Philippine Normal University

and

Department of Education

DIGITAL KIDS ASIA-PACIFIC (DKAP)

National Report on Filipino Students Digital Citizenship

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Message

The Digital Kids Asia-Pacific (DKAP) research project is spearheaded by the Southeast Asian Ministers of Education Organization (SEAMEO) Secretariat and funded by the UNESCO Korean Funds-in-Trust Project. In the Philippines, DKAP is implemented by the Philippine Normal University in coordination with the Department of Education (DepEd). The project aims to survey around 1,000 Grade 10 students from various schools using the tool developed by UNESCO. DKAP supports the development of evidence-based national policy, interventions in the education system, and public information and awareness campaigns on the role of information and communications technology (ICT) in a learner's education so that this will eventually lead to a child-centered and holistic development.

PNU, as the National Center for Teacher Education, commits to provide solutions to issues and problems in education through relevant research. The University believes that decisions and policies affecting and influencing the state of education in the country must be data-driven and are anchored on pertinent information in order to provide invaluable insights to policy makers, education leaders, curriculum developers, teachers, and other stakeholders.

With this, we are pleased to share with you the technical report of the DKAP research project in the Philippines. We are grateful to SEAMEO Secretariat and DepEd for choosing to work with PNU on this project. We are certain that DKAP will offer substantial recommendations to further improve the content and delivery of ICT education in the country among our basic education students.

I also wish to offer my thanks and congratulations to the PNU Research Team led by Dr. Ronald Allan S. Mabunga, Vice President for Research, Planning, and Quality Assurance for working tirelessly to complete the research report despite all the limitations brought about by the pandemic.

We are one with the global community in ensuring quality, relevant, and accessible education for our young learners.

BERT JAZMIN TUGA, PhD
President

Message

The UNESCO's Digital Kids Asia-Pacific (DKAP) Project brought SEAMEO member countries (Indonesia, Lao PDPS, and Malaysia) together to understand the experiences and challenges of our learners on digital skills and literacy in a rapidly changing learning environment. In partnership with the Philippine Normal University (PNU), the Department of Education (DepEd) has conducted a survey using the DKAP survey tools to around 1,000 Grade 10 students nationwide.

Utilizing and maximizing technology in education has been one of the priorities of the Department of Education (DepEd) in the past years. This is currently highlighted as we ensure learning continuity in the height of a health crisis which has led to the shift to distance learning delivery modalities. The results will help us understand how to further improve our current distance learning modalities as learners navigate the digital world.

The DKAP results also arrive at an opportune time as we push forward *Sulong EduKalidad,* a campaign seeking to strengthen the quality of basic education in the Philippines. The results will help us formulate evidence-based policy interventions that shall develop the digital literacy; digital emotional intelligence; digital safety and resilience; digital participation and agency; and digital creativity and innovation of our learners. The results shall also provide insights in the review of our K to 12 curriculum, the reskilling and upskilling of our teachers, improving our learning environment, and forging partnerships with stakeholders. This will also be relevant as we prepare our learners and the education system for Industry 4.0.

We acknowledge and value the continued support of our partner organizations and stakeholders in the continuous pursuit of evidence-based actions in the education system. We thank the PNU in partnering with us in the implementation of this research, and to all the Filipino learners who willingly participated in the study.

Let us remain steadfast in providing accessible, equitable, and quality basic education for all learners because as we say, *Handa Isip, Handa Bukas.*

LEONOR MAGTOLIS BRIONES
Secretary
Department of Education

Foreword

The dynamic advances in Information and Communication Technology (ICT) have continuously altered our way of life. From finding information at our fingertips to connecting with one another via various social media platforms, ICT has become part of our daily routines. In the education sector, the evolution of ICT has also changed the way students learn. Children nowadays have easy access to the digital world through smartphones, laptops, and other devices. This is both a boon and a bane - with technology utilized and maximized in the teaching-learning process while also being a venue for learners to be exposed to the dangers of the digital world such as the peddling of fake information and cyberbullying, for example.

While the Department of Education (DepEd) has put into forefront education technology through its various connectivity and ICT integration initiatives in the past years, the need to strengthen ICT systems has been heavily highlighted recently as we shifted to distance learning modalities and work-from-home setups in response to the COVID-19 pandemic. The past initiatives and the current education landscape have seen its share of challenges particularly the digital divide especially among those without access to modern technology. In all these, our learners are front, and center and it is of paramount importance to understand their understanding of, interaction with, and attitude towards the digital world.

The Digital Kids Asia-Pacific (DKAP) Project, supported by UNESCO and the Korean In-Trust Funds, seeks to provide insights as to the knowledge, beliefs, and attitude towards ICT and the digital world of Filipino students. Conducted by the Department of Education (DepEd) and the Philippine Normal University (PNU), the findings of the DKAP project shall help shape policy and program development in the integration of ICT and digital citizenship in the curriculum, learning delivery, education assessment, and other aspects of education. The study surveyed around 1,000 Grade 10 students on the five domains of the DKAP Digital Citizenship Competency Framework, namely: (1) digital literacy; (2) digital safety and resilience; (3) digital participation and agency; (4) digital emotional intelligence; and (5) digital creativity and innovation. Using this framework, the report explored factors that affect their interaction with the digital world such as sex, socio-economic status, geographical locations, and access to digital devices, among others.

The results of the DKAP study shall guide us in our campaign towards quality basic education, *Sulong Edukalidad*, that focuses on (1) K to 12 review and update; (2) improving learning environment; (3) teachers upskilling and reskilling; and (4) engagement of stakeholders for support and collaboration. The results will also help us improve and strengthen the implementation of the Basic Education Learning Continuity Plan (BE-LCP) as we support learners during this pandemic. Most importantly, the findings will allow is to develop a more holistic, strategic, and equitable approach on developing policies, programs, and interventions on digital citizenship.

It is our fervent hope that this report will signal discussions among education leaders and stakeholders in ensuring that Filipino learners are able to purposefully navigate the digital world.
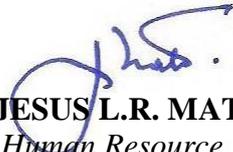
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Statement from the Research Team

In 2019, the United Nations Educational, Scientific and Cultural Organization (UNESCO) initiated a groundbreaking project entitled Digital Kids Asia-Pacific (DKAP). The DKAP Project aimed to measure children's information and communication technologies' (ICT) practices, attitudes, behaviors, and competency levels. The main goal of the project is to establish evidence-based understandings of children's safe, effective and responsible use of ICT within an educational context across the Asia-Pacific countries. The project is one of the numerous initiatives of UNESCO in response to the United Nations Sustainable Development Goal (SDG) 4 which aims to ensure inclusive and equitable quality education and to promote lifelong learning opportunities for all.

Through a partnership between and among the Southeast Asian Ministers of Education Secretariat (SEAMES), the Department of Education (DepEd), and the Philippine Normal University, an online Survey on the Digital Kids Asia-Pacific (DKAP) Project has been administered in the Philippines among randomly selected Grade 10 students from both public and private schools in urban and rural areas in the country.

Using quantitative research design, the Philippines DKAP Country Report provides evidence-based information relative to access and use of ICT, usage of digital devices and internet among the respondents. In particular, the Report highlights information about the following: digital literacy; digital safety and resilience; digital participation and agency; digital emotional intelligence; and, digital creativity and innovation. In addition, factors like gender, type of school, and geographical location in relation to digital knowledge and skills are presented.

The results of the Survey on DKAP in the Philippines are expected to serve as additional scientific-based inputs to education policy makers, experts, practitioners, and other stakeholders in developing the appropriate intervention programs geared toward the provision of a more equal and quality access to information and communication technology to further enhance learning among our children.

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Abbreviations and Acronyms

CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CHED	Commission on Higher Education
CI	Confidence Interval
DepEd	Department of Education
DKAP	Digital Kids Asia-Pacific
GFI	Goodness-of-Fit Index
ICT	Information and Communication Technology
NCR	National Capital Region
NRT	National Research Team
PRDD	Policy Research and Development Division
RMSEA	Root Mean Square Error of Approximation
SD	Standard Deviation
SDGs	Sustainable Development Goals
SDG 4	Sustainable Development Goal 4
SEM	Structural Equation Modeling
TLI	Tucker-Lewis Index
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

Executive Summary

The Digital Kids in Asia-Pacific (DKAP) Project is originally initiated by the United Nations Educational and Scientific Organization (UNESCO) covering four (4) countries - Republic of Korea, Bangladesh, Fiji and Viet Nam. Through a partnership between UNESCO and the Southeast Asian Ministers of Education Secretariat (SEAMES) based in Bangkok, Thailand, a similar study has been conducted in the Philippines, Indonesia, Lao PDR, and Malaysia . In the Philippines, the DKAP Project has been conducted by the Philippine Normal University (PNU), in partnership with the Department of Education (DepEd), through its Policy Research and Development Division (PRDD).

The main objective of the DKAP research project is to have evidence-based information relative to the state of digital citizenship among ASEAN children. In particular, the DKAP project investigates five (5) competency domains: Digital Literacy, Digital Safety and Resilience, Digital Participation and Agency, Digital Emotional Intelligence, and Digital Creativity and Innovation.

Specific to the Philippine context, the main focus of the present research project is to determine the digital citizenship competency of the Filipino children. In particular, the study aims to answer the following: (1) Is the reliability and validity of DKAP appropriate for Filipino students?; (2) How may we describe the digital citizenship competency among 15-year old Filipino students?; (3) Are there differences in the Filipino students' digital citizenship competence due to gender, type of school, and geographical location?; and (4) Are there individual and contextual characteristics that predict Filipino students' digital citizenship competency?

The research project adopted a quantitative research design using survey methodology. The research utilized the self-report questionnaire originally developed for the DKAP survey by UNESCO in 2019. The survey consists 104 items that measure the five (5) DKAP domains and their corresponding sub-competencies. Using purposive random sampling, 1,186 participants aged 15 years old who are full time Grade 10 students participated in the study. The student participants are sampled from 32 public and private schools with representatives from urban and rural schools. Data collection was conducted online using the Google form of the DKAP survey questionnaire. The reliability and validity of the questionnaire were established using Cronbach's alpha and Confirmatory Factor Analysis (CFA).

The major findings of the research reveal that the respondents from the Philippines are most confident in the domain Digital Safety and Resilience (M=3.47) but are least confident in the domain Digital Creativity and Innovation (M=2.96). In general, the Filipino respondents' mean scores in all digital citizenship domains are well-above the midpoint value, except for Digital Creativity and Innovation.

Results further showed that the Filipino respondents have personal and contextual characteristics that affect their digital citizenship competency. Primarily, the results indicate that girls have significantly higher scores than boys in all competency domains, except for Digital Creativity and Innovation where there was no significant difference by gender. In terms of type of school, students from private schools have higher scores in Digital Literacy, Digital Safety and Resilience and Digital Emotional Intelligence than students from public schools, while there was no difference between students from private and public schools in the other two domains. Another factor identified is the geographical location of the respondents which shows that students from urban schools have higher scores in Digital Literacy and Digital Safety and Resilience compared with students from rural schools.

Further, multiple regression analysis indicates the following results: (1) students who reported to have learned coding skills are more likely to have higher scores in all five domains compared to those who reported not to have learned coding skills; (2) students who learned how to develop web or application are more likely to have higher scores in all domains, except in Digital Safety and Resilience where learning to develop web or app did not matter; (3) the educational level of students' parents is not associated with students' scores in any domain, except in Digital Creativity and Innovation where students who reported lower level of parents' education have higher scores in this domain; (4) students who reported that their homes have a car, television, or bathroom with shower/bathtub are more likely to have higher scores in all domains, except in Digital Participation and Agency; and (5) the number of books at the students' homes is not associated with any of the domains.

The domain-specific results reveal that in the Digital Literacy domain, the children from the Philippines are more confident in their ICT Literacy (M=3.21) which is greater than their Information Literacy (M=3.15). Results in the domain of Digital Safety and Resilience suggest that the respondents are most confident in Understanding Child Rights and Personal data, Privacy, and Reputation (M=3.56) and least confident in Promoting and Protecting Health and Well-Being (3.27). The results for the domain of Digital Participation and Agency show that among its three sub-competencies, respondents from the Philippines are most confident in their understanding of Netiquette (M=3.45). On the other hand, the least mean score gathered is on Civic Engagement (M=2.73). For the domain of Emotional Intelligence, Self-Awareness showed the highest average mean score (M=3.39). In contrast, Empathy is revealed to be the lowest among the sub-competencies (M=3.17). For the Digital Creativity and Innovation domain, respondents have identical mean scores in Creative Literacy and Expression (2.96) which are both below the midpoint value.

Additional survey results reveal that digital divides exist among the Philippine respondents as indicated by the percentage of students who reported not having access to any digital device at home (9.61), the percentage of students who have never used a digital device or have used a device for less than a year (30.5), and the percentage of students who hardly ever used the Internet or computers for school study (14.5).

Interestingly, results on the respondents' use of digital technologies highlighted the role of teachers as indicated by the percentage of students who reported that they learned how to use computers mainly from teachers (29.5), the percentage of students who reported that they were frequently (i.e. often, very often, or all the time) guided by teachers in using the Internet safely (43.9), and the percentage of students who reported getting encouragement from their teachers in learning new things using the Internet frequently (44.2).

Based on the results of the survey, the following conclusions can be inferred: (1) digital citizenship education is a critical component of the education system particularly in basic education level; (2) the DKAP survey questionnaire used in this research may serve as a benchmark for future assessments particularly in determining the potential changes in the level of competency among the students vis-a-vis digital citizenship education; and (3) digital divide' needs to be fully recognized by policymakers and practitioners (i.e., school leaders and teachers) in order to develop the necessary interventions in addressing the said gap.

The following recommendations are offered:

➢ Develop a holistic framework for Digital Citizenship Education in the Philippines.

➢ Pursue collaborative efforts among education stakeholders to promote digital citizenship education.

➢ Invest and strengthen ICT resources to bridge the gap on digital divides.

➢ Conduct further research on the digital citizenship of Filipino learners.

As a final note, it can be said that the DKAP framework and survey questionnaire are important developments that provide opportunities for counties or educational systems in the Asia-Pacific region to assess the development of digital citizenship among their students. While much work is yet to be done in terms of enhancing the measurement of digital citizenship competencies, identifying other factors that promote digital citizenship competency, and designing policies and programs that expand opportunities for digital citizenship education within the socio-cultural context of a country, the present research conducted in the Philippines provide important information that serve as preliminary data on the digital citizenship of Filipino learners. It is desirable that the Philippines and other countries continue to explore and elaborate on the DKAP concepts as digital citizenship competencies are critical for individuals and societies to be successful in a world that has been rapidly changing in the past decades due to advancement in digital technologies.

Chapter 1: Introduction

1.1. Background

Internet and Education: The Philippine Context

While the COVID-19 pandemic challenges the different societal systems, the academe continuously searches for the best option to help students continue with their studies. In effect, the pandemic forced the educational system to migrate the teaching and learning processes from traditional to flexible modalities. Now more than ever, the internet plays an important role in the lives of most Filipino students because it seemed to be the best method that can help them to still succeed with their academic tasks at home.

However, several challenges on the use of Internet and technology beset the education policy makers and leaders. The Technical Education and Skills Development Authority (TESDA) of the country describes in their website that the "Philippines still pales in comparison to other nations in terms of personal computer (PCs) penetration index." Only about two percent (1.37 million) of the total population have installed PCs with a greater percentage in private businesses rather than the household. On the other hand, the demand on internet usage is continuously growing in the country particularly in this time of pandemic (International Data Corporation, 2020). Although there is an increasing demand for internet usage, the Philippines has one of the slowest internet speeds in Southeast Asia. In fact, the country has been reported to be at the bottom 50% of the world ranking in terms of the ICT development index (www.tcdata360.worldbank.org, 2020). The current dilemma on the state of the ICT in the country indeed threatens the success of different agencies reliant on it such as the education sector.

The Department of Education (DepEd) of the country is cognizant of the importance of the internet as well as the need to improve the digital literacy skills among the young people. According to Umali (2019), Filipino children must develop a whole new range of ICT-related skills for them to thrive and be effective citizens in a digital economy. In response, DepEd has formally integrated digital citizenship and responsibility into the basic education curriculum. The digital literacy program of DepEd aims to maximize the opportunities and potential of ICT and many other digital technologies as tools that will improve the life of the people, personally as well as professionally.

Furthermore, the DepEd acknowledges that more than the availability of the needed ICT infrastructure is the ability of the students to thrive in a digital world. In other words, students must have the necessary skills to competently use the internet and other digital technologies in their studies. DepEd Secretary Leonor Briones specifically acknowledged the importance of educating the youth on the use of the internet. In her speech in 2019, Secretary Briones stressed that "[w]hile we believe that the internet is fundamental to achieving inclusive and equitable quality education, we are also aware that it exposes our youth to many potential risks that may harm them." The realities of Internet usage of the youth, as pointed out by Secretary Briones, led the DepEd to implement programs like Digital Thumbprint Program to educate students on the proper online behavior and to create an open, inclusive, and safe online environment. It has also developed K to 12 Basic Education Curriculum for ALS-K to 12 learning Strand 6 which focus on Digital Literacy.

Internet Use in the Philippines

The demographic landscape of the Philippines is varied and relatively young but growing. The population growth in the Philippines is 8.2% over the last five years (Nielsen, 2019). The Philippines is one of the many countries in the world with relatively young populations. 67% of the population are less than 35 years old. The country's median age is 24 years old which can be inferred as a healthy, potential source of labor force, and expected to have higher consumer demands.

The internet users in the country are about 73 million with 67% internet penetration as of January 2020. Social media users are approximately 73 million which has increased by 5.8 million between April 2019 and January 2020. On the other hand, there were 173 million mobile connections with an increase of 38 million between January 2019 and January 2020 (Datareportal, 2020).

According to the 2019 Nielsen report, with smartphone users who are digitally immersed with their gadgets, there is an upsurge in spending power and lifestyle of convenience. In the urban Philippines, "73% are already internet users and among this number is over 90% of Generation Z and Millennials. Internet access shows no signs of slowing down, despite relatively slower internet speeds in the country compared to our Asian neighbors. As a mobile-first market with growing internet penetration, the Philippines can be a captured and highly engaged audience for marketers."

These data and trends on the use of the internet has huge implications in the delivery of education programs. It is imperative that the education agency of the country must be equipped with relevant and timely information to serve as a basis for developing programs and policies that will respond to the needs and challenges of education in the new normal.

Digital Citizenship: Domains and Competencies

The postmodern world is eclipsed using technology through the continuing increase of adopting new technologies such as artificial super intelligence (ASI), cloud computing, algorithm, robotics, data analytics, among others in all fronts of society. The Industry 4.0 ushered in a new period of computers that "are connected and communicate with one another to ultimately make decisions without human involvement. As a result of the support of smart machines that keep getting smarter as they get access to more data, our factories will become more efficient and productive and less wasteful" (Marr, 2018). Thus, the social world had been radically morphed. Employees, students, and all citizens are therefore required to acquire the necessary digital skills for them to adapt to this on-going change.

With the Covid-19 pandemic, the efforts of national governments defined and redirected to re-evaluate their digital capability and the need to invest more on education to strengthen the digital literacy of their citizens. The educational institutions are now more than challenged to provide quality and effective programs to improve the digital skills among their students. While there are numerous challenges posted by the Covid-19 pandemic in the field of education, it has also led into a significant paradigm shift on how teaching and learning is conducted. Suddenly, the majority or almost all of the students are now attending their classes online (remote learning). With remote learning, students need more than ever a set of digital skills and literacy for them to thrive in the new normal of learning. Specifically, it pressed the button to expedite the use of ICT in education to support the delivery or modality of various education programs in the midst of the pandemic. Hence, it is apt and timely to push for education for digital citizenship in the country.

Digital citizenship as described by the UNESCO (2016) is *"being able to find, access, use and create information effectively; engage with other users and with content in an active, critical, sensitive and ethical manner; and navigate the online and ICT environment safely and responsibly, being aware of one's own rights."* With the said definition in mind, UNESCO (2019) conducted a study called Digital Kids Asia-Pacific (DKAP) which aims to understand the state of digital citizenship among ASEAN children. Primarily, the DKAP project investigates five competency domains: digital literacy, digital safety and resilience, digital participation and agency, digital emotional intelligence, and digital creativity and innovation.

In response, the education for *digital literacy* aims to promote among students the ability to seek, critically evaluate, and use digital tools and information effectively to make informed decisions (www.dkap.org, 2020). It means that ICT and information literacy need to be promoted among students. As the Organization for Economic Cooperation and Development (OECD, 2020) describes that machines and ICT infrastructure are "useless without the competence to exploit them," schools and colleges should nurture digital literacy among its students for in such lies the foundations of lifelong learning. To be digitally literate, an individual must possess the competency to successfully manage the hardware and software technologies and use ideas and information for informed responses.

Another domain that digital citizenship wants to strengthen is the *digital safety and resilience* where children should learn to protect themselves from any harm while being exposed to the different online activities. Specifically, the domain on digital safety and resilience aims to educate children with their legal rights; be conscious with sharing information online and respecting others privacy online; participate in promoting healthy well-being; and be proactive with the different challenges that they may encounter in the digital space.

Meanwhile, another domain, called *digital participation and agency,* aims to promote among children the ability to use ICT for positive interaction. Specifically, this domain wants children to be competent in collaborating with others online in order to achieve a common goal. It is the desire of the digital citizenship framework that as children collaborate they are also willing to actively exercise civic engagement and demonstrate ethical and courteous behavior while dealing with others. This specific domain seems to support that ICT must be at the front of the infrastructure of the national government "to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision."

One of the indicative strategies in promoting digital citizenship is to "provide distance learning, ICT training, access to appropriate technology and necessary infrastructure to facilitate a learning environment at home and in conflict zones and remote areas, particularly for girls, women, vulnerable boys and youth, and other marginalized groups." If such differences will not be acknowledged, one can assume that digital divide will be evident.

In the world today, digital divide in education is felt more than in the previous years because learning and education are now facilitated within ICT platforms. The gaps in terms of access to technology continues to be a barrier to the effective education of young people, thus the imperative to narrow the gap through universal access to the use of computers and internet; creation community access centers; additional well trained technical staff; and paradigm shift in the way people perceive technology.

Therefore, to promote equity and inclusivity, the digital citizenship education strives to promote positive *emotional intelligence* among children. In this domain, students are prepared to be aware of themselves and in the physiological changes in their bodies, to understand the complexities of their behavior and emotion, and to recognize factors that can help them achieve their goals. Ultimately, as children understand themselves, it is hoped that they also understand others.

The World Economic Forum (2020) clearly articulated that the "social and economic impact of technology is widespread and accelerating. The speed and volume of information have increased exponentially." The increase in information can enable children to take advantage of them in creative and responsible ways.

This is the aim of the domain *digital creativity and innovation* that specifically desires children to be creative and to be able to express themselves through their own innovative contents.

The different domains of digital citizenship clearly suggest the importance of digital literacy on the national education curriculum of each country. In education for digital literacy, various competencies must be the focus of the education system.

This DKAP project is a timely and appropriate step toward the direction of providing evidence-based data in developing education programs and projects that will effectively respond to the urgent demand of providing training and learning opportunities for students to enhance their digital skills, competencies, and knowledge.

1.2.   Overall Objectives of the Research

Objectives of the Project

Since 2014, UNESCO Bangkok has implemented the "Fostering Digital Citizenship through Safe and Responsible Use of ICT" Project. The overall goal of this project is to promote and sustain policy dialogue in the Asia-Pacific on the issues of the safe, effective, and responsible use of ICT and to build the education sector's capacity to foster digital citizenship among children.

As part of the Project, the "Digital Kids Asia Pacific (DKAP)" project component seeks to conduct a comparative cross-national study to address the Asia-Pacific region's knowledge gap regarding children's ICT practices, attitudes, behaviors, and competency levels within an educational context. Specifically, the objectives of the DKAP project are to:

➢ Contribute to the evidence-base in Asia-Pacific by obtaining and comparatively analyzing quantitative and qualitative data on children's actual attitudes, behaviors, competency levels, and use of ICT within an educational context.

➢ Establish an evidence-based understanding of children's safe, effective, and responsible use of ICT in Asia-Pacific by developing and validating a framework that can measure children's attitudes and behaviors, competency levels, and use of ICT within an educational context.

The expected output of this project is a comparative cross-national study that:

➢ Sets out a reliable and comprehensive baseline in Asia-Pacific countries of children's actual attitude, behaviors, competency levels, and use of ICT within an educational context that will inform relevant education policies and practices.

➢ Assesses whether the framework's domains and competencies are valid, based on the data gathered from pilot countries, for measuring children's attitudes and behaviors, competency levels, and use of ICT within an educational context.

In 2019, the DKAP survey was conducted in four Asia-Pacific countries: Bangladesh, Fiji, Republic of Korea, and Vietnam. The findings and recommendations are published in a publicly available report (UNESCO, 2019) which provides initial data on the digital citizenship of students in the four surveyed countries. The present research is a continuation of the efforts to assess and describe the digital citizenship competency of Asia-Pacific students using the DKAP framework.

Research Questions

The overall research question in the DKAP project is: "Is DKAP measuring the 'digital citizenship competency' of Asia Pacific students?" For the present research, the research question is: "Is DKAP measuring the 'digital citizenship competency' of Filipino students?"

To answer this question, more specific sub-research questions are established for the present research:

1. Is the reliability and validity of DKAP appropriate for Filipino students?

2. How may we describe the digital citizenship competency of 15-year-old Filipino students?

3. Are there any differences in the Filipino students' digital citizenship competency due to gender, type of school, and geographical location?

4. Are there individual and contextual characteristics that predict Filipino students' digital citizenship competency?

Chapter 2: Methodology of the Research

2.1.   Nature of the Research

Survey

The present research adopted a quantitative research design using survey methodology. The research utilized the self-report questionnaire developed for the DKAP survey (UNESCO, 2019). The survey consists of 104 items that measure digital citizenship competencies and other relevant information. The questionnaire has eight (8) sections and the primary items refer to the items designed to measure the five DKAP domains and their corresponding competencies. The present research used the English version of the DKAP survey and was not translated to another language as English is the medium of instruction in Philippine secondary education. The survey questionnaire adopts a four-point Likert scale format. Table 1 presents the survey's summary of item distribution per component. The full questionnaire is in Annex 1.

Table 1
Summary of survey components and number of items

	Components	Number of items
A	**Digital Literacy**	**14**
B	**Digital Safety and Resilience**	**18**
C	**Digital Participation and Agency**	**12**
D	**Digital Emotional Intelligence**	**16**
E	**Digital Creativity and Innovation**	**11**
F	**Student Background**	**8**
G	**Access to and usage of digital devices**	**18**
H	**Socio-economic status (SES)**	**7**
	TOTAL	**104**

The DKAP survey has been converted to a technology-based, online format. The online questionnaire was converted using Google Form, with the PNU licensed electronic-mail domain. Initial drafts were presented to the National Research Team (NRT) comprising PNU and DepEd personnel for further recommendation and suggestions. No parts of the DKAP final survey format has been altered or modified, except to the addition of other demographic profile variables contextually applicable to the Philippines (i.e. type of school, region, province or city represented, name of school).

Applying the standardized time allocation for the conduct and accomplishment of the survey, there were some modifications on the expected time frame as an online questionnaire was administered. Table 2 shows the time allocation for the administration of the DKAP online questionnaire.

Table 2
Time allocation on the administration of DKAP Online Questionnaire

Activities	Length
Preparation of students and reading of instructions	**Approx. 10 min.**
Administering the main and contextual questionnaire via online	**45 min.**
Submission of the online survey	**Less than a min.**
TOTAL	**56 min.**

Sampling and Participants

To ensure and maximize the representation of the Filipino learners in the 17 regions of the Philippines, the NRT used a two-staged stratified random sampling. In the first stage of stratification, schools were randomly selected based on four (4) criteria: (1) public schools in urban areas; (2) public schools in rural areas; (3) private schools in urban areas; and (4) private schools in rural areas. During the second stage of stratification, the target 15-year-old learners enrolled in Grade 10 level were randomly selected. The learner's age considered in the sampling were 15 years old at the time of DKAP participation or turning 15 years-old until December 31, 2020. The list of schools and the list of Grade 10 learners including the data elements of age and gender were generated through the Basic Education Information System (BEIS), the primary management information system of the Department of Education. Using the randomizer function in the Microsoft Excel program, sampling resulted in four schools per region, with a total of 68 schools nationwide. For the second stage of stratification, the target learners were randomly selected which resulted to 60-student representatives, at most, per school.

In consideration of the impacts of two successive typhoons that hit the country during the data collection process, one region was excluded to participate in the research. With the availability concerns of a private-rural school in another region, only three target schools were involved from that region. Moreover, one region, the National Capital Region (NCR), is classified as urban, thus, there is no identified rural school in the said region. In this regard, four schools in the NCR were selected as target schools. Hence, a total of 63 schools from 31 provinces and 17 cities with 2,316 learners were initially targeted as respondents. However, the availability of digital devices and the learners' limited to no access to internet connection, particularly those who are into full printed modular distance learning, affected the students' participation in the online DKAP survey. Additionally, two successive strong typhoons also affected several of the Philippine regions which resulted to lower turnouts of participating schools and respondents.

A total of 1, 744 students from 49 schools responded in the survey which comprised the initial database for the present research. Respondents with several missing information and/or incorrect computer entries were removed from the database, while respondents from schools which have lower than 20 total respondents were also removed. The final sample used in the research consists of 1, 186 participants aged 15 years old who are full-time Grade 10 students (4th year high school). The participants came from a total of 32 participating schools. Of these participants, 342 (28.8%) are from private schools and 844 (71.20%) are from public schools, and 695 (58.60%) are from urban schools and 491 (41.4%) are from rural schools. There are 686 girls (57.80%) and 500 boys (42.20%).

Data Collection

Because of the global COVID-19 pandemic and the corresponding community quarantine that led to the Philippine government to prohibit face to face classes in almost all areas in the country, data collection was conducted online using the Google Form version of the DKAP survey questionnaire. The data collection was carried out between October to November 2020 with the assistance of field coordinators from DepEd. The data collection process is summarized in Figure 1.

Figure 1

Data Collection and Field Operations Procedures
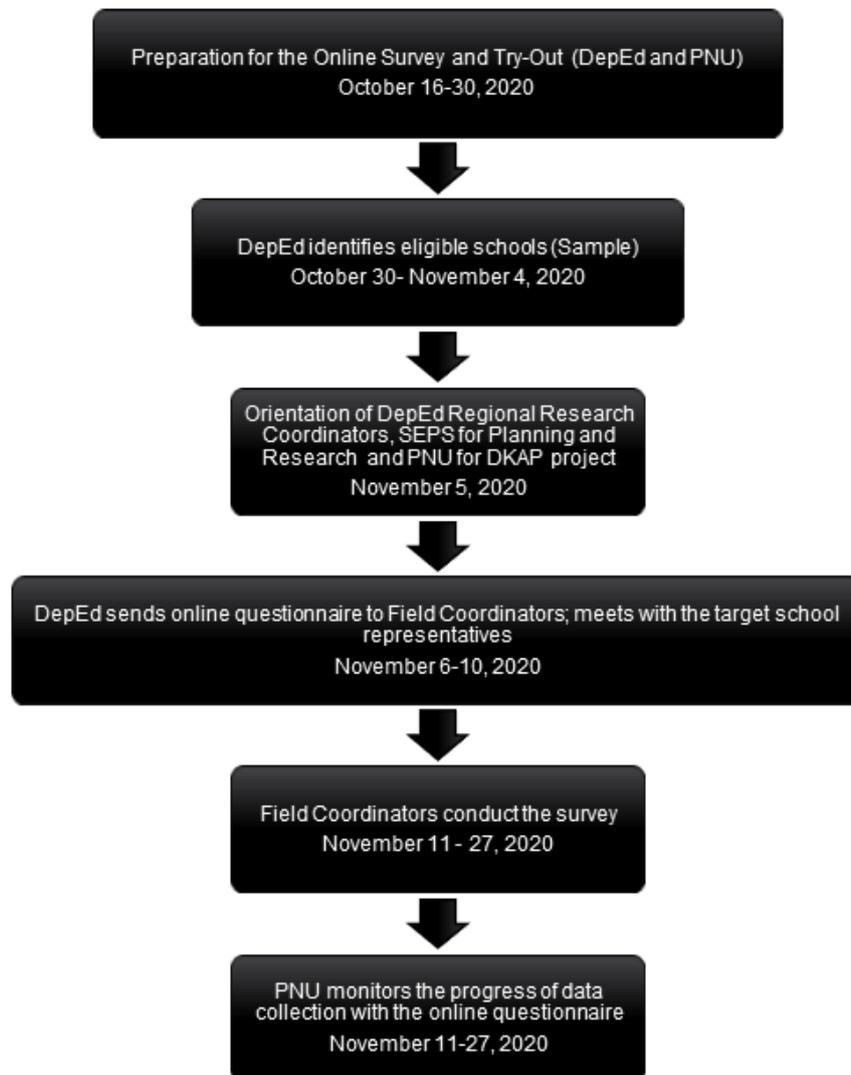
The draft of the survey was piloted in a laboratory school of a state university. Upon getting the approval for the process, the survey was administered to 32 Grade 10 students of the said university. The respondents of the pilot test described the time it took them to complete the survey and gave inputs on which terms/questions they had difficulty understanding. These information were used in finalizing the DKAP survey questionnaire.

The NRT then conducted an orientation with field research coordinators. The background of the DKAP research project, research design, data collection strategies, and the roles of the coordinators were discussed. They were tasked to coordinate with the selected schools to collect and consolidate the schools' contact information for the survey deployment. It was explained that access to the survey will only be from 8:00am to 5:00pm, from Monday to Friday.

To ensure compliance with the Data Privacy Act of 2012 or RA 10173, the list of the selected learners and the information to participate in the survey were directly referred to the school head/ coordinator by the NRT via electronic mail. The school coordinators then administered the survey by sharing the DKAP background information and survey link to the selected learner respondents.

PNU monitored the progress of data collection to ensure that the target samples will be reached. Considering the pandemic and the distance learning modalities in the country, the DKAP data collection was administered online for two weeks (November 11-27, 2020).

2.2.   Reliability and Validity of Survey

One of the purposes of the present research is to determine if the DKAP survey questionnaire is reliable and valid. Data from the sample of Filipino participants who responded to the online survey was then examined to establish the reliability and validity of the questionnaire used.

Cronbach's alpha was obtained to determine the internal consistency of each domain and the sub-competencies within each domain. Annex 2 presents the results of the internal consistency reliability analysis. Cronbach's alpha values for the domains range from .81 to .89 which are all indicative of good internal consistency. The Cronbach's alpha values for the sub-competencies range from .58 to .85 which are deemed acceptable (Kline, 2020). It must be noted that the competency Promoting and Protecting Health and Well-Being was found to have very low and negative Cronbach's alpha in the four countries where the DKAP survey was first used (UNESCO, 2019). In the present research, the Cronbach's alpha is deemed acceptable (.58) for this competency especially as it only has a few items. Overall, the internal consistency of the DKAP survey is acceptable and provides evidence that the survey is reliable.

To assess the validity of the measurement model of the DKAP survey, confirmatory factor analysis (CFA) using structural equation modelling (SEM) was performed on the survey data. CFA was performed for each of the five competency domains with sub-competencies as latent variables and their corresponding items as observed variables. Unlike in the previous survey (UNESCO, 2019), CFA was conducted on the level of the items which is important for determining the structural validity of a new questionnaire. Overall, CFA results indicate that all five domains have adequate to good model fit, although Digital Literacy obtained less than satisfactory model fit indices. For all domains, all items loaded significantly on their hypothesized latent factor (sub-competency) with standardized parameter estimates ranging from .383 to .825. Moreover, standardized parameter estimates were all above .50, except for one item each for ICT Literacy, Understanding Child Rights, Promoting and Protecting Health and Well-Being, and Civic Engagement. Overall, the CFA results provided support to the validity of the DKAP survey.

The CFA results are presented in Annex 3.

2.3.   Data Analysis

The responses of the sampled Filipino students to the DKAP survey were analyzed by determining frequency, percentage scores, mean scores, and standard deviations to describe the digital citizenship competency of the participants in terms of the DKAP domains and sub-competencies. Whenever applicable, responses in certain items were reverse-coded.

A series of independent sample t-test were conducted to determine if there are differences in the participants' digital citizenship competency domains as functions of gender (girl/boy), type of school (private/public) and location (urban/rural). A series of multiple regression analyses were performed to determine if a set of personal and contextual factors predict each of the domains. The factors that were hypothesized as predictors were mostly adopted from the ones used in the previous survey (UNESCO, 2019). For the present research, these factors are: (1) type of school, (2) geographical location, (3) gender, (4) duration of use of digital devices, (5) frequency of use of digital devices, (6) coding skills learning experience, (7) web or application development experience, (8) parents' education level, (9) home environment (presence of car, television, and bathroom with shower or bath tub), and (10) number of books at home. To account for shared variance, all hypothesized predictor variables were entered in the multiple regression model simultaneously.

2.4.   Ethical Considerations, Limitations, and Challenges

The present research observed research ethics, especially during the data collection phase. The informed consent form was embedded in the survey and respondents were requested to ensure that at least one of their parents gave consent for their participation in the survey. The preliminary pages of the survey questionnaire explained to the respondents the purpose of the research and were given the option not to continue with the survey if they choose to do so. Since the questionnaire was given online, there was no risk related to exposure to COVID-19 during the data collection. The data collected from the respondents did not include the names and actual student identification numbers of the respondents. The privacy, security, and confidentiality of the data were ensured by the research team. During data organization and analysis, only the members of the research team that were involved in data coding and analysis had access to the data. In the presentation of results in this report, no individual data is provided, and only aggregate data are reported and discussed.

The research is not without limitations. First, the measure of digital citizenship competency used was a self-report questionnaire. While the questionnaire's validity and reliability with the Philippine respondents were established, the limitations inherent with self-report measures are expected (e.g., some students may have responded with social desirability bias, some students may have responded without full understanding of some items). Second, the sample size used may not be representative of the entire population of 15-year-old Filipino students in the Philippines, thus, caution should be exercised in generalizing the results. In

addition, because of the pandemic, only those students with access to digital device and connectivity during data collection became part of the study. Hence, the generalizability of the findings is limited. Future research on students' digital citizenship should consider data collection through printed questionnaires to enable students with limited or no access to digital device or connectivity. Third, while all the competency domains have good internal consistency, some of the sub-competencies have less than satisfactory internal consistency. The results seem to indicate that it may be more useful to use the general domains instead of the more specific sub-competencies in describing the digital citizenship competency of the respondents. Fourth, not all possible personal and contextual variables measured in the survey were tested as predictors of the digital competency domains. It is possible that other factors not considered could have exerted effects on the respondents' digital citizenship competency. Related to this, the DKAP survey did not cover the whole range of personal and contextual factors that may have an impact on digital citizenship. Moreover, while the role of various factors on digital citizenship competency was examined using correlational techniques (i.e., multiple regression), the analysis does not provide support for the cause-and-effect relationship. The predictive effects of factors on digital citizenship competency is indicative of correlation, not causality. Lastly, the data collection occurred during the COVID-19 pandemic where most schools shifted to the remote learning environment, with online learning as the primary delivery mode. Thus, the students in the study are more likely to have been exposed to digital mode of instruction and learning, which may partly explain the ensuing results from the research. It is plausible that an assessment of the Filipino students' digital citizenship competencies prior to COVID-19 and the shift to online education may paint a different set of results.

The present research is also not without challenges. The NRT was formed when the COVID-19 pandemic already made its way to the Philippines and other Southeast Asian countries. This made meetings among researchers limited to online or web conferencing modality. The community quarantine imposed in most areas in the country also made communication among field coordinators and participating schools challenging. Moreover, when data collection commenced, two successive typhoons affected several regions in the Philippines which affected the turnout of responses since many areas experienced loss of electricity and internet connectivity for several days. This necessitated the NRT to extend the survey schedule. Nevertheless, some of the sampled or identified schools which did not meet the required minimum number of respondents and were removed from the final set of data.

Chapter 3: Findings of the Research

3.1. Summary of Findings on Domains

3.1.1. The Filipino students' digital citizenship competency

The current survey aims to generally answer the question "Is DKAP measuring the "digital citizenship competency" of Asia Pacific students?" Contextually, the present research answers the research question in Philippine perspective: What is the "digital citizenship competency" of Filipino students?

Table 3
Descriptive Results on Each Domain

Domain	Mean	SD
Digital Literacy	3.19	.51
Digital Safety and Resilience	3.47	.41
Digital Participation and Agency	3.18	.45
Digital Emotional Intelligence	3.28	.44
Digital Creativity and Innovation	2.96	.55

In general, the results of the survey show that the Filipino respondents in the present research have adequate levels of digital citizenship competency as reflected with their general agreements on the DKAP items measuring the five domains of digital citizenship competency. As shown in Table 3, all the mean scores in the respondents' DKAP competency domains are well above the midpoint value except for Digital Creativity and Innovation which is below the midpoint value. This means that on the average, the Filipino respondents in the present research agreed or are confident that they have the necessary competencies for digital citizenship.

As depicted in Table 3, the domain with the highest mean score is Digital Safety and Resilience. It means that the respondents, on the average, are generally aware of the threats they can encounter while using the internet and can realize how to rightfully make use of the knowledge they get from online sources.

As previously mentioned, the domain with the lowest mean score is on Digital Creativity and Innovation. The said domain describes students' ability to use their knowledge on ICT and technology to express themselves in different online platforms. The result seems to suggest that the respondents, on the average, are not that competent yet in demonstrating their creativity and innovativeness through digital technology.

The overall results seem to be in parallel with the first DKAP survey (UNESCO, 2019) where the respondents from the four countries who participated also obtained high mean scores for the domain on Digital Safety and Resiliency while the lowest score was obtained in the Digital Creativity and Innovation domain. Nevertheless, some notable results can be observed with the data gathered from the Filipino students in the Philippines relative to the key findings on the first DKAP Survey (UNESCO, 2019). First, the Philippines' mean rating for Digital Safety and Resiliency and Digital Literacy is second to that of Korea. Second, while the first survey described similar results on Digital Participation and Agency for the four countries surveyed, the mean scores for the Philippines on this domain is notably higher. Third, while Korea was reported to have the highest mean score for Digital Creativity and Innovation and Digital Emotional Intelligence among the four countries in the first survey, the Philippines mean scores on these two domains are notably higher. Nevertheless, the comparison of the results between the Philippine respondents and the respondents from the four countries in the first survey should be interpreted with caution as the first survey (UNESCO, 2019) was made before the COVID-19 pandemic, whereas the survey in the current research was conducted during the COVID-19 pandemic where most schools have shifted to online learning. This situation strengthened advocacy and awareness on the use of various online learning platforms and digital applications in the teaching-learning process. These could have contributed to the relatively high self-ratings of the respondents in the present research.

The results suggest the need for the Philippine education system to continue its investment in the digital citizenship education of Filipino students. Indeed, the results seem to provide information on how Filipino learners are improving in terms of their Information, Media, and Technology Skills, one of the core 21st century skills promoted by the Department of Education. Likewise, the results can provide bases for improving the spiral progression of ICT curriculum standards and their implementation with the use of learning resources that include ICT equipment and devices. Nevertheless, the focus of the education system should not just be on digital literacy or ICT literacy, but attention should be afforded to all five domains spelled out by the DKAP framework. In particular, there seems to be a need to focus more on designing policy and programs that promote Filipino students' creativity and innovation through digital technologies. Further, UNESCO (2015) reported that the Philippines has strong policies related to cybersafety and protection issues in basic education schools. There is a need to assess the current implementation of such policies and to further craft policies that would promote or develop the other domains of digital citizenship.

3.1.2. Does gender, type of school, and geographical location matter?

The results indicate that girls have significantly higher scores in all competency domains, except for Digital Creativity and Innovation where there was no significant difference in gender (see Annex 4). This is consistent with the results of the previous survey (UNESCO, 2019). However, when other factors are accounted for, gender is only associated with the Digital Literacy and Digital Safety and Resilience domains (see Annex 5).

In terms of type of school, students from private schools have higher scores in Digital Literacy, Digital Safety and Resilience and Digital Emotional Intelligence than students from public schools, while there was no difference between students from private and public schools in the other two domains (Annex 4). Surprisingly, the results of the multiple regression analysis indicate that when controlling for other factors, type of school is not a predictor of any domain except for Digital Creativity and Innovation where results suggest that students in public schools have higher scores (Annex 5).

In terms of geographical location, students from urban schools have higher scores in Digital Literacy and Digital Safety and Resilience compared with students from rural schools (Annex 4). There is no significant difference between students from urban and rural schools in the other domains. However, when other factors are accounted for, geographical location is not a factor in any of the domains (Annex 5).

In general, the results point to the role that gender, type of school, and geographical location play in the digital citizenship competency of Filipino students. Educational policy and interventions should then be designed to bridge the gap in the digital divides that are created by the advantages that students from private and urban schools have. However, the results indicating that the effects of gender, type of school, and geographical location weakening when other personal and contextual factors are considered suggest that policies and interventions can target these factors instead in order to bridge the digital divides among Filipino students.

3.1.3. Other personal and contextual factors associated with digital citizenship competency

The multiple regression analysis also indicates the following results: (1) students who reported to have learned coding skills are more likely to have higher scores in all five domains compared to those who reported not to have learned coding skills; (2) students who learned how to develop web or application are more likely to have higher scores in all domains, except for Digital Safety and Resilience where learning to develop web or application has no effect; (3) the educational level of students' parents is not associated with students' scores in any domain, except with Digital Creativity and Innovation where students who reported lower level of parents' education have higher scores in this domain; (4) students who reported that their homes have a car, television, or bathroom with shower/bathtub are more likely to have higher

scores in all domains, except for Digital Participation and Agency; and (5) the number of books at the students' homes is not associated with any of the domains.

The most important result suggests the relevance of providing adequate learning experiences in using digital technologies (e.g., developing web or application) to students in secondary education level, if not earlier. Another important result is that a home environment that is more conducive for living is more important than the educational level attained by students' parents. This highlights the critical role that parents and home environment play in the digital education of Filipino students.

See Annex 5 for the full results of the multiple regression analyses.

3.2. Summary of Findings on Competencies

3.2.1 Digital Literacy Competencies

The domain on Digital Literacy has two competencies which are Information and Communication Technology (ICT) Literacy and Information Literacy. ICT literacy competency describes students' ability to use the available hardware and software materials while Information Literacy is their potential to evaluate information that can inform their decision making.

Table 4.1
Descriptive Results on Digital Literacy Competencies

Sub-Competency	Mean	SD
ICT Literacy	3.21	.52
Information Literacy	3.15	.58

Results in Table 4.1 show that the respondents' mean score in the ICT Literacy is greater than Information Literacy. Comparing the results with the first survey (UNESCO, 2019), the Philippine students' ICT literacy mean score is second to Korea and Fiji but higher than Vietnam and Bangladesh. The mean score for the Information Literacy from the Philippine respondents was also lower to Korea but higher than the other countries surveyed.

On the average, the Filipino students in the survey reported adequate levels of ICT Literacy and Information Literacy which seems to indicate that the current programs by the Philippine Department of Education (DepEd) to promote digital literacy in basic education schools are working.

3.2.2 Digital Safety and Resilience Competencies

The domain on Digital Safety and Resilience tells of the "individual's ability to understand how to protect himself or herself and others from harm in digital space." It is in this domain that students should be able to evaluate the information they gather from the online environment to help them make informed decisions.

Table 4.2

Descriptive Results on Digital Safety and Resilience Competencies

Sub-competency	Mean	SD
Understanding Child Rights	3.56	.45
Personal data, Privacy, and Reputation	3.56	.50
Promoting and Protecting Health and Well-Being	3.27	.55
Digital Resilience	3.44	.56

As shown in Table 4.2, among the four sub-competencies for the Digital Safety and Resilience domain, the respondents are most confident in Understanding Child Rights. However, the Filipino students' mean score in this competency is lower compared to those of the four countries from the first survey (UNESCO, 2019). The Philippine respondents also obtained a similar mean score for the competency on Personal data, Privacy, and Reputation When compared with the results from the first survey, the Philippine mean scores are higher than all four countries surveyed. Likewise, the Filipino students' mean score in Digital Resilience is also well above the midpoint value and is higher than the other four countries in the first survey.

In terms of Promoting and Protecting Health and Well-Being, the Filipino students have the lowest mean score in this competency. The previous survey did not have data on the four countries on this competency because the items in this component of the survey were found to have negative and very low reliability estimates.

On the average, the level of Filipino students' sub-competencies in this domain are more than adequate, but may need improvement in terms of understanding child rights in the digital environment to be at par with other Asia-Pacific countries. This is especially critical given the increasing cases of cyberbullying and other online misbehaviors in social media.

3.2.3 Digital Participation and Agency Competencies

The domain of Digital Participation and Agency means the ability to equitably interact, engage and positively influence society through ICT use. Table 4.3 reports how children from the Philippines see their competencies in the said domain.

Table 4.3
Descriptive Results on Digital Participation and Agency Competencies

Sub-competency	Mean	SD
Interacting, Sharing, and Collaborating	3.36	.55
Civic Engagement	2.73	.67
Netiquette	3.45	.53

Among the three competencies, the children's competency in Netiquette has the highest mean score. This result seems to suggest that the Filipino students observe courteous and appropriate behaviors when dealing with others online. On the other hand, the lowest mean score gathered is on Civic Engagement. While the mean score is well below the midpoint value, a similar trend is evident in the four countries' scores in this competency and the Filipino students' score in this competency is actually the highest.

In general, the results suggest a favorable level of competencies in this domain for the Philippine respondents. Nevertheless, there seems to be a need for Filipino students to be taught in schools and be given opportunities to volunteer and influence others with appropriate use of digital technologies.

3.2.4 Digital Emotional Intelligence Competencies

The current availability of technology today evades the different aspects of children's activities and can therefore influence their emotional intelligence. Hence, the domain Digital Emotional Intelligence is an important area of study to determine the ability of the children to recognize, navigate and express emotions in one's digital intrapersonal and interpersonal interactions.

Table 4.4

Descriptive Results on Digital Emotional Intelligence Competencies

Sub-competency	Mean	SD
Self-awareness	3.39	.50
Self-regulation	3.30	.54
Self-motivation	3.31	.55
Interpersonal skills	3.18	.57
Empathy	3.17	.58

The results in Table 4.4 indicate that the Filipino students have adequate levels on the four competencies in the Digital Emotional Intelligence domain. Results also show that the Filipino students have the highest mean score in Self-awareness. Comparing this result with that of the four countries in the first survey (UNESCO, 2019), the Philippine respondents' mean score is higher than any of the other countries. The Filipino students' mean score in Interpersonal Skills is also higher than the four countries. Moreover, while the Filipino students have their lowest mean score in Empathy, it is actually higher than the other countries except for Korea.

Interestingly, the results seem to show that while Filipino students are conscious of their activities, practice self-regulation, and are intrinsically motivated, they have to work on understanding and relating well with others. Indeed, socialization and networking with others are critical in the digital or online environment and schools must be able to develop Filipino students' interpersonal skills and values in the digital world.

3.2.5   Digital Creativity and Innovation Competencies

The domain on Digital Creativity and Innovation describes the individual's ability to express and explore herself or himself through creation of content using ICT tools. As UNESCO (2019) described, this domain is the most challenging because it revealed the lowest mean scores in the first survey among other Asia-Pacific countries.

Table 4.5

Descriptive Results on Digital Creativity and Innovation Competencies

Sub-competency	Mean	SD
Creative Literacy	2.96	.63

Expression	2.96	.63

As the results in Table 4.5 show, the Filipino students have identical mean scores in the two competencies (Creative Literacy, Expression) under the domain Digital Creativity and Innovation. The results suggest a less than adequate level of digital creativity competency, but the mean scores of the Filipino students are actually higher than the mean scores of all four countries from the first survey.

Like other Asia-Pacific children, Filipinos need to be more confident and creative in using digital tools to create content and express themselves. Creativity is an important 21st century skill so it is imperative that digital creativity is likewise developed among students.

3.3. Access and Use of ICT, Usage of Digital Devices, and Internet Use

3.3.1. Which devices do students mostly have access to?

Smartphones are the most accessible digital device among the Philippine students, and this is the case at home, school, or local community as shown in Table 5. This result is consistent with the trend observed in other countries where smartphones were reported to be the most accessible device (UNESCO, 2019). The second most accessible device at home is the laptop, while the second most accessible device at school is desktop computer. These results suggest the increasing preference for using laptops over desktop computers at home, while desktop computers are still the preferred device used in schools.

Table 5
Percentage of students with access to digital devices by type of device

	Desktop Computer	Laptop	Smart phone	Tablet PC	Printer	None of the Above
At home	12.65	30.44	86.00	18.13	18.47	9.61
At school	51.52	22.51	55.65	12.23	32.38	12.82
At the local community	23.86	15.51	46.04	09.27	24.28	34.99

As seen in Table 5, there are students who reported not having any of the digital devices listed. This suggests the existence of digital divides among the Philippine students surveyed. The percentage of students who reported not having access to any digital device at home (9.61) is relatively larger compared with students who reported the same from any of the four countries who participated in the first survey (UNESCO, 2019). While school and local

community are able to bridge the gaps in students' access to desktop computers and printers at home, the significant percentage of students who reported not having access to any digital device at school and local community still suggests that schools and local community should do more to provide students access to digital devices in order to counter students' limited access to digital devices at home.

3.3.2. For how long have students used digital devices?

As seen in Figure 2, 8.3% of students reported that they had never used any devices while 22.2% had used a device for less than a year. This means that about 30% of the participants have never used a digital device until the age of 14. This particular result is even more surprising given that all participants are in Grade 10 (the last grade level for junior high school in the Philippines).

Further analysis revealed that duration of use of digital devices is a positive predictor of every competency domain even when controlling for other factors, except for Digital Creativity and Innovation. This means that longer duration of use is associated with higher levels of Digital Literacy, Digital Safety and Resilience, Digital Participation and Agency, and Digital Emotional Intelligence (see Annex 5).

Figure 2
Years of experience using digital devices
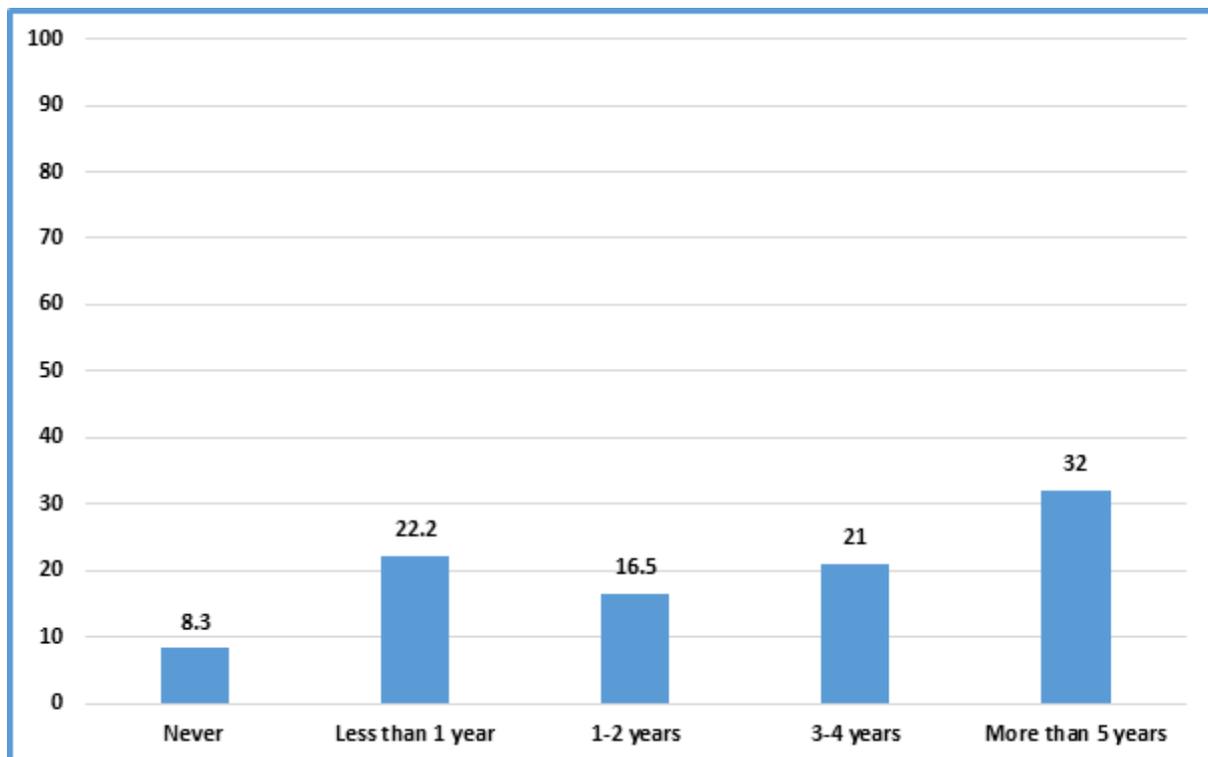
3.3.3. For how many hours a day do students use the Internet with their digital devices?

A small percentage (5.7) of students reported hardly ever using the Internet, while more than one-third (39.8) reported using the Internet with their devices from less than an hour to 1-2 hours per day. More students, however, reported using the Internet for at least three hours (Figure 3).

Further analysis revealed that the frequency of using the Internet with their digital devices is a positive predictor of all five competency domains even when controlling for other factors. In other words, students who spent more time online in a day have higher levels of Digital Literacy, Digital Safety and Resilience, Digital Participation and Agency, Digital Emotional Intelligence, and Digital Creativity and Innovation (see Annex 5).

Figure 3
Length of time spent on the Internet using digital devices
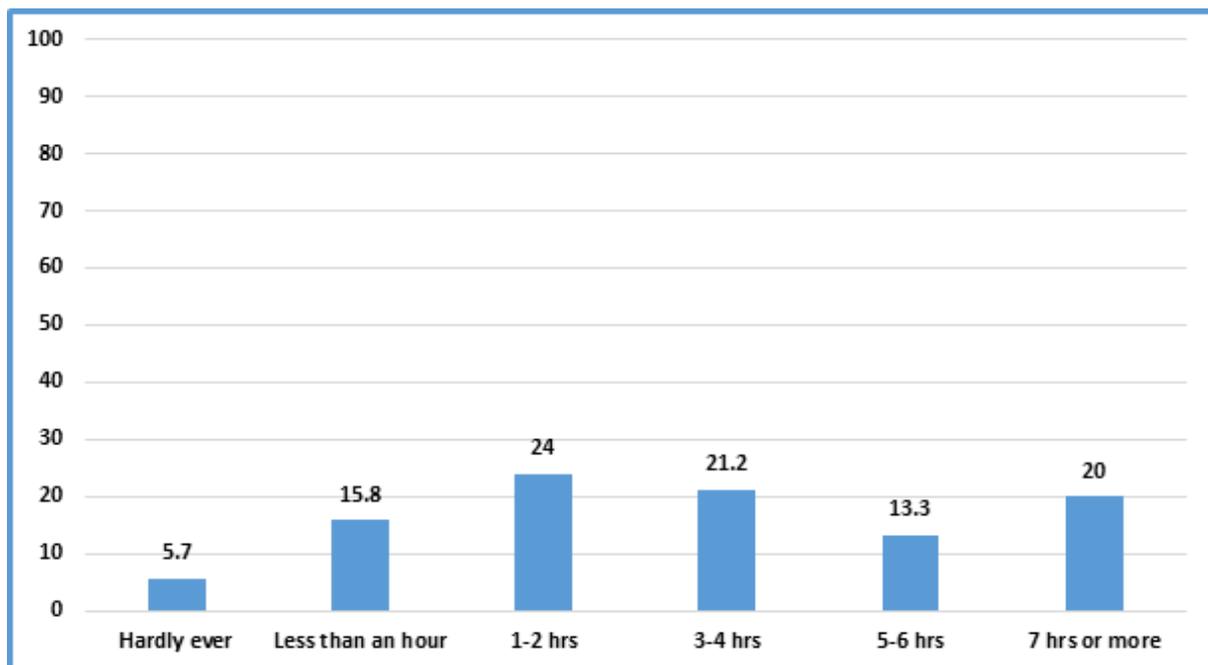
In addition, there are more students who reported that they use the Internet or computers for 1-2 hours for school study (32.3), for personal purpose (36.8), for leisure (30.6), and for socializing with friends (32.5). Surprisingly, a significant percentage (14.5) of the students reported that they hardly ever used the Internet or computers for school study which is another indication of digital divide among the students (See Annex 6).

3.3.4. How many students have access to the Internet?

Wireless Internet is the most widely used type of connectivity as reported by the students, and this is the case at home, school, or local community as shown in Table 6. This result is consistent with the growing trend of using wireless connectivity in schools. However, a significant percentage of the students reported not having access to any type of connectivity in all places.

Table 6
Percentage of students with access to Internet by type of connectivity

	Wired Internet	Wireless Internet	None
At home	35.24	49.92	25.30
At school	26.73	43.00	37.10
At the local community	26.64	45.78	36.85

3.3.5. From whom do students learn about computers and the Internet?

Figure 4 shows that in terms of the role of others on students' use of computers, more than 30% of students reported that they learned by themselves, while almost 30% reported that they learned from their teachers. The trend is different in terms of the role of others in students' use of the Internet as almost half (49.1) of the students reported that they learned by themselves, but more students reported learning from family or friends more than learning from their teachers (Figure 5).

Figure 4
Percentage of students who were taught how to use computers by source of learning
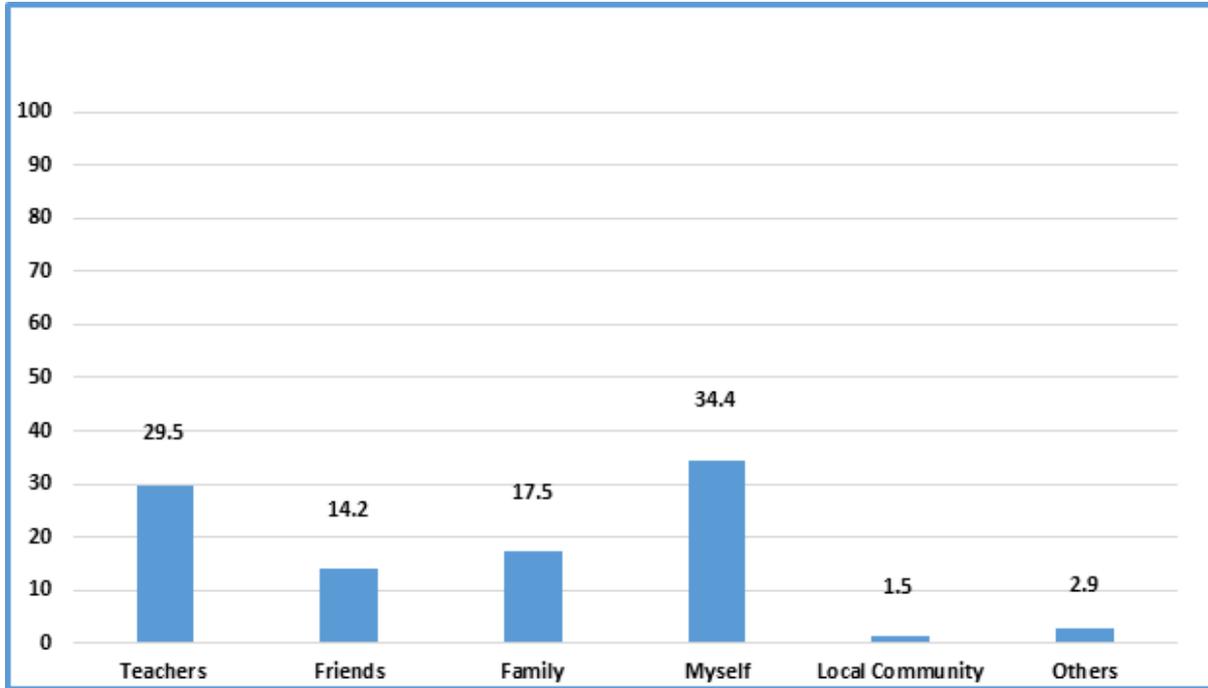
Figure 5
Percentage of students who were taught how to use Internet by source of learning
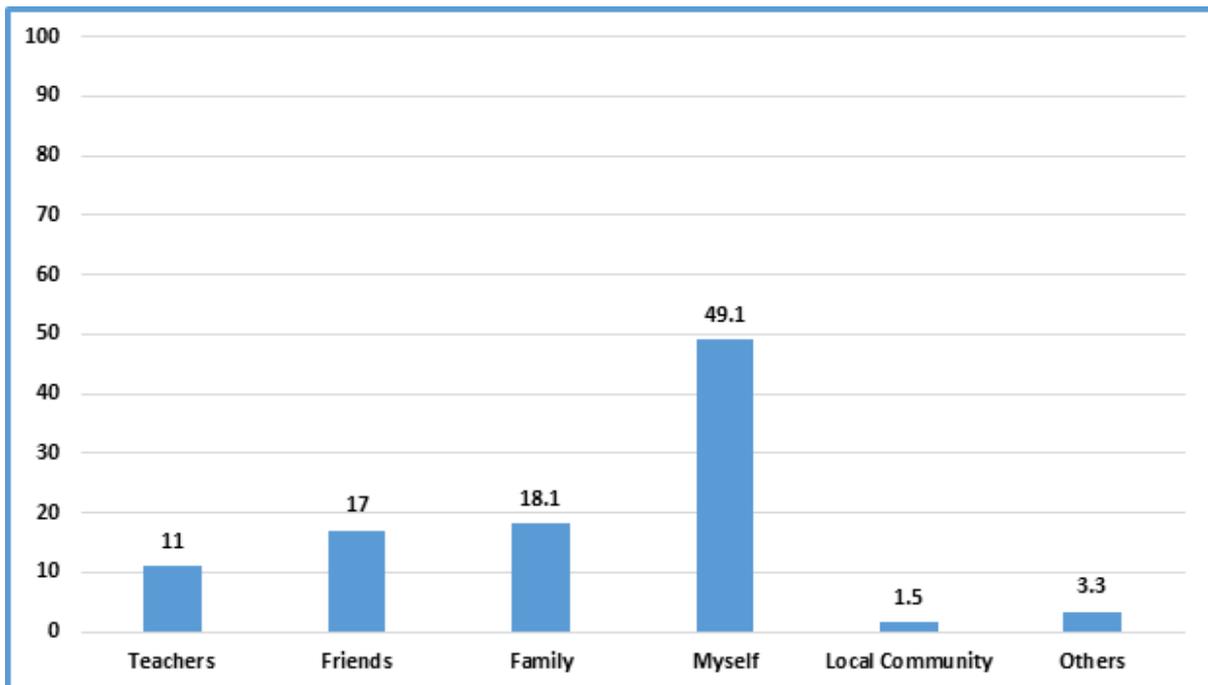
3.3.6. Do other people guide students to use the Internet safely?

As shown in Table 7, there are more students who reported that their parents/caregivers guide them in using the Internet safely all the time compared with other stakeholders. However, the results show that there are more students who reported being guided by their teachers often, very often, or all the time (43.9) in using the Internet safely.

Table 7
Percentage at which students are guided to use the Internet safely by type of stakeholder

	Never	Hardly Ever	Some-times	Often	Very Often	All the Time
Parents/caregivers	12.6	9.2	40.7	9.4	8.3	19.8
Teachers	7.9	11.2	37.0	16.1	13.1	14.7
Siblings	16.9	12.3	34.7	15.0	10.3	10.8
Peers	18.0	14.8	37.5	15.1	7.8	6.8

3.3.7. Do other people encourage students to explore or learn things using the Internet?

As shown in Table 8, there are more students who reported that their teachers encourage them to learn new things on the Internet all the time compared with other people. Moreover, the results also show that there are more students who reported getting encouragement from their teachers in learning new things using the Internet often, very often, or all the time (44.2).

Table 8
Percentage at which students are encouraged to explore or learn new things on the Internet by type of stakeholder

	Never	Hardly ever	Some-times	Often	Very often	All the time
Parents/caregivers	13.8	12.8	39.9	12.1	10.0	11.4
Teachers	7.8	10.9	37.3	17.5	12.1	14.6
Siblings	16.8	11.2	36.0	15.7	11.2	9.1
Peers	17.1	13.1	36.8	16.1	9.5	7.4

Chapter 4: Conclusions and Recommendations

4.1. Conclusions

The main objective of this research project is to determine the digital citizenship competency of the Filipino students using the Digital-Kids in Asia Pacific (DKAP) survey questionnaire which examines five (5) competency domains: Digital Literacy, Digital Safety and Resilience, Digital Participation and Agency, Digital Emotional Intelligence, and Digital Creativity and Innovation. While the present research is only an initial attempt to measure and describe the digital citizenship of Filipino students, a number of inferences can be drawn from the key results.

First is the recognition that digital citizenship education is a critical component of the education system particularly in basic education level. With the current global pandemic requiring schools to shift their delivery of instruction and other educational services through remote or flexible learning modality with online learning or e-learning as the primary approach, the need to provide or enhance educational programs that promote or develop digital citizenship competency among Filipino students have become more critical than ever. While the relatively good results pertaining to the digital citizenship competencies of Filipino students can somehow serve as indicators of success for the Department of Education's programs that promote information, media, and technology skills among Filipino learners, much work still need to be done in order to develop Filipino learners as competent and responsible digital citizens. Related to this is the need for teachers to have the awareness on digital citizenship concepts and to have the pedagogical skills to develop digital citizenship competencies among learners.

Secondly, the DKAP survey questionnaire used in this study may serve as a benchmark for future assessments particularly in determining the potential changes in the level of competency among the students vis-a-vis digital citizenship education. As such, the need for a more regular and/or periodic assessment relative to digital citizenship may be conducted among students at various levels. The DKAP questionnaire may also be modified over time making it more responsive to the needs of the time.

Thirdly, it can also be inferred that 'digital divide' needs to be fully recognized by policymakers and practitioners (i.e., school leaders and teachers) in order to develop the necessary interventions in addressing the said gap. The results of this study show significant differences in the level of digital citizenship competency between those who have more access as opposed to those who have limited quality access to information and communication technologies. The role that schools play to bridge the limitations of digital resources and opportunities available at the students' homes cannot be overemphasized.

4.2. Recommendations

The goal of this research project is to provide evidence-based information on the competency level of Filipino students relative to digital citizenship education. Such information is likewise aimed at providing data-informed policy directions for governments and other key stakeholders in education who may consider to develop and implement a more holistic digital education citizenship program and policies. As such, the following policy recommendations are presented.

1. Develop a holistic framework for Digital Citizenship Education in the Philippines

The Department of Education (DepEd) and the Commission on Higher Education (CHED) may consider the development of a holistic framework for digital citizenship education both for basic education and higher education levels. With the DKAP framework as an initial lens, a more holistic framework can be developed incorporating the context of Filipino learners and addressing the gaps observed from the results of the present research. In terms of curriculum and educational interventions, the need to go beyond developing digital literacy and ICT skills is essential as digital citizenship education is about developing learners to become individually-able and socially-responsible digital citizens in this time of digital technologies and social media.

On the same vein, integrating digital citizenship education concepts in teacher education curriculum is critical as there is a need to develop the digital citizenship competency of teachers so they will be more capable of developing the same among their students. Equally important is for pre-service teachers to develop their pedagogical competence in facilitating digital citizenship education. This will entail revisiting the current teacher education curriculum vis-a-vis digital citizenship education ensuring consistency and alignment between the pre-service curriculum (i.e., with focus on the required digital citizenship competencies for teachers) and the basic education students' competency requirements.

Integrating knowledge and pedagogy for digital citizenship in training and professional development programs for in-service teachers is also imperative. These trainings and programs may be especially critical for teachers who are not graduates of teacher education programs, especially those in the senior high school level. In addition, a report on an analysis of the K to12 Philippine curriculum vis-à-vis the framework of the Program for International Student Assessment or PISA (Balagtas & Montealegre, 2020) recommended that teachers may need upskilling in the use of computer-based assessment which is what PISA and other international assessment systems are using. This is also important as the Filipino students' lack of familiarity in computer-based assessment may partly explain why a number of students found the 2018 PISA difficult.

2. Pursue collaborative efforts among education stakeholders to promote digital citizenship education

It seems imperative that education stakeholders consider developing inter-sectoral partnerships in the development and implementation of digital citizenship education based on the 'whole-of-school' framework highlighting both the responsibilities and accountabilities of the said stakeholders. In the public sector, the Department of Education's 'school-based management' system may be capitalized for this purpose while the same mechanism may likewise be considered for those in the private sector.

3. Invest and strengthen ICT resources to bridge the gap on digital divides

All concerned national and local government agencies may consider coming up with policies and programs that would foster equitable quality access to information and communication technologies (ICT) in order to address the increasing 'digital divide' phenomenon. Government intervention in providing equitable quality access to information and communication technologies (ICT) needs to be given utmost priority by the concerned government agencies. Such intervention may come in the form of legislation ensuring that sufficient resources are provided to homes, schools and local communities for such purposes.

The aforementioned support for resources may be more critical for students from public schools and those from rural areas where ICT resources and opportunities are more limited compared to students from private schools and urban areas. Hence, policies or programs meant to strengthen ICT resources for Filipino students should consider prioritizing supports for students from such demographics. Ascertaining equity in digital resources can serve as a strong enabling mechanism for the attainment of SDG 4 (Quality Education) of the United Nation's (UN) Sustainable Development Goals (SDGs).

4. **Conduct further research on the digital citizenship of Filipino learners**

Further research relevant to digital citizenship and digital citizenship education may be considered particularly by teacher education institutions and other higher education institutions. Future research may focus on exploring other personal and contextual factors that may have effects on the digital citizenship competency of Filipino students beyond those that were examined in the present research. Other research may focus on designing and implementing intervention programs aimed at improving the digital citizenship competency of Filipino students. Developing competency-based or performance-based measures of specific digital citizenship competencies should also be explored in the future.

4.3. Concluding Remarks

It can be said that the DKAP framework and survey questionnaire are important developments that provide opportunities for counties or educational systems in the Asia-Pacific region to assess the development of digital citizenship among their students. While much work is yet to be done in terms of enhancing the measurement of digital citizenship competencies, identifying other factors that promote digital citizenship competency, and designing policies and programs that expand opportunities for digital citizenship education within the socio-cultural context of a country, the present research conducted in the Philippines provide important information that serve as preliminary data on the digital citizenship of Filipino learners. It is desirable that the Philippines and other countries continue to explore and elaborate on the DKAP concepts as digital citizenship competencies are critical for individuals and societies to be successful in a world that has been rapidly changing in the past decades due to advancement in digital technologies.

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Annex 1: DKAP Survey Questionnaire

	Section A

A. How much do you agree with the following statements?

Fill one circle for each line.

No		Disagree a lot	Disagree a little	Agree a little	Agree a lot
A1	I can edit electronic resources (e.g., text, graphics, audio, videos)	①	②	③	④
A2	I use social media platform (e.g., Facebook, Instagram, Snapchat, LINE, We Chat) to share ideas, participate in discussions, and collaborate with others.	①	②	③	④
A3	I can set up a safe computing environment (e.g., remove computer viruses, install security programs/antivirus).	①	②	③	④
A4	I can transfer photos, music, and video files saved on my computer into other digital devices (e.g., mobile phone, tablet PC).	①	②	③	④
A5	I use computer software (e.g., Microsoft Word, Microsoft PowerPoint, Google Docs) to complete learning tasks at school.	①	②	③	④
A6	I know how to use the latest digital devices.	①	②	③	④
A7	I use digital devices in order to search for information and applications I need.	①	②	③	④
A8	I use digital devices for learning at home.	①	②	③	④
A9	I use digital devices for my personal interest (e.g., games, chatting, shopping, searching for information).	①	②	③	④
A10	I assess the relevance of the digital information to complete learning tasks at school.	①	②	③	④
A11	I can separate reliable from unreliable information when searching for digital information.	①	②	③	④
A12	I search for and find information to complete learning tasks on the Internet.	①	②	③	④
A13	I know I need to report the source of information when using information attained from online.	①	②	③	④
A14	If I find wrong information on the Internet, I can correct it.	①	②	③	④

Section B

B. How much do you agree with the following statements?

Fill one circle for each line.

No		Disagree a lot	Disagree a little	Agree a little	Agree a lot
B1	I understand I should show respect to others on the Internet.	①	②	③	④
B2	I understand I should protect the privacy and security of others.	①	②	③	④
B3	Since it is against copyright law to copy software illegally, I would not let myself make a copy.	①	②	③	④
B4	I read the privacy policy of websites I visit when using the Internet.	①	②	③	④
B5	I try to avoid threatening other people's personal information when using digital information.	①	②	③	④
B6	I try to avoid infringing other people' intellectual property rights (e.g., software copyrights, portrait rights) when searching for and using digital information.	①	②	③	④
B7	I try to protect my personal information from others online.	①	②	③	④
B8	I know which information I should and should not share on the Internet.	①	②	③	④
B9	I find myself using digital devices for longer periods of time than intended.	①	②	③	④
B10	I use digital devices to relieve myself from stress (e.g. listening to music, watching movies, SNS).	①	②	③	④
B11	I feel anxious if I have not checked for messages or switched on digital devices for some time.	①	②	③	④
B12	I can modify privacy setting to keep myself safe/away from unwanted contacts (e.g., spam texts, emails).	①	②	③	④
B13	I try to avoid clicking on information that looks weird or suspicious.	①	②	③	④
B14	If a person is bothering me online, I can ask the person to stop sending unwanted disturbing messages or emails.	①	②	③	④

B15-18. Think about how you will react in the following situations:

Choose all that apply.

No.		Get rid of it immediately by closing the page, deleting the file, or scrolling away	Talk about it with parents/ caregivers	Use a program that prevents it from happening again	Talk about it with a friend	Look away or close my eyes	Keep looking	Block the webpage or website	Don't know what to do
B15	How will you react when you are exposed to unwanted disturbing files or websites (e.g., pornography website, violent media)?	①	②	③	④	⑤	⑥	⑦	⑧

No.		Block and report the person	Delete the contact	Ignore the messages and the person	Talk with parents/ caregivers about what to do	Ask the person to stop sending these messages or pictures	Talk with teachers about what to do	Report the issue to the police and show them what happened	Don't know what to do
B16.	How will you react when you receive unwanted disturbing messages including annoying messages or embarrassing pictures from someone on your contact list?	①	②	③	④	⑤	⑥	⑦	⑧

No.		Change your account password	Review privacy settings and choose a more secure password	Use a report button	Disable or delete the account and make a new account	Ask parents/ caregivers to help	Ask teachers to help	Report the issue to the police and show them what happened	Don't know what to do
B17.	How will you react when you find that your personal information is misused, compromised or acquired without permission online?	①	②	③	④	⑤	⑥	⑦	⑧

No.		Block and report the persons	Delete the contact	Show the persons that I am not bothered by their behavior by ignoring them	Ask the persons to stop sending annoying messages or pictures	Talk with teachers about what to do	Report the issue to the police and show them what happened	Keep the evidence of bullying (e.q. screenshot)	Don't know what to do
B18.	How will you react when you are bullied online by friends or others?	①	②	③	④	⑤	⑥	⑦	⑧

Section C

C. How much do you agree with the following statements?

Fill one circle for each line

No		Disagree a lot	Disagree a little	Agree a little	Agree a lot
C1	I use the Internet to talk to people from places or backgrounds different from mine.	①	②	③	④
C2	I use the Internet to share something I am good at or I know well.	①	②	③	④
C3	I can share my knowledge online to anyone if it is helpful to him/her.	①	②	③	④
C4	I make new friendships with other people online.	①	②	③	④
C5	I post news on social issues online (e.g., Facebook, Instagram, blog).	①	②	③	④
C6	I use the Internet to create solutions to problems in my school.	①	②	③	④
C7	I use the Internet to create solutions to problems in my town/community.	①	②	③	④
C8	I get involved online in social issues.	①	②	③	④
C9	If I disagree with people online, I watch my language so that it does not come across as mean.	①	②	③	④
C10	I am careful to make sure that the pictures I post or send will not embarrass other people or get them into trouble.	①	②	③	④
C11	My favorite online places are where people are respectful toward each other.	①	②	③	④
C12	I do not add to arguments and insulting interactions that happen on the Internet.	①	②	③	④

Section D

D. How much do you agree with the following statements?

Fill one circle for each line

No		Disagree a lot	Disagree a little	Agree a little	Agree a lot
D1	I am aware of my feelings that I experience in my interactions online.	①	②	③	④
D2	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).	①	②	③	④
D3	I am aware of the meaning of non-verbal messages (e.g., smiley face, emoji) that I send to other people on the Internet.	①	②	③	④
D4	I express my feelings freely on the Internet using online communications.	①	②	③	④
D5	I can manage my feelings when I talk with other people on the Internet.	①	②	③	④
D6	Even though I get distracted during online classes or activities, I can easily go back to my work again.	①	②	③	④
D7	I stick to my goals when I use the Internet to do assignments at home.	①	②	③	④
D8	I am motivated by the good results that my group can get from the projects that we do online.	①	②	③	④
D9	Even though I face challenges while using digital devices, I solve the problem without giving up.	①	②	③	④
D10	When I use digital devices or software (e.g., programs, applications) for the first time, I expect I am able to do well.	①	②	③	④
D11	I communicate comfortably with people who have different backgrounds, appearances, and opinions on the Internet.	①	②	③	④
D12	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).	①	②	③	④
D13	I know how to resolve the conflicts that arise when I interact with people from diverse backgrounds on the Internet.	①	②	③	④
D14	When I meet friends online, I easily empathize with their emotions.	①	②	③	④
D15	When I talk with friends on the Internet, I understand their perspectives even if I disagree.	①	②	③	④
D16	When I meet friends on the Internet, I easily recognize what they want to talk about.	①	②	③	④

	Section E

E. How much do you agree with the following statements?

Fill one circle for each line

No		Disagree a lot	Disagree a little	Agree a little	Agree a lot
E1	I make changes to the digital contents (e.g., photos, videos, music, text, etc.) that others have produced.	①	②	③	④
E2	I remix existing digital contents by using digital media software (e.g., programs, applications).	①	②	③	④
E3	I create presentation slides to support my ideas or opinions.	①	②	③	④
E4	I create something new from existing digital contents.	①	②	③	④
E5	I express my ideas through selecting, organizing, and sharing existing digital materials.	①	②	③	④
E6	I use the Internet to try out different ways of expressing myself.	①	②	③	④
E7	I express my personality online.	①	②	③	④
E8	I show a better version of myself online.	①	②	③	④
E9	I express who I want to be online.	①	②	③	④
E10	There are certain things I express about myself more freely online than offline.	①	②	③	④
E11	When I'm online, I present myself how I want others to view me.	①	②	③	④

	Section F		

No.		Girl	Boy
F1.	Are you a girl or a boy?	①	②

F2. When were you born?

Month	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Year	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**

F3. What grade are you in?

Grade Level	7	8	9	10	11	12

No.		Test language/English	Other
F4	What language do you speak at home most of the time?	①	②

For Other, please specify _____

No.		Test country (Philippines)	Other
F5	Which country were you born in?	①	②

For Other, please specify _____

No.		Lower secondary/ Junior High School	Upper secondary / Senior High School	Post - secondary / College	Masters/ Doctoral	I don't know
F6.	What is the highest grade or level of school you expect to complete?	①	②	③	④	⑤

[Note: The month should not include school vacation or holidays]

No.		None	1 or 2 days	3 or 4 days	5 to 10 days	More than 10 days

F7.	How many days were you absent from school in the last month?	①	②	③	④	⑤

F8. Outside of school, how much time each day do you usually spend doing the following activities?

	Less than an hour	1-2 hour a day	3-4 hours a day	5-6 hours a day	7 hours a day or more
F8-1) Having fun with friends	①	②	③	④	⑤
F8-2) Helping my family with work, housework or looking after somebody	①	②	③	④	⑤
F8-3) Doing homework or other study activities (e.g., private education)	①	②	③	④	⑤
F8-4) Participating in volunteer work	①	②	③	④	⑤
F8-5) Doing fine arts activities (e.g., drawing or playing an instrument)	①	②	③	④	⑤

Section G

No.		Never	Less than 1 year	1-2 years	3-4 years	More than 5 years
G1.	How long have you been using digital devices (e.g., desktop/laptop, smartphone, tablet PC)?	①	②	③	④	⑤

No.		Hardly ever	Less than an hour	1-2 hour	3-4 hours	5-6 hours	7 hours or more
G2.	How often do you go online or use the Internet using digital devices (e.g., smartphone, desktop/laptop, tablet PC) per day?	①	②	③	④	⑤	⑥

G3. Where do you usually access Internet?

	Hardly ever	At least every month	At least every week	At least every day				
				Less than an hour	1-2 hour a day	3-4 hours a day	5-6 hours a day	7 hours a day or more
G3-1) Home	①	②	③	④	⑤	⑥	⑦	⑧

	Hardly ever	At least every month	At least every week	At least every day				
				Less than an hour	1-2 hour a day	3-4 hours a day	5-6 hours a day	7 hours a day or more
G3-2) School	①	②	③	④	⑤	⑥	⑦	⑧
G3-3) Internet Cafe	①	②	③	④	⑤	⑥	⑦	⑧
G3-4) local community or local district (e.g., local library, community center)	①	②	③	④	⑤	⑥	⑦	⑧

Please check all that apply.

No.		Desktop computer	Laptop	Smart Phone	Tablet PC (eg., iPad, Galaxy Tab	Printer	None of the above
G4.	Do you have access to any of these things at your home?	①	②	③	④	⑤	⑥
G5.	Do you have access to any of these things in your school?	①	②	③	④	⑤	⑥
G6.	Do you have access to any of these things in your local community (e.g., local library, community center)?	①	②	③	④	⑤	⑥

No.		Wired Internet	Wireless Internet	None
G7.	Which of the following can you access at home?	①	②	③
G8	Which of the following can you access at school?	①	②	③

[Note. Wireless Internet means Internet connectivity via radio waves rather than wires. Simply imagine Wi-Fi. Wired Internet means Internet connectivity using a network hub via a wired connection like satellite, cable, DSL, etc.]

No.		Yes	No
G9.	Does your local community (e.g., local library, community center) or local district provide any place to use the Internet?	①	②

Please check all that apply.

No.		Wired Internet	Wireless Internet	None
G10	Which of the following can you access in your local community or local district?	①	②	③

No.		My teachers	My friends	My Family	I learned myself	My local community (eg., library, community center)	Others
G11.	Who taught you most about how to use computers?	①	②	③	④	⑤	⑥
G12.	Who taught you most about how to use the Internet?	①	②	③	④	⑤	⑥

No.		Hardly ever	Less than an Hour	1-2 hour	3-4 hours	5-6 hours	7 hours or more
G13.	How often do you use computers or the Internet for school study (e.g., doing homework, preparing and reviewing classes) per day?	①	②	③	④	⑤	⑥
G14.	How often do you use computers or the Internet for studying for personal purpose (e.g., studying English, preparing certificates, or searching information for your career) per day?	①	②	③	④	⑤	⑥
G15	How often do you use computers or the Internet for leisure (e.g., computer games, music, comics, videos) per day?	①	②	③	④	⑤	⑥

No.		Hardly ever	Less than an Hour	1-2 hour	3-4 hours	5-6 hours	7 hours or more
G16	How often do you use computers or the Internet for socializing with your friends (e.g., Social Network Services, messenger program, blog) per day?	①	②	③	④	⑤	⑥

No.		yes	No
G17	Have you ever learned basic coding skills at school?	①	②
G18	Have you ever developed websites or applications	①	②

Section H

Please check all that apply

No.		Mother (including step or foster mother)	Father (including step or foster father)	Grand-parent(s) or other relatives	Siblings (including half, step or foster siblings)	I live in a foster home or children's home	I live alone	Someone or somewhere else
H1.	Who usually lives at home with you?	①	②	③	④	⑤	⑥	⑦

For Someone or somewhere else (please state): _____

No.		Did not go to school	Primary	Lower secondary	Upper secondary	Post-secondary	Masters/ Doctoral	I don't know
H2.	What is the highest level of schooling completed by your mother?	①	②	③	④	⑤	⑥	⑦
H3	What is the highest level of schooling completed by your father?	①	②	③	④	⑤	⑥	⑦

H4. Do you have the following item(s) at your home?

	Yes	No
H4-1) Car	①	②
H4-2) Television	①	②
H4-3) Bathrooms with a bathtub or shower	①	②

No.		0-10 books	11-25 books	26-100 books	101-200 books	201- 500 books	More than 500 books
H5.	How many books are there in your home?	①	②	③	④	⑤	⑥

[Note. There are usually about 15 books per foot of shelving. Do not include magazines, newspapers, or your schoolbooks.]

H6. When you use the Internet, how often do the following person/people suggest ways to use the Internet safely?

	Never	Hardly ever	Sometimes	Often	Very often	All the time
H6-1) parents/caregivers	①	②	③	④	⑤	⑥
H6-2) teachers	①	②	③	④	⑤	⑥
H6-3) siblings	①	②	③	④	⑤	⑥
H6-4) peers	①	②	③	④	⑤	⑥

H7. When you use the Internet, how often do the following person/people encourage you to explore or learn things on the Internet?

	Never	Hardly ever	Sometimes	Often	Very often	All the time
H7-1) parents/caregivers	①	②	③	④	⑤	⑥
H7-2) teachers	①	②	③	④	⑤	⑥
H7-3) siblings	①	②	③	④	⑤	⑥
H7-4) peers	①	②	③	④	⑤	⑥

Annex 2: Reliability Analysis Results

Internal Consistency Reliability of the Survey Questionnaire

Competency	Cronbach's alpha
Digital Literacy	.89
ICT Literacy	.83
Information Literacy	.80
Digital Safety and Resilience	.87
Understanding Child Rights	.67
Personal data, Privacy, and Reputation	.79
Promoting and Protecting Health and Well-Being	.58
Digital Resilience	.71
Digital Participation and Agency	.81
Interacting, Sharing, and Collaborating	.73
Civic Engagement	.70
Netiquette	.74
Digital Emotional Intelligence	.89
Self-awareness	.70
Self-regulation	.62
Self-motivation	.65
Interpersonal skills	.68
Empathy	.72
Digital Creativity and Innovation	.88
Creative Literacy	.83
Expression	.85

Annex 3: Confirmatory Factor Analysis Results

Model Fit Summary of Domains

	GFI	TLI	CFI	RMSEA (90% CI)
Digital Literacy	.897	.866	.888	.088 (.082-.093)
Digital Safety and Resilience	.947	.914	.933	.066 (.061-.073)
Digital Participation and Agency	.950	.895	.919	.071 (.064-.078)
Digital Emotional Intelligence	.950	.919	.937	.058 (.053-.063)
Digital Creativity and Innovation	.938	.908	.928	.087 (.080-.095)

Standardized Factor Loadings on Digital Literacy

Sub-competency	Item	Standardized Parameter Estimate	p
ICT Literacy	A1	.522	<.001
	A2	.608	<.001
	A3	.383	<.001
	A4	.605	<.001
	A5	.568	<.001
	A6	.579	<.001
	A7	.746	<.001
	A8	.761	<.001
	A9	.648	<.001
Information Literacy	A10	.554	<.001
	A11	.622	<.001

Sub-competency	Item	Standardized Parameter Estimate	p
	A12	.726	<.001
	A13	.668	<.001
	A14	.746	<.001

Standardized Factor Loadings on Digital Safety and Resilience

Sub-competency	Item	Standardized Parameter Estimate	p
Understanding Child Rights	B1	.457	<.001
	B2	.603	<.001
	B3	.753	<.001
	B4	.699	<.001
Personal data, Privacy, and Reputation	B5	.679	<.001
	B6	.662	<.001
	B7	.712	<.001
	B8	.728	<.001
Promoting and Protecting Health and Well-Being	B9	.431	<.001
	B10	.685	<.001
	B11	.556	<.001
Digital Resilience	B12	.692	<.001
	B13	.651	<.001
	B14	.659	<.001

Standardized Factor Loadings on Digital Participation and Agency Competencies

Sub-competency	Item	Standardized Parameter Estimate	p
Interacting, Sharing, and Collaborating	C1	.583	<.001
	C2	.702	<.001
	C3	.669	<.001
	C4	.593	<.001
Civic Engagement	C5	.499	<.001
	C6	.703	<.001
	C7	.825	<.001
	C8	.424	<.001
Netiquette	C9	.563	<.001
	C10	.699	<.001
	C11	.731	<.001
	C12	.612	<.001

Standardized Factor Loadings on Digital Emotional Intelligence Competencies

Sub-competency	Item	Standardized Parameter Estimate	p
Self-Awareness	D1	.668	<.001
	D2	.640	<.001
	D3	.624	<.001
	D4	.544	<.001
Self-regulation	D5	.592	<.001
	D6	.579	<.001
	D7	.618	<.001
Self-motivation	D8	.616	<.001

Sub-competency	Item	Standardized Parameter Estimate	p
	D9	.657	<.001
	D10	.596	<.001
Interpersonal skills	D11	.633	<.001
	D12	.642	<.001
	D13	.656	<.001
Empathy	D14	.727	<.001
	D15	.677	<.001
	D16	.636	<.001

Standardized Factor Loadings on Digital Creativity and Innovation Competencies

Sub-competency	Item	Standardized Parameter Estimate	p
Creative Literacy	E1	.581	<.001
	E2	.707	<.001
	E3	.727	<.001
	E4	.776	<.001
	E5	.725	<.001
Expression	E6	.565	<.001
	E7	.736	<.001
	E8	.772	<.001
	E9	.762	<.001
	E10	.703	<.001
	E11	.665	<.001

Annex 4: TABLES ON DIFFERENCES IN DOMAIN BY GENDER, TYPE OF SCHOOL, AND LOCATION

Difference by Gender

DOMAIN		Mean	SD	t	Sig.
Digital Literacy	Girl	3.22	.49	2.61	.009
	Boy	3.14	.53		
Digital Safety and Resilience	Girl	3.51	.38	4.03	.000
	Boy	3.42	.44		
Digital Participation and Agency	Girl	3.20	.43	2.14	.033
	Boy	3.15	.47		
Digital Emotional Intelligence	Girl	3.30	.42	2.35	.019
	Boy	3.24	.46		
Digital Creativity and Innovation	Girl	2.97	.53	.24	.812
	Boy	2.96	.59		

Difference by Type of School

DOMAIN		Mean	SD	t	Sig.
Digital Literacy	Private	3.34	.39	6.48	.000
	Public	3.13	.54		
Digital Safety and Resilience	Private	3.59	.27	6.55	.000
	Public	3.42	.45		
Digital Participation and Agency	Private	3.22	.41	1.77	.077
	Public	3.17	.46		
Digital Emotional Intelligence	Private	3.32	.40	2.45	.015
	Public	3.26	.45		
	Private	2.95	.52	-.74	.462

DOMAIN		Mean	SD	t	Sig.
Digital Creativity and Innovation	Public	2.97	.57		

Difference by Location

DOMAIN		Mean	SD	t	Sig.
Digital Literacy	Urban	3.22	.50	2.62	.009
	Rural	3.14	.52		
Digital Safety and Resilience	Urban	3.50	.40	2.97	.003
	Rural	3.43	.43		
Digital Participation and Agency	Urban	3.19	.44	.97	.333
	Rural	3.16	.46		
Digital Emotional Intelligence	Urban	3.29	.43	1.09	.278
	Rural	3.26	.44		
Digital Creativity and Innovation	Urban	2.95	.54	-.67	.501
	Rural	2.98	.57		

ANNEX 5: MULTIPLE REGRESSION ANALYSIS RESULTS

Multiple Regression Analysis Results for Digital Literacy

Predictors	Standardized Beta	t	Sig.
Type of School (Private/Public)	-.059	-1.845	.065
Geographical Location (Urban/Rural)	-.016	-.588	.556
Gender	-.061	-2.22	.026
Duration of use	.145	4.279	.000
Frequency of use	.131	3.935	.000
Learned coding skills	.067	2.309	.021
Developed web or application	.146	4.997	.000
Parents education level	-.013	-.408	.683
Home environment	.092	2.907	.004
Number of books	-.008	-.279	.780
Model Summary: R Square = .138, F = 18.818, Sig. = .000			

Multiple Regression Analysis Results for Digital Safety and Resilience

Predictors	Standardized Beta	t	Sig.
Type of School (Private/Public)	-.045	-1.406	.160
Geographical Location (Urban/Rural)	-.023	-.836	.403
Gender	-.101	-3.719	.000
Duration of use	.247	7.359	.000
Frequency of use	.096	2.915	.004
Learned coding skills	.064	2.236	.026
Developed web or application	.037	1.275	.203
Parents education level	.024	.784	.433

Predictors	Standardized Beta	t	Sig.
Home environment	.065	2.060	.040
Number of books	-.038	-1.320	.187
Model Summary: R Square = .152, F = 21.096, Sig. = .000			

Multiple Regression Analysis Results for Digital Participation and Agency

Predictors	Standardized Beta	t	Sig.
Type of School (Private/Public)	.038	1.150	.251
Geographical Location (Urban/Rural)	.001	.038	.970
Gender	-.044	-1.571	.116
Duration of use	.152	4.365	.000
Frequency of use	.101	2.953	.003
Learned coding skills	.104	3.479	.001
Developed web or application	.133	4.421	.000
Parents education level	-.031	-.957	.339
Home environment	.041	1.273	.203
Number of books	-.027	-.891	.373
Model Summary: R Square = .086, F = 11.080, Sig. = .000			

Multiple Regression Analysis Results for Digital Emotional Intelligence

Predictors	Standardized Beta	t	Sig.
Type of School (Private/Public)	.015	.454	.650
Geographical Location (Urban/Rural)	-.001	-.029	.977
Gender	-.053	-1.882	.060
Duration of use	.122	3.498	.000

Predictors	Standardized Beta	t	Sig.
Frequency of use	.086	2.504	.012
Learned coding skills	.097	3.254	.001
Developed web or application	.152	5.036	.000
Parents education level	-.019	-.579	.563
Home environment	.067	2.069	.039
Number of books	-.037	-1.223	.222
Model Summary: R Square = .086, F = 11.043, Sig. = .000			

**Multiple Regression Analysis Results for Digital Creativity and Innovation**

Predictors	Standardized Beta	t	Sig.
Type of School (Private/Public)	.070	2.132	.033
Geographical Location (Urban/Rural)	.028	.988	.324
Gender	.003	.115	.909
Duration of use	-.010	-.276	.782
Frequency of use	.105	3.070	.002
Learned coding skills	.110	3.708	.000
Developed web or application	.199	6.622	.000
Parents education level	-.065	-2.205	.043
Home environment	.090	2.766	.006
Number of books	-.002	-.071	.944
Model Summary: R Square =.092, F =11.867, Sig. = .000			

## ANNEX 6: FIGURES ON TIME SPENT USING COMPUTERS OR THE INTERNET FOR VARIOUS PURPOSES

**Length of Time Spent Using Computers or the Internet for School Study**
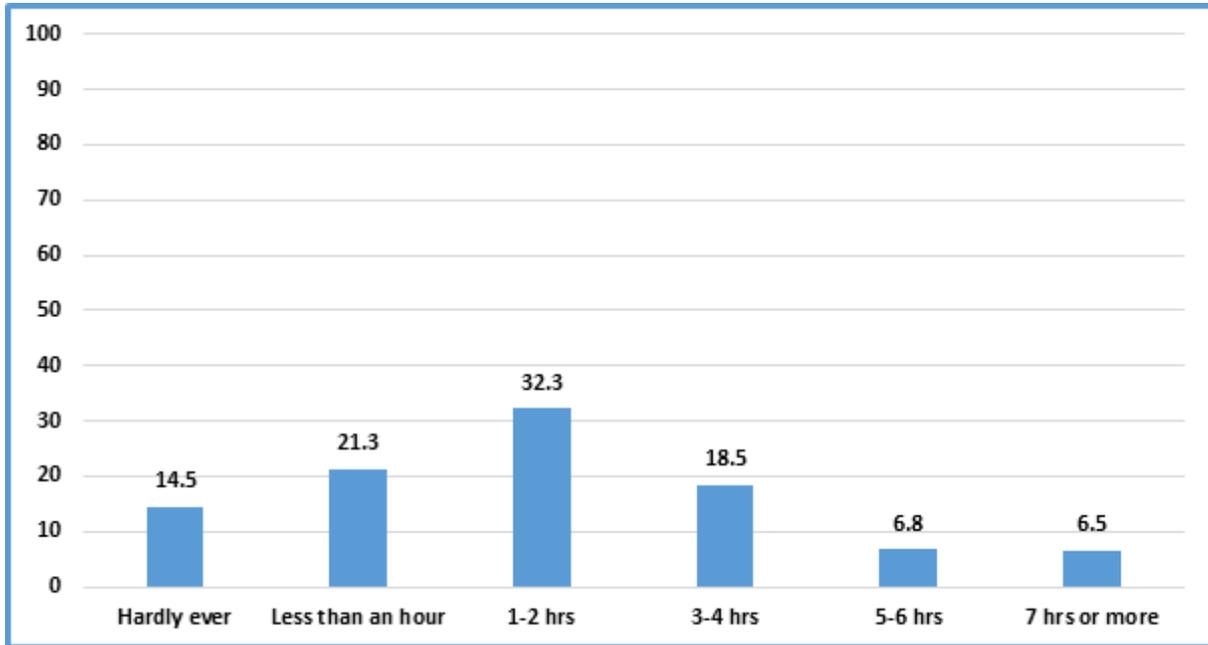
Length of Time Spent Using Computers or the Internet for Personal Purpose
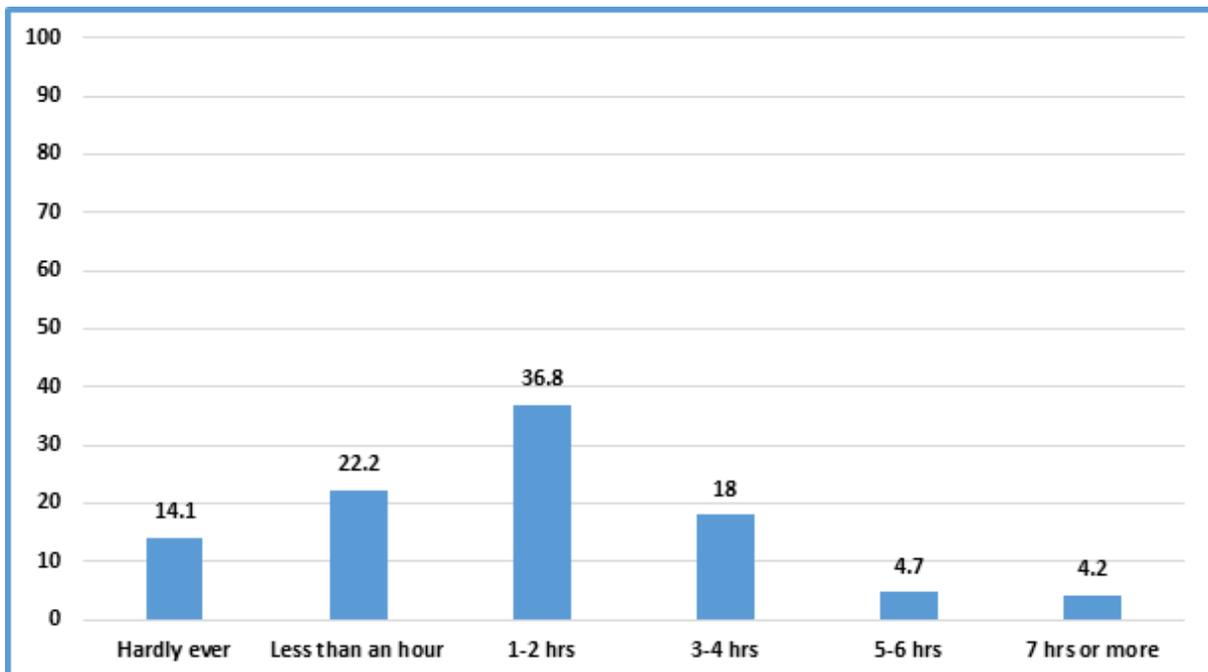
Length of Time Spent Using Computers or the Internet for Leisure

Length of Time Spent Using Computers or the Internet for Socialization with Friends