the increasing use of the Internet and various social media among the public, especially among students. In the pandemic era, the use of ICT in learning has encouraged students to be more independent in seeking sources of information and literature that support academic article writing.

## ■ CONCLUSIONS

The era of technological disruption is a challenge for all educational institutions in the world, especially in developing countries like Indonesia. Mastering information and communication technology is a must for generations who want to survive in an era of change. The results of the study show that the Covid-19 pandemic has encouraged lecturers and students to change their behavior from traditional to more modern. Changes in behavior from technological stuttering to technological literacy will be very useful in solving educational problems in the era of technological disruption. The use of ICT and online learning

application technology has an impact on improving academic quality, including reducing the impact of the spread of the COVID-19 pandemic. Therefore, higher education institutions need to encourage the improvement of lecturers' ICT mastery and increase the development of ICT tools to support the learning process.

This study contains several weaknesses, such as using secondary data rather than primary data. During the pandemic, it is very difficult to conduct surveys related to internet users, the application of technology used, and the intensity of the use of information and communication technology. Therefore, further research suggestions are needed for survey research related to internet users and applications used. For the world of education, these findings will be very useful for determining the curriculum needed by graduates to compete in the world of work and adapt in an era of change. For the government, it is necessary to focus more on developing ICT technology, as well as protecting the security of user data from the threat of hacking data

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