*International Journal for Educational Media and Technology*
*2022, Vol.16, No. 2, pp.77-85*

# An Inquiry into K-12 Graduates' Technology Use and Skills in the Philippines

**Danilo M. Baylen**
*University of West Georgia, Georgia, USA*
dbaylen@westga.edu

**Merle L. Junsay**
*Central Philippine University, Philippines*
mljunsay@cpu.edu.ph

*The study determined the extent of technology use, the tasks completed, and the type of technology utilized in completing specific tasks by the first batch of students of the K-12 curriculum in the Philippines who came from a private university of higher learning in the Visayas region. Findings revealed that the students identified themselves as above average or heavy technology users, and their perception as to the type of user they were did not vary according to gender and location. Smartphones were the standard technology the students used to complete most tasks. At the same time, students utilized laptops to complete limited but essential tasks like designing, entering data into spreadsheets, and doing presentations. Noticeably, the students did not use the desktop computers. Also, they did not use technology for big tasks such as checking bank finances, creating podcasts, or paying bills online.*

*Keywords: K-12 graduates, Philippines, Technology skills, Utilization*

## Introduction

The knowledge of increasing access, availability and use of technology across different Filipino society sectors is critical for educators, school and university administrators, and policymakers. The information gathered could help define efforts and direct strategies that support curriculum development, teacher education program implementation, faculty preparation, and resource allocation, to name a few. A baseline in identifying students' technology literacy skills would guide policy development impacting 21st-century skills development. The researchers argued for the need to collect data about technology literacy skills from graduates of the new basic education program known as K-12. Philippine education transformed from a 10-year pre-university cycle into a K-12 program under the Republic Act No. 10533 series 2012, signed on May 15, 2015. The new curriculum ensured that graduating from the K-12 program would provide "the standard knowledge, skills, and competencies needed to go to college" (Acosta & Acosta, 2016, p. 2452). Acosta and Acosta (2016) stated that the new curriculum would "produce holistically developed citizens equipped with 21st century skills essential for both life-long learning and employment" (p. 2452).

The first batch of K-12 graduates entering as university students began in 2018. The higher education faculty and administrators looked forward to seeing students demonstrate media and information literacies as stated in the content standard of the senior high school curriculum of the Department of Education. As such, they should perform competencies showcasing their understanding, insights, and perceptions of the different resources of media and information (Philippines. Department of Education, 2013).

### Literature Review

The education reform argued that K-12 graduates would be college-ready and equipped with skills to succeed in the 21st-century workplace. One of the essential 21st-century skills focuses on developing literacy skills such as information, media, and technology that promote digital comprehension and supports completing tasks at home, school, or the workplace (Batelle for Kids, 2019). Stauffer (2020) described these literacies as understanding facts, figures, statistics, data, publishing, and tools and applications supporting activities in the information age.

### Technology in the Philippines

Technology devices as tools supporting the completion of various tasks have become pervasive in living and work situations. For many young people, using technology seems essential in daily activities and meeting personal, academic, social, and work-related needs. Further, the Philippine government supported implementing projects that promoted technology use and integration in the schools. For example, the iSchools Project in Camarines Sur Province made significant contributions toward integrating ICT into public high schools (Foronda, 2011). Also, similar project implementation in Tarlac Province contributed to bridging the digital divide by developing an educational digital network. The project equipped teachers with ICT literacy skills and provided access to relevant digital content and applications to make learning effective (Lorenzo, 2016). However, Tomaro (2018) argued that full integration of ICT in Philippine education required more training for teachers, the building of computer infrastructures, strategic planning of ICT in the curriculum, and strong leadership with a vision.

### Technology Use

Online blogs, pages, and research articles abound on how Filipinos use technology in different contexts (Carbonilla Gorra & Bhati, 2016; Gonzales, 2019; Stauffer, 2020). Research on students' use of technology reported activities involving "instant messaging through chatting, lesson inquiry about assignments, sending and receiving emails (Carbonilla Gorra & Bhati, 2016, p.102). Students also use the web for research by finding articles using online databases and data gathering using online tools. Further, Gonzales (2019) reported that social media "soared from 9 hours and 29 minutes last year to 10 hours and 2 minutes this year, the highest in the world" (para 4). Reports from these sources indicate Filipinos spend more time online than the citizens of neighboring Asian countries.

Moreover, Reyes (2017) reported the growth of using mobile devices in both personal and professional activities. Reyes cited Jason Miller, the chief strategist of commerce of Akamai Technologies, stating mobile devices generated "sixty-nine percent of the Web traffic, which offers proof that mobile is the primary device of most Filipinos" (para 4). However, the Pew Research Center reported a "notable number of people in emerging economies who do not own a mobile phone, or who share one with others" (Rainie & Silver, 2019, p.3).

## Research Design and Methods

The researchers present this writing as a descriptive-relational study that utilized survey design. The study participants were the first batch of graduates of the K-12 curriculum who attended a local university as first-year students.

### Context

The study respondents came from one of the local universities in Iloilo City, located in Iloilo province in Western Visayas in the Philippines. The university is a non-stock, non-profit institution that enrolls over 12,000 students in its primary and secondary education, undergraduate, graduate, and professional programs. The researchers chose first-year students from the local university as respondents, given its open admission, large senior high school population, and reputation for quality higher education programs.

### Data Collection

The researchers collected data using an online survey delivered through *Qualtrics* application. The online survey questionnaire was self-created, and the lead researcher developed the survey items based on the analysis of the related literature and other secondary data sources (An & Reigeluth, 2011; Andrade, 2012; McLaren, 2019; UNESCO, 2013). The survey items included questions on demographic information (gender, age, residence location, and user type), perceived frequency of using technology, and technology devices used in completing tasks. The link to the online survey was made available to educators and librarians in contact with the study's target population. The cover letter explaining its purpose and goals included consent to participate in the study.

### Online Survey

After the study participants provided consent, the Qualtrics application provided access to the online survey containing thirty-two statements referring to various tasks and then several questions collecting demographic information. Participants first completed a sentence that read, "I use technology to …., " followed by a statement about a specific task (e.g., listening to music). In completing the statement, the participant needed to choose one of the answer options: None at all, Sometimes, Most Times, and All the time. Second, the participants responded to the next question asking for the technology device used to complete the task identified in the previous statement. The choices included a SMART phone, tablet/iPad, laptop, or desktop. Also, participants could choose "not applicable" if they had no experience completing the task, as mentioned earlier, or did not use a technology device.

### Demographic Information

The online survey also collected demographic information as factors in the study and identified the characteristics of the K-12 program's graduates as study participants. In writing the report, the researchers included and discussed four factors: User Type, Gender, Age (2018 as the base year), and Location of Residence. The data for User Type came from participants' responses to their perceived extent of use of technology. The researchers asked participants which task required technology they would use. Choices included Beginner (10% or less), Average (less than 50%, greater than 10%), Above average (less than 100%, greater than 50%), and Heavy user (100%).

**Gender and age.** The research literature discussed gender and age as factors influencing the acquisition of technology literacy skills (Bray, 2007; Cai, Fan & Du, 2017). Regarding age, the participants provided their birth years, and the researchers determined the participants' age using 2018 as the base year. The researchers grouped the sample's age range into 18-, 19-, and 20-24.

**Location of Residence.** Participants reported city or rural as their location of residence. The research literature discussed place as a factor in providing exposure and experiences related to technology literacy (Anderson, 2015; Wang, 2013). Talandon-Felipe et al. (2016) investigated the incidence of the digital divide in a rural community in the Philippines. Her team found that those residing away from urban areas have limited knowledge and access to ICT tools and resources.

**Data Analysis.** The researchers used frequencies to describe the perceived user type of participants by age, location, and gender, their extent of use of technology, and the kind of technology they used to complete specific tasks. They also used Chi-Square Test for Independence to test the possible relationship between the extent of technology used and respondents' demographics.

**Limitations**. Given the study's scope and outcome, the researchers know there would be limitations, such as time and funding constraints. As a descriptive study, the researchers could only examine texts and narratives from the participants' self-reports and observed frequency and patterns from the survey responses collected. Reports from the data analysis only provided a snapshot of potential factors or determinants of using technology to complete the sample's tasks. With these constraints, the study's findings could not be generalized or extended beyond the participants.

## Results

The initial research questions focus on developing a description based on the demographic data, self-reports of technology devices used, and perceptions of technology use:

1. What are the students' perceptions of the extent of use of technology in completing specific tasks?
2. What technology users are the students as they perceived themselves according to gender, age, and location?
3. What technology devices did the students use in completing specific tasks?

### Participant Characteristics

Researchers selected three demographic information (gender, age, and location of residence) to describe the study participants of K-12 graduates and first-year university students. More than 900 surveys were returned to the

researchers, but 571 surveys with valid responses were considered for analysis. The sample comprised 478 females (83.7%) who completed surveys and 93 males (16.3%) participants. For the age distribution, the researchers received valid survey responses from the following groups: 135 surveys from 18-year old (23.6%), 386 from 19-year old (67.6%), and 50 from 20-24-year old (8.8%). Finally, the residence location generated 304 for the city (53.2), while 267 selected rural (46.8%).

## Perceived User Type

Participants, as users, had four choices based on their perceived rate of technology use. The researchers asked the participants what task required technology they would use. They could either rate themselves as *Beginner* (10% or less), *Average* (more than 10% but less than 50%), *Above Average* (50% or more but less than 90%, and *Heavy* (100% or All the time). Table 1 shows that none of the participants perceived themselves as beginners, but 10.7% identified themselves as Average users. Above Average users were nearly half (46.6%) and led the groups in frequency count, followed closely by 244 Heavy users (42.7%).

## Gender and User Type

Are there more heavy users among females in comparison to male participants? Table 1 provides the breakdown of user types by gender. Percentage-wise, there seems to be no variation as to the kind of users the students were (*Average, Above Average*, and *Heavy*) given female and male participants. The Chi-square Test of Independence result, X2 (2, 571) = .156, p >.05, shows no significant relationship between the student's gender and the type of user they were as they perceived themselves to be.

## Age and User Type

Do younger participants see themselves as heavy users of technology? Within each group, 19-year-old students reported themselves as heavy users (44.8%) compared to other user types (38.5% and 38%). Both participants, 18-year-old (51.1%) and 20-24-year old (54%) users, posted high percentages as the *Above Average* user type. However, the Chi-square test of independence result, X2 (2, 571) = 3.36, p >.05, shows no significant relationship between the student's age and their perceived user type.

## Location of Residence and User Type

Are city residents more heavy users of technology than those in rural areas? Results revealed almost the same number of *Above Average* (46.7% and 46.2%) and *Heavy* (42.9% and 41.9%). The Chi-square test of independence result X2 (2, 571) = 1.29, p >.05. provided proof of such a relationship.

*Table 1. Perceived user type according to gender, age, and location.*

| | Sample | | GENDER | | AGE | | | LOCATION | |
|---|---|---|---|---|---|---|---|---|---|
| | Distribution | | Female | Male | 18 | 19 | 20-24 | City | Rural |
| **USER TYPE** | *f* | % | % | % | % | % | % | % | % |
| Beginner | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Average User | 61 | 10.7 | 10.5 | 11.8 | 10.4 | 11.1 | 8 | 10.5 | 10.9 |
| Above Average User | 266 | 46.6 | 46.7 | 46.2 | 51.1 | 44 | 54 | 46.7 | 46.2 |
| Heavy User | 244 | 42.7 | 42.9 | 41.9 | 38.5 | 44.8 | 38 | 42.9 | 41.9 |
| Total | 571 | 100 | | | | | | | |

## Task and Technology Device Used

There were five choices as to the technology devices: Desktop, Laptop, Tablet/iPad, SMART phone, or *Not Applicable.*

SMART phones and laptops seem to be the technology devices university students use to complete tasks identified in this study. But of all the devices, the SMART phone appeared to be the most utilized technology to complete most tasks. Using 50% and above as an indicator of pervasiveness in a specific technology device, eighteen tasks received 50% or more responses for using a SMART phone from the sample population. The task of calling friends and family (97.5%) received the highest count for using a SMART phone, followed by texting friends and family (96.8%). Chatting with family and friends (96.0%) came in third, followed by listening to music (95.4%) and taking pictures or digital images (95.4%). Of the tasks, a large number of survey participants (mean of 91.5%) reported using SMART phones to communicate with others (#4, 5, 23, 28). Also, about 85% reported using the same technology device for entertainment (#9, 16, 21, 24, 27) while about 80% used it to complete academic-related tasks (#1, 7, 8, 17, 20, 29, 31).

On the other hand, three tasks received 50% or more responses for using a laptop from the students. The job of putting together an electronic presentation (e.g., using PowerPoint) received the highest response (78.1%). Other tasks receiving a high response that met the cut-off criteria included designing and creating brochures, flyers, or posters (55%) and entering data into a spreadsheet (52.9%). Further, some survey participants reported using laptops (62%) in completing academic-related tasks (#14, 15, 22). The researchers found these findings consistent with the literature about access to technology devices in Asia, especially in the Philippines (Librero, Ramos, Ranga, Triñona, & Lambert, 2007; Valk, Rashid, & Elder, 2010).

Moreover, desktops and tablets/iPads as technology devices use to complete the tasks did not receive 50% or more responses from the sample population. Percentage-wise, the highest answer reported was 15.6% for desktop and 3.3% for tablet/iPad.

Table 2. Frequency of task by technology device used (N=571)

| **Task** (N = 571) | NA | Rank | Desktop | Rank | Laptop | Rank | Tablet/ iPad | Rank | SMART Phone | Rank |
|---|---|---|---|---|---|---|---|---|---|---|
| | **%** | | **%** | | **%** | | **%** | | **%** | |
| 1. access online databases and research articles. | 0.2 | 27 | 4 | 14 | 15.4 | 12 | 2.1 | 16.5 | 78.3 | 14 |
| 2. build web pages and websites. | 35.2 | 7 | 10.5 | 4 | 21.2 | 8 | 0.5 | 31.5 | 32.6 | 26 |
| 3. buy or sell items online. | 26.6 | 8 | 1.9 | 25.5 | 3.2 | 26 | 2.1 | 16.5 | 66.2 | 17 |
| 4. call friends and family. | 0 | 30.5 | 0.2 | 31.5 | 0.7 | 31 | 1.6 | 27 | 97.5 | 1 |
| 5. chat with family and friends. | 0 | 30.5 | 0.4 | 29.5 | 1.6 | 29 | 2.1 | 16.5 | 96 | 3 |
| 6. check or monitor my finances or bank account. | 57.4 | 3 | 1.9 | 25.5 | 5.6 | 23 | 0.7 | 30 | 34.3 | 25 |
| 7. complete an online form. | 3.2 | 18 | 9.1 | 6 | 20.1 | 9 | 2.1 | 16.5 | 65.5 | 18 |
| 8. compute or solve math-related problems. | 9.3 | 14 | 2.5 | 21.5 | 7.5 | 20 | 1.4 | 28 | 79.3 | 12 |
| 9. create a digital story. | 37.1 | 6 | 2.8 | 19.5 | 12.8 | 14 | 2.6 | 4 | 44.7 | 23 |
| 10. create an online profile (e.g., Facebook). | 1.2 | 22 | 3.2 | 16 | 9.6 | 15 | 2.3 | 11 | 83.7 | 10 |
| 11. create a podcast. | 65.3 | 2 | 2.3 | 23 | 3.3 | 25 | 2.3 | 11 | 26.8 | 28 |
| 12. create digital images (e.g., using Photoshop. | 12.4 | 12 | 8.2 | 7.5 | 27.5 | 7 | 2.1 | 16.5 | 49.7 | 20 |
| 13. create multimedia files (e.g., videos or movies). | 6.8 | 15 | 7.9 | 9 | 35 | 5 | 3.2 | 2 | 47.1 | 21 |
| 14. design and create brochures, flyers, or posters. | 13.3 | 11 | 15.6 | 1 | 55 | 2 | 2.5 | 8.5 | 13.7 | 30.5 |
| 15. enter data into a spreadsheet. | 18.4 | 9 | 13.3 | 2 | 52.9 | 3 | 1.8 | 24.5 | 13.7 | 30.5 |
| 16. listen to music. | 0.2 | 27 | 0.4 | 29.5 | 1.9 | 27.5 | 2.1 | 16.5 | 95.4 | 4.5 |
| 17. look up words using online reference tools. | 1.1 | 25 | 2.5 | 21.5 | 8.2 | 17.5 | 2.5 | 8.5 | 85.8 | 7 |
| 18. make a reservation for a place to stay (e.g., hotel). | 37.8 | 5 | 2.1 | 24 | 5.8 | 21.5 | 1.9 | 22 | 52.4 | 19 |
| 19. pay bills online. | 65.5 | 1 | 1.6 | 27 | 1.9 | 27.5 | 0.5 | 31.5 | 30.5 | 27 |
| 20. search for information on the web. | 0.2 | 27 | 4.4 | 13 | 8.2 | 17.5 | 2.6 | 5 | 84.6 | 9 |
| 21. play an online game. | 9.5 | 13 | 10 | 5 | 9.1 | 16 | 2.6 | 5 | 68.8 | 16 |
| 22. put together an electronic presentation (e.g., PowerPoint). | 1.9 | 19 | 8.2 | 7.5 | 78.1 | 1 | 1.8 | 24.5 | 10 | 32 |
| 23. send and receive email from friends and family. | 1.2 | 22 | 4.7 | 12 | 15.8 | 11 | 2.6 | 5 | 75.7 | 15 |
| 24. store digital images. | 1.2 | 22 | 2.8 | 19.5 | 14.3 | 13 | 2.3 | 11 | 79.2 | 13 |
| 25. submit an application for school or job. | 15.9 | 10 | 11.4 | 3 | 34.9 | 6 | 2.1 | 16.5 | 35.7 | 24 |
| 26. take or complete an online course. | 49.9 | 4 | 6.7 | 10.5 | 17.2 | 10 | 0.9 | 29 | 25.4 | 29 |
| 27. take pictures or digital images. | 1.2 | 22 | 0.5 | 28 | 0.9 | 30 | 1.9 | 22 | 95.4 | 4.5 |
| 28. text friends and family. | 0.9 | 26 | 0.2 | 31.5 | 0.4 | 32 | 1.8 | 24 | 96.8 | 2 |
| 29. translate texts from one language to another | 5.3 | 16 | 3 | 17.5 | 8.1 | 19 | 2.1 | 16.5 | 81.6 | 11 |
| 30. view images of places for a vacation. | 3.7 | 27 | 3.3 | 15 | 5.3 | 24 | 2.8 | 3 | 84.9 | 8 |
| 31. watch videos online (e.g., YouTube). | 0.2 | 17 | 3 | 17.5 | 5.8 | 21.5 | 3.3 | 1 | 87.7 | 6 |
| 32. word process papers and assignments. | 1.2 | 22 | 6.7 | 10.5 | 44.3 | 4 | 1.9 | 22 | 45.9 | 22 |

## Task and Perceived Frequency of Technology Use

The survey presented the participants with thirty-two tasks using technology to complete (see Table 3). Users had four choices to respond when asked for their perception of how frequently they use technology in achieving a specific task: *All the time, Most times*, *Sometimes,* and *None at all*.

Table 3. Frequency of task by perceived use of technology

| **Task** (N = 571) | *None at all* **%** | *Sometimes* **%** | *Most times* **%** | *All the time* **%** |
|---|---|---|---|---|
| 1. access online databases and research articles. | 0.2 | 9.1 | 45.2 | 45.5 |
| 2. build web pages and websites. | 37.7 | 35.9 | 18.4 | 8.1 |
| 3. buy or sell items online. | 28.2 | 48.9 | 13.5 | 9.5 |
| 4. call friends and family. | 0 | 8.9 | 31.5 | 59.5 |
| 5. chat with family and friends. | 0.2 | 2.5 | 19.1 | 78.3 |
| 6. check or monitor my finances or bank account. | 55.2 | 29.4 | 10.5 | 4.9 |
| 7. complete an online form. | 3.2 | 41.3 | 33.6 | 21.9 |
| 8. compute or solve math-related problems. | 7.7 | 41.9 | 32.4 | 18 |
| 9. create a digital story. | 38.2 | 34.2 | 17.2 | 10.5 |
| 10. create an online profile (e.g., Facebook). | 1.6 | 19.4 | 32 | 46 |
| 11. create a podcast. | 68.1 | 22.9 | 7 | 1.9 |
| 12. create digital images (e.g., using Photoshop. | 12.4 | 42.4 | 25.4 | 19.8 |
| 13. create multimedia files (e.g., videos or movies). | 7.4 | 41.5 | 30.6 | 20.5 |
| 14. design and create brochures, flyers, or posters. | 14 | 47.5 | 24.2 | 14.4 |
| 15. enter data into a spreadsheet. | 18.7 | 44.5 | 22.9 | 13.8 |
| 16. listen to music. | 0 | 2.1 | 20.5 | 77.4 |
| 17. look up words using online reference tools. | 1.4 | 13.5 | 39.1 | 46.1 |
| 18. make a reservation for a place to stay (e.g., hotel). | 38.2 | 35.9 | 16.1 | 9.8 |
| 19. pay bills online. | 66.4 | 22.1 | 6.7 | 4.9 |
| 20. search for information on the web. | 0.4 | 4.7 | 28 | 66.9 |
| 21. play an online game. | 9.8 | 31.5 | 24.2 | 34.5 |
| 22. put together an electronic presentation (e.g., PowerPoint). | 1.9 | 17.5 | 40.1 | 40.5 |
| 23. send and receive email from friends and family. | 1.2 | 26.4 | 32.6 | 39.8 |
| 24. store digital images. | 1.2 | 11.4 | 26.4 | 60.9 |
| 25. submit an application for school or job. | 15.6 | 44.3 | 25 | 15.1 |
| 26. take or complete an online course. | 50.8 | 22.1 | 15.4 | 11.7 |
| 27. take pictures or digital images. | 1.1 | 8.1 | 21 | 69.9 |
| 28. text friends and family. | 0.5 | 4.9 | 18.9 | 75.7 |
| 29. translate texts from one language to another | 5.3 | 38.5 | 26.3 | 29.9 |
| 30. view images of places for a vacation. | 3.7 | 24.2 | 27.1 | 45 |
| 31. watch videos online (e.g., YouTube). | 0.2 | 4.9 | 22.1 | 72.9 |
| 32. word process papers and assignments. | 0.7 | 17.7 | 39.8 | 41.9 |

Using 50% and above as an indicator of pervasiveness in technology use, the researchers identified patterns of responses based on frequency count within groups for *All the time*. Eight tasks received 50% or more reactions of *All the time* from the sample, while the task of chatting with family and friends (78.3%) received the highest count for answers *All the time*, followed by listening to music (77.4%). The task of texting friends and family (75.2%) came in third, followed by watching videos online (72.9%). Moreover, other functions that received a response of *All the time* included taking pictures of digital images (69.9%), searching for information from the web (66.9%), storing digital photos (60.9%), and calling friends and family (59.5%).

On the other hand, no other tasks received 50% or more responses of *Most times* or *Sometimes*. For a reaction of *Sometimes*, the researchers identified seven tasks receiving between 40 and 50 percent: Buying or selling items online (48.9%); Designing and creating brochures, flyers, or posters (47.5%); Entering data into a spreadsheet (44.5%); Submitting an application for school or job (44.3%); Computing or solving math-related problems (41.9%); Creating multimedia files (e.g., videos or movies) (41.5%); and Completing an online form (41.3%).

For *None at all*, four tasks received 50% or more from the students, which included creating a podcast (68.1%), paying bills online (66.4%), checking or monitoring my finances or bank account (55.2%), and taking or completing an online course (50.8%).

The researchers found patterns in the responses that raised questions, if not speculations, on the respondents' previous experiences of using technology. First, trends noted that all the time responses could be grouped into two categories: tasks involving a form of communication (#4, 5, 28), and entertainment (#16, 24, 27, 31). Using technology for communication and entertainment seems consistent with reports about Filipinos' amount of time on social media (Gonzales, 2019). The researchers considered the task of searching for information on the web (#20) as not fitting to either category, which led to the identification of a new one called academic work.

Second, responses of *Most times* or *Sometimes* identified several tasks (a total of 10) as primarily related to academic work (#1, 7, 8, 13, 14, 15, 22). The findings align with the research literature on the use and integration of information and communication technologies in the Philippines (Carbonilla Gorra, & Bhati, 2016; Foronda, 2011). Two tasks related to the conduct of business transactions (#3, 25) received a response of Sometimes. Overall, participants seemed to have limited experience in conducting business transactions. Researchers speculated that age as a demographic factor could be involved. Further, several business transactions require using credit cards that this age group might not have access to.

Third, study participants indicated they had limited (less than 10%) or no experience completing a task with technology. Three of these tasks involved conducting business transactions (#6, 19, 26), while the researchers categorized creating a podcast (#11) as academic work or entertainment.

Given the patterns of responses observed after data analysis (*Not applicable*, *Sometimes*, *Most times*), the researchers suggested that K-12 program experiences promoting technology use in support of academic work might be needed. If higher education programs expect students to exhibit technology literacy as university students, they need to start learning and using technology during senior high school, if not earlier.

Finally, the expectation of using technology also requires practice for students to do it well in different contexts, especially in business transactions. As more businesses, including government entities, use technology to conduct business (e.g., buy or sell, pay for bills, apply for jobs or licenses, etc.), students, as young adults, would be expected to perform these functions. In reflection, the researchers speculated that some factors might be limiting (or hindering) K-12 graduates from having experiences with these tasks before attending the university.

## Conclusion

The K-12 program became a reality due to the need to get Filipinos ready and competitive for the 21st-century workplace. The education reform added content knowledge to the current basic curriculum and pushed for the teaching of technology literacy.

In creating multiple snapshots of K-12 graduates' technology use in different aspects of their lives, the researchers could eventually produce a "big" picture for the area, region, and country. The idea of a "big" picture could provide a map for educators and policymakers in developing new and relevant curricula at each level from primary, secondary, senior high school, and college. The "big" picture could also provide both the Department of Education and the Commission on Higher Education with a focus on creating support infrastructures for educational institutions under their supervision, including training and resource allocation.

The researchers recommend further inquiry into the interaction of the demographic factors with students' technology device choices and perceptions on technology use. Are there significant relationships between elements, tasks, and perceptions? The outcomes of the descriptive study encourage researchers to continue collecting data from diverse

groups of participants. A study comparing different age groups, including older adults, could provide insights into technology diffusion from a historical perspective. Also, expanding the data collection to other locations, such as the neighbouring island or region, could inform stakeholders about the accessibility and availability of technology devices and the proliferation of technology literacy practices.

Finally, the researchers encourage further studies focusing on how people acquire technology literacy skills, where they learn, and how they know. The researchers believe that adding more snapshots could result in the formation of a "big" picture. Future studies focusing on acquiring technology literacy skills in the Philippines could help transition from K-12 to higher education.

## References

Acosta, I. C., & Acosta, A. S. (2016). Teachers' perceptions on senior high school readiness of higher education institutions in the Philippine. *Universal Journal of Educational Research, 4*(10), 2447-2462. DOI: 10.13189/ujer.2016.041024

An, Y-J., & Reigeluth, C. M. (2011). Creating technology-enhanced, learner-centered classrooms: K-12 teachers' beliefs, perceptions, barriers, and support needs. *Journal of Digital Learning in Teacher Education, 28*(2), 54-62.

Anderson, M. (2015). *Technology device ownership: 2015*. Pew Research Center. Retrieved from http://www.pewinternet.org/2015/10/29/technology-device-ownership-2015

Andrade, D. (2012 January10). 10 tech skills every student should have. *Teaching & Learning.* https://www.techlearning.com/david-andrade/3750

Battelle for Kids. (2019). *Framework for 21st century learning definitions*. http://static.battelleforkids.org/documents/p21/P21_Framework_DefinitionsBFK.pdf

Baylen, D. M., & Arellano, E. (2018). Technology-based experiences of young people: Opportunities for Filipino educators. *TCC Refereed Proceedings, 2018*(1). https://tccpapers.coe.hawaii.edu/archive/2018/Baylen.pdf

Bray, F. (2007). Gender and technology. *Annual Review of Anthropology, 36*, 37-53. DOI: 10.1146/annurev.anthro.36.081406.094328

Cai, Z., Fan, X., & Du, J. (2017). Gender and attitudes toward technology use: A meta-analysis. *Computers & Education, 105*, 1-13.

Carbonilla Gorra, V., & Bhati, S. S. (2016). Students' perception on use of technology in the classroom at higher education institutions in Philippines. *Asian Journal of Education and e-Learning, 4*(3), 92-103.

Foronda, V. R. (2011). Integrating information and communication technology into education: A study of the iSchools Project in Camarines Sur, Philippines. *Journal of Developments in Sustainable Agriculture, 6*, 101-113.

Gonzales, G. (2019). Filipinos spend most time online, on social media worldwide – report. *Rappler.* https://www.rappler.com/technology/news/222407-philippines-online-use-2019-hootsuite-we-are-social-report.

Jin, W., & Junio-Sabio, C. (2018). Potential use of mobile devices in selected public senior high schools in the city of Manila Philippines. *International Journal of Learning, Teaching and Educational Research, 17*(4), 102-114. https://doi.org/10.26803/ijlter.17.4.7

Librero, F., Ramos, A. J., Ranga, A. I., Triñona, J., & Lambert, D. (2007). Uses of the cell phone for education in the Philippines and Mongolia. *Distance Education*, *28*(2), 231-244. DOI: 10.1080/01587910701439266

McLaren, K. (2019 February 7). Why are technology skills so important to today's students. *Immerse Education*. https://www.immerse.education/why-are-tech-skills-so-important-to-todays-students/

National Center for Educational Statistics. (2002). *Technology in schools: Suggestions, tools and guidelines for assessing technology in elementary and secondary education*. https://nces.ed.gov/pubs2003/2003313.pdf

Philippines. Department of Education. (2013). *K to 12 basic education curriculum: Senior high school – core subject: Media and information literacy*. Retrieved from https://www.deped.gov.ph/wp-content/uploads/2019/01/SHS-Core_Media-and-Information-Literacy-CG.pdf

Rainie, L., & Silver, L. (2019). *Mobile divides in emerging economies*. Pew Research Center. https://www.pewresearch.org/internet/2019/11/20/mobile-divides-in-emerging-economies/

Reyes, R. R. (2017 October 7). *Mobile technology to grow further in the Philippines.* https://businessmirror.com.ph/2017/10/07/mobile-technology-to-grow-further-in-the-philippines/

Sarmiento, D. H., & Orale, R. L. (2016). Senior high school curriculum in the Philippines, USA, and Japan. *Journal of Academic Research*, *1*(3), 12-23.

Stauffer, B. (2020 March 19). *What are 21st century skills?*https://www.aeseducation.com/blog/what-are-21st-century-skills

Talandon-Felipe, M. M. P., Tautho, Y. C., & Tautho, C. C. (2016). Investigating the digital divide in a rural community in the Philippines. *Central Mindanao University Journal of Science, 20*.

Tomaro, Q. P. V. (2018). ICT integration in the educational system of Philippines. *Journal of Governance and Public Policy, 5*(3), 260-282.

United Nations Educational, Scientific, and Cultural Organization (UNESCO). (2013). *UNESCO training guide on ICT multimedia integration for teaching and learning*. Bangkok: Asia Pacific Regional Bureau for Education.

Valk, J-H., Rashid, A. T., & Elder, L. (2010). Using mobile phones to improve educational outcomes: An analysis of evidence from Asia. *International Review of Research in Open and Distance Learning, 11*(1), 117-140.

Wang, P-Y. (2013). Examining the digital divide between rural and urban schools: Technology availability, teachers' integration level and students' perception. *Journal of Curriculum and Teaching, 2*(2), 127-139.