



LEMBAGA PENELITIAN DAN PENGABDIAN KEPADA MASYARAKAT
(LPPM)

UNIVERSITAS PGRI BANYUWANGI

Jl. Ikan Tongkol 01, Banyuwangi 68416. Telp. (0333) 4466937

web : www.unibabwi.ac.id

email : lppm@unibabwi.ac.id



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Penulis : Agus Mursidi, Harwanti Noviandari, Edi Irwanto, Wawan Setiawan, M. Kamal, Achmad Zayul Mustain, Mislan

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"How Technology Transform Innovative Educational Solution During Pandemic Disruption"

Abstract

This paper discussed technology transformation strategies to create educational solutions during a pandemic. The government's policy is to optimize distance learning using technology because it closes schools and continues learning from outside. So we reviewed many publications and other literature sources to gain understanding and perspectives of experts, which are scientific evidence from the field of how technology transforms more innovative educational solutions during our efforts to examine information to get answers to the questions of this study through a phenomenological approach, an attempt to looking for answers by studying the evaluation of the data, interpreting the data and drawing conclusions by considering the principles of high validity and trustworthiness. Finally, we conclude that some strategies result from learning innovations that are useful during the pandemic, including technology that can increase the interest in learning of motivating students, as well as leisure-based education, internet-based distance multimedia, and everything that education is based on data. Among other things, we can conclude that we hope that this is a valuable finding for the development of similar studies in the future, both in academic and field contexts.

Keywords: innovation, technology, transformation, education, solutions during the pandemic

Introduction

The Covid-19 has changed all aspects of life in the world. They are forcing all sectors to make innovative breakthroughs to survive, compete and answer all the challenges and problems amid this pandemic (Chang et al., 2021). Innovation is an idea, renewal, uniqueness, or modification of something already exists. The goal is to solve all problems amid complicated deadlocks, adversity, and difficulties so that the community can benefit, facilitate and provide solutions for the present and future. The rapid flow of information marks the era of the industrial revolution 4.0. This era encourages people to access all information faster through various technologies. With the internet network, everything is quickly connected to parts of the world. The pandemic has accelerated this era to face the next generation. The pandemic encourages innovation breakthroughs by thinking more creatively and productively to survive and rise from adversity. The critical thinking and creativity processes echoed by the 4.0 revolution era are essentially towards innovation (Ibarra et al., 2020). A country will increase its productivity if it has competitiveness and transformation to a developed country.

If innovation breakthroughs from various sectors mark the land, the country is getting ahead. The Global Competitiveness Report Survey from the World Economic Forum based in Geneva on senior business players in 134 countries worldwide from 2001-2009 shows that Indonesia's competitiveness was ranked 55th in 2007. 37, and Singapore 9th (Schwab & Sala-i-Martin, 2016, April). According to the World Economic Forum, Indonesia's competitiveness is still not competitive. Based on the 2006-2007 Business Competitiveness Index (BCI), Indonesia is ranked 62 out of 124

countries. Why is the competitiveness of companies in Indonesia low? The answer is because of low innovation. Salaman and Storey (2002) say that innovation is the answer as an essential process for organizational health and is a crucial factor for the sustainability and competitiveness of a business organization. Said that Indonesia needs to promote development in research products and written works. Research productivity in Indonesia is still low. The principal capital of research and innovation is human resources (HR), no more extended budget and infrastructure, although both are no less important.

Indonesia's inventive works are relied upon to ascend amidst the current slump. The pandemic has turned into energy to make advancement forward in all areas. Development is the way to have the option to adjust and confront changes in each period. We are likewise pleased, after, over a time of being fashioned by the pandemic, Indonesia has shown to have the option to demonstrate by delivering 61 inventive items made by the country's kids as a reaction to COVID-19. The rise of imaginative things made by the country's kids is something we want to appreciate. Indonesia is relied upon to keep on making advancement forward leaps and become a field for reflection with the goal of free exploration, improvement, appraisal, and utilization of science and innovation. The pandemic urges the country's youngsters to be more inventive, helpful, and creative to pursue a rising Indonesia, progressing notwithstanding the pandemic.

The pandemic has likewise turned into a driving force to foster different mechanical advancements from different angles to invite a superior future and get ready to ask the time of brilliant society 5.0. The pandemic has likewise sped up the instructive insurgency to keep on teaming up make associations between grounds, research establishments, government organizations to keep on making advancement developments in the field of training. The objective is that everything understudies can learn whenever and anyplace. They are learning without segments, without limits. The pandemic requires web-based figuring out how to have the option to adjust and keep on developing as the way into the supportability of instructive foundations. Instructive advancement is an exit plan, so youngsters do not encounter learning misfortune and the Covid-19 spike in schooling groups. Learning innovation advancement is one part of development forward leaps amidst a pandemic and turns into an upper hand to get ready prevalent assets and become the brilliant age.

Organizations or offices that do not make learning development forward leaps will be abandoned and run over. The motivation behind instructive development in Indonesia, as per Kusnadi (2017), is for Indonesia to make up for lost time and find science and innovation progress, endeavor to give fair and impartial schooling, and change the Indonesian school system to be more compelling, proficient, and produce a quality result as per the requirements of the society later on. In like manner advancement developments from the wellbeing, financial, social and different areas. It is trusted that it will get by and be serious about giving the local area advantages and answering all changes and current difficulties. The pandemic powers us to have the option to change quicker, adjust and enhance. Different development systems have been completed, beginning from the enormous information approach, digitization, coordinated effort, and contemporary methodologies. Everything fields

can get by amidst a pandemic and have the option to contend. Before the pandemic, we have encountered the time of interruption (Bilbao-Osorio et al., 2013).

The presence of a pandemic empowers quicker mechanical advancement in all parts of life. Mechanical advance answers all changes and difficulties confronted when the pandemic hits. Mechanical developments help and work with every human action whenever movements are at home (Agarwal et al., 2020). Home is presently not a 'home for rest' yet in addition for activities of every sort like research, working, working out, revering, cultivating, making innovative substance and different things. The present home is a focal point of movement, innovativeness, and usefulness that are presently 'changed' into a spot to set off a cutting-edge advancement. Virtual exercises should be possible at home, for example, investigating the world unbounded. All occasions utilize innovation that works with human activities to trade data, collaborate, and convey (Chandra & Agarwal, 2020).

Different logical examinations, studios, classes, preparing, courses, in any event, welcoming individuals from other pieces of the nation should be possible essentially. Colleges and universities are relied upon to keep at the forefront to make development leap forwards (Napoli, 2011). Autonomous grounds and free learning are relied upon to be the main thrust to keep on creating imaginative items for the country's kids and to work together with different establishments in free exploration, advancement, study, and utilization of science and innovation. The grounds are a focal point of progress that will answer all issues and the difficulties of the times. Development is the way to get by and contend amidst pandemics and problems later on. The primary, predominant, and quickest nations keep advancing leaps from different fields. Advancement Innovation is working so the autonomy and greatness of the country can be acknowledged by delivering imaginative items for the country's youngsters (Altbach & Selvaratnam, 2012).

The transformation of education in various fields can advance the quality of Education in Indonesia. Like it or not, we have to do it if we want to be better in the Digital Age. Transformation is a necessary thing in this life—for example, the transformation in the world of education. We certainly realize that times are progressing and developing very rapidly. The teaching and learning system has to transform or change in various fields. Especially in the digital era like now, where multiple sources of knowledge can be obtained easily via the internet. The transformation in education is also a kind of effort so that the quality of education and human resources (HR) can be further improved from year to year. Speaking of HR, Syarief Oebaidillah, in his writing. Moeliodihardjo et al. (2012) said that making Indonesia a big country with superior and productive human resources is the obligation of all parties. The education sector that we deal with is only one of them but is the central sector. The state must ensure that educational services are provided equally and of good quality. We want Indonesians to stay in school for a long time and what is equally important, namely to ensure that what is learned from the learning process is adequate and meaningful (Aziz et al., 2014).

The transformation in the world of education that the current government is continuously promoting should be supported by us. Especially in the Covid-19 season, all levels of society should work hand in hand or work together so that the quality of education in this country will increase through the transformation of education in various fields (Zhou et al., 2020). Although the pandemic is not over, transformations in various education, culture, research, and technology continue to be rolled out to achieve superior human resources, advanced Indonesia. For the first time in history, as many as 173,329 honorary teachers passed the first stage of the selection exam and were appointed as State Civil Apparatus of Government Employees with Work Agreements. Selection for honorary teachers will continue to appoint more honorary teachers as government officers (Charisma, 2019). This is certainly exciting news and one of the achievements of the leadership of the good government in the office

As what Sa'diyah et al. (2022) said that the Independent Learning Program, promoted by the Ministry of Education and Culture and is currently in an advanced stage, has also become another achievement that deserves appreciation and joint evaluation. After launching 5 Independence Learning policies in the period December 2019 to July 2020, during the last year period, namely October 2020 to October 2021, there were at least 8 Independent Learning policies launched by the Minister of Education, Culture, and Culture (Wu, 2014). Research, and Technology, Nadiem Makarim, namely Merdeka Learning Episodes 6 to 13. The details are as follows: Merdeka Learning Episode 6 accentuates the change of government subsidizing for advanced Education; Episode 7: Mover School; Episode 8: Center of Excellence Vocational School; Episode 9: Smart Indonesia Card Lecture Merdeka; Episode 10: Expansion of the Education Fund Management Institute Scholarship Program; Episode 11: Vocational Independence Campus; Episode 12: Safe School for Shopping with SipLah, and Episode 13: Free Culture with Indonesian Channels (Mota & Scott, 2014).

Method and Material

In this method section, the study will explain the stages of carrying out a literature review in the field, namely how technological transformation can create innovative educational solutions when faced with various crises, one of which is a pandemic (Vindrola-Padros et al., 2020). Education and learning media experts advised that the suitable warning given when a pandemic shakes world education is a technological transformation that adapts to one's creation (Matsumoto & Barton, 2021). As understood, the pandemic correction where the government has taken policies that follow various technological developments and also information from various countries that are facing the same problem, namely, the solution is to finish or close schools and turn on online classes, when school is online or in online learning (Pollock et al., 2020). So the right solution is to empower all existing potential, especially technology to discuss how the transformation and the solutions provided by the experts of this study examine various literature sources and their publications that actively discuss technological transformation in education (Santana et al., 2020).

So what we did was search electronically for various field studies in the form of scientific studies that have been published in various international education and

technology journals. Then we have been under a phenomenological approach, a strategy on collecting as much data as possible and then summarizing them (White, 2021). We have done a very in-depth evaluation to understand and answer the problem with the principle of quality, accuracy, and point data, so after that, we try to get additional relevant information to answer the problem. As for reporting, we follow various design models for reporting qualitative studies related to education and technology, which are the solutions when we go and are hit by various crises, one of which is the pandemic crisis. So this also informs that 100% using secondary data searching through the help of Google cells can finally report that we have done this situation with the help of secondary data (Kackin et al., 2021).

Result and Discussion

- Accelerating Educational Transformation

Innovation vows to impact how understudies learn significantly, and instructors educate, introduce the time of 21st-century learning frameworks and establish understudy-focused learning conditions. Innovation likewise can speed up the instructive change process (Aysan et al., 2021). Through the comprehensive utilization of innovation devices and administrations - not simply in study halls or inside the extent of school foundation - instructive establishments can guarantee lean and centered arranging and effective changes to achieve effective change to work on the nature of understudy results. Here are some innovation instruments that can be helpful at any period of the change excursion to drive change all the more successfully (Cantarero, 2020).

The first stage that the government has taken is to simplify and streamline the learning arrangement system using technology (Chang, 2020). Changing computerized learning systems begins by bringing together all the central partners to characterize a distinctive vision collectively, underlying beliefs, and goals (Cone et al., 2021). At this stage, the attention is on identifying potential areas where innovation can achieve change to work on the study results. This cooperative interaction involves a top-down evaluation of the qualities and shortcomings of today's instructive organizations. Gathering input from outsiders such as public officials, the business world, trustees, and local pioneers and drawing motivations and references from today's various computerized companies is essential for the work to shape dreams and methodologies (Beck et al., 2021). Many innovative instruments can work with correspondence and cooperation between various meetings - initiatives and organizations and IT divisions of schools, guardians, students, and others. Devices for computerized conferencing such as Skype, for example, help to overcome area barriers by enabling meetings to be held appropriately. Applications, for example, Microsoft Teams, can also provide opportunities to hold discussions smoothly outside of meetings, share assets effectively, and store data for future reference (Bsharat & Behak, 2020).

The second stage is creating and implementing changes towards school innovation services: Equipped with a distinctive vision to direct the direction of change, partner groups from various foundations can plan and implement development independently but synergistically, reducing the time and friction that

can affect change. Innovation helps to drive work with and smoothen change in instructive organizations (Ameis et al., 2020). Computerized assets, for example, the OneNote instructor handbook, can ensure that tangible changes are promptly and appropriately delivered to all educators.

Prepared recordings can also be shared using OneNote or Stream to give school staff and instructors the adaptability to concentrate on progress according to their circumstances without following a specific schedule that could compromise student interest (Reimers et al., 2020).

The third stage is monitoring and refinement by experience and reflection: As educational institutions push forward towards the goals and visions that have been set, researchers want to continue to review and evaluate the effects of utilizing innovations to ensure that the change program, in general, can be put to work—the nature of learning outcomes. Tools, for example, internet power and learning board applications and frameworks, can provide information and objective inquiry and emotional critique of what changes are made that are meaningful to learning (Махачашивілі et al., 2020). This data gives partners the bit of knowledge they need to survey progress and refine technique and execution where fundamentals are.

- Work with advanced change with innovation

The instructive and teaching change process is an iterative and continuous interaction - and innovation can accelerate this cycle and ensure that change is significant and influential in working on the nature of learning outcomes (Babalola & Kolawole, 2021). Microsoft and other apps focus on helping students achieve learning changes that empower them to achieve better results. To learn more about this, please apply to become a Microsoft School and get the resources, assets, best practices, and local support we want to start changing instruction from creative means to relentless innovation (Savitz-Romer et al., 2020).

- Transforming education with the latest technology

COVID-19 and multiple crises in the country and other worlds seem to still feel at home and do not want to leave the country, evidenced by the increasing number of positive people for COVID-19 (Dwivedi et al., 2021). In response to this, the world of education must be ready and agile in dealing with these changes with various innovations and creativity so that education continues. Education is known as "minal Mahdi al Mahdi," often called "longevity education." Therefore, in the presence or absence of a pandemic, education must continue in various ways and follow existing conditions. The teaching universe is constantly changing according to the conditions of the times, before when the clock of the Prophet Muhammad. He sends his friends to make it up on bones or date palm fronds (Taiwo, 2013). Similarly, in the pre-progressive time frame, where the movement of all kinds is done physically by human hands without the help of machines, the preparation of books has not been completed by hand as well as transportation, there is no good public transportation so that before researchers to study they go for a long time. old and so on (Miirro & Schemanya, 2018).

Around the seventeenth century until the mid-eighteenth century, the modern

insurgency started with the rise of the Industrial Revolution 1.0 (began with the presence of processing plants and the disclosure of steam power by researchers). Then, at that point, the Industrial Revolution 2.0 during the eighteenth century (the utilization of electric power, the presence of vehicle creation) and the Industrial Revolution 3.0 starting around 1960 (the blast of computerized data, PCs, and cell phones). Along with the progress of the times, the world of education also has advanced; for example, writing has been using computers, the teaching and learning process has used electronic devices. This proves that the world of education develops with the times. We are entering the Industrial Revolution 4.0 Era, which has undergone numerous improvements since first presented in 2011 in Germany at the Hannover Trade Fair. The Industrial Revolution 4.0 coordinates digital innovation and mechanization innovation. The effect of the modern upset 4.0 period is that it no longer enables human laborers since every one of them has carried out the idea of mechanization in its application.

Advances in technology in such a way can be likened to the world being in the palm, and all activities can be done through the touch of a finger, then it is time to maximize technology in supporting education, especially the effects of the COVID-19 pandemic, which requires everyone to keep their distance and start a new life side by side with COVID-19. For almost one year, the children could not go to school because of the unresolved pandemic, the world of education was also busy with WFH (Work From Home), this policy was taken, of course, considering the safety side of the children, so they are not exposed to COVID-19, for that schools facilitate children to keep learning utilizing PJJ (distance learning). The PJJ process that schools have implemented does not always run smoothly, various kinds of obstacles are encountered, but so far, the implementation of PJJ can be said to be successful with all its shortcomings. Now, the problem that must be explored is how the following educational process will be considering that the new school year will soon begin, will for the next one year use the same method, namely students continue to study at home or do they go to school with the risk of contracting COVID-19?

- Era of Educational Transformation and Digital Technologies

As part of human endeavor, education cannot be separated from the aforementioned changes. Education needs to welcome the era of change to meet the future. The era of change, known as the digital era, requires us to prepare everything. Is this digital era an opportunity, or is it a challenge for us? We need to prepare for education that brings students willing and ready to learn in entering the digital era, namely in an atmosphere and process that can teach students in an ever-changing situation and the learning experience becomes meaningful for students. Dramatic changes in educational applications have expanded information technology practices worldwide (Seels & Richey, 1994). Learning in the digital era becomes an opportunity or opportunity for students when they can utilize new technology.

The ability to adapt to new technology is essential for students. For this reason, creativity is needed to find new information through digital technology. Learners who have high literacy skills in the field of new technology are called digital technology, and they enjoy using this technology to find and trace all the information needed for

learning purposes. Thus, the learner will obtain valuable information to meet his learning needs, and he will continuously seek and find the information needed. Also, this dimension of information technology practice tends to expand on improving student performance or performance. Better performance or learning outcomes are expected to be achieved by students through educational technology.

On the other hand, if this is not done, students in the digital age are faced with real problems they may not be able to apply this knowledge. Learners who lack skills (unskilled literacy) are challenged to use their time to find the information needed to benefit their learning tasks. Learners will spend a certain amount of time finding the little information related to their learning tasks. Learners even lose most of their time finding and finding the necessary information caused by a lack of literacy skills. This is a challenge for students in facing the digital era. Students need to make adjustments in the face of this new era of technology. Based on the things above, students who have information literacy skills or skills will manage their time to seek and find all information. He has the opportunity and opportunity to learn more in applying his learning experience. To gain real experience and connect with an ever-evolving world, learning must emphasize learner development, and learning is directed to something more meaningful.

- **Mastery of Literacy Skills Entering Digital Technology**

The use of digital technology or virtual technology is very inspiring for everyone because, with the help of virtual technology, there seems to be no absolute limit related to distance as stated by Cristl & Winter (2013) that in the digital era, what we have done is recorded, monitored or tracked wherever we are. Almost every piece of equipment we use is connected to the internet. The rapid development of information and communication technology in collecting, processing, and extracting personal data is an integral part of our entire life. In addition, technology (information technology) has shown very positive impacts or results based on research studies. Innovative learning techniques (e.g., text-incorporated questioning techniques, advance organizers, and media) typically show learners' progress on average by one percentile point.

As shown by the results of previous research, technological advantages can improve student performance, in this case, knowledge, skills, and attitudes. The results of other studies also show that students prefer to learn through computers rather than television. It can be said that TV presents what they have while the computer invites students about what they want to do. In short, it can be said that students prefer interactive participation roles rather than passive participation roles. In line with this, Knapp & Glenn (1996) suggested why students prefer using technology (computers) and prefer participating in learning using computers. Effective computer software programs actively engage learners and can freely control them. Moreover, incorporating computer technology into learning can also increase students' positive attitudes towards school, lessons, and learning in general.

- **Utilization of Learning Technology in the Digital Age**

In the 21st century, technology, in this case learning technology, assumes an increasingly broad position and is related to the context of learning and development. These new technological advances have changed how technology is appropriately used to enhance and develop the potential of learners, which in the latest definition of technology is facilitating learning and improving performance, increasing student performance. As teachers or lecturers, we believe that technology is fundamentally related to how technology and media are used and what we need to consider to support success (Kirkwood & Price, 2012). Teachers or lecturers need to know the availability of technology and media used in learning and how important technology and media areas factors that affect the learning process. Kirkwood (2009) also conveys suggestions that learning technology allows carrying out one or more of the following functions: 1) presentation, namely conveying materials and sources (such as text, data, sound, still images).

Moreover, motion) provided for the learner, either previously designed or which; 2) interaction, which allows students to be actively involved in interacting with resources, to use and track information or data and so on; 3) dialogue, namely facilitating communication between students and students, between students to carry out discussions, cooperation, collaboration; 4) activities that produce something (a productive activity), namely various activities provided for students for recording, creating, collecting, storing and re-discovering elements (such as text, data, images, graphics, charts) in response to various learning activities and assignments to prove their experience and abilities. The use of technology can help increase the acquisition of knowledge and skills, and learning using technology is critical for students to increase competence in carrying out tasks in society and the world of work in the 21st century. In addition, the use of technology can equip students to organize their learning process independently. Thus, learners' fundamental change from passive information recipients to active users (Tam, Olofsson & Lindberg, 2012).

As indicated at the start, change has happened so quickly. We realize that understudies have experienced and utilized an assortment of cutting-edge innovative devices (Erkinovich, 2022). PC-based data and innovation in different schools contribute new, powerful ways and give understudies detailed insight into the school educational plan. Through endlessly learning assets that can be run electronically, PC innovation can extend students' experience (the younger age) further past the restrictions of time, space, and materials. The wellsprings of specific learning materials utilized in the learning system incorporate the accompanying, for instance, PC media communications, recreation conditions, digital materials, programming creation, etc. It is essential to change the instructor's job in the homeroom concerning these changes (Pal et al., 2021). The educator's job is not enough to address the material being instructed, yet he wants to change his job so that instructing is more powerful. In confronting the computerized period, instructors who depend on conventional learning techniques or methodologies are less pre-arranged when confronted with things that require the ability to use cutting-edge innovation – in this way, managing such a circumstance requires instructors who have the right stuff to use innovation and utilize various techniques or learning methodologies. In entering the computerized unrest, we want brilliant educators (Hooshmand et al., 2020).

Fruitful and prevalent educators shrewdly use computerized innovation that is suitable or viable with the learning systems utilized in the learning system, taking into account that it is not to the point of depending on learning methodologies alone

Instructors need to utilize suitable innovation admirably, other than that educators by instructors are as yet expected to have the option to 1) rouse understudies to confront future difficulties, 2) assist understudies with overseeing time and tasks, 3) form understudies' social and enthusiastic abilities, 4) guide and give instances of fundamental abilities, 5) present individual and unusual circumstances to understudies, 6) help understudies investigate and foster higher request thinking abilities, and 7) assume a sense of ownership with guaranteeing understudy learning results (Hennessy et al., 2010). The adjustment of the instructor's part in learning in the advanced time is vital, corresponding to getting ready understudies to enter the computerized period. Constant and consistent expert improvement of educators (reasonable and proceeding with the proficient turn of events) is vital for each instructor. Subsequently, the readiness of instructor professional advancement programs that can offer sufficient types of assistance for understudies in the computerized time should be reevaluated connected with the capacities and abilities of educators in utilizing new innovative gadgets, be specific computerized innovation (Ghareb & Mohammed, 2016).

Conclusion

Finally, we conclude that the summary of the study results from various sources of literature review aims to gain an in-depth understanding of how technological transformation innovations make solutions for carrying out education during crises such as pandemic disturbances and others. Researchers understand that one solution that experts have proved is that when educational disruptions occur, such as a pandemic which is closely related to health and learning success, the government, through its policies in responding to conflicts, is to close schools and then open online classes because online education is optimizing the use of technology. So, we believe that various experts have succeeded in proving how creative innovation and transformation are caused by using technology to improve higher education outcomes and overcome solutions when a global pandemic impacts education.

So why we believe that technological solutions can transform education globally is because technology with all the activities and models of implications and applications that have been designed by various in the field, after receiving research after receiving recognition and perspectives from various educational technology experts. Finally, we were able, and all the scientific evidence from the field study was used as the findings of this study. The results of the study that we can conclude to answer the challenge of contaminated education disrupted by the pandemic, among others, based on existing publications, we see that the use of technology can accelerate the transformation of education from old education whose face-to-face orientation was disrupted by the pandemic to remotely through various applications. Moreover, accurate learning models have indeed accelerated the achievement of learning outcomes required by data and study results.

Next, we also review how the innovations are caused by technology that works across conditions and the atmosphere. Through the transformation of education with the help of the most up-to-date technology, the disturbances caused by pandemics and other crises in various countries have been resolved wherever possible – solutions with the most advanced technology. Then in the era of educational transformation, which demands better service quality, the presence of digital technology is a solution, of this is due to thoughts and contributions and also research evidence confirms that the era of transformation has occurred when technology on the internet has entered the world of education, especially when education is infected with the corrupt which disrupted by the pandemic.

Likewise, educational information occurs because of digital technology and the skills of wedding implementers such as sleep, teachers, and students, including parents, wherewith their readiness, students can study remotely. Through the use of learning technology, digital solutions have appeared before our eyes, how the demands of Islamic boarding school devices for adopting technology into all aspects of life, including education, it can be assumed that accelerated learning will occur with a note that the utility of digital technology has been answered due to the presence of digital technology. Finally, we conclude that the era of education that the pandemic has disrupted can be tempered by adopting technological transformations into the implementation of online education, proven by various esports in the field. Various other solutions have been thought of and proven by studies that exist.

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