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## **A Q-Methodology of Preservice Teachers' Cognition of Digital Literacy: A Philippine Case Study in Resource-Rich and Resource-Limited Contexts**

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*Abstract: This study aims to determine the existing digital literacy notions of Filipino preservice in two universities: one is a resource-rich context while the other is a resource-limited context. Contexts were determined based on the observed availability of digital tools. Twenty (20) preservice teachers each from two universities were invited for interviews after which they were again requested to arrange statements culled from the interviews. Utilizing the Q-sort methodology, a method that determines the standpoints of participants by their ranking of statements, three dimensions were identified: the portrait of balance, portrait of responsibility and portrait of support. The portraits represent the themes identified after participants determined the ranking of their statements. As evidenced on the results, the pre-service students in the resource-rich context identified themselves with the portrait of support and responsibility while those from the resource-limited context concentrated heavily on the portrait of balance. The differences in the viewpoints identified how the preservice teachers' access to resources has impacted their cognition of digital literacy.*

**Keywords:** preservice teacher's cognition, digital literacy, q-methodology, resource-rich setting, resource-limited setting

### **Introduction**

In the Philippines, the Department of Education (DepEd), through its Information and Communications Technology (ICT) Service, implemented milestones in the basic education curriculum for the integration of technology as early as Grade 4 where productivity tools such as phones and tablets are introduced to the students and where tablets and personal computers (PCs) are utilized to augment teachers' lessons. The terms Information and Communication Technology (ICT) and technology are used interchangeably, as mentioned in DepEd's Digital Rise Program (DepEd Press Release, 2022) and as observed in the curriculum where students are expected to demonstrate ICT skills or skills using the technology as they move to a particular Grade level. By Grade 7, basic programming skills are initiated; by Grade 8, multimedia skills are further honed as the students are recognized to be immersed early in digital tools; and, by Grade 11-12, vocational skills are integrated with ICT (Umali, 2019). Thus, it is essential that teachers be prepared in handling teaching and students' learning assisted by technology. According to the news article, digital literacy, which is the goal of DepEd, can only be achieved through ICT assisted teaching and ICT assisted learning.

Therefore, the Department has rolled out several initiatives for teacher development in the use of ICT, which included the procurement of PCs, and tablets for teachers; the access of teachers to software and open resources; and finally, the removal of paper-based visual materials replaced by ICT materials. In the light of the COVID-19 pandemic, the Department of Education has also recognized other modalities (distance learning, modular materials, blended learning, etc.) as evidenced in the continuity plan (Department of Education, 2020).

The development of digital literacy of the in-service teacher's point to the existing challenge that teacher training has not prepared fully competent graduates in handling of ICT for teaching. This challenge can be traced to the preparation of teachers during the preservice period because despite the engagement of preservice teachers in technology, it cannot be assumed that they are equally prepared to use technologies in teaching students (Hasse, 2017; Kumar & Vigil, 2011; Starčić, et. al., 2017). Borthwick and Hansen (2017) have also raised concerns about teacher competency in terms of digital literacy and has recommended that: "A common set of teacher technology competencies for teacher education faculty will provide a pathway for professional development and related essential conditions that can be targeted and purposeful" (p. 47). Adcock and Bolick (2011) citing Shulman (1986) and Mishra and Koehler (2006) have added that technology alone would not bring about "intelligent engagement (p. 226)" and hence "preservice experiences should be infused with technology, pedagogy, and content to develop a nuanced understanding of the complex relationships between technology, content, and pedagogy" (p.226) which they call TPACK (Technological Pedagogical and Content Knowledge).

Seemingly, studies have shown that preservice teachers are generally interested in information and communication technologies (ICT), however, their utilization in the teaching and learning needs more reconsiderations. Most preservice teachers, if not all, use ICTs for social media (Akayoğlu, et. al., 2020; Durriyah & Zuhdi, 2018; Garcia-Martin & Garcia-Sanchez, 2017) and have not fully appreciated how these technologies could aid them in teaching. There is a growing demand, however, for most teacher institution to step up and fill the gap regarding the preparation of teachers for learners who are equally immersed in technology that is not fully channeled in learning. This demand has been identified in Indonesia (Li, Noordin & Razali, 2018), Israel (Peled, 2021), and Singapore (Divaharan, 2011).

Most literatures (Durriyah and Zuhdi, 2018; Larson, 2012; List, Brante & Klee, 2020; Starčić et. al., 2017), however, are found to have concentrated on experiences of teachers in European or Western contexts where technology may be more accessible than their Asian counterparts. Hobbs and Tuzel (2015) explored Turkish preservice students experience and found significant relationships between student teachers' subject area specialization and digital learning motivation profile. Maderick, et.al. (2016) looked into self-assessments of preservice teachers in Southwest Nevada and how their reflections can aid in adjusting their perceptions and attitudes towards technology. The study of Daniels, et. al. (2019) delved into the experiences of British early grade teachers who are struggling between the use of technology in the primary level and the need to balance the students' learning of print materials.

Research reveals, however, that preservice students' perception of technology or its use and cognition of digital literacy play important considerations in the development of teachers' digital literacy competency. Paratore, et. al. (2016) found in their experimental study of preservice teachers' integration of technology in their teaching to have increased confidence and use of technology in teaching various subjects like science, mathematics, social studies and language. They noted, however, that this increased confidence might be considered fragile if a deepened and more extensive focus on the integration of technology would not be in place. Facebook seemed to be a favorite platform for Indonesian pe-service

students who identified the program as a venue for communicating confidently and comfortably to students (Durriyah and Zuhdi, 2018). Preservice teachers felt that their use of online platforms such as Facebook, Skype, blogs and WhatsApp, which they regularly use for personal and informal purposes, may actually be used in language teaching. The study on language teacher cognition is further supported by Kubanyiova and Feryok (2015) who reinforced that studying teachers' cognition "as emergent sense making in action has for bridging the links between teachers' inner worlds, their practices, and their students' language learning experiences" (p. 29); that it deviates from the normal top-down approach in studying teachers' practices in relation to their inner lives; that it recognizes the role of context in language teaching; and lastly, this presents an ethical viewpoint of language teacher cognition.

Digital literacy competence is an ongoing discussion as digital tools continue to evolve requiring teachers, in general, to accommodate these changes and to demonstrate their literacy. Literacy remains to be important in the discussion as the term tends to be differently defined through years. Mora and Golovatino-Mora (2017, p. 40), citing his own work in 2015, found that talking about literacy is a "contentious issue". For example, the United Nations Educational, Scientific and Cultural Organization (UNESCO) defined literacy as:

*...more than reading and writing - it is about how we communicate in society. It is about social practices and relationships, about knowledge, language and culture. Literacy ... finds its place in our lives alongside other ways of communicating. Indeed, literacy itself takes many forms: on paper, on the computer screen, on TV, on posters and signs. Those who use literacy takes it for granted - but those who cannot use it are excluded from much communication in today's world. Indeed, it is the excluded who can best appreciate the notion of 'literacy as freedom' (from Koïchiro Matsuura's preface, UNESCO 2003).*

This definition has distinctly evolved from the early UNESCO definition of literacy in 1947 which looked into literacy as a human right and one that is basic for human development. This notion of literacy was understood in the context of reading and writing alone (UNESCO, 2006).

But with the world changing with new technologies especially in the light of the COVID-19 pandemic, the scope of literacy has further expanded considering the availability of these tools. Although it has been argued that digital technology was created for certain motivations and purposes, it has become a recognized way of being and living. Laurillard (2012), as cited by Maggioli (2017, p. 91), argued that:

*Tools and technologies, in their broadest sense, are important drivers of education, though their development is rarely driven by education. Precisely because of their potential to change education unbidden, it is imperative that teachers and lecturers place themselves in a position where they are able to master the use of digital technologies, to harness their power, and put them to the proper service of education.*

Thus, digital literacy is defined more specifically than literacy as it is not just a subset of the latter. Carrier and Nye (2017, p. 209) refer to digital literacy as "the range of skills that technology users need to have not only in order to operate equipment and software, but also in order to understand what the potential uses of technology might be". The need to invest on developing technological knowledge has been acknowledged by all growing economies.

In another report by McAleavy, et. al. (2018) regarding technology in support of education in developing countries, they have cited how India, Pakistan, Bangladesh and Kenya have benefitted from the practices of using gadgets such as mobile phones and SD cards. Adhering to the calls of UNESCO for a more inclusive form of education especially in

low and middle-income countries, technology was utilized for teacher training and results reveal that even with low-cost technological devices, learning outcomes have been met and technology for teachers was deemed sustainable.

Given these reports, it would be reasonable to investigate the teacher development and preparation of preservice teachers in resource-limited context also in the light of teaching literacy. Teacher development in this study, however, will only look into teacher resources and best practices, and teacher preparation while literacy in resource-limited context will only focus on economic diversity and education equity. The study also included a comparison between two settings – one which is resource-limited and the other is resource-rich, the basis of which depended on the access to resources.

Basically, the study sought to answer the question: What is the preservice teachers' cognition of digital literacy?

## **Review of Related Literature**

Anchored on Borg's theory (2003) on teacher cognition and McKenna and Stahl's theory (2015) on reading comprehension, the study aimed at identifying the experiences of preservice teachers in the light of their teaching of literacy and in the light of their contexts as readers and teachers.

### **Teacher Cognition**

Teacher cognition refer to the unobservable cognitive dimension of teaching – what teachers know, believe, and think (Borg, 2003). On the factor of teacher cognition, Borg (2003) identified four areas that would be included when one contemplates on teacher experiences: 1) schooling (extensive experience of classrooms which defines early cognitions and shapes teachers' perceptions of early training); 2) professional coursework (may affect existing cognitions although especially when unacknowledged, this may limit its impact); 3) contextual factors (influence practice either by modifying cognitions or else directly, in which case incongruence between cognition and practice may result); and, 4) classroom practice (defined by the interaction of cognitions and contextual factors which includes classroom experience influences cognitions unconsciously and/or through conscious reflections) (p. 82). Borg's definition of cognition has been largely cited by researchers in the field of teaching international students (Haan, et. al., 2017), English as a second language teaching (Nishino, 2012 & Kaşlıoğlu and Ersin, 2018), foreign language teaching (Nazari & Allahyar, 2012; Feryok & Oranje, 2015) and applied linguistics (Kubanyiova & Feryok, 2015).

The term teachers' cognition is defined as any of the following: pre- or in-service teachers' self-reflections; beliefs and knowledge about teaching, students, and content; and awareness of problem-solving strategies endemic to classroom teaching (Kagan, 1990). Maggioni and Parkinson (2008) have further defined teacher's cognition as epistemic cognition. They defined the term as “the processes in which individuals engage in order to consider the criteria, limits, and certainty of knowing (Kitchener, 1983), and the literature on epistemic beliefs—beliefs regarding the stability, structure, and source of knowledge (Schommer, 1990)” (p. 446). They studied literature on cognition to determine its relationship with epistemic beliefs for the calibration of instruction.

Preservice teachers' cognitions are very important as they represent the mindset of the future teachers who will bank on their previous knowledge and experiences as learners their

concept of a “good teacher”. Lortie (1975), as cited by Maggioli (2017), calls this phenomenon as apprenticeship of observation. This simply puts that one’s concept of a good teacher is shaped by one’s experience as a learner.

### **Digital Literacy**

Literacy is understood best by actively acknowledging its inheritances, setting aside inconsistencies, re-conceptualizing views and imagining futures, knowing that today’s future is tomorrow’s present (Parr & Campbell, 2012, p. 572). This underlines the growing understanding of literacy which only considered reading and writing in the past as also taught in schools. Furthermore, Burnett and Merchant (2015) suggested that practices beyond the classroom should not be overlooked as they contribute to the growing and shifting concept of literacy. In addition, they recommend that teachers build on the existing digital practices and explore resources that enable students to acquire 21<sup>st</sup> century skills.

In the case of Turkey, Cam and Kiyici (2017) studied 354 prospective teachers and identified their digital literacies anchored on five areas: information literacy, visual literacy, software literacy, technology literacy and computer literacy. Based on the study, prospective teachers’ digital literacies were related to gender, access to the computer and Internet, and the disciplines. The concept of digital literacy concentrated more on the access and use of digital tools.

In as much as preservice teachers would take on the challenge of facilitating the learnings of the future, their skills and capabilities for the learners should be flexible enough to adopt and adapt to the issues and challenges of the time. One of these challenges would be their digital literacy.

Borthwick and Hansen (2017) analyzed the teachers’ preparedness to teach either in basic education or higher education and they concluded that teacher preparation institutions should “ensure preservice teacher experiences with educational technology are program-deep and program-wide rather than one-off courses separate from methods courses (p.46)”. They also support the development of competencies that would set the standards in determining the capability of preservice and in-service teachers especially in technology use and skills development.

This phenomenon can be observed among Swaziland preservice teachers who understood the usefulness of technology but have decided not to integrate it in their classroom. In the study by Mthethwa (2014) of preservice teachers who did not have enough background knowledge on computers, it was noted that preservice teachers decided not to use technology for the following reasons: the class size was quite large and it took time for them to get assistance from the technical experts who are not also technologically equipped; they also needed time to practice using technology and they do not have enough practice time; the Internet speed was very slow; and power outage was very frequent thus causing the disruption in the classes.

In the case of the teaching of English through literature in Turkey, Kaşlıoğlu and Ersin (2018) investigated 65 preservice teachers and delved into their beliefs which were shaped by their experiences as students and experiences as teacher trainees. Despite a two-semester course on teaching English through literature, the preservice teachers’ beliefs did not change as they still relied on their previous experiences on how English language was taught by their teachers.

Contexts are important as they spell the difference in the teacher development in teaching literacy. As Bernardo (2000) posits, “here exist differences in literacy levels that seem to be due to variations in a person's experiences in the socio-economic environment” (p.

461). He also offered that “the report also notes that what differentiates the various countries from each other in overall literacy levels is not the high scorers (i.e., adults from more privileged backgrounds attain high levels of literacy in all countries), but the low scorers” (p. 461).

## Methodology

The study determined the cognition on digital literacy of preservice teachers in two contexts: resource-rich and resource-limited contexts using Q sorting, a unique method of using both qualitative and quantitative methodologies (Coogan & Harrington, 2011; De Guzman, et. al. 2012; Sung & Akhtar, 2017). Q methodology was developed by William Stephenson (Coogan and Harrington, 2011) for the purpose of decreasing or eliminating subjectivity by “allowing an individual to represent his or her vantage point for purposes of holding it constant for inspection and comparison (p. 24)”. Q methodology has been used in a variety of fields: Education, (Demir, 2016), Nursing (De Guzman, et.al, 2012), Pharmacy (Wastell, et. al., 2013), Engineering (Logo, 2013) and Medicine (Kibblewhite et. al., 2016). Using Q-sort as the main method, the answers were basically interview transcriptions which were translated into quantitative data.

In the initial stage, preservice teachers were interviewed to determine their viewpoints regarding digital literacy. During the interview, vignettes pertaining to situations of preservice teachers were presented to the participants. Some questions were raised regarding the vignettes. The questions for the interview were formulated based on the framework of Borg (2003), thus questions were raised regarding the preservice teachers’ experiences regarding their schooling, professional coursework, classroom practices and their contexts or backgrounds. The interviews were recorded and transcribed. After the interviews and upon review of the transcriptions, significant statements were identified. Initially, 223 statements were identified but were trimmed down to 36 statements after careful deliberation. Sample statements were as follows:

1. Teaching literacy is a responsibility for all teachers and not only for the language teachers.
2. Digital literacy only involves reading and writing using the computer and smart phones and the internet.
3. One is digitally literate when one demonstrates the ability to search on the internet, to encode information or any type of data, to make PowerPoint presentation, print and to open and close the computer.
4. Instead of reading books, you now research on the internet for it is easier and faster than going to the library and read books.
5. Access to information is easier now with technology but the validity of the information is harder to establish.

After arriving at 36 statements, the preservice students were invited again to sort out the statements following the Q-sort grid. The statements were already identified based on the three dimensions developed by the researchers: Portrait of Support, Portrait of Balance and Portrait of Responsibility. Based on the sorting of students, their answers were analyzed using the PQ Method maintained by Peter Schmolck, based on FORTRAN code by John Atkinson at Kent State University (Schmolck, 2023). The software can be accessed in Windows.

**Locus**

The study was conducted in two universities in the Philippines – the resource-rich context was one of the comprehensive universities in Manila while the resource-limited context was found in a state-supported university in the north of Luzon, one of the three major islands of the Philippines.

The resource-rich context was defined based on the availability of resources and the access of students to these resources. The total population is more or less 30,000 students in one campus. It offers 63 undergraduate programs and 64 graduate programs.

The other resource-limited context is located in the north of Luzon where preservice students were enrolled in a satellite campus. The campus is one of the eight campuses of the system. During the conduct of the study, the satellite campus has about 1,500 total population offering six programs and with 360 teacher education students from its three programs.

**Results**

Forty preservice teachers, 20 from the resource-rich context and 20 from the limited-resource context, were invited to participate in the study. They were interviewed and based on the interviews, forty significant statements were determined and statements which were deemed to show same impression were grouped together to form dimensions. Out of the 40 statements, 3 themes or dimensions were identified: Portrait of Balance, Portrait of Support and Portrait of Responsibility. Table 1 provides the statements and their dimension.

<b>DIMENSION</b>	<b>STATEMENTS</b>
R	Teaching literacy is a responsibility for all teachers and not only for the language teachers.
R	Digital literacy only involves reading and writing using the computer and smart phones and the internet.
R	One is digitally literate when one demonstrates the ability to search on the internet, to encode, to make PowerPoint presentation, print and to open and close the computer.
S	Instead of reading books, you now research in the internet for it is easier and faster than going to the library and read books.
S	I prefer traditional materials because they are what we only have in school and at home.
S	I watch more YouTube and online videos rather than read the newspaper.
B	It's okay if there is no power and no internet connection because our family is not used to it.
B	Some of my classmates hardly know how to use digital tools and some of them are having a hard time in creating their PowerPoint presentations.
B	Technology is a good thing in education but it is a bad thing when it is used for spreading lies like social media.

**Table 1: Sample statements assigned to dimensions from student teachers (R – portrait of responsibility, S – portrait of support and B – portrait of balance)**

**Portrait of Balance**

Portrait of Balance indicated the viewpoint supporting the concept that as a student and a teacher, one can adjust to the availability or non-availability of technology. One can easily adjust to tasks, activities and assignments that need to be accomplished with or without the use of digital tools. This group can adapt to contexts that may or may not use technology as long as the goals of the activity or the experience have been met: “It does not matter



whether my teachers in the University use technology in teaching as long as they can deliver the lesson/topic effectively.” Furthermore, they also recognize that one’s experiences in technology may vary and that they can be found at various points in a continuum, and they recognize that there is such an instability as a group in the use of technology: “Some of my classmates hardly know how to use digital tools and some of them are having a hard time in creating their PowerPoint presentations.”

### **Portrait of Support**

As one navigates in the university as a student or teacher, support systems are in place. These various types of support may include concrete forms such as books, libraries, computer terminals, classrooms, Internet or Wi-Fi, peers, administrators, community members and the family. It may also be abstract such as knowledge and skills gathered from school experiences or family activities. This particular dimension refers to all kinds of support perceived and received by the preservice students: “I have computer subjects from elementary to high school and I have Ed-tech courses in college, and they have shaped my digital literacy.” This support may also be readily available and pre-service students need not necessarily seek for it as identified in one of the statements: “Instead of reading books, you now research in the internet for it is easier and faster than going to the library and read books.” This portrait, however, does not merely concentrate on the availability of the support but may also refer to the lack of it: “One of the realizations I have is that we don’t have enough Filipino resources in the Internet.”

### **Portrait of Responsibility**

This portrait refers to the deemed concerns or obligations of the preservice teachers. The responsibilities may fall into the different roles they fulfill: one as a student, one as a teacher, one as a family member and another as a community member. As a teacher for example, they may consider digital literacy as an important consideration in their teaching: “I use digital tools more as a teacher than as a student because I spend more time preparing for teaching.” It also gives an indication of their preferences as students concerning instruction: “I want my teachers to use more of the digital tools because we are now in the modern world, and we need to be updated with the latest digital tools.” This portrait encompasses not just the persona of the pre-service teacher as a student or teacher but as a young adult as well, involved in social media: “I spend more time using the cellphone and the internet as a student due to Facebook and selfies and in encoding my lesson plan and preparing my instructional materials and many more.”

### **Preservice Teachers and the Dimensions**

Forty preservice teachers participated in the study. Half of the participants came from resource-limited context and half came from resource-rich context. As gleaned from Table 2, majority of the participants belong to the Portrait of Balance with 15 pre-service teachers in the category. This number is followed by the Portrait of Support at 12 and Portrait of Responsibility at 11. There were two preservice teachers who did not significantly identify with any of the identified dimensions.

<i>Respondents</i>	<i>Portrait of Support</i>	<i>Portrait of Balance</i>	<i>Portrait of Responsibility</i>
PSTR1	0.2157	0.2526	0.6342X
PSTR2	0.3208	0.1031	0.7430X
PSTR3	0.4797	0.0854	0.6132X
PSTR4	0.2538	0.2079	0.4927X
PSTR5	0.3594X	0.1647	0.1938
PSTR6	0.5727X	0.1002	0.2938
PSTR7	0.6532X	-0.0614	0.1679
PSTR8	0.4069	0.2768	0.5595X
PSTR9	0.4265X	0.1715	0.0509
PSTR10	0.1465	0.2807	0.2712
PSTR11	0.3939X	0.0725	0.0791
PSTR12	0.722X	0.0987	0.1371
PSTR13	0.3225	0.2837	0.4853X
PSTR14	0.7571X	0.2979	0.0294
PSTR15	0.5943X	-0.0803	0.3916
PSTR16	0.2192	-0.0555	0.5790X
PSTR17	0.5627X	-0.2963	0.4682
PSTR18	0.5445X	0.0003	0.2022
PSTR19	0.3913	0.4408	0.3560
PSTR20	0.2060	-0.1043	0.4782X
SUBTOTAL	10	0	8
<i>Respondents</i>	<i>Portrait of Support</i>	<i>Portrait of Balance</i>	<i>Portrait of Responsibility</i>
PSTL1	-0.0301	0.6306X	0.0730
PSTL2	0.0263	0.3522X	0.0838
PSTL3	-0.2376	0.6255X	0.0836
PSTL4	0.3644	0.6062X	0.3292
PSTL5	0.2816	0.5428X	0.0815
PSTL6	-0.1657	0.2605	0.6532X
PSTL7	-0.1176	0.4016X	0.2156
PSTL8	0.3151	0.7210X	-0.2328
PSTL9	0.3599	0.5631X	0.3913
PSTL10	-0.0105	0.4416X	0.3862
PSTL11	-0.0236	0.5013	0.5707X
PSTL12	0.4839X	0.3885	0.2523
PSTL13	-0.0251	0.1329	0.3805X
PSTL14	0.1012	0.4079X	0.2979
PSTL15	0.3651	0.4024X	0.0812
PSTL16	0.5149X	0.2269	-0.0945
PSTL17	0.1841	0.4506X	0.0095
PSTL18	0.2527	0.4746X	0.2099
PSTL19	0.4285	0.5768X	-0.2514
PSTL20	0.2803	0.5326X	0.4032
SUBTOTAL	2	15	3
TOTAL	12	15	11

\*PSTR (Preservice teacher in resource-rich context) and PSTL (Preservice teacher in limited-resource Context)

**Table 2: Factor matrix of preservice teachers per dimension (highlighted values with x pertains to the highest value indicating that respondent surfaces characteristics under that dimension)**

As indicated too by Table 2, the 15 preservice teachers from the limited-resource context acknowledged the Portrait of Balance compared to the 10 preservice teachers in the resource-rich context who seemingly identified more the Portrait of Support. The groupings were based on the result of the Q-sort.

## Discussion

The interviews pointed to three dimensions: Portrait of Support, Portrait of Balance, and Portrait of Responsibility. These dimensions offered the cognitions of the preservice teachers regarding digital literacy as well as demonstrated the identified factors of Simon Borg (2003). As indicated by the answers of the preservice teachers, their experiences at home, in school and in the classroom as teachers shaped their views regarding digital literacy.

Cognition about digital literacy in the framework of Miller and McKenna (2016) included proficiency, access, alternatives and culture and the results showed that pre-service teachers look at digital literacy beyond the confines of reading and writing thus is understood that literacy has developed an extensive range. Though preservice teachers agree that digital literacy needs to include the use and access to technology, the application of technology to their daily tasks and the effective use of this technology will define their digital literacy. They know that technology is pervasive in their lives as students, as teachers and as members of the family and the community but they also identify that their access to the technological resources may be limited, especially for preservice teachers from the limited-resource context. This, however, was not detrimental in gaining digitization as expressed by the participants. The Portrait of Balance, which was the dimension found by most of the preservice teachers from the limited-resource context expressed this sentiment. Bernardo (2000) supported this results that the socio-economic development of persons affected their views in learning.

Interestingly, the Portrait of Balance was not found at all among the preservice teachers in the resource-rich context. The absence of this portrait signifies that teacher trainees in this context are comfortably immersed in technology or have sufficient access to it thus their attention is focused elsewhere beyond access. These respondents leaned towards the Portrait of Support or Portrait of Responsibility whose concentration focused more on the availability or absence as well as functionality of the resources, whether human or material.

In terms of responsibility, the preservice teacher respondents (PSTRs) believe that there are times their students seem to know more because their access to information are made available by technology:

*“There are times when you find their (students) questions interesting. It makes you realize that their generation seems to be far different from our generation now. We were not like that in high school. I want to capitalize on that, especially now that they have more access.” (PSTR2)*

*“In my teaching, students find the PowerPoint with videos engaging...they find the pictures interesting especially when it starts to move”. (PSTR6)*

Some preservice teachers lament, however, that some resources, especially those that make use of the first language (L1) or mother tongue, are not readily available on the Internet. Teachers who are teaching using the first language, Filipino, expressed their dismay at this absence of support. With the emergence of online learning in the time of the pandemic and the surge of materials using various platforms, hopefully, the use of mother tongue would become popular.

*“One of the realizations I had is that we don't have enough Filipino resources on the Internet.” (PSTR16)*

Majority (75%) of the preservice teachers from the limited resource context demonstrated a Portrait of Balance. This means that preservice teachers can cope with their needs to be digitally literate as students and as teachers notwithstanding the limited resources provided by their school, families, or communities.

The Portrait of Balance is found in most of the interview responses where they say they prefer the use of both digital technology and traditional materials if they were to teach the courses they have in college:

*“By using the printed materials and digital depending on the situation. If you teach only the steps, you can just write the steps using visual aids but for the subject automotive, you can use video because it is hard to explain the parts if there are no real objects.” (PSTL11)*

When asked about their preference as tools – using traditional materials or using digital tools - most preferred the use of digital over traditional in teaching:

*“I prefer to use the digital tools because we are born in the modern period and learners like to use technology.” (PSTL14)*

*“For me, digital tools because it is now easy for me to make presentations.” (PSTL3)*

When their interest in or need to use digital technology is compromised by the absence of state-of-the-art gadgets and access to internet connections, the preservice teachers are still able to cope in their limited resource environment:

*“I will go to the library and read books to access information.” (PSTL 5)*

*“It’s okay because dati naman ma’am mas maraming natututunan sa mga books (...in the past, there were many information learned from the books).” (PSTL 17)*

*“I will feel ignorant but I will read books to be able to make my lessons.” (PSTL11)*

The view that learning and teaching can take place despite the limitation of technology contradicts the study of Durriyah and Zuhdi (2018) where university students find the limitation of the Internet access within the campus affecting the studies. Preservice students coming from the resource-limited context coped with the resources they have thus the limitations set by their environment or immediate human circles have not hampered their responsibilities as children, students, or teachers. This viewpoint would be helpful in creating professional teachers who could easily adapt to situations, utilizing resources that are available within the contexts.

Regardless of contexts, resource-rich or limited-resource, preservice teachers readily contribute that by and large, their experiences as students have readily shaped their views and practices as teachers. This supported Borg’s cognition theory (2003) and Kaşlıoğlu and Ershin’s findings (2018) that students’ experiences will have impact on their teaching practices.

*“I think my teachers tend to provide instruction with limited or without the use of technology because that was how it was during their time. They just brought along their experiences as students to their practice now as teachers. I think this is also how I am going to be.” (PSTR16)*

*“It is not about the digital technology or traditional tools they use but, on the strategies, and knowledge they inculcate” (PSTL13)*

*“The material you use is not a big matter as long as your students understand you.” (PSTL 9)*

## Conclusion

Preservice teachers' cognitions are very important as they provide insights into the directions of their professional practice. As indicated in the study, the digital literacy cognitions of preservice teachers were shaped by their experiences which are concentrated mostly on their practices as students. Inadvertently, these experiences impacted on the strategies, classroom management, and use of resources, particularly, digital resources of the preservice teachers. In-service training, which provides support to the development of professional teachers, will have to consider the cognitions of teachers as there is great need to bridge the existing classroom practices and learners' needs.

Besides looking into the in-service trainings, further studies should consider the cognitions of professional teachers and identify possible strengths and weaknesses. Despite the continuing trainings with technology for teachers, educators and researchers should also consider the impact of technology on learning. These trainings should not just focus on the integration of technology, but also on choosing the appropriate tools for students and not necessarily adopting technology and its full potential. This is true as potential teachers are coming from various experiences and part of these experiences is growing up in a context that is not necessarily immersed in digital technology.

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