

The Analysis of Government Strategy in Integrating Technology in Education

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ABSTRACT

This study aims to analyze the Indonesian government's strategy in integrating technology in education. COVID-19 pandemic encourages schools to implement distance learning, and technology becomes a necessity. Already launching the subject named Information and Communication Technology (ICT), integrating ICT skills in all courses, and applying a new course called Informatics, teachers still feel unprepared in a pandemic situation. The researchers use qualitative method to study documents and interview seven respondents from six schools located in Jakarta to know (1) their perception of government policy for technology integration in education, (2) the government programs if answer the need of students, (3) and the suggestion for better implementation. As a result, the government still didn't have a good policy and master plan for integrating technology into education. The government tries to implement some policies and strategies, but they are only on paper and weak in implementation. The government only develops data of teachers and students, but the data didn't answer the need for schools and teachers about the need for technology in teaching-learning activities. The respondents suggest some solutions, including a solid and clear technology integration policy in education, the development of teachers' skills, and infrastructure.

Keywords: Government policy, technology integration, Informatics, Information Communications and Technology (ICT), infrastructure

1. INTRODUCTION

Since several credible organizations reported it in late 2019, Coronavirus (COVID-19) has spread rapidly worldwide. This virus has a significant impact on the educational sector (R. H. Huang et al., 2020), [1], [2]. Like many countries, Indonesia has closed its educational institutions to stop the spread of the virus. Numerous schools have started distance learning [3]. However, some issues have arisen regarding the appropriate educational system for this pandemic. The current situation is educating the public about the importance of technology in education.

This paper illustrates the importance of technology integration in education and the integration strategy of the Indonesian government. The government already launched Information and Communication Technology (ICT) as a subject/course for primary and secondary education in 2006. The subject, which enabled the school and students to integrate technology into their learning, was discontinued in 2013 [4]. The government declared that ICT skills would be integrated into all subjects and that the ICT subject was not necessary to teach them as a separate subject.

After around five years, in 2018, the government introduced a new Subject called Informatics [5]. The government said the new subject (Informatics) refers to STEM skills and helps students develop their Higher-Order Thinking Skills (HOTS) or computational thinking. The government also explained that the new course is not a replacement for the

ICT course. However, some educators speak, understand, and treat the new subject as a substitute for the ICT subject. This study examines the government strategy to integrate technology in education by analyzing technology integration policy in the classroom since 2006 in ICT subject, ICT integrated into all subjects, and Informatics [4].

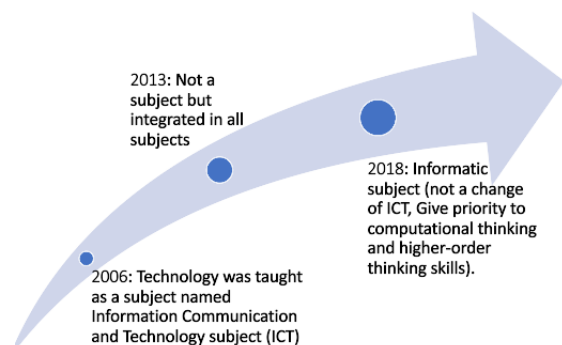


Figure 1. The history of technology integration in primary and secondary education in Indonesia

2. LITERATURE REVIEW

Technology integration in education is a necessity in the digital society [6], [7]. The imperative to use technology is

related to the education focus itself, namely students who have digital culture and digital competencies in technology [6], [2]. Students (the young generation) tend to have strong ties with ICT. This is reflected in the names given to this generation, such as digital natives, millennials, net generation, and digital generation [7], [8], [9]. Yelubay et al. (2020) describe the current community as the digital society and technology as the requirements of a market economy, and digital society and educators have to develop the digital culture and digital competencies [6]. The necessity of technology is especially proved when the Coronavirus spreads worldwide, and schools have to close. The current generation is exposed to technological gadgets such as smartphones and tablets from a very young age [10], [8]. The majority of students use smartphones to send text messages and visit social media. Seeing the extent to which technology is integrated with and used for education, it can be assumed that students accept and use technology intensely in their lives [11], [12].

Vanderkam described the necessity of technology, saying that institutions that do not want to change, will be forced to change [9], [13]. The need for technology can be seen in increasing online learning or E-Learning [14], [15]. Online and distance learning has become a necessity in the pandemic era. Schools are looking for an excellent platform to do online learning. Large-scale national efforts to harness technology to support distance learning, distance education, and online learning during the COVID-19 pandemic are emerging and proliferating [16], [17].

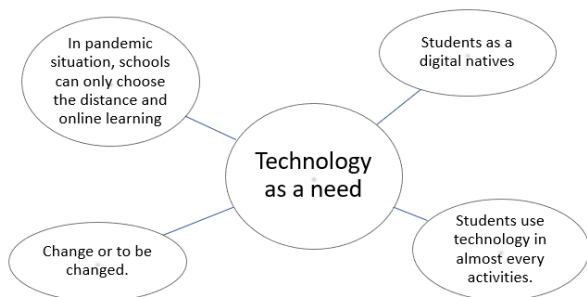


Figure 2. Technology is a necessity

However, Wahab Ali (2020) said that Coronavirus had exposed emerging vulnerabilities in education systems worldwide [7]. The Education system has not provided system flexibility, both for formal and non-formal education; It isn't available for many situations, including pandemic situations [18]. As a result, almost all educational institutions stated that they were not ready to carry out learning activities when schools closed. Nearly all educational institutions are unprepared in the face of a pandemic situation [19].

There are some experiences in a normal situation where there are few limitations; technology and online learning are challenging and complex [20], [21]. Of course, the situation becomes even more complicated when learning must take place during a pandemic [22], [17]. These limitations are related to a lack of online teaching infrastructure, lack of

teacher experience, information gaps, and complex environments at home [23], [24], [25].

Problems that arise regarding the integration of technology in learning are not just limited infrastructure. Students and teachers to large online repositories, without proper guidance, will not thrive during the lockdown of the COVID-19 pandemic. Many young people, called digital natives, have shown limitations in their use of technology [25], [26].

More than that, it is necessary to consider the problems related to teaching pedagogy. The integration of technology in education not only changes the way students learn. It also changes the teacher and their teaching pedagogy [27], [28], [29], [30]. When there is a shift from a teacher-controlled environment to one that is more learner-centered, the role of the educator becomes more of a facilitator [22]. Teachers are key players in the effectiveness of implementing ICT integrated learning. Therefore, they need to have the right attitudes (as facilitators) and perceptions of ICT to integrate technology effectively in teaching [22].

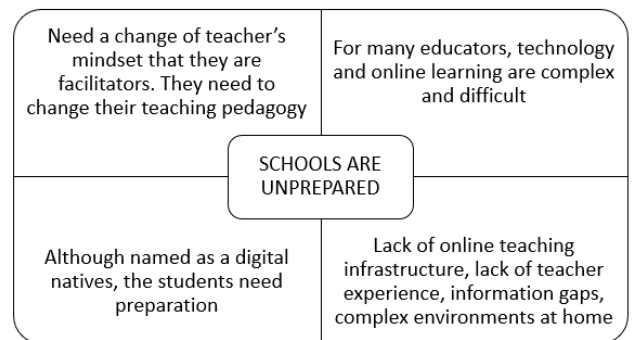


Figure 3. The readiness of schools to use technology

Schools need the right solutions related to limitations and challenges in terms of infrastructure. The Net generation needs institutions to prepare them for new situations. This is because their entry into the world occurs when technological developments are rampant and widely adopted in many sectors, including in teaching and learning activities. [7]. There is no doubt that the integration of ICT as an instructional tool in academic courses has increased rapidly. Traditional teaching methods must be supported by online technology and resources as the needs of the current generation [31] [32], [33]. In terms of student affairs, student responses to technology-related materials indicated that the majority of students used information technology [34], [33], [2].

Educational institutions also support the needs of the current generation. In recent years, interest in the development and use of multimedia content through the use of ICTs to improve the quality of teaching and learning has increased [34], [33], [35], [26]. Multimedia content of digital teaching materials that combine text, graphics, audio, and video/animation is standard in many schools. Teachers tend to use this content to bring classroom lessons to life by using it to demonstrate better and explain complex

concepts that cannot be easily presented using text alone [6], [33], [21].

According to Lee, Hsiao, and Ho (2014), ICT tools can help improve students' understanding of learning material [36]. Therefore, it is necessary to accelerate the rate of technology iteration and optimize the technical implementation of online education programs, given the alarming impact of the COVID-19 pandemic [37], [38].

Educational solutions are needed to keep up with technological trends so that education becomes flexible and the difficulties of 21st-century education can be overcome.

The solution needed is an intervention of the government. Huang et al. (2020) stated that the government and education providers need to stand against those who oppose the use of technology to overcome the pros and cons and ensure policy implementation [18]. The things that must be resolved related to technology integration in education are broad and related to resources, staff readiness, self-confidence, student accessibility, and motivation [23]. Therefore, a strong government role is needed [7], [10], [27]. Successful technology integration provides students with the opportunity to learn and apply the necessary 21st-century skills. Technology acts as a catalyst and supports teachers in preparing and delivering lessons [39], [15].

Only having resources does not mean that ICT can be implemented quickly, but other factors such as learning preparation time, supportive curriculum design, and staff readiness [40], [41]. Yelubay (2020) and Tudor (2020) states that before ICT can be integrated effectively, lecturers must be equipped with adequate training and support in the field of ICT and pedagogy. Teachers' attitudes and their willingness to apply ICT make a big difference in the lives of their students. Besides, staff readiness and motivation need to be considered as essential factors for the successful integration of technology in education [23], [6], [35], [25]. Education institutions know that technology is never neutral and that any change can be met with resistance [42]. Moreover, when there are no options, such as in the covid-19 pandemic situation, the decision to use online and blended learning becomes a political commitment and needs the government's action. If there is no government intervention, the pros and cons and differences in attitudes between groups towards the integration of ICT in teaching and learning will never be resolved. The government needs to emphasize what is better than others (Czerniewicz, 2020). If left untreated, people reject technology for weak but annoying reasons.

For example, in terms of blended learning, some believe face-to-face is superior to online and blended learning. Wahab Ali described some fake news such as online and blended learning as more inferior to face-to-face mode and inevitably infiltrates the system and further creates chaos and uncertainty. Wahab Ali emphasized that the government needs to highlight what must be done, what steps to take and provide genuine assistance [7]. The World Bank believes it is essential to carry out concrete research on the specific systems that should support learning [26]. Tumwesige also reminds the difficulties in applying technology and online knowledge so that significant steps are needed [21].

General guidelines are needed, even though it is not possible to create one strategy for all contexts. This means designing processes that are appropriate for a particular context and recognizing that technology decisions will be shaped in a way that reflects the differences, alliances, discourses, and perspectives that exist in a specific institution. Apart from policies, the government must play a role in teachers' resources, infrastructure, trust, and motivation [23].

Apart from the reasons for the unexpected Covid-19 pandemic so that schools and teachers are not ready, there is a need for questions about government policy regarding the application of technology in education. So far, the government has implemented several policies related to the application of technology in education. For example, in 2018, the government launch Permendikbud no 37 [5]. This decree amends the Regulation of the Minister of Education and Culture Number 24 of 2016 concerning Core Competencies (KI) and Basic Competencies (KD) of the 2013 Curriculum.

This change is to add the Informatics subject as a new subject at the elementary to high school levels in 2019. At the elementary level, the issue is in the form of extracurricular activities or local content. In junior and senior high school, learning already has core competencies and essential competencies as learning references [5]. Information and Communication Technology (ICT) is a subject with the same model as Informatics. ICT started as a lesson in 2006 to accommodate the development of science and technology that was developing very rapidly at that time. In 2013 these subjects were phased out considering that ICT would be integrated into all fields of study and not stand alone. It will more influence more significant targets as they are embedded in all subjects. Unfortunately, this goal has not been achieved, and children's ICT skills decline [4].

However, several officials at the Ministry of Education and Culture explained that Informatics is not replacing the ICT course. The Informatics material is a form or retrieval of STEM-C content (referring to Science, Technology, Engineering, Mathematics, and Computational Thinking). The STEM-C system pushes students to develop higher-order thinking skills as early as possible and based on the demands of the 2013 Curriculum.

This research formulates the problems statement:

1. Does the government have a good strategy regarding the implementation of technology in education?
2. How have the changes made from ICT to Informatics and Computational Thinking answer the needs of students and schools?
3. What should the government do so that technology integration in education can be more effective in the current situation, especially in this pandemic era?

3. METHOD

Research design. The study used a qualitative case study to identify the school leader's perception of the Indonesian government's policy of integrating technology into education. Yin (2009) said that case studies are the preferred

strategy when 'how' or 'why' questions are being posed, such as when the investigator has little control over events and when the focus is on a contemporary phenomenon within some real-life context. The study used the 'how' and 'why' of key issues to identify the school leader's perception of the Indonesian government's integrating technology into education [43].

It examined contemporary events. The investigator triangulated the data by using documentation and interviews of persons involved in the process of integrating the technology in education from the promulgation of ICT subject (2006), integration the technology in all subjects (2013) as the change of teaching ICT as a separate subject, and then promulgate the Informatics as a new course (2018). Yin (2003) said that the case study is widely accepted as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and the context are not evident" [43]. The integration of technology into teaching has been a practice in teaching in recent years. The researcher analyzed the three elements (1) the government strategy of technology integration in education (what and why), (2) the change and process of technology integration (how is it implemented), and (3) the recommendation as to the future steps for the technology integration in education.

Yin (2009) mentioned case study tactics that were used during the study.

Table 1. Case study tactics

<i>Tests</i>	<i>Case Study Tactic</i>	<i>The phase of research in which tactics occur</i>
Construct validity	* use multiple sources of evidence * Establish a chain of evidence * have critical informants review draft case study report	Data collection Data collection Composition
Internal validity	* Do pattern-matching * Do explanation-building * Address rival explanations * Use logic models	Data analysis Data analysis Data analysis Data analysis
External validity	* Use theory in single-case studies * Use replication logic in multiple-case studies	Research design Research design
Reliability	* Use case study protocol * Develop case study database	Data collection Data collection

Population and sample. In the research, the researcher selected six (6) schools located in Jakarta in Java Island as the representatives of the schools which have full support to integrate the technology in education started around 14 years ago since the implementation of ICT course, the change to incorporate the technology in all subjects, and the implementation of Informatics as a new course.

These schools were the first to integrate technology into education. Besides, these schools are leading in terms of educational quality in Indonesia. The researcher chose these schools that have followed all government strategies to integrate technology in education since the beginning of the process because, in the duration, much data regarding the process and the development can be collected.

Also, these schools were chosen based on good performance and reasonable responses. Based on the agreement with the school administrators, the researcher did not mention the name of the schools in the paper. The anonymous alphabetical codes from Respondent A to G were used.

The respondents were purposely chosen in three groups: The first group is the Buddhist school (A); the second is the two good catholic schools (Respondent B, C, and D); the third is the three members of the Association of National and Private School (ANPS). ANPS is a group of qualified private schools that becomes the pioneer in internationalizing primary and secondary education quality. These schools are set up to be international standard schools.

The participants as respondents consisted of School Principal or IT Leader. They were chosen because of their involvement in leading, facilitating, and/or implementing technology integration in education.

Table 2. Types and numbers of participants

School	Princip al	IT Leader	Respondents code
Buddhist School	1		A
Catholic School (1)		1	B
Catholic School (2)	1	1	C and D
ANPS member (1)		1	E
ANPS member (2)	1		F
ANPS member (3)		1	G

Data collection. There are three principles of data collection: using multiple sources of evidence, creating a database, and maintaining a chain of evidence. In the triangulation method, the researcher uses some sources, check and cross-check, and getting in-depth information [43]. The study collected the data by using interviews and documentation.

The interviews provide in-depth insights into the perspectives of key actors in the phenomenon under the investigation. In the study, the leader of the schools (including Information Technology (IT) leaders) were the key actors that have in-depth information and insight. The interviews enabled the researcher to ask the targeted questions which focused directly on the topic. An interview instrument guided the researcher to focus on the subject of the study. Through the interview, the researcher was able to ask questions about the perceived causal inferences developed from the document analysis [43].

The researchers contacted and sent questions to respondents using WhatsApp and electronic mail. The responses of respondents were categorized based on the questions, and

the researchers adjusted some responses. Some responses were treated as the sub of the questions.

The other data was the available documentation and archival records, both in the hard and soft copies, which are accessible on these institution's websites, etc., and provided by the respondents.

Table 3. Data collection method

<i>Data collection method</i>	<i>Description</i>
Interviews	Seven respondents from six schools consist of four Principals and three IT leaders
Documentation	Hard and soft copies of documents that are accessible in these institution's archives, websites, etc., as well as provided by the respondents.

This study used semi-structured interview questions to organize and ensure consistent data collection across the seven respondents. The interview questions were based on the research questions for the survey. The interview questions for the School Principal and IT Leader aren't different.

Data analysis consisted of coding, examining, categorizing, tabulating, and testing. Yin implicitly stated that the process of analyzing data requires creativity because strategies and techniques have not been well defined [43]. The study included two steps to analyze the data. These were the within-case analysis and cross-case analysis. The within-case analysis is the process of examining the data of each case. In this phase, the researcher found the emergent concepts, categorized them, abstracted them in the properties, and made a proposition. The cross-case analysis was used to analyze and compare the data in every single case. The researcher looked beyond the initial impressions and saw the evidence through multiple lenses. Based on the comparison of the six institutions through seven respondents, the researcher built a report.

4. RESULT AND DISCUSSION

Almost all respondents said that the government did not yet have a good strategy related to implementing technology in education. Respondent E said that government planning was unclear. "Planning seems patchy. Because the planning is not clear, there is no strategy," said Respondent A.

Respondents B, C, and D state that the government has a concept but is not implemented. Respondent G mentioned almost the same comments saying that the commitment to develop IT was contained in the Ministry of Education and Culture's Strategic Plan for 2020-2024 but is not implemented. "In the strategic plan, it was mentioned about the platform for spending for goods and services, teacher identification platforms, platforms for teacher competency development materials, provision of devices filled with lesson content and development of information systems."

Furthermore, respondent G stated that apparently, the government strategic plan was only a plan and wasn't implemented yet."

However, respondent F said that the government has a system that pushes all schools to upload and use the data of teachers and students. It seems that technology is already implemented in education. "Unfortunately, the said system is only about the database of teachers and students named Dapodik. The data didn't answer the needs of schools at all that need technology integration in the teaching-learning activities," said respondent F.

Respondent F still added his explanation that if we observe, there are quite many schools implementing IT well. However, these schools are located in big cities with good infrastructure and are supported by sound financial support. "They can integrate technology in teaching and learning activities, not because of government support and policies but because they take the initiative by themselves.

Respondents A, B, and C stated that ICT implementation in education is most clearly seen when the ICT concept is implemented in classroom learning. Therefore, respondents agreed to see the implementation of ICT from 2006 to the present, namely since the ICT subject was implemented, then deleted, and then Informatics promulgated. Respondents stated that the government had made a good move when starting ICT lessons.

Respondent A memorized his experience with the ICT subject. He said that every school had an IT concept; many schools prepare IT special personnel. In addition to teaching, IT personnel also help other teachers to develop in IT. With the existence of the ICT Subject, some schools did learning variations that were more interesting and enjoyable. The school principal felt disappointed and regretted that this concept was discontinued. "Information and Communication Technology was once the national curriculum content but not anymore," said Respondent A.

The elimination of ICT brought about a profound setback. Some schools no longer had ICT personnel who usually came from specialized agencies, third parties. As a result, exciting learning with many variations was lost. Many creativity had stalled. Removing ICT had many other consequences. Because it was no longer a priority for the government, support and assistance in finance and human resources for implementing ICT learning are lost. Finally, schools became withdrawn or had to work on their own. Affluent schools had their creations to develop their ICT.

Respondents A and F stated that eliminating the ICT subject had a destructive impact, namely the visible gap between affluent and poor schools. Because each school had to work independently without strong policy support, schools with mediocre abilities usually stop developing the use of ICT. Schools with sufficient resources and funds were determined to build their ICT. As a result, it appears that there were schools with technical support and schools that we're turning back to traditional. There was also a gap between cities in Java and outside Java. "Big cities couldn't be used as a benchmark because they move independently. If they follow the government's strategy, they could even fall further behind," said Respondent F.

After eliminating ICT, it turned out that another government plan, namely the integration of technology into all fields of study, did not happen. Several schools seemed to be given a signal not to build and implement ICT, which felt somewhat complicated and complex for some people.

Several people have new hopes when there is a subject named Informatics, which is considered to replace the role of ICT that is felt so needed by schools. However, Respondent E reminded us that ICT Subject and then Informatics are two different subjects. As mentioned above, the respondents saw that informatics was not a substitute for ICT. Informatics that emphasizes STEM focuses on increasing HOTS students and not paying attention to technology integration in education. Moreover, some comments from the government to implement computational thinking could lead to misunderstanding. Some schools understand that the government runs ICT subjects, then replaced them with Informatics, and then will emphasize Computational Thinking lessons. These three things are different and independent of one another. Maybe, there is a link between informatics and computational thinking. But it is different from ICT. ICT should still exist, and informatics and computational thinking should also exist. Respondent E stressed that ICT and Informatics are other, and the two are needed in education.

Respondents D and F regretted that the name was unclear. There are ICT, Informatics, and Computational Thinking. ICT subject is removed, and as if there are replacements. Respondent F said that the subjects should be well explained. Respondent G mentioned that there is a leap in thinking about ICT, Informatics, and Computational Thinking. Respondent G complained about the removal of the ICT subject. He said that the ICT competencies would prepare students to study Informatics and Computational Thinking. "I can't understand the way the government analyzes the Informatics without ICT subject. In my mind, students must learn ICT, and it will help them understand Informatics and Computational Thinking. "It is difficult to expect computational thinking and coding when the basics of computer literacy are not implemented," said Respondent E. Many people hope that the Informatics subject can be a solution for technology integration in education. However, they are confused by the concept of informatics, which encourages higher-order thinking skills, STEM, and computational thinking, and not to present technology in teaching and learning activities.

Respondent E also said that infrastructure is the most urgent matter to pay attention to. The government has spent less and less effort on this. "Infrastructure in the area is very minimal. This also points to the absence of a good strategy regarding the implementation of technology in education," said Respondent E.

Some respondents mentioned the current situation (pandemic situation). They said that ICT skills are very much needed. The pandemic period shows how many schools are not ready to integrate technology into education. Respondent F noted that distance learning and study from home are only effective in big cities, where in a small town with poor facilities and infrastructure, this does not happen." The integration of technology in education in big cities

happens because of the creativity of the school and teachers. "Everything goes on auto-pilot without government policy," said Respondent E.

What should the government do? The researcher summarizes the opinion of respondents who mention the eight steps that the government needs to take. Firstly, technology integration in education must become a government policy explicitly affirmed and stipulated in detail. According to Respondent F, the government needs to integrate technology into teaching by linking it to the eight National Education Standards. "Integration of educational technology must refer to the 8 National Education Standards; and it is standardized as a practical system, easy to operate even by teachers with less computer background."

Secondly, the integration of technology into education must become a program of every school. It can only happen if there is a big commitment of school leaders. In the beginning, they have to understand the benefits of using technology in education. Vanderkam describes that technology reduces cost and improves student learning outcomes by solving bad lectures, disengaged students, burned-out teachers, and a lousy environment [13]. Also, E. Szeto said that technology opens up many possibilities [44]. Technology opens up creativity and innovation in new ways, methods, and results. UNESCO also mentions the benefits of technology integration into learning that can be more student-centered and sustainable [45].

Thirdly, technology integrated into education must be formulated in detail and easy to be used by all education personnel, especially teachers and students, both in cities and in the regions.

Fourthly, the government needs to build, develop, and repair infrastructure. This should be the main one for running other programs. Even though the concepts and programs are well-formulated, the program cannot be implemented without infrastructure. Anita lie et al. (2020) said that the pandemic situation is the right momentum to improve infrastructure. Even Anita Lie et al. said that infrastructure improvement is imperative [19].

Fifthly, the concept of government must be clear, operational, and well understood. The idea is currently understood differently, even by schools within the same province. So far, B said that it seems that the government only tends to encourage others to integrate technology in education but does not conceptualize and implement excellent and clear programs.

Sixthly, apart from infrastructure, the government needs to create a service-learning center. "The government can start to make service learning centers that can be accessed easily by students. This is a way out for schools or students from schools whose technological capabilities are weak."

Seventh, the government must improve the quality of human resources. The government must improve the technical competencies of all teachers. They are future teachers in digital society [6], [35]. Teachers have to get good training in technology and have time to interact with it. They must avoid overload in teaching. Anita lie et al. Find that good infrastructure would be useless if teachers do not improve their capacity, especially in integrating technology with pedagogy and content knowledge [19], [25].

Respondent E stated that the government needs to make an ICT Masterplan in education similar to the master plan owned by Singapore.

5. CONCLUSION

The researcher examines the Indonesian government's strategy for implementing technology in education. It becomes essential because technology has become a necessity in running education in a pandemic situation. COVID-19 pandemic encourages schools to implement distance learning. Distance learning generally uses some variants, which in essence promotes the use of technology. Several technologies used are typically synchronous online software in the form of zoom, Google Meet, etc. Also, teachers are encouraged to compile learning materials that may be used for distance learning. Most teachers agree that they are not prepared to do so. It raises questions about the government's strategy for implementing technology in education.

The study analyzes the integration of technology in education from 2006 until now when the government applies Information and Communication Technology (ICT) as a new subject in Primary and Secondary Schools in Indonesia. Only around seven years, in 2013, the policy was changed. The government removed the issue and said that the ICT skills aren't taught as a separate subject but integrated into all topics. In 2018, the government launched a new topic named Informatics. Although some educators understood the new course as the new name of ICT subjects, the government said that the subject refers to higher-order thinking skills and computational thinking.

Using the qualitative case study, the researcher interview seven respondents from six schools located in Jakarta to know (1) their perception of government policy for technology integration in education, (2) their perception of the integration process from the launching of ICT subject until Informatics subject if they already answer the need of students, (3) and their suggestion to government to implement better the technology in education.

As a result, the government still doesn't have a good policy and master plan for integrating technology into education. The government tries to implement some policies and strategies, but they are only on paper and weak in implementation. They are only discourses. The government only develops the Dapodik for the data of teachers and students, but the data didn't answer the need for schools and teachers about the need for technology in teaching-learning activities. The respondents suggest some solutions, including a strong and clear policy of technology integration in education (make a master plan), the development of teachers' skills, and infrastructure.

This research can be a good recommendation for the government in determining distance learning policies and education solutions in the Covid-19 pandemic. Schools and teachers can also get good guidelines and evaluations regarding the integration of technology in education to identify strengths and weaknesses in the implementation of learning during the pandemic.

This research is still limited to the perceptions of schools with sound finance and infrastructure when implementing distance learning. Further research needs to be carried out to capture the perceptions of schools in the middle and low quality. Also, it is necessary to capture the situation and problems of schools outside Java which are very limited in human resources and infrastructure.

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