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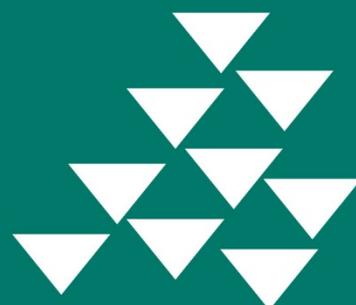


DIGITAL KIDS ASIA-PACIFIC



INSIGHTS INTO THE DIGITAL LIVES OF CHILDREN

National Report Indonesia



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FOREWORD

Currently, almost everyone in the world is an information and communication technology (ICT) user. However, the widespread use of technology by children should raise a serious concern among parents and education stakeholders. With the ease and freedom of ICT access, every child can search for information quickly and instantly, and these pose risks that parents and policymakers should be aware of.

The impact of the continuous use of digital technology on the development of children's learning both at school and at home needs to be regulated in such a way so that children can have certain level of ICT literacy. This Indonesian student survey is part of the UNESCO Digital Kids Asia-Pacific (DKAP) project, which aims to explore the attitudes and behavior of students in using ICT in an educational context. The survey found that the students' level ability to understand how to protect themselves and others from the potential harms of the digital world is relatively low, and the way they use ICT tends to be less innovative.

We hope that the results of this survey would help UNESCO as well as national education authorities in the region prepare the proper strategy in mediating the children development on the one hand and the digital technology growth on the other. The survey results would also serve to provide evidence of whether or not we have achieved the sustainable development goals in the field of education, that is ensuring inclusive and equitable quality education for all. In this regard, policies that equip our children with improved access to and skills in the use of ICT both inside and outside the school environment need to be advocated further.

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ACRONYMS

APJII	Indonesian Internet Service Providers Association
BRIN	The National Research and Innovation Agency
BPS	Central Bureau of Statistics
DKAP	Digital Kids Asia-Pacific
FAANG	Facebook, Apple, Amazon, Netflix, and Google
HDI	Human Development Index
HP	Handphone
ICT	Information and Communication Technology
IP	Internet Protocol
IP-TIK	The Technology, Information and Communication Development Index
Kab	Kabupaten (District)
KTSP	The Education Unit Level Curriculum
Menristek	The Minister of Research and Technology
SEAMEO	Southeast Asian Ministers of Education Organization
SI	Content Standard
SKL	Graduate Competence Standard
SMA	Senior High School
SMK	Vocational School
TVRI	Televisi Republik Indonesia
UN*	United Nation
UN**	National Exams
UNBK	The Computer-Based National Exams
UNESCO	The United Nations Educational, Scientific and Cultural Organization

EXECUTIVE SUMMARY

The report on the results of this ICT survey, with entitled "Digital Kids Asia-Pacific (DKAP): Insights into Children's Digital Citizenship, Country Report – 2021 Indonesia" is to understand the knowledge, behavior and attitudes of children in the digital world which are interrelated with one another. The purpose of this survey is to determine the practice of using ICT in Indonesia which is associated with the digital competence of citizens, in this case students, where one of the practices is to study the attitudes, behavior and use of students' ICT in an educational context. This report was also prepared and developed in the context of a groundbreaking project by UNESCO Digital Kids Asia-Pacific (DKAP) in the development of a comprehensive education policy and statistically validated, evidence-based survey of children's knowledge, behavior and attitudes towards ICT.

Supported by UNESCO Bangkok, in close collaboration with the SEAMEO Secretariat Bangkok, the objective of this report is based on as follows: 1) generate a validated statistical framework that can be used in accordance with research ethics, as well as the use of reliable tools to measure digital citizenship competencies. 2) create a comprehensive baseline from Indonesian country studies to examine students' attitudes, behavior and use of ICT in an educational context. 3) Identify factors that associated with differences in students' digital competencies from the national perspective. The results of this ICT survey are expected to yield a balanced perception.

The DKAP framework in this survey uses five domains: Digital Literacy, Digital Security and Resilience, Digital Participation and Agency, Digital Emotional Intelligence, and Digital Creativity and Innovation which consists of 16 identified competencies (T. Shin et al, 2019). The framework is then used as the basis for online survey to measure the digital citizenship competence of children in Indonesia. This given survey was distributed to 1,257 high school/vocational students with the range of age between 15 years and 16 years (maximum) in 34 provinces in Indonesia, then 18 Provinces were selected for their representation based on the category of Technology Development, Information and Communication Index (IP-TIK) in 2018 and sort out according to type: high, medium, and low value. Each province was selected 1 district (representative from rural areas) and 1 city (representative from urban areas), so that the results obtained 18 districts and 18 cities.

CHAPTER 1 INTRODUCTION

A. Global digital development of student competencies

1. Access to digital devices and the internet

The speed of access to information through the internet has become everyone's need. This information speed is supported by three important infrastructures, namely: connectivity through information and communication technology, cloud (virtual data warehouse), and mobile and digital devices. Almost all human activities today depend on this technology. According to DataReportal from Singapore, nearly 4.54 billion people or nearly half of the world's population access the internet. Today, the flow of information and the world economy is also determined by the products and services of digital technology companies. Tech giants such as Facebook, Apple, Amazon, Netflix, and Google (FAANG) currently have high share value in the stock market. As of January 2020, around 3.8 billion users are busy with social media accounts every day (DataReportal, 2020). The new generation spends more on accessing the internet, especially on social media platforms, and using digital devices compared to reading conventional media such as newspapers and magazines, watching TV, or just listening to the radio.

Internet users spend an average of 6 hours 43 minutes per day, and this means that 40% of our time a day is used to access the internet excluding the times needed to access our digital devices such as smartphones and smart homes that are always connected to digital platforms. The cumulative total of approximately internet user access in the world spends 1.25 billion years online in 2020, in which one-third of that time is spent accessing social media (DataReportal, 2020).

Table 1. Top 3 (higher, middle, and lower) countries using internet

No.	Name of Country	Time (hour/minute)
1.	Philippines	09.45
2.	South Africa	09.22
3.	Brazil	09.17
4.	Indonesia	07.59
5.	Portugal	06.38
6.	India	06.30
7.	Vietnam	06.30
8.	Germany	04.52
9.	Netherlands	04.37
10.	Japan	04.22

Source: Globalwebindex in <https://datareportal.com/reports/digital-2020-global-digital-overview>

The Philippines is the highest country where users spend on the internet at an average of 9 hours 45 minutes per day compared to Japan which is only 4 hours 22 minutes per day. Despite the increasing number of internet access through mobile devices, three-quarters of users aged 16 – 64-years-old still access the internet through laptop or desktop computer. However, about 53% of web page access data, according to Statcounter, comes from mobile phones compared to 44% through the computer (laptop/desktop).

a. Internet user figures, age, and gender

By the end of 2019, the world’s population was recorded at 7.75 billion with an urbanization flow of 55% (UN in DataReportal, 2020). Internet access in the world has grown to 4.54 billion users or about 7% in 2020, while the number of mobile phone users is 5.19 billion and social media users are 3.8 billion. From this data, it is revealed that social media users in the world are dominated by men of 55% and remaining female users of 45% (DataReportal, 2020). Based on a survey conducted by the Indonesian Internet Service Providers Association (APJII) in 2018, the total internet users’ percentage in Indonesia was 64.8% of the total population in Indonesia for approximately 264.16 million. Field data were taken during the period of March - April 2019. This survey involved 5,900 samples with a margin of error of 1.28 percent. In total, male and female internet users in Indonesia reached by 39.39% from the total population (KataData, 2018).

Table 2. Internet users by age groups

Age	Internet Access	No Internet Access
15 - 19 Years	91%	9%
20 - 24 Years	88.5%	11.5%

Source: Indonesian Internet Service Providers Association (APJII), 2018

According to APJII, data on internet users by educational background shows that the ones who studied and have not graduated are equal in number to those who have graduated from a doctoral program. As for the world level, half of the internet users in the African continent are under 20-years-old, while in South Asia around 460 million users are under 13-years-old.

Benefits of ICT

Information and communication technology is currently being used by students to make it easier to do assignments and find sources of information. The presence of the Google search engine has long been used as the fastest access to finding the necessary information sources. For instance, in China, internet users and especially students have long switched to the local search engine Baidu following the government’s blockage of Google. In the world of education, there are at least four categories of benefits of ICT. First, it is a source of knowledge with artificial intelligence technology on search engines and other digital platforms. Second, as a learning aid, artificial intelligence plays an important role at this time. Teachers can use ICT to create exam questions, references, interactive learning videos, and distance learning communication tools with students. Third, it serves as a student aid through independent learning, question exercises, learning simulations, especially for experiments. Fourth, ICT serves as an infrastructure for storing learning materials online both on a small, medium, and more complex scale (Prayitno et al., 2018).

b. Negative impact of ICT

Advances in information technology make it easier for students to get information instantly, without the hassle of going to newspaper stalls or bookstores like the generation before the internet. However, this has led to a lot of misuse of internet access by students, one of which is the ease of accessing social media platforms. Even though the requirements for accessing and having a social media account include creating an email at least 13 years old, this age limit does not apply to Google accounts for education (support.google.com). Ironically, more and more elementary school students under 13-years-old have social media accounts such as Instagram, Facebook, or Tik Tok. As a result of free and unwise access to social media, problems and disputes often arise between users who are still children and adolescents. Social media has the impact of disrupting student concentration, fraud or misappropriation of identity, even disrespectful language and victims of bullying on social media (Putri et al., 2016).

An even greater negative impact is the exposure of students in their teens to accessing pornographic contents which can damage students' mentality as a younger generation. Pornographic contents tend to plunge students/adolescents into irresponsible sexual behavior and problems (Hariyani et al., 2012). The result can lead to cases of underage prostitution and the danger of child trafficking.

On the other hand, easy access to online teaching materials and answers makes students lazy to process learning resources. Instead of adding knowledge easily and quickly, students are tempted to plagiarize and copy and paste answers to their schoolwork. Such as the Brainly website platform, which is a place for sharing knowledge and learning together for around 200 million students and education experts around the world who are equipped with artificial intelligence machines. However, many students use it to find answers from schoolwork and copy them directly without processing.

The developing negative issues of ICT

The developing negative issue of ICT in the global scope is the privacy of internet users, where the use of personal data for the benefit of advertisers is increasing. Internet users voluntarily fill out personal data forms on email, social media, online shopping, and other digital platforms including gaming accounts. 64% of internet users today are concerned about how a company or application platform uses their data. Globally, internet users in Colombia rank the highest as much as 80% of their concerns over the risk of misuse of personal data. Meanwhile, internet users in Japan rank at the bottom of 40% (GlobalWebIndex, 2020).

The impact of the rampant hoaxes (fake news) has also increased internet users' distrust of media and news that are sourced from the internet. A survey conducted by The Reuters Institute for the Study of Journalism in January 2020 stated that 56% of people aged 18 years and over in 40 countries in the world are concerned and worried about distinguishing which news or broadcast is real and fake on the internet. Based on this survey, the level of distrust increased from 54% a year earlier. The countries that were most worried and exposed to hoaxes were Brazil at 85%, followed by Kenya at 76%, and South Africa at 72% because of the massive use of social media. The country with the lowest exposure to hoaxes was the Netherlands at 31%. The increase in hoax news and public distrust of the news that circulated occurred in Hong Kong, 51%, increasing 6% from the previous year. This is due to the democratic conflict between the government and student protesters. In Finland, there was also a 4% (56%) increase due to false and misleading disinformation from Russia (Newman et al., 2020).

As for the massive digital advertising on the internet, many internet users have installed software to block ads. GlobalWebIndex released its survey results which found that almost half, namely 49% of total internet users aged 16 - 64 years, use ad-blocking software. Indonesia is the country with the largest number of users using ad blocking software, with 65%, followed by the Philippines with 63%, and Malaysia with 59%. As for the lowest use of ad blockers is Japan, at 23%. However, the reason internet user respondents use ad-blocking software is not because of privacy and personal data security issues, but because they are disturbed by a large number of incoming advertisements while accessing the internet.

This negative impact related to the privacy of the lives of internet users backfires because of the tendency to adopt technology and devices that are specifically made to share more personal data in users' lives. The number of users and homes in the world that adopt a smart home device (a smart device connected to the internet) increased by a third during 2019 (Statista, 2020). This shows that tens of millions of users are consciously spending an average of \$550 a year on smart home devices that actively record and track the things the user does in his/her personal life.

B. Research objectives

1. This study aims to determine the practices that exist in Indonesia regarding the digital competence of citizens, in this case, students, in the following ways:
2. create and release a statistically validated and reliable framework, and a reliable tool for measuring digital citizenship competence.
3. create a comprehensive baseline data from Indonesia and validation study to understand student's attitudes, behaviors, and the use of ICT in an educational context.
4. identify the factors associated with differences in the background of student's digital competencies.

C. Research questions

To find out more about the objectives of this DKAP project, the main questions of this study are as follows:

“Can DKAP measure support the digital competence of students in the Asia-Pacific region?”

The followings are sub-research questions:

1. What criteria can measure students' digital competence?
2. What are the validity and reliability of the DKAP survey?
3. How do individual characteristics such as gender, family background, schools and local communities influence the digital competence of 15-year-old students?
4. What can be distinguished from the practice of digital competence of 15-year-old students across the country?

CHAPTER II LITERATURE REVIEW

A. Review of literature

The challenge of education in the industrial era 4.0 is that human civilization is built with fast and massive technological sophistication. This makes student competency demands higher in line with the development of science and technology. Literacy in this era, it is not enough just literacy skills to read, write, and count, but there is something that is no less important, namely how someone can understand digital information correctly. For that, students are required to be able to master digital literacy. The importance of digital literacy learning in student learning today cannot be separated from the rapid development of technology and information. This condition is also called the disruptive era, which is an era where old habits are radically abandoned as a result of the development of digitalization (Sormin et al., 2019).

Digital literacy is an ability that teachers and students should have in understanding and using the information appropriately. However, not all teachers and students have these digital literacy skills. The results of research conducted by Asari et al (2019) show that teachers and students do not all have digital literacy skills. This is because some teachers and students in training held in Malang Regency (East Java) still do not understand how to effectively utilize digital information media. Therefore, digital literacy learning needs to be applied because it is a practical solution to building digital literacy competencies for teachers and students so that human resources who have character and can compete in the global world are formed.

Digital skills must be mastered by both educators and students, one of the reason is that digital literacy skills will improve learning processes and methods to become more effective and efficient, which have an impact on increasing student competence. The results of research conducted by Elpira (2018) show that there is a strong relationship between the use of digital literacy and increased learning. The learning improvement referred to in this study is the conscious effort made by all elements of the school environment in improving the learning process or method to be more effective and efficient. While the results of the coefficient of determination in this study obtained a value of 0.448 which indicates that the independent variable affects the dependent variable by 44.8%. Meanwhile, 55.2% was influenced by other factors that were not examined in this study.

In line with Elpira's study, the role of technology in education in the industrial era 4.0 greatly affects the competence of graduate students. The use of informatics technology, especially in the learning process, can shape students into a competitive generation. The results of research conducted by Surani (2019) state that educational technology has a very important role in the industrial era 4.0, through the use of technology products in the learning process such as E-learning, learning applications, self-study platforms, and others. This will create a creative, innovative, and competitive generation. In addition, the development of cyber systems in the world of education will allow teachers to provide up-to-date teaching materials according to the times that can directly display the material in classrooms online. In other words, the development or provision of cyber network facilities as part of the integration with information technology networks in educational institutions will create various conveniences, both in academic and non-academic administration and teaching and learning processes. This will lead to an increase in the quality of human resources output from an educational institution.

The survey conducted by the University of Oslo in 2015 also concluded that there is a strong relationship between student and teacher perceptions of digital competence to solve problems with classroom learning, especially those related to the use of ICT. In addition, the results of this study also concluded that digital competence between teachers and students is also stated to be important in supporting the learning process in the classroom. Following are the results of the research:

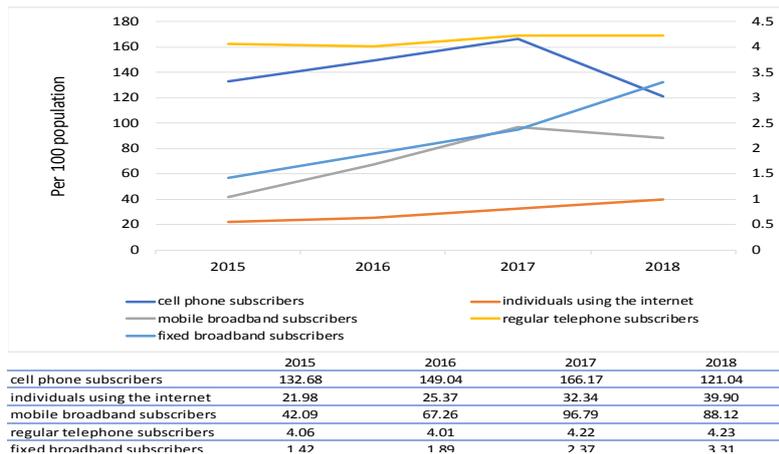
“The most important finding was the strong association between the student teachers’ perceptions of digital competency to resolve challenges relating to information and communication technology (ICT) in schools and their instructional self-efficacy, which was explored via two dimensions: (1) self-efficacy for maintaining discipline and (2) self-efficacy for influencing students’ use of ICT in the service of learning. Implications for practice are discussed. We argue that digital competency among student teachers is important for sustaining instructional self-efficacy in technology-rich classrooms”. (Elstad & Christophersen, 2017, p. 1)

1. The development of ICT in Indonesia

Indonesia is the fourth most populous country in the world. In terms of the level of use of ICT, Indonesia ranks 115th in 2016, higher than India as the country with the third-largest population which ranks 144th. Other highly populated countries, such as China, ranks 69th and the United States ranks 20th. The country with the highest usage sub-index in 2016 was Denmark. Regarding the development of Indonesian ICT, it has increased from 2015 to 2016. In 2015, Indonesia ranked 114th out of 175 countries, while in 2016 Indonesia ranked 111th out of 176 countries (ITU, Measuring Information Society, 2017). When compared to ASEAN countries, Indonesia’s position is above Cambodia, Timor Leste, and Myanmar.

In the last four years, in general, there has been a positive trend in several indicators of technology, information and communication in Indonesia. In terms of communication, cellular phone subscribers per 100 population continued to increase until 2017, then decreased in 2018 by 121.04, which indicates that one resident subscribes to more than one card. Unlike the world phenomenon, fixed telephone subscribers per 100 populations have tended to increase from 2015 to 2018, where in 2018 the value was 4.23, which means there are four to five fixed telephone subscribers per 100 Indonesian residents. In line with this, the development of internet penetration in Indonesia has also experienced a positive trend, from 21.98 in 2015 to 39.90 in 2018 (Figure 1). The increase in internet penetration is supported by the expansion of internet broadband provision in Indonesia. Active mobile broadband subscribers increased until 2017 and decreased in 2018 to 88.12 per 100 populations. Meanwhile, fixed broadband subscribers tended to increase from year to year to 3.31 in 2018.

Figure 1. The development of ICT Indonesia, 2015-2018



Source: Central Bureau of Statistics (BPS), 2018

Provinces in Indonesia have different levels of ICT development, and this creates disparities between provinces, particularly in terms of ICT development. Even though there are disparities between provinces, household access to the internet has always increased from year to year. In rural areas with various limitations, they still experience problems in accessing the internet. Urban household internet usage in 2018 reached 78.08 percent, while in rural areas it reached 51.9 percent. The policy of providing internet access evenly to remote areas continues to be implemented so that all people have equal access to information.

Furthermore, internet penetration in Indonesia has also continued to increase. Similar to households, there is a gap in internet penetration in urban and rural areas, i.e. almost twice as many individuals use the internet in urban areas as in rural areas. In terms of comparison between provinces, disparities in the level of internet penetration still occur. In 2018, there were four provinces with internet penetration of more than 50 percent, namely DKI Jakarta, DI Yogyakarta, Riau Islands, and East Kalimantan. Meanwhile, internet penetration in Maluku, Central Sulawesi, West Nusa Tenggara, West Sulawesi, North Maluku, East Nusa Tenggara and Papua provinces was still below 30 percent.

The development of ICT in Indonesia has progressed very rapidly. This is due to the strong era of disruption and globalization. Recently, the use of ICTs such as mobile phones, computers and internet networks is a facility that has dominated various life activities, including in the world of education. Of course, the development of ICT up to now requires a process. The following will describe the process of ICT development in Indonesia, which is quoted from the idntimes.com page with the author Herdianto (2020).

The first information technology in Indonesia on record is the radio. The inauguration of Indonesia's first radio took place on June 16, 1925. Radio was the main source of information at that time. Almost all information obtained by Indonesian citizens comes from radio, such as how Japan's defeat in World War II and its conditions. After several decades, Indonesia's first television station, Televisi Republik Indonesia (TVRI) was inaugurated with its first broadcast commemorating the Independence of the Republic of Indonesia, on 17 August 1962. On 8 July 1976, the Palapa satellite was launched. Since then, television broadcasts have improved better. The Internet began to enter Indonesia on June 24, 1988. This was based on the first Internet protocol (IP) records registered by the University of Indonesia on June 24, 1988. The Internet was originally used for work using the email system. Entering the 2000s, the Indonesian people began to understand and use the internet massively which was used for various kinds, including to support the learning process.

The following will describe the ownership of ICT devices and their use in grade 9 students in Indonesia. The analysis was sourced from secondary data related to ICT Literacy obtained from the

Education Assessment Center (2019). The data is the result of filling out questionnaires for students whose schools hold the 2019 National Examination using the computer-based national exams (UNBK) mode throughout Indonesia. In each school that participates in the national exam (UN) with UNBK mode, as many as four students are taken randomly to fill out a questionnaire about ICT literacy. The total number of all students in national who filled out the questionnaire was 133,072 students.

Table 3. Ownership of ICT equipment for grade 9 students in 2019 in Indonesia

No	Questions	Number of Students Who Answered (%)			
		None	One	Two	Three/more
1	How many computers/laptops are available in your house?	55,80	31,86	8,29	4,05
2	How many Tablets / HP smartphones / I-Pads are available in your house?	11,31	35,47	19,45	33,77

Source: Center for educational assessment, in 2019 (Data processed)

From table 3 above, it can be described that there are still many students who do not have computers or laptops at home, which is 55.80%. However, only 11.31% of students at home do not have a Tablet / HP smartphone / I-Pad. This means that the majority of grade 9 students can use ICT in their learning process. The following shows the use of the above ICT tools in supporting the learning process. With the question "In this year, how often do you use your laptop, computer, or smartphone to complete the activities below."

Table 4. Utilization of ICT devices in student learning activities

No	Statements	Never (%)	Once every 1-2 months (%)	Once every 1-2 weeks (%)	Very day (%)
A	Creating multimedia presentations (with images, sound or video)	38,68	29,80	23,44	8,08
B	Writing or editing text for school work (eg, using <Google Docs>, <Microsoft Word>)	25,89	33,09	32,81	8,21
C	Find information online about the general knowledge or phenomena that occur at this time (eg, climate change, oil spills, measure the height of a building).	26,91	22,72	29,34	21,03
D	Collecting and recording data (eg, using data loggers, <Google Form>, spreadsheets)	41,94	22,98	23,83	11,25
E	Analyzing the data that you collect yourself (eg, using <Microsoft Excel>)	43,06	26,53	23,61	6,80
F	Send or share the results of your experiments or research	52,22	22,40	18,74	6,64
G	Planning and managing work or projects (example: dividing tasks, managing deadlines)	44,64	23,16	22,72	9,48

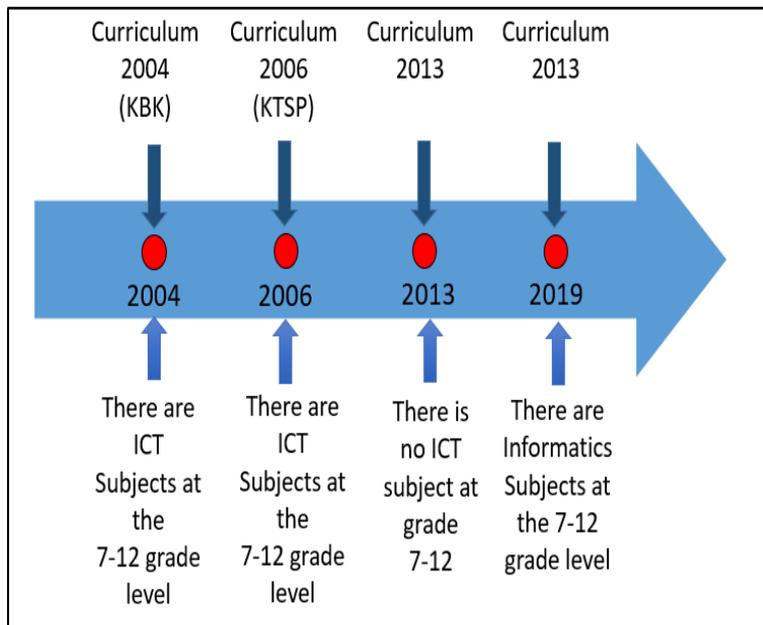
H	Collaborating with other students to create digital content (example: presentation material)	32,05	26,56	27,58	13,81
I	Using digital learning content (eg from youtube, tve.kemendikbud.go.id, khan academy or other)	29,51	22,84	27,03	20,63

Source: Center for educational assessment, in 2019 (Data processed)

2. Review of ICT policy development in Indonesia

Strategies in producing literate human resources with technological advances, one of which is by integrating the use of Information and Communication Technology (ICT) in the national curriculum. Thus, students will be able to apply ICT in learning activities. In addition, the application of ICT can also be used in all aspects of daily life and even useful in the world of work. The following will explain the development of ICT subjects that are integrated into the curriculum in Indonesia.

Figure 2. The development of ICT in the national curriculum lesson



In 2004, ICT subjects were first integrated in the National Curriculum. This is stated in the 2004 Curriculum document which is often referred to as the Competency-Based Curriculum (KBK). Based on the Decree of the Director General of Primary and Secondary Education No. 399a / C.C2 / Kep / DS / 2004 of 2004 concerning Competency-Based Curriculum, education units for SMP / equivalent and SMA / equivalent are required to provide ICT subjects/skills. These lessons are given at all grade levels with a time allocation of 2 hours per week.

In 2006, the Ministry of National Education launched a new curriculum, namely the 2006 Curriculum which is often referred to as the Education Unit Level Curriculum (KTSP). The 2006 Curriculum was enforced based on the Regulation of the Minister of National Education No. 24/2006 on the Implementation of Ministerial Regulation No. 22 concerning SI and No. 23 regarding SKL. Although the curriculum has changed, ICT subjects are still compulsory for junior high school students/equivalent and high school students/equivalent at all grade levels.

In 2013, the Ministry of Education and Culture launched a new curriculum, namely the 2013 Curriculum. The ICT subjects in this curriculum were eliminated at all levels of education. This is contained in the Regulation of the Minister of Education and Culture number 59 of 2014 concerning the 2013 Curriculum for Senior High Schools / Madrasah Aliyah and the Regulation of the Minister of Education and Culture number 58 of 2014 concerning the 2013 Curriculum for Junior High Schools / Madrasah Tsanawiyah.

The reason is that the Ministry of Education and Culture has suspended ICT lessons because it considers that ICT is not to be learned, but is used to help study other subjects. This is in accordance

with what was stated by the Minister of Education and Culture at that time, Nuh (2014) who said that:

"The elimination of ICT subjects is a consequence that ICT is a learning tool that is absolutely implemented by teachers in all subjects being taught".

In line with that, the next Minister of Education and Culture, Muhajir Effendy (2018) also said that:

"Information and communication technology do not need to be a subject in schools".

According to him, information and communication technology or ICT should no longer be studied but mastered in everyday life. In 2019 the Ministry of Education and Culture re-launched ICT subjects at the junior / senior high school level/equivalent, which is named informatics. The Head of the Center for Curriculum and Book of the Ministry of Education and Culture, Awaluddin Tjalla (2018) said that:

"In 2019, ICT subjects will be applied again in schools. However, it changed its name to informatics which will be taught at the junior high school level with two hours of lessons per week. Meanwhile, for SMA, the choice will be included with a portion of up to three hours per week".

These changes are contained in the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 36 of 2018 concerning Amendments to the Regulation of the Minister of Education and Culture number 59 of 2014 concerning the 2013 Curriculum for Senior High Schools / Madrasah Aliyah. The regulation explains that for Crafting Subjects and/or Informatics Subjects, the education unit organizes one or both of these subjects.

Meanwhile, at the Senior High Schools / equivalent level, it is stated in the Regulation of the Minister of Education and Culture of the Republic of Indonesia number 35 of 2018 concerning Amendments to the Regulation of the Minister of Education and Culture Number 58 of 2014 concerning the 2013 Curriculum for Junior High Schools/Madrasah Tsanawiyah. In this regulation, it is explained that the implementation of Informatics learning as an optional subject is carried out starting from the 2019/2020 school year according to school readiness. The reason for the re-emergence of ICT-related subjects according to the regulation is that:

"Informatics is a scientific discipline that functions to provide human thinking skills in overcoming increasingly complex problems so that they can compete in the 21st Century. Information and Communication Technology as a part of Informatics is a basic need of students in order to develop their abilities in the digital era. Informatics subjects are elective subjects that are organized based on the availability of teachers according to academic qualifications and competencies, as well as infrastructure in educational units."

CHAPTER III RESEARCH METHODS

This research is a quantitative study that uses an online questionnaire as a means of collecting data regarding internet use among 15-year-old students. This section describes the research methodology, including the profile of ICT in Indonesia, target age groups, participant sampling, data collection procedures, and statistical validation of assessment items. All important decisions at each step are made with care based on the mutual agreement of all parties including researchers, national research teams, project teams, partners, experts, and other relevant stakeholders. The limitations of the research and challenges are also presented.

A. Target age group sample

Based on the directions from UNESCO, this survey focuses on students aged 15 years for some reasons: (1) There is a sustainable development goal, namely the proportion of youth and adults with ICT skills. The target age of this group is appropriate because the UN defines youth as people between the ages of 15 and 24 years. (2) Considering the different stages of ICT development in the Asia-Pacific region, strategically targeting older children can contribute to reducing potential gaps in access to and use of digital devices in the short term. (3) Easing the data collection process, as the involvement of younger children requires additional time and resources such as the presence of parents in data collection, special training for data collectors, and the need to take into account the various reading skills of children.

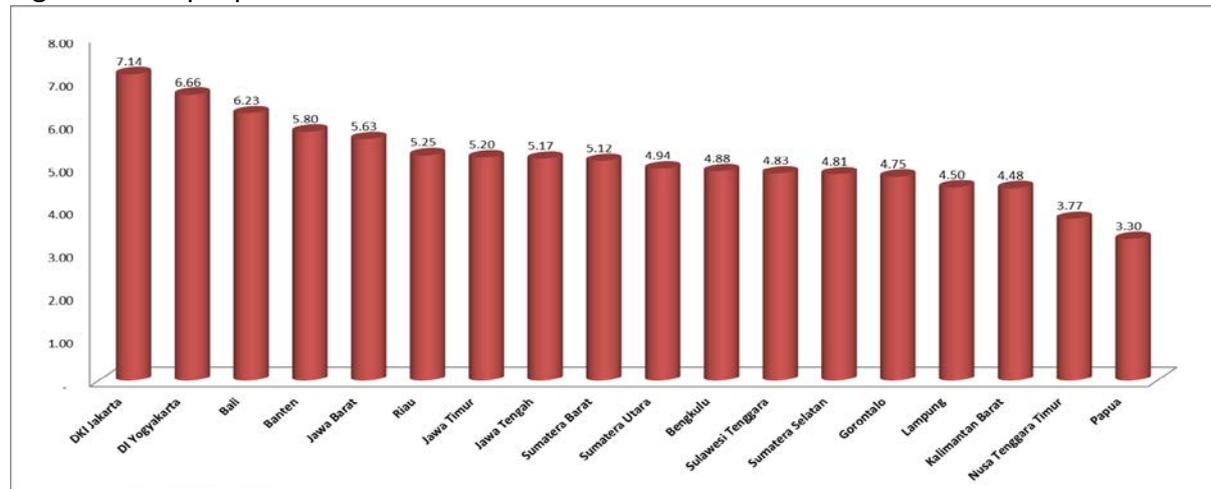
B. Sample

This survey has a large heterogeneous population, and therefore multistage random sampling is used to obtain a representative sample. Multistage random sampling is a sampling method using a combination of 2 (two) or more different sampling methods. According to Zuriah (2006), multistage sampling is an extension of multiple samples. The samples taken were more than doubled. Compound sampling can only be done if the population is large enough (Maman, 1993 in Margono, 1997). Multistage sampling is a special case of cluster sampling, wherein in the second stage, all elements are not selected from the cluster, rather than are selected randomly. This multistage random sampling can use a combination of other sampling techniques. At least two techniques can be used in this technique, such as simple random, stratified random, systematic random, and cluster random. In this study, the combination of sampling methods used was clustered stratified sampling.

In this survey, the first step is determining the location of the Province. Of the 34 existing provinces, 18 provinces were selected with the Technology, Information and Communication Development Index (IP-TIK) category in 2018 with the high, medium, and low categories. The Information and Communication Technology Development Index (IP-TIK) compiled by the Central Bureau of Statistics (BPS) was developed by the International Telecommunication Union (ITU) under the name of ICT Development Index (ICT DI). IP-ICT is very important as a standard measure of the level of ICT development in a region that can be compared across time and between regions. In addition, IP-TIK is able to measure the growth of ICT development, measure the digital gap between regions, and measure the potential for ICT development (BPS, 2019).

Based on IP-TIK in 2018, here are the details of the provinces that became the survey samples:

Figure 3. Sample provincial achievement ICT index



Source: Central Bureau of Statistics (BPS), 2019

After determining the province based on the index of ICT (Figure 3), the next step is determining the District and the City as a representative of the Rural and Urban. The main reference for selecting districts and cities from each selected province is based on the 2019 Human Development Index (HDI) data issued by BPS. Each province consists of 1 district (representative of Rural Areas) and 1 city (a representative from Urban) to obtain the results of 18 districts and 18 cities. The main considerations for using HDI as a basis for sampling include:

1. HDI is an important indicator to measure success in efforts to build the quality of human life (community/population).
2. HDI can determine the rank or level of development of a region/country.

Based on the search results, the details of the district and the city of the sample of this research are as follows:

Table 5. List of district and city samples

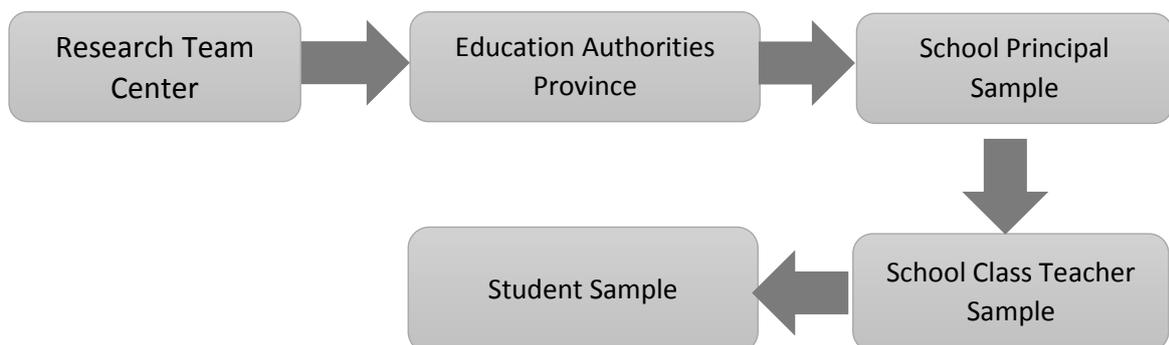
No	Province	District/City	No	Province	District/City
1	DKI Jakarta	Jakarta Selatan	10	Sumatera Utara	Kota Medan
		Jakarta Utara			Kab. Nias Barat
2	D.I. Yogyakarta	Kota Yogyakarta	11	Bengkulu	Kota Bengkulu
		Kab. Gunung Kidul			Kab. Kaur
3	Bali	Kota Denpasar	12	Sulawesi Tenggara	Kota Kendari
		Kab. Karangasem			Kab. Buton Tengah
4	Banten	Kota Tangerang Selatan	13	Sumatera Selatan	Kota Palembang
		Kab. Lebak			Kab. Penukal Abab Lematang Ilir (PALI)
5	Jawa Barat	Kota Bogor	14	Gorontalo	Kota Gorontalo
		Kab. Cianjur			Kab. Gorontalo Utara
6	Riau	Kota Pekanbaru	15	Lampung	Kota Bandar Lampung
		Kab. Indragiri Hilir			Kab. Tulang

No	Province	District/City	No	Province	District/City
					Bawang Barat
7	Jawa Timur	Kota Surabaya	16	Kalimantan Barat	Kota Pontianak
		Kab. Sampang			Kab. Sekadau
8	Jawa Tengah	Kota Semarang	17	Nusa Tenggara Timur	Kota Kupang
		Kab. Brebes			Kab. Sabu Raijua
9	Sumatera Barat	Kota Padang	18	Papua	Kota Jayapura
		Kab. Pasaman			Kab. Nduga

Source: Central Bureau of Statistics (BPS), 2019 (Data processed)

The final step is selecting schools based on district and city data in each province. For the selection of school samples, 1 public senior high school, and 1 public vocational high school were taken from the highest 2019 Computer-Based National Examination (UNBK) results in each selected regency and city. After selecting the schools, the selection of 30 students who filled out a questionnaire was taken randomly by the principal in the age range of 15 years and a maximum of 16 years. Based on the sample selection criteria, 3,600 questionnaires were distributed to the respondents. The number of questionnaires distributed was with the consideration of optimizing the fulfillment of the targets given by SEAMEO Bangkok as many as 1,000 student respondents aged 15 years and a maximum of 16 years, and the number of returned questionnaires and the quality of the online questionnaire filled out by these students.

C. Data collection scheme



The online questionnaire which had been translated into Indonesian was then distributed to the Provincial Education Office as regional coordinator. Furthermore, the online questionnaire link was disseminated to sample schools that have been determined by the central research team. The principal who has received the online questionnaire link then appoints a class teacher to select the 15-year-old category student as the research sample.

To ensure the completeness and quality of the questionnaire, the central research team also checked every day the results of the questionnaire that the students had filled in. If there were errors and/or shortages of students filling out the questionnaire, the direct notification had been made to the Provincial Education Office as the regional coordinator and the sample school principal (Table 5). The number of schools sampled in the survey are 72 schools spread throughout Indonesia. In the implementation of filling out the online questionnaire, the central research team opened a question-and-answer service through the WhatsApp application available on the online questionnaire link that was distributed.

Table 6. List of schools' samples

No	Province	District/City	Level (Senior high schools (SMA) /vocational (SMK))	Name of Schools
1	Prov. Bali	Kab. Karang Asem	SMK	SMK NEGERI 1 AMLAPURA
2	Prov. Bali	Kab. Karang Asem	SMA	SMA NEGERI 2 AMLAPURA
3	Prov. Bali	Kota Denpasar	SMK	SMK NEGERI 2
4	Prov. Bali	Kota Denpasar	SMA	SMA NEGERI 1
5	Prov. Banten	Kab. Lebak	SMK	SMK NEGERI 1 CIBEBER
6	Prov. Banten	Kab. Lebak	SMA	SMA NEGERI 1 RANGKASBITUNG
7	Prov. Banten	Kota Tangerang Selatan	SMK	SMK NEGERI 4
8	Prov. Banten	Kota Tangerang Selatan	SMA	SMA NEGERI 2
9	Prov. Bengkulu	Kab. Kaur	SMK	SMKN 7 KAUR
10	Prov. Bengkulu	Kab. Kaur	SMA	SMAN 5 KAUR
11	Prov. Bengkulu	Kota Bengkulu	SMK	SMK NEGERI 1
12	Prov. Bengkulu	Kota Bengkulu	SMA	SMA NEGERI 5
13	Prov. D.I. Yogyakarta	Kab. Gunung Kidul	SMK	SMK NEGERI 1 WONOSARI
14	Prov. D.I. Yogyakarta	Kab. Kulon Progo	SMK	SMK NEGERI 1 PENGASIH
15	Prov. D.I. Yogyakarta	Kota Yogyakarta	SMK	SMK NEGERI 1
16	Prov. D.I. Yogyakarta	Kota Yogyakarta	SMA	SMA NEGERI 3
17	Prov. D.K.I. Jakarta	Kota Jakarta Selatan	SMK	SMK NEGERI 20
18	Prov. D.K.I. Jakarta	Kota Jakarta Selatan	SMA	SMA NEGERI 8
19	Prov. D.K.I. Jakarta	Kota Jakarta Utara	SMA	SMA NEGERI 13
20	Prov. D.K.I. Jakarta	Kota Jakarta Utara	SMK	SMK NEGERI 12
21	Prov. Gorontalo	Kab. Gorontalo Utara	SMK	SMK NEGERI 2 GORONTALO UTARA
22	Prov. Gorontalo	Kab. Gorontalo Utara	SMA	SMA NEGERI 7 GORONTALO UTARA
23	Prov. Gorontalo	Kota Gorontalo	SMA	SMA NEGERI 3
24	Prov. Gorontalo	Kota Gorontalo	SMK	SMK NEGERI 1
25	Prov. Jawa Barat	Kab. Cianjur	SMK	SMK NEGERI 1 CIANJUR
26	Prov. Jawa Barat	Kab. Cianjur	SMA	SMA NEGERI 1 SUKARESMI
27	Prov. Jawa Barat	Kota Bogor	SMK	SMK NEGERI 3
28	Prov. Jawa Barat	Kota Bogor	SMA	SMA NEGERI 1
29	Prov. Jawa Tengah	Kab. Brebes	SMK	SMK NEGERI 1 BREBES
30	Prov. Jawa Tengah	Kab. Brebes	SMA	SMA NEGERI 1 BUMIAYU
31	Prov. Jawa Tengah	Kota Semarang	SMA	SMA NEGERI 3
32	Prov. Jawa Tengah	Kota Semarang	SMK	SMK NEGERI 2
33	Prov. Jawa Timur	Kab. Sampang	SMA	SMA NEGERI 1

No	Province	District/City	Level (Senior high schools (SMA) /vocational (SMK))	Name of Schools
				SAMPANG
34	Prov. Jawa Timur	Kab. Sampang	SMK	SMK NEGERI 1 SAMPANG
35	Prov. Jawa Timur	Kota Surabaya	SMA	SMA NEGERI 5
36	Prov. Jawa Timur	Kota Surabaya	SMK	SMK NEGERI 1
37	Prov. Kalimantan Barat	Kab. Sekadau	SMK	SMK NEGERI 1 NANGA TAMAN
38	Prov. Kalimantan Barat	Kab. Sekadau	SMA	SMA NEGERI 1 SEKADAU
39	Prov. Kalimantan Barat	Kota Pontianak	SMA	SMA NEGERI 1
40	Prov. Kalimantan Barat	Kota Pontianak	SMK	SMK NEGERI 3
41	Prov. Lampung	Kab. Tulang Bawang Barat	SMK	SMKN 1 TULANG BAWANG TENGAH
42	Prov. Lampung	Kab. Tulang Bawang Barat	SMA	SMAN 1 TUMIJAJAR
43	Prov. Lampung	Kota Bandar Lampung	SMA	SMA NEGERI 2
44	Prov. Lampung	Kota Bandar Lampung	SMK	SMK NEGERI 1
45	Prov. Nusa Tenggara Timur	Kab. Sabu Raijua	SMA	SMA NEGERI 1 RAIJUA
46	Prov. Nusa Tenggara Timur	Kab. Sabu Raijua	SMK	SMK NEGERI 1 SABU BARAT
47	Prov. Nusa Tenggara Timur	Kota Kupang	SMA	SMA NEGERI 3
48	Prov. Nusa Tenggara Timur	Kota Kupang	SMK	SMK NEGERI 1
49	Prov. Papua	Kab. Nduga	SMK	SMK NEGERI 1 KENYAM
50	Prov. Papua	Kab. Nduga	SMA	SMA NEGERI 1 KENYAM
51	Prov. Papua	Kota Jayapura	SMA	SMA NEGERI 4
52	Prov. Papua	Kota Jayapura	SMK	SMK NEGERI 1
53	Prov. Riau	Kab. Indragiri Hilir	SMK	SMK NEGERI 1 TEMBILAHAN
54	Prov. Riau	Kab. Indragiri Hilir	SMA	SMA NEGERI 1 TEMBILAHAN HULU
55	Prov. Riau	Kota Pekanbaru	SMK	SMK NEGERI 1
56	Prov. Riau	Kota Pekanbaru	SMA	SMA NEGERI 8
57	Prov. Sulawesi Tenggara	Kab. Buton Tengah	SMK	SMK NEGERI 2 MAWASANGKA
58	Prov. Sulawesi Tenggara	Kab. Buton Tengah	SMA	SMA NEGERI 2 TALAGA RAYA
59	Prov. Sulawesi Tenggara	Kota Kendari	SMK	SMK NEGERI 1
60	Prov. Sulawesi	Kota Kendari	SMA	SMA NEGERI 1

No	Province	District/City	Level (Senior high schools (SMA) /vocational (SMK))	Name of Schools
	Tenggara			
61	Prov. Sumatera Barat	Kab. Pasaman	SMK	SMK NEGERI 1 LUBUK SIKAPING
62	Prov. Sumatera Barat	Kab. Pasaman	SMA	SMA NEGERI 1 LUBUK SIKAPING
63	Prov. Sumatera Barat	Kota Padang	SMK	SMK NEGERI 3
64	Prov. Sumatera Barat	Kota Padang	SMA	SMA NEGERI 1
65	Prov. Sumatera Selatan	Kab. Penukal Abab Lematang Ilir	SMK	SMK NEGERI 1 TALANG UBI
66	Prov. Sumatera Selatan	Kab. Penukal Abab Lematang Ilir	SMA	SMA NEGERI 2 UNGGULAN
67	Prov. Sumatera Selatan	Kota Palembang	SMK	SMK NEGERI 6
68	Prov. Sumatera Selatan	Kota Palembang	SMA	SMA NEGERI 6
69	Prov. Sumatera Utara	Kab. Nias Barat	SMA	SMA NEGERI 1 MORO'O
70	Prov. Sumatera Utara	Kab. Nias Barat	SMK	SMK NEGERI 2 ULU MORO'O
71	Prov. Sumatera Utara	Kota Medan	SMA	SMA NEGERI 1
72	Prov. Sumatera Utara	Kota Medan	SMK	SMK NEGERI 11

D. Limitations of the research and challenges

It is noteworthy to take into consideration of some the following limitations in conducting this study. First, the sample size surveyed did not represent the entire population of districts and cities, which in this case represented rural and urban areas. In addressing this issue, the sampling process and sample size are carefully designed and standardized to reduce the risk of standard errors. However, the minimum number of 1,000 students from 20 schools through the stratification method such as school and/or regional type determined by UNESCO has been fulfilled. To fulfill the quota, the Indonesian survey team has distributed questionnaires 3 times from the target, namely 3,600 students from 72 schools located in districts and cities which are representative of rural and urban areas in Indonesia.

Second, as all participating students were from Grade 9 and around 15 years of age, the research does not provide any insights about children of other ages and/or school grades. It has to be expected that the use of ICT and patterns of interaction change during childhood and adolescence.

Third, it is related to student competencies that measure skills and attitudes towards information technology as measured through student self-reporting using the four-point Likert scale. While head teachers, ICT teachers, education officers and enumerators provided students with an overview of the research study and the questionnaire, there is a chance that students misunderstood or misinterpreted some of the questions.

CHAPTER IV FINDINGS AND DISCUSSION

This section presents the key findings from the survey analysis focused on Indonesia's results as well as other countries. Research on the digital competence of students in Indonesia is one of the instruments in the form of a questionnaire consisting of closed and open questions. The closed question questionnaire consists of four response selections, i.e. disagree a lot, disagree a little, agree a little, and agree a lot. Scoring was given to each respondent who answered the statement, namely disagree a lot (score 1), disagree a little (score 2), agree a little (score 3), and agree a lot (score 4). Determination of the digital competency score of students with closed questions using the formula for the equivalent mean score with the total score of all respondents divided by the number of respondents. The interpretation of students' digital competency scores is perceived from the mean score interval on each variable, which consists of five levels, i.e. very poor, insufficient, sufficient, good, and very good. Determination of the mean score interval using the formula of the difference between the highest score and the lowest score divided by five, so that the score interval for each level is 0.60. The results of the calculation of the mean score interval and interpretation are shown in the following table.

Table 7. Interpretation of students' digital competency assessments

Interval Mean Score	Interpretation of Assesment
1,00 – 1,60	Very Poor
1,61 – 2,20	Insufficient
2,21 – 2,80	Sufficient
2,81 – 3,40	Good
3,41 – 4.00	Very Good

The open question questionnaire, respondents in answering every question given the freedom in accordance with what has been perceived or completed. Meanwhile, analysis and processing of data by classifying students with the identical answer, then we calculated the frequency and made percentage on the same answer. The following will describe the results and discussion of research based on the eight (8) research variables, explicitly: Digital Literacy, Digital Safety and Resilience, Digital Participation and Agency, Digital Emotional Intelligence, Digital Creativity and Innovation, Student background, Access to and usage of digital devices, and Socio-economic status (SES).

A. Digital Literacy

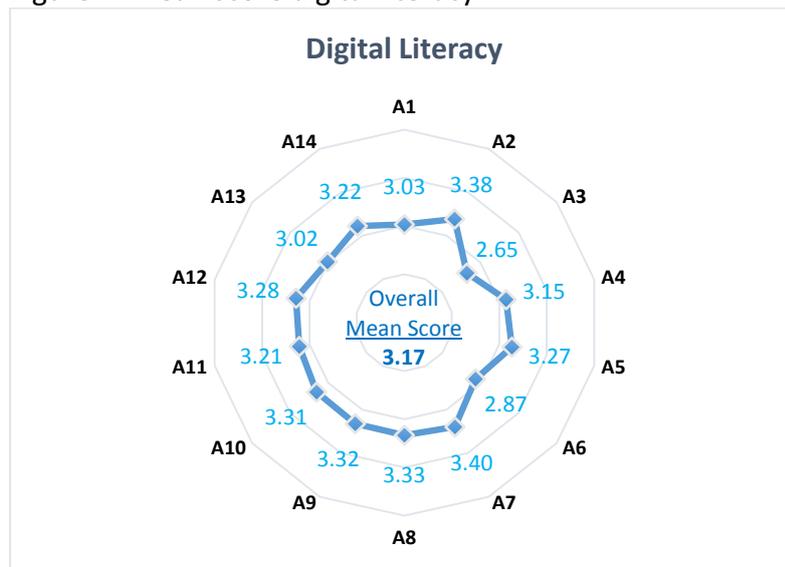
Digital literacy competencies are needed by students in Indonesia. With these competencies' students can socialize with the digital world safely and comfortably. Hopefully, Indonesian students can improve the competence of science to explore the digital world with a precise, safe and comfortable. In this study, one of the variables is digital literacy.

The digital literacy variable consists of 14 closed questions, including the following: (1) I can edit electronic resources (e.g., text, graphics, audio, videos) (2) I use social media platform (e.g., Facebook, Instagram, Snapchat, LINE, We Chat) to share ideas, participate in discussions, and collaborate with others; (3) I can set up a safe computing environment (e.g., remove computer viruses, install security programs/antivirus); (4) I can transfer photos, music, and video files saved on my computer into other digital devices (e.g., mobile phone, tablet PC); (5) I use computer software (e.g., Microsoft Word, Microsoft PowerPoint, Google Docs) to complete learning tasks at school; (6) I know how to use the latest digital devices; (7) I use digital devices in order to search for information and applications I need; (8) I use digital devices for learning at home; (9) I use digital devices for my personal interest (e.g., games, chatting, shopping, searching for information); (10) I assess the

relevance of the digital information to complete learning tasks at school; (11) I can separate reliable from unreliable information when searching for digital information; (12) I search for and find information to complete learning tasks on the Internet; (13) I know I need to report the source of information when using information attained from online; dan (14) If I find wrong information on the Internet, I can correct it.

Here are the results of the analysis of the mean score variable digital literacy as well as scores for each question indicated on the graph cobweb below.

Figure 4. Mean score digital literacy



Source: Author's own calculation from the survey results

Based on the results of the analysis above, it shows that the overall mean score of the digital literacy competency variable of Indonesian students is 3.17. This can be interpreted that the digital literacy competencies of Indonesian students have good assessments.

The digital literacy competence of Indonesian students is already good. To improve it, Indonesian students need to be given training related to understanding in using the internet in a healthy and safe manner. The results of research conducted by Aziz et al (2020) state that with proper internet training, it can avoid the dangers of the internet from the negative side, recognize tips on how to find true and false news, and can also surf safely and healthily.

Almost all indicators of digital literacy competence have good ratings. Only one indicator has a sufficient rating, namely the third indicator "competency set up a safe computing environment (e.g., remove computer viruses, install security programs / antivirus)" with a score of 2.65. The competence of Indonesian students in setting up a safe computing environment (e.g., remove computer viruses, install security programs / antivirus) is still unsatisfactory. Even though in the era of cyber-attacks, all computers need antivirus to avoid various problems caused by computer viruses. For this reason, Indonesian students need to improve their competence in installing or installing strong security (antivirus) software on computer systems. One of the reasons why Indonesian students are lacking in competence to remove computer viruses, install security programs / antivirus is because every time they purchase a computer, an antivirus program was already installed.

However, many Indonesian students who can develop antivirus. Second grade student of SMP 48 in Bandung, Arrival Dwi Sentosa, has succeeded in creating one of the best anti-virus programs in

Indonesia. These students learn to make antivirus by themselves or teach themselves. More than a million people at home and abroad have downloaded his anti-virus program (voaindonesia.com, 2011).

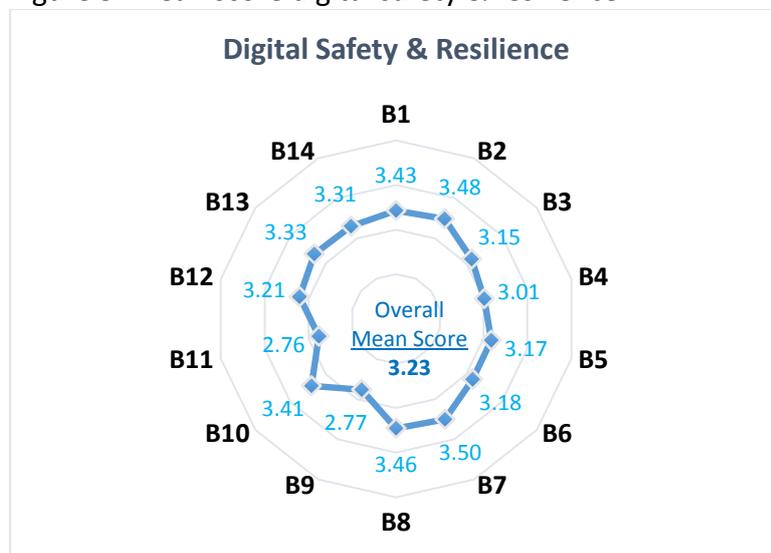
B. Digital Safety and Resilience

Digital safety and resilience competencies are urgently needed by students in Indonesia. The digital safety and resilience variable consists of 14 closed questions and 4 open questions. The closed questions are as follows: (1) I understand I should show respect to others on the Internet; (2) I understand I should protect the privacy and security of others; (3) Since it is against copyright law to copy software illegally, I would not let myself make a copy; (4) I read the privacy policy of websites I visit when using the Internet; (5) I try to avoid threatening other people's personal information when using digital information; (6) I try to avoid infringing other people' intellectual property rights (e.g., software copyrights, portrait rights) when searching for and using digital information; (7) I try to protect my personal information from others online; (8) I know which information I should and should not share on the Internet; (9) I find myself using digital devices for longer periods of time than intended; (10) I use digital devices to relieve myself from stress (e.g. listening to music, watching movies, SNS); (11) I feel anxious if I have not checked for messages or switched on digital devices for some time. (12) I can modify privacy setting to keep myself safe/away from unwanted contacts (e.g., spam texts, emails); (13) I try to avoid clicking on information that looks weird or suspicious; dan (14) If a person is bothering me online, I can ask the person to stop sending unwanted disturbing messages or emails.

In addition to 14 closed questions with four answer choices, the digital safety and resilience variables also contained four open questions. The questions include: (1) How will you react when you receive unwanted disturbing messages including annoying messages or embarrassing pictures from someone on your contact list? (2) How will you react when you find that your personal information is misused, compromised or acquired without permission online? (3) How will you react when you find that your personal information is misused, compromised or acquired without permission online? (4) How will you react when you are bullied online by friends or others?

Following are the results of the analysis of the mean score of the digital safety and resilience variable and also the score of each indicator on the instrument with closed questions, which is shown on the cobweb graph.

Figure 5. Mean score digital safety & resilience



Source: Author's own calculation from the survey results

Based on the results of the above analysis, it shows that the overall mean score of the digital safety and resilience competency variable for Indonesian students is 3.23. This can be interpreted that the digital safety and resilience competencies of Indonesian students have good assessments. Of the 14 questions, there were 5 questions that had a very good score, 7 questions that had a good score, and there were 2 questions that had a sufficient score.

Five questions that have a very good assessment are question number (1) I understand I should show respect to others on the Internet with a score of 3.43; (2) I understand I should protect the privacy and security of others with a score of 3.43; (7) I try to protect my personal information from others online with a score of 3.50; (8) I know which information I should and should not share on the Internet with a score of 3.46; (10) I use digital devices to relieve myself from stress (e.g. listening to music, watching movies, SNS) with a score of 3.41.

There were two questions that had a sufficient rating, namely questions number 9 and 11. The scores of these questions included: (9) I find myself using digital devices for longer periods of time than intended with a score of 2.77; (11) I feel anxious if I have not checked for messages or switched-on digital devices for some time with a score of 2.76.

Advances in information technology require Indonesian students to have digital safety and resilience competencies. So that the risk or negative impact from the use of information technology can be minimized. The results of a study conducted by Hidayat et al (2016) stated that the habit of using the internet by students and students faces several risks, such as verbal and nonverbal violence, bullying, pornography, account piracy, and the risk of interacting with strangers. Furthermore, the results of the analysis of digital safety and resilience variables with open questions are shown in the following bar chart.

Figure 6. How will you react when you are exposed to unwanted disturbing files or websites?



Source: Author's own calculation from the survey results, percentage more than 100%, respondents may choose more than one answer

When respondents were given an open question, "How will you react when you are exposed to unwanted disturbing files or websites?" The most answers were "Get rid of it immediately by closing the page, deleting the file, or scrolling away" with 81%. In addition, many also answered "Block the webpage or website", which was 54%.

Figure 7. How will you react when you receive unwanted disturbing messages including annoying messages or embarrassing pictures from someone on your contact list?



Source: Author's own calculation from the survey results, percentage more than 100%, respondents may choose more than one answer

When respondents were given an open question, "How will you react when you receive unwanted disturbing messages including annoying or embarrassing pictures from someone on your contact list?" The most answers were "Block and report the person (44%), Delete the contact (44%), Ask the person to stop sending these messages or pictures (39%), and Ignore the messages and the person (36%)."

Figure 8. How will you react when you find that your personal information is misused, compromised or acquired without permission online?



Source: Author's own calculation from the survey results, percentage more than 100%

100%, respondents may choose more than one answer

When respondents are asked an open question "How will you react when you find that your personal information is misused, compromised or acquired without permission online?" Most answers were "Review privacy settings and choose a more secure password (66%) and Change your account password (65%)."

Figure 9. How will you react when you are bullied online by friends or others?



Source: Author's own calculation from the survey results, percentage more than 100%, respondents may choose more than one answer

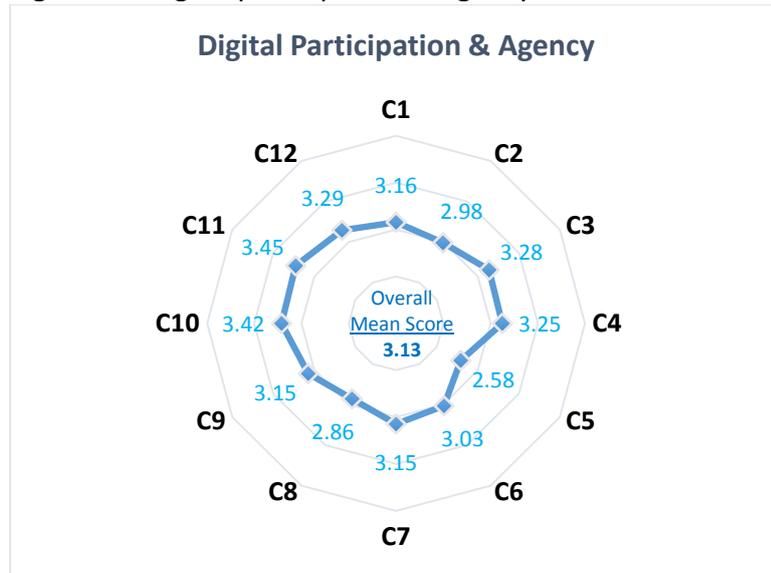
When respondents were given an open question "How will you react when you are bullied online by friends or others?" most answers were "Keep the evidence of bullying (e.g., screen shot) (49%) and Show the persons I am not bothered by their behavior by ignoring them (43%)."

C. Digital Participation and Agency

Internet use is generally used for socializing and interacting. In this research there are digital participation variables and agency. The digital participation and agency variables from 12 closed questions are as follows: (1) I use the Internet to talk to people from places or backgrounds different from mine; (2) I use the Internet to share something I am good at or I know well; (3) I can share my knowledge online to anyone if it is helpful to him / her; (4) I make new friendships with other people online; (5) post news on social issues online (e.g., Facebook, Instagram, blog); (6) I use the Internet to create solutions to problems in my school; (7) I use the Internet to create solutions to problems in my town / community; (8) I get involved online in social issues; (9) If I disagree with people online, I watch my language so that it does not come across as mean; (10) I am careful to make sure that the pictures I post or send will not embarrass other people or get them into trouble. (11) My favorite online places are where people are respectful toward each other; (12) I do not add to arguments and insulting interactions that happen on the Internet.

Following are the results of the analysis of the mean score of variable participation and agency as well as the scores of each indicator in the instrument with closed questions, which are shown in the following cobweb graph.

Figure 10. Digital participation & agency



Source: Author's own calculation from the survey results

Based on the results of the analysis above, it shows that the overall mean score of Indonesian students' participation and agency competence variable is 3.13. This can be interpreted that the competence of digital participation and agency of Indonesian students has a good assessment. Of the 12 questions, there are 2 questions that have a very good score, namely questions number 10 and 11. The questions are: (10) I am careful to make sure that the pictures I post or send will not embarrass other people or get them into trouble and (11) My favorite online places are where people are respectful toward each other. In addition, there is 1 question that has a sufficient score, namely number (5) with questions post news on social issues online (e.g., Facebook, Instagram, blog). The use of the internet, especially for social media, has both positive and negative impacts. For this reason, teachers and parents can jointly control students in using social media. The use of social media, one of the negative impacts, can lead to consumptive behavior in children. The results of research conducted by Amalia (2017) state that there is an effect of the use of social media on consumptive behavior. Another negative impact is that many children become anti-social where they are lulled by the fun of talking on social media compared to meeting face to face in the real world, another thing is that many are trapped in being lazy and wasteful in order to continue their preoccupation with talking on social media (Fitri, 2017).

Even so, there are several positive impacts on the use of social media, one of which can improve students' writing skills. The results of research conducted by Pratama & Mulyati (2018) state that the use of social media can improve writing skills, especially Instagram social media.

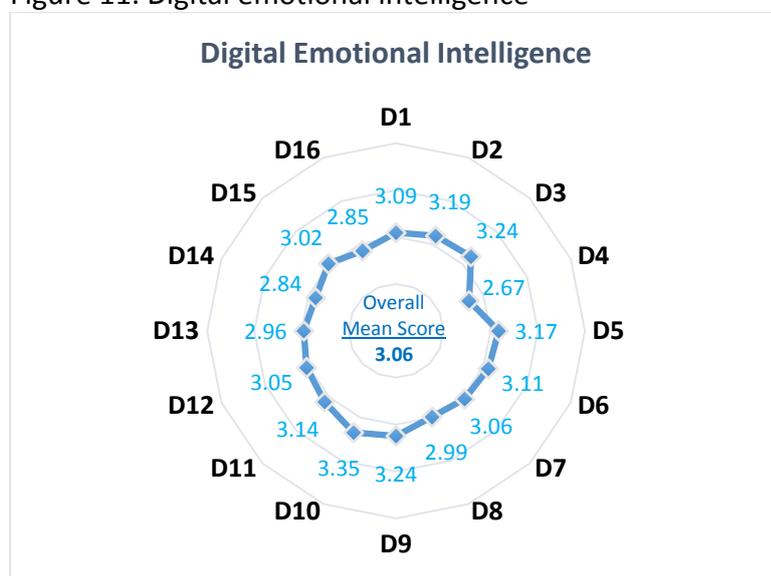
D. Digital Emotional Intelligence

Emotional intelligence needs to be possessed by every student in using information technology, so that it does not have an impact on something that is less detrimental to themselves. The digital emotional intelligence variable from 16 closed questions is as follows: (1) I am aware of my feelings that I experience in my interactions online; (2) I express myself in a way that makes a good impression on others when I write a post or comments on SNS (e.g., Facebook, Instagram); (3) I am aware of the meaning of non-verbal messages (e.g., smiley face, emoji) that I send to other people on the Internet; (4) I express my feelings freely on the Internet using online communications; (5) I can manage my feelings when I talk with other people on the Internet; (6) Even though I get distracted during online classes or activities, I can easily go back to my work again; (7) I stick to my

goals when I use the Internet to do assignments at home; (8) I am motivated by the good results that my group can get from the projects that we do online; (9) Even though I face challenges while using digital devices, I solve the problem without giving up; (10) When I use digital devices or software (e.g., programs, applications) for the first time, I expect I am able to do well; (11) I communicate comfortably with people who have different backgrounds, appearances, and opinions on the Internet; (12) I help other people feel better when they are not feeling well on the Internet (e.g., when they read negative comments or see awful pictures of themselves posted by others); (13) I know how to resolve the conflicts that arise when I interact with people from diverse backgrounds on the Internet; (14) When I meet friends online, I easily empathize with their emotions; (15) When I talk with friends on the Internet, I understand their perspectives even if I disagree; (16) When I meet friends on the Internet, I easily recognize what they want to talk about.

The following are the results of the analysis of the mean score of the digital emotional intelligence variable and the score of each indicator on the instrument with closed questions, which is shown in the following cobweb graph.

Figure 11. Digital emotional intelligence



Source: Author's own calculation from the survey results

Based on the results of the analysis above, it shows that the overall mean score of the digital emotional intelligence competency variable for Indonesian students is 3.06. This can be interpreted that the digital safety and resilience competencies of Indonesian students have good assessments. Of the 16 questions, there is only 1 question that has a sufficient score, namely the question in Number (4) I express my feelings freely on the Internet using online communications. The rest have good scores.

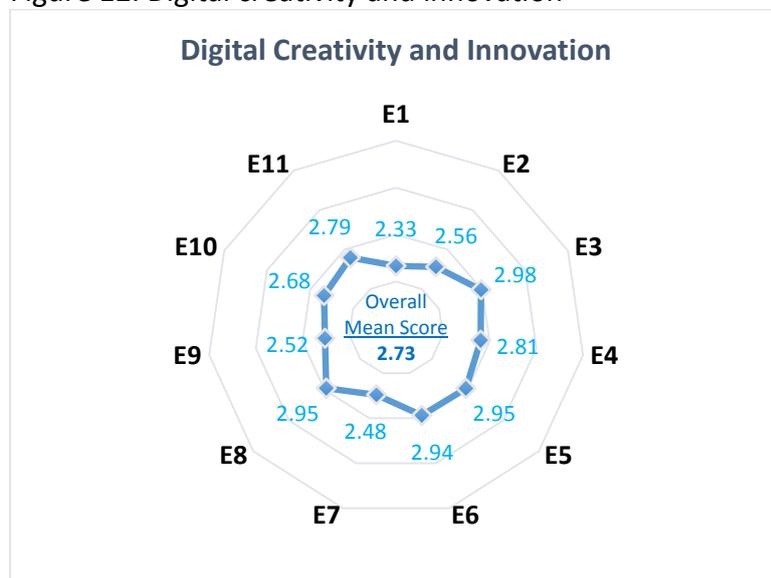
Indonesian students need digital emotional intelligence, given the tendency for people who lack emotional intelligence to be more easily addicted to the internet. The results of research conducted by Ferry (2019) stated that "Internet addiction in internet cafe customers with a Product Moment (r) correlation of -0.737 with a p of 0.000 ($p < 0.05$), meaning that the better emotional intelligence they have, the teenagers the less addicted to the internet, the worse the emotional intelligence, the more adolescents will be addicted to the internet more often.

E. Digital Creativity and Innovation

Creativity and innovation in using the internet can also be a positive skill, even making money. The variable digital creativity and innovation in this study consists of 11 closed questions as follows: (1) I make changes to the digital contents (e.g., photos, videos, music, text, etc.) that others have produced; (2) I remix existing digital contents by using digital media software (e.g., programs, applications); (3) I create presentation slides to support my ideas or opinions; (4) I create something new from existing digital contents; (5) I express my ideas through selecting, organizing, and sharing existing digital materials; (6) I use the Internet to try out different ways of expressing myself; (7) I express my personality online; (8) I show a better version of myself online; (9) I express who I want to be online; (10) There are certain things I express about myself more freely online than offline; and (11) When I'm online, I present myself how I want others to view me.

The following are the results of the analysis of the mean score of digital creativity and innovation variables and the scores of each indicator on the instrument with closed questions, which are shown in the following spiderweb graph.

Figure 12. Digital creativity and innovation



Source: Author's own calculation from the survey results

Based on the results of the analysis above, it shows that the overall mean score of the digital competence variable of Indonesian students' creativity and innovation is 2.73. This can be interpreted that the digital competence of creativity and innovation of Indonesian students has a sufficient assessment. Of the five digital competencies of Indonesian students, only the digital competencies of creativity and innovation have sufficient ratings. This means that Indonesian students in using the internet tend to be passive. For this reason, it is necessary to develop the creativity of Indonesian students in using information technology. One of them is by including coding-related material (programming language) in the educational curriculum.

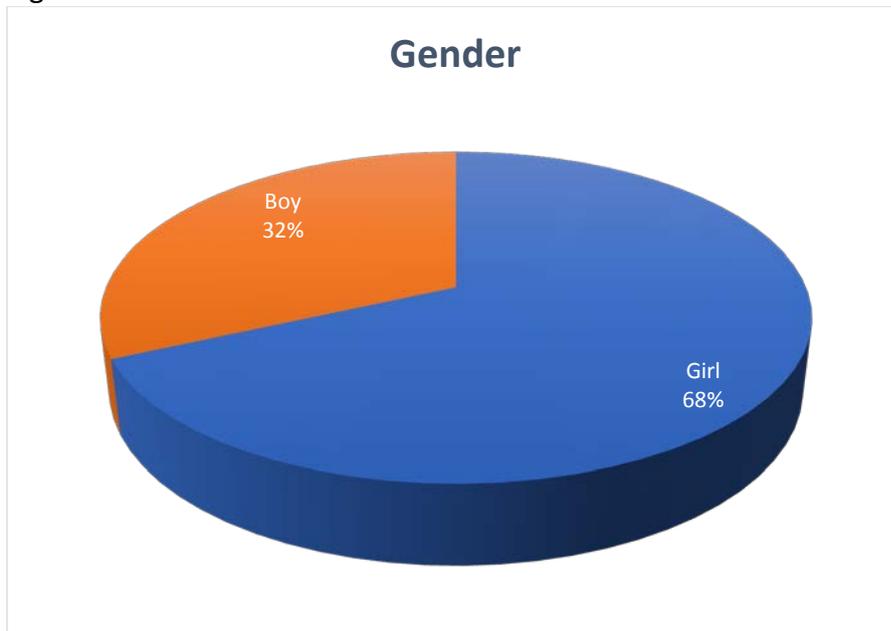
Coding or programming language will be a lesson for school students. The goal is to prepare Indonesia's human resources (HR) for the Industrial Revolution 4.0. The plan was submitted by the Minister of Research and Technology (Menristek) / Head of the National Research and Innovation Agency (BRIN) Bambang Brodjonegoro. To make it happen, Bambang will discuss it with the Minister of Education and Culture Nadiem Makarim who takes care of education from early childhood, elementary, junior high school, high school to higher education (<https://www.cnbcindonesia.com>, 2019).

Providing coding material to students has an impact on the expansion of coding knowledge in society. Thus, it is hoped that Indonesian human resources in the future can develop Artificial Intelligence (AI) and the Internet of Things (IoT), two things that are priorities to be able to jump into Industry 4.0.

F. Student Background

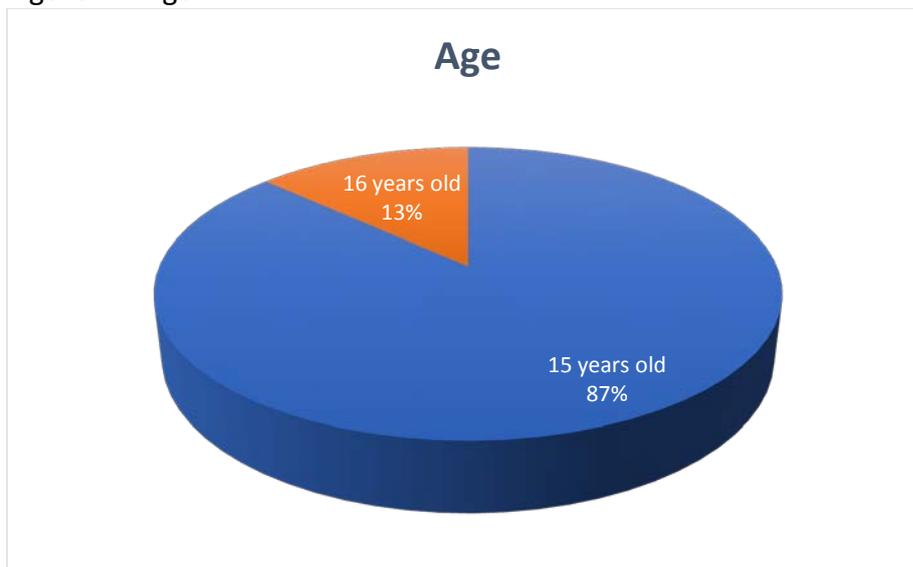
The background of the questionnaire respondents included: (1) In terms of gender, 68% female respondents and 32% male respondents; (2) In terms of age, 87% of respondents aged 15 were and aged 16 were 13%; (3) Judging from the class level, respondents in class 10 were 82% and class 11 were 18%. As seen from the aspirations of the respondents in continuing to college, it can be shown in the following figure.

Figure 13. Gender



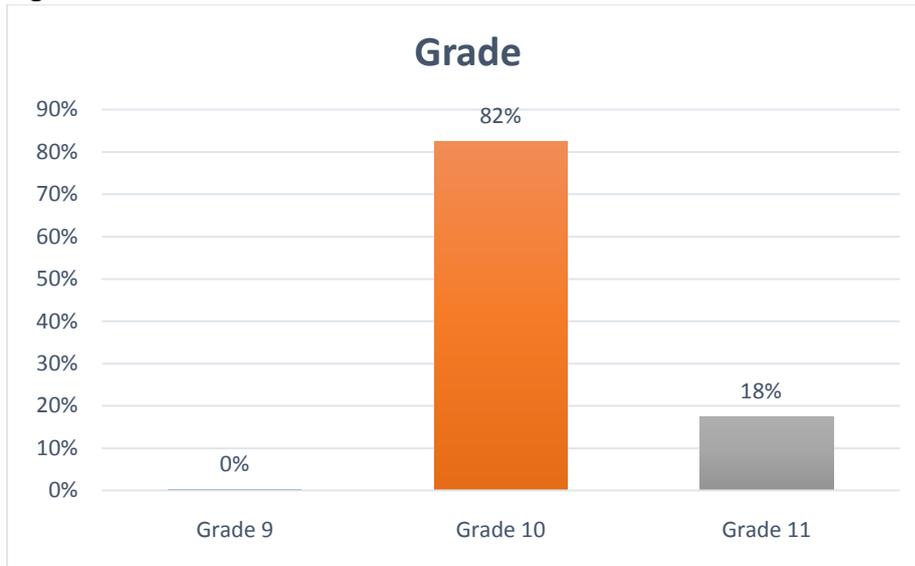
Source: Author's own calculation from the survey results

Figure 14. Age



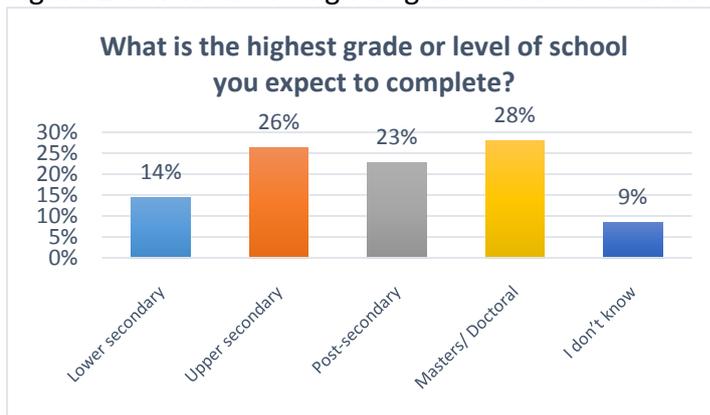
Source: Author's own calculation from the survey results

Figure 15. Class levels



Source: Author's own calculation from the survey results

Figure 16. What is the highest grade or level of school you expect to complete?

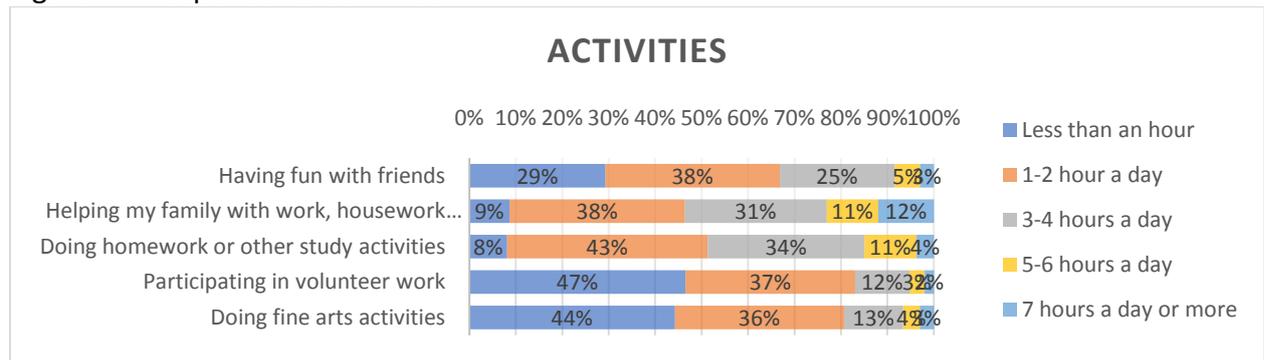


Source: Author's own calculation from the survey results

In the diagram above, it can be seen that the interest of Indonesian students to continue their education until postgraduate is quite high, even the highest compared to other levels of education. Respondents who have the desire to continue up to the master / doctoral level are 28%. This means that the motivation to learn from the Indonesian people is fairly high.

The length of time that respondents usually spend each day doing activities can be shown in the following graph.

Figure 17. Respondents activities



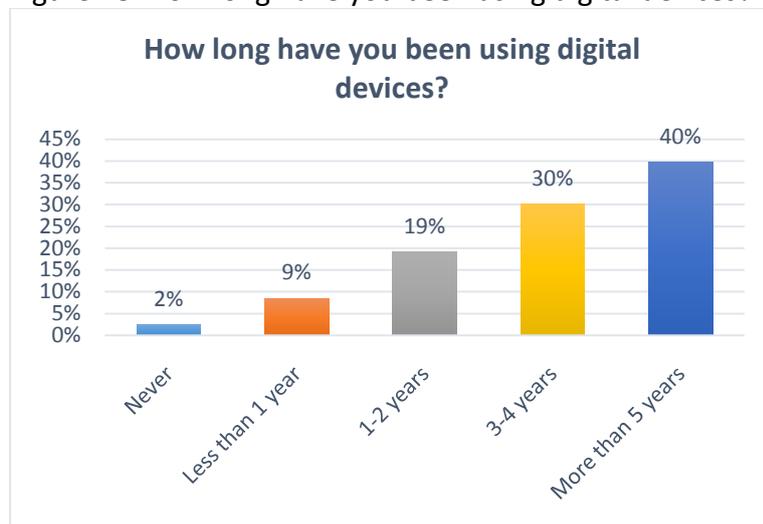
Source: Author’s own calculation from the survey results

The graph above shows that the activities of Indonesian students when they are not in school. A total of 12% of the Indonesian students spend more than 7 hours per day of "Helping my family with work, Housework or looking after somebody". The activity of Indonesian students in doing homework or studying is also relatively good. This can be seen from the “Doing homework or other study activities” which carried out more than 3 hours, around 50%.

G. Access to and Usage of Digital Devices

Access to and usage of digital devices affects the digital competence of students in the Indonesian region. The following is a graph of how long the respondent has used digital devices (eg. computers / laptops, smart phones, tablets and so on).

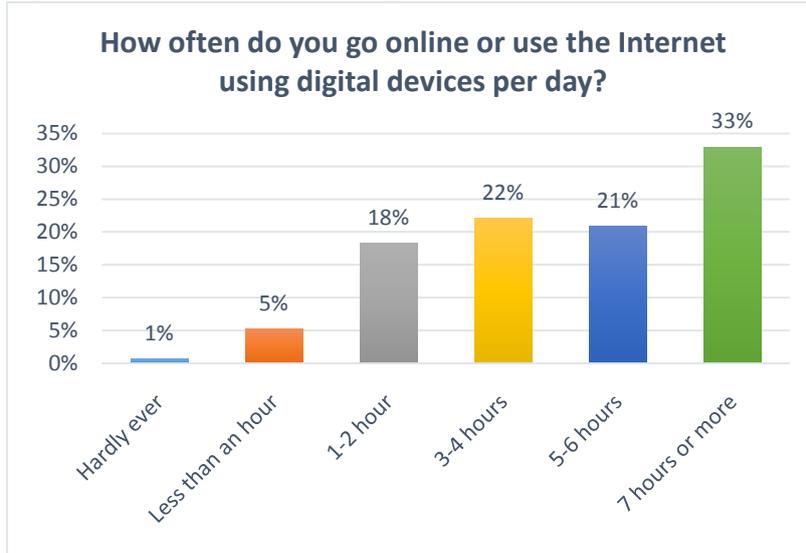
Figure 18. How long have you been using digital devices?



Source: Author’s own calculation from the survey results

From the graph above, it can be seen that the majority of respondents have used digital devices for more than five years, which is around 40%. This means that they will be able to mentor the students' digital competencies themselves. However, there are still respondents who have only used digital devices for a year, and some have not. The following shows a graph of how often respondents use the internet from digital devices (for example smartphones, computers / laptops, or tablets) every day.

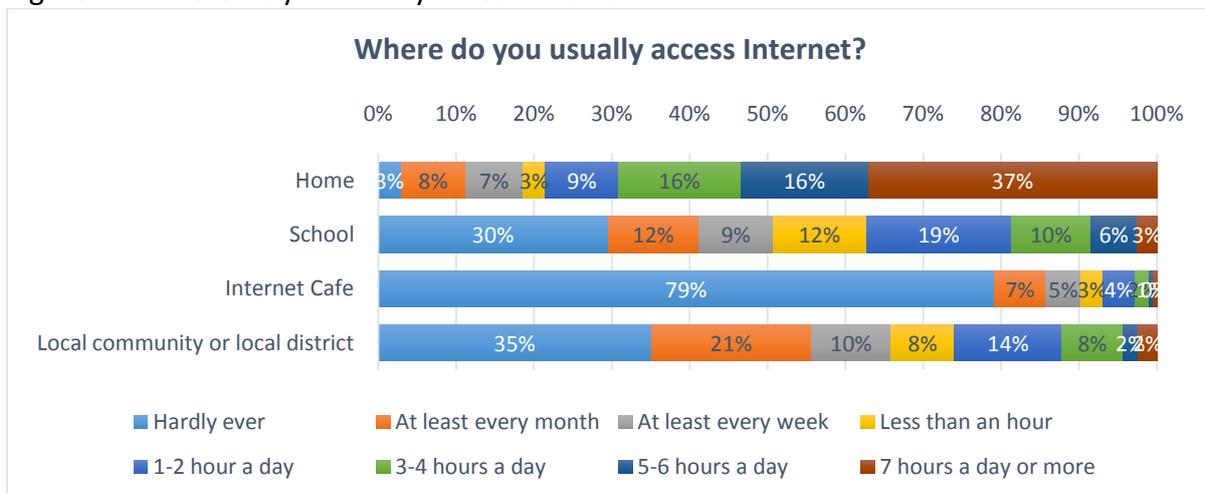
Figure 19. How often do you go online or use the Internet using digital devices per day?



Source: Author's own calculation from the survey results

Most respondents use the internet every day for seven or more hours a day, which is 33%. This means that about a third of the respondents spend their free time being used only in front of the internet. The following will show where the respondent uses the internet.

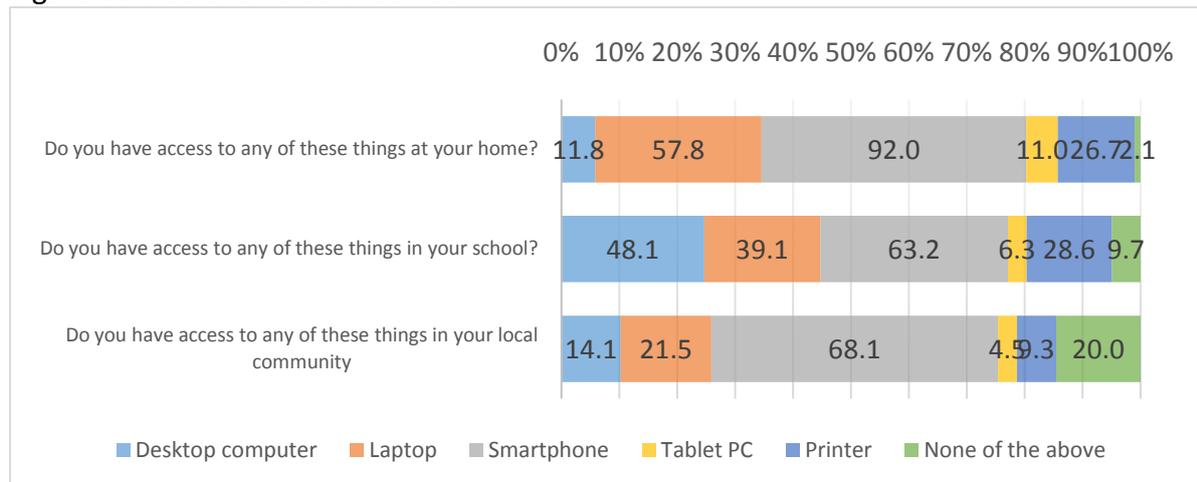
Figure 20. Where do you usually access Internet?



Source: Author's own calculation from the survey results

In the graph above, it can be seen that the longest time respondents used the internet was done at home, namely 37% who answered 7 hours a day or more. The role of parents is very important in supervising their children from accessing the internet, so that their children in exploring the world through the digital world can be precise, safe and comfortable. Apart from being at home, respondents also access the internet at school and in the community. The following will show a graph of where the respondent is using digital devices.

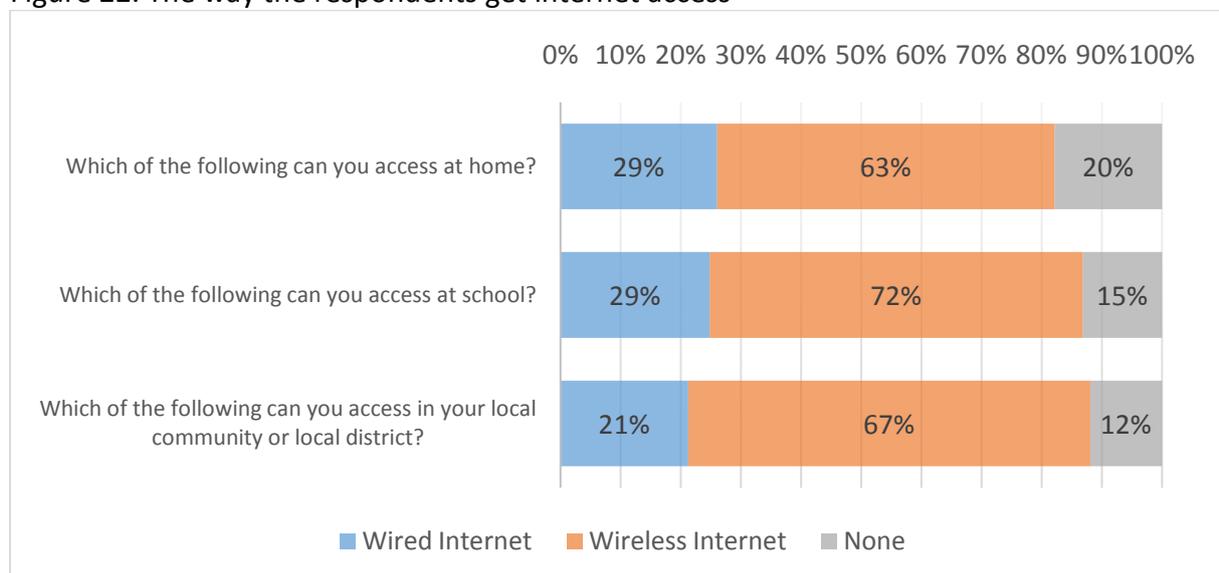
Figure 21. Tools to access internet



Source: Author’s own calculation from the survey results, percentage more than 100%, respondents may choose more than one answer

In the graph above, it can be seen that the majority of respondents access the internet at home via smartphones as much as 92%. In addition, around 58% also access the internet at home using a laptop. At school, respondents access the internet via a desktop computer (around 48%) and a laptop (around 39%) provided by the school. Usually used during learning hours. In addition, 68% of respondents access the internet at school via smartphones. The use of this smartphone is usually done during school breaks or when coming home from school. The way the respondents get internet access is presented in the following graph.

Figure 22. The way the respondents get internet access

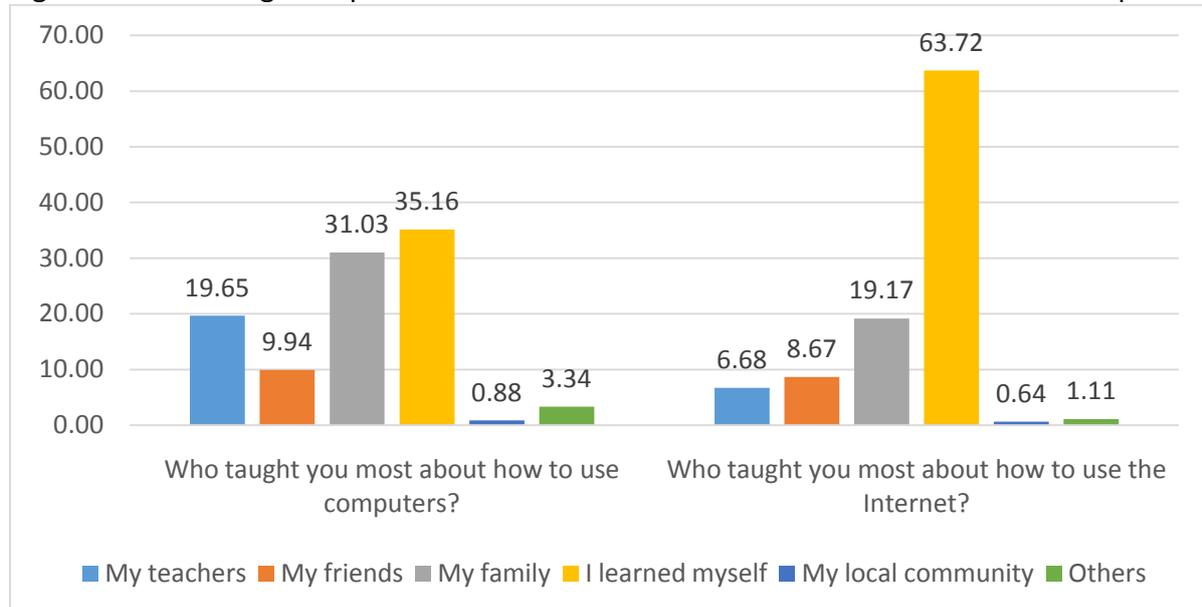


Source: Author’s own calculation from the survey results, percentage more than 100%, respondents may choose more than one answer

In the graph above, it can be seen that most students access the internet with wireless internet compared to wired. In schools, 72% of respondents access the internet from wireless, while at home and in the local community it is 63% and 67%, respectively. The respondents who answered that in the local community or local district provide any place to use the Internet were 68%. The following

will be presented graphs related to those that taught respondents the most about how to use the internet and computers.

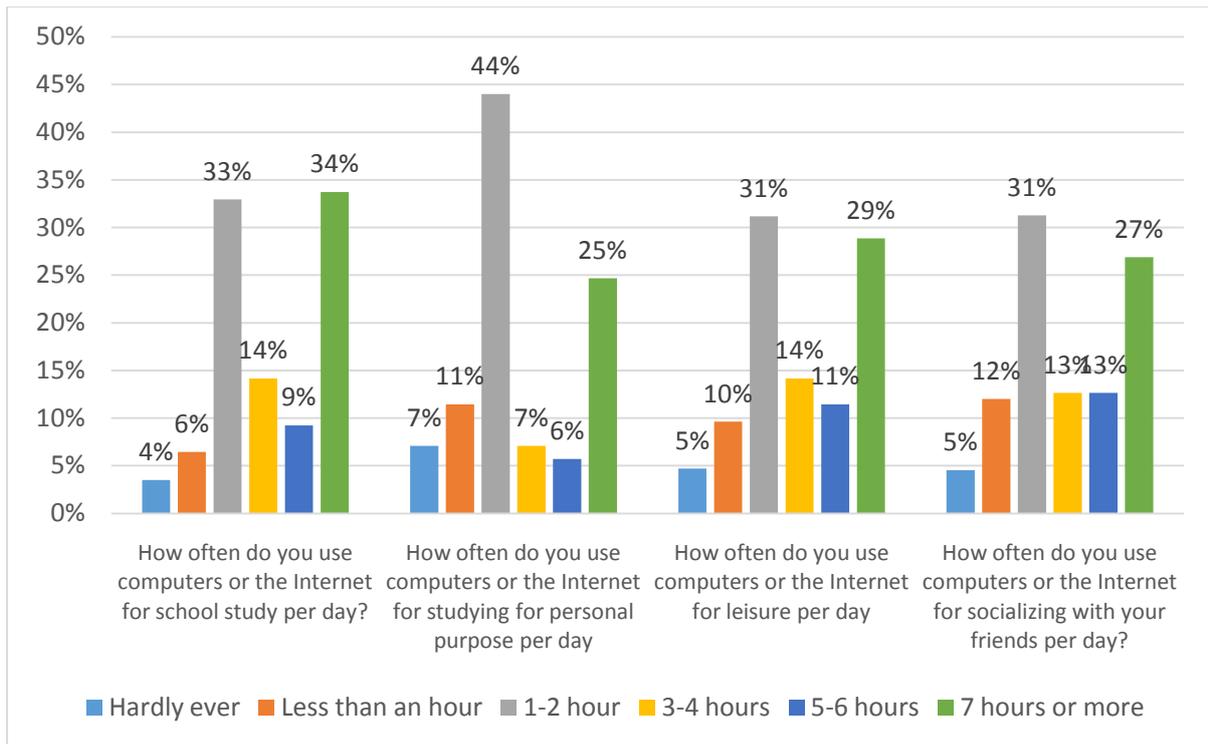
Figure 23. Who taught respondents the most about how to use the internet and computers?



Source: Author's own calculation from the survey results

Respondents who were taught how to use computers were mostly self-taught, which was about 35%. In line with that, most respondents learn to use the internet themselves, which is around 63%. Respondents learned how to use computers and the internet which were taught by the teacher only slightly, namely 19% and 6%, respectively. This may imply that knowledge of how to use computers and access the internet can be done independently or self-taught. For this reason, computer learning provided by school teachers is focused on more complex information technology, for example programming languages, coding, artificial intelligence, etc. This is a diagram of the frequency of computer and internet usage.

Figure 24. The frequency of computer and internet usage



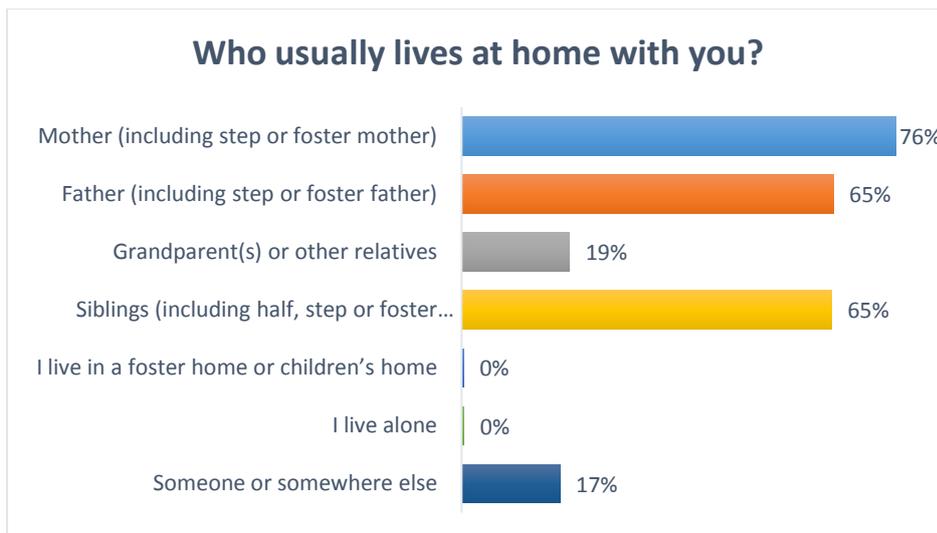
Source: Author's own calculation from the survey results

From the diagram above, it can be seen that the time to use computers or the internet for school lessons every day most of the respondents answered 7 hours or more, namely 34%. Most respondents use it for personal learning purposes to answer 1-2 hours per day, which is about 44%. Most respondents used to relax answered 1-2 hours per day. Meanwhile, using computers or the internet to socialize with friends, the most respondents answered 1-2 hours, but many also answered 7 hours or more, which is around 27%. Meanwhile, about 46% of respondents who have learned basic skills at school. Only a few respondents have developed a website or application, namely around 15%.

H. Socio-Economic Status

Socio-Economic Status (SES) can affect students' digital competencies. The following will be explained related to student SES. The following is a diagram related to the person who usually lives with the students.

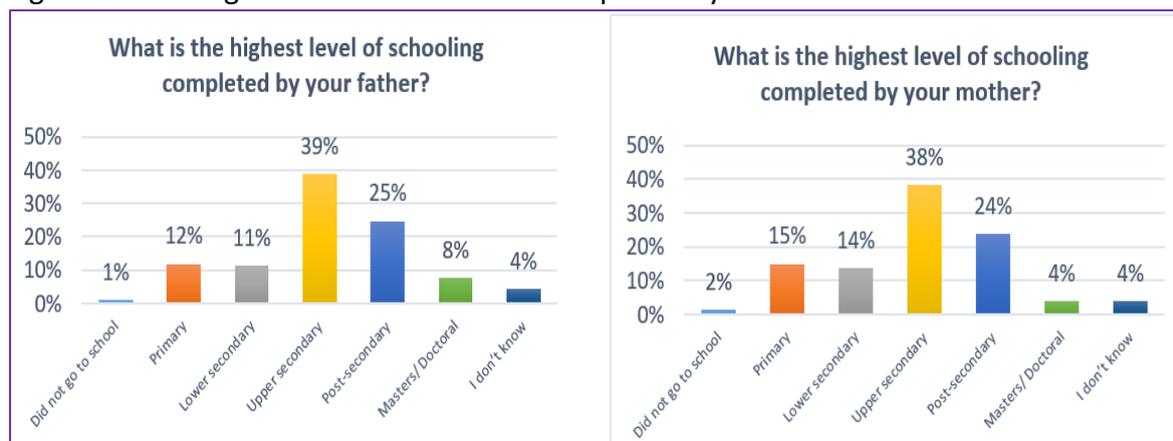
Figure 25. Who usually lives at home with you?



Source: Author's own calculation from the survey results, percentage more than 100%, respondents may choose more than one answer

Most respondents answered related to the answers of people who used to live in the same house with them, namely the mother, about 76%, then followed by fathers and siblings around 65%. Below is a diagram regarding the highest level of education completed by the father and mother.

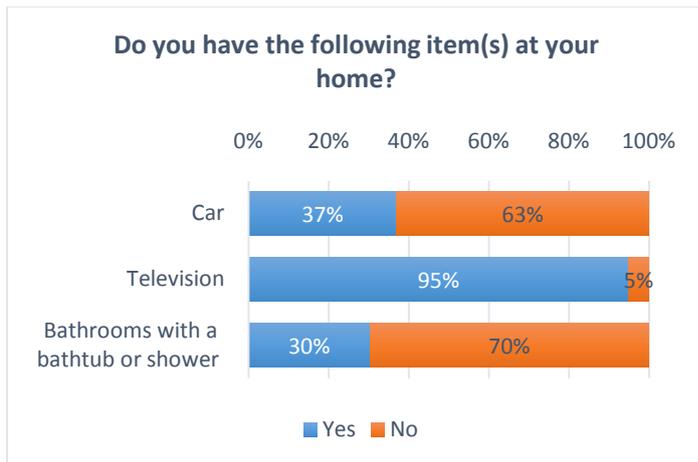
Figure 26. The highest level of education completed by the father and mother



Source: Author's own calculation from the survey results

The highest education completed by fathers is upper secondary, which is around 39% and followed by post-secondary, which is around 25%. While the education that his mother completed was not far from his father, namely upper secondary, which was around 38% and followed by post-secondary, which was around 24%. Next, the following is the facility ownership owned by the respondent.

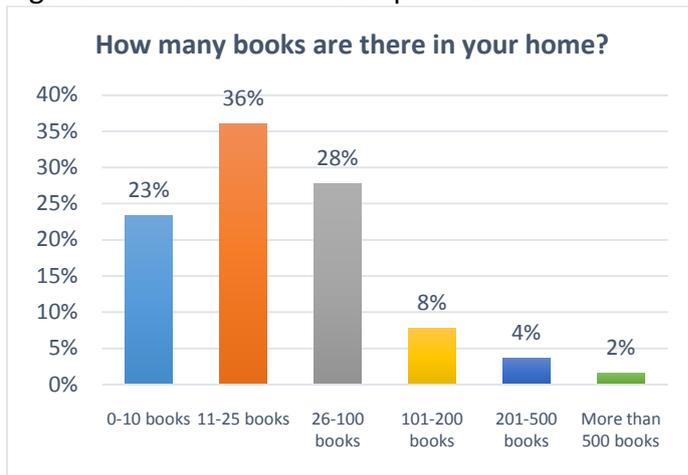
Figure 27. The facility ownership owned by the respondent



Source: Author’s own calculation from the survey results

In the bar chart above, 37% of respondents have a car, 95% have television, and 30% Bathrooms with a bathtub or shower. Next, a diagram of book ownership at home will be presented.

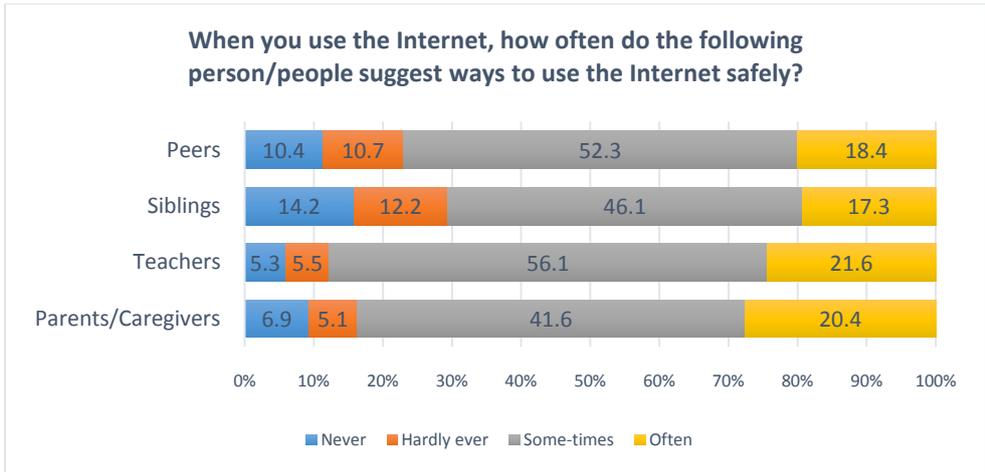
Figure 28. The book ownership at home



Source: Author’s own calculation from the survey results

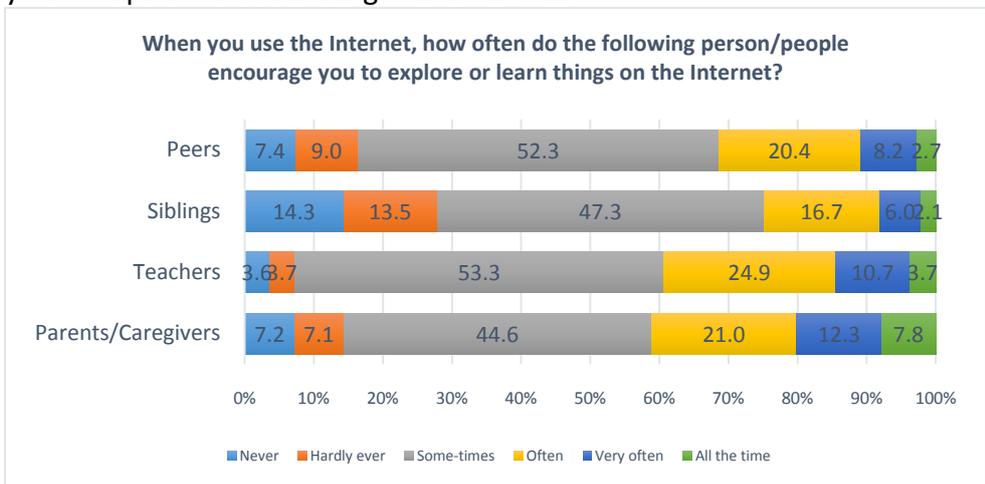
In the diagram above, it can be seen that the number of books at home is at most 11-25 books, which is around 36%. Then followed by 26 - 100 books, which is about 28%. Furthermore, the following will be shown to suggest and encourage respondents to use the internet.

Figure 29. When you use the Internet, how often do the following person/people suggest ways to use the Internet safely?



Source: Author's own calculation from the survey results

Figure 30. When you use the Internet, how often do the following person/people encourage you to explore or learn things on the Internet?



Source: Author's own calculation from the survey results

The people who most frequently advised respondents how to use the internet safely were teachers, around 22% and then parents, which was around 20%. Meanwhile, the people who most often encourage respondents to explore or learn various things on the internet are parents and teachers.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

A. Conclusion

This study, which was carried out jointly by UNESCO, aims to identify policy directions for governments that are currently, or intend to, promote digital citizenship competence in children. Learning addresses this goal through a current level five domain survey of digital citizenship among 15-year-old students in four countries in the Asia-Pacific region. The study is significant since it provides a measurement tool for assessing concept progress. Based on the research results, it can be concluded that:

1. The ability to use information technology is high but not balanced with innovation and creativity in using information technology.
2. Smartphones are the mainstay of children aged 15 to 16 years in accessing information technology as a source of learning and other information.
3. Most children aged 15 to 16 years in Indonesia are more independent in accessing information technology as a source of learning and other information.
4. The level of teacher participation in teaching technology as a learning resource for children is still lacking.
5. The level of digital safety and resilience children's ability to understand how to protect themselves and others from dangers in the digital space is quite good.
6. The level of creativity and digital innovation means that children's ability to express and explore themselves through content creation using ICT tools is sufficient.

B. Recommendations

One of the objectives of this research is to provide data-based policy direction for the government and other key stakeholders who intend to develop and implement policies related to digital-based education. This study offers three main policy recommendations that the research findings draw on.

1. Guidance is needed for children to increase innovation and creativity in using information technology

Information technology or the internet today is part of the mass media where the facts show that mass media has a big role in people's lives. The mass media has a role in conveying information from people in one part of the world which is one community from another part of the world. Also, the mass media has a role to carry out supervisory duties in the sense of supervising existing activities in the community so that they are in accordance with applicable standards in society. Besides, it functions to educate and entertain.

The Internet is a global system of all interconnected computer networks covering the whole world. The internet helps us communicate with people who are very far away and at a very low cost compared to other communication facilities such as telephones or televisions. Using the internet is also relatively easy, especially with a large number of friendship networking platforms such as Facebook, Twitter, etc. making the internet very popular with various groups and ages. Various advantages can be obtained through the internet, not only the ease of communication but also access to the desired information through various available sites. For example, information about the latest news, education, religion, and various knowledge. However, if it is not based on good use intentions, the internet can also bear negative influences, e.g. misleading information or pornographic sites. Ironically, those who cannot optimize the internet properly are teenagers who are generally in a period of looking for an identity. Using the internet with the wrong purpose can certainly form a bad personality for these teenagers.

Considering that there are still many negative impacts from using the internet, especially for children, it is necessary to guide them to use it with full innovation and creativity so that they can take positive benefits from the existence of information technology or the internet. At present, the types of professions in this digital era are of course more diverse than ours. When asked about their aspirations today, most children immediately answered that they wanted to become YouTubers, gamers, endorsers, etc. It needs to take a look at some of the people who creatively use digital technology so that in the end they can inspire people, benefit, and even make money. Associated with the theory of Uses and Gratifications, it provides a clear picture that the internet can provide information and interpretation of general problems in society, more specifically to the Young Generation, as a tool for daily life, and a tool for relaxation as part of daily activities. Uses and Gratification concerning this research are how the internet can be used by the younger generation as a form of meeting the needs to increase knowledge and insight of the young generation, to fill their spare time, as well as information needs from various regions and even from other countries that are fast to get. Thus, the media, in this case, the Internet, can provide significant benefits and roles for them.

2. Improvement of network facilities in all regions of Indonesia

Technological progress is now very fast and increasingly sophisticated. Many sophisticated technologies that have been created have made enormous changes in human life in various fields. It seems that gadgets can have such an impact on cultural values. Nowadays, everyone in the world must have a gadget. Not infrequently, nowadays many people have more than one gadget. This may be caused by several factors such as gadget users do not only come from the workers, rather than almost all people, including children and toddlers. Almost everyone who uses gadgets spends a lot of their time in a day. Therefore, gadgets also have their values and benefits for certain people. In Indonesia, the gadget is a mainstay of children aged 15 to 16 years in accessing information technology as a source of learning and other information. In accessing the internet either through gadgets or laptops, a qualified network is required.

3. Increased participation of teachers and parents in mentoring children aged 15 to 16 years in accessing information technology as a source of learning and other information

Nowadays, the use of gadgets sometimes becomes a shortcut for parents in assisting them as caregivers for their children. With a variety of interesting features and applications, they use it to accompany children so that parents can carry out activities calmly, without worrying that their children are wandering around, playing dirty, messing around at home, which ultimately makes them fussy and disturbs parents' activities. Children can cleverly operate gadgets and focus on games or other applications. Many parents lately think that gadgets are capable of being safe and easy playmates under supervision. Thus, the role of parents has now been replaced by gadgets that should be friends to play with. Even though, it is necessary to know that a very sensitive period of child development is at the age of 1-5 years, as an early childhood so it is often called the golden age. At this time, all aspects of the development of intelligence, namely intellectual, emotional, and spiritual intelligence experienced extraordinary developments that would influence and determine further developments. When a child is at the golden age, all information will be absorbed quickly. They become reliable imitators, are smarter than we think, smarter than they seem, and will form the basis of their character, personality, and cognitive abilities. Thus, it is not wise to underestimate children at that age.

Considering both the advantages and disadvantages of introducing gadgets to children, in the end, depends on the readiness of parents and teachers in introducing and supervising children while playing with gadgets. Therefore, all parents need to be reminded of their important role in using

gadgets in children. Parents and teachers need to apply several rules to their children in using gadgets. To be able to use gadgets effectively, parents should be able to understand and explain the content on gadgets. Without assistance from parents, the use of gadgets will not focus on what parents teach. Instead, it will deviate from what parents teach.

First, provide opportunities for children to learn to use gadgets and interact from an early age. Since the use of gadgets is something that cannot be avoided at this time and in the future, it is clear that gadgets have certain effects on their users including physical effects on a person. Then, it is clear that the benefits and purposes of using gadgets are to provide directions to children on how to use gadgets properly either by sitting position and paying attention to the location of the light and visibility with the gadget. It is because the too close visibility will interfere with the child's vision. Second, choose an application that suits the needs of the children by adjusting the child's age and abilities. All games, social media, videos must pass parental supervision since elements of violence and pornography are prone to occur or are easily found in the content mentioned above. It needs to give a wise explanation of each function of the content on the gadget. Children will be able to receive explanations before they are immersed in their gadgets. Children can understand that with gadgets we can interact as needed both with fellow family members and with residents around the environment. All of these communications can use social media that have been used so far. Parents must provide clear and detailed information about the use of each application. They should know more about all the contents of their children's gadgets. Third, place the gadget in a common room. Sometimes parents feel proud to be able to put gadgets in their child's room. This is dangerous because parents and teachers find it difficult to monitor their children's activities using gadgets. It needs to choose a comfortable chair or table for playing with gadgets because the habit of playing with gadgets in a sleeping position is not good for eye health. Fourth, adjust the duration of gadget usage to avoid the kids be immersed in gadgets. All of these facilities are so fun that the children lose track of time. For this reason, parents and teachers must be able to confirm the time limit for using gadgets for their children. In addition, parents need to always build good interactions with their children. Parents and teachers provide examples of the positive use of gadgets because every child who is adept at using gadgets initially imitates their parents. For this reason, parents can provide a good example of using gadgets from the start. Fifth, help children make their own decisions. Sometimes children want to create a new atmosphere but they do not have the courage to communicate with their parents. Here, parents must always invite discussions and even invite stories so that children can present or be creative with the ideas that are on their minds.

Furthermore, it needs to cultivate a fear of God so that if there is no parent, he knows that God is watching what is done. This can lead children to make their own decisions without bad thinking. Accompanied use of the internet can be useful for enhancing digital security and resilience of children's ability to understand how to protect themselves and others from dangers in the digital space.

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