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Digital capital and belonging in universities: quantifying social inequalities in the Philippines

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This study examines social inequalities in Philippine universities that were exacerbated during the COVID-19 pandemic. A quantitative approach using a national sample of 677 university students was utilized to measure the mediating role of digital capital on social inequalities associated with belonging to academic spaces . For the purpose of determining direct and indirect impacts, structural equation modeling (SEM) was employed. Sociodemographic (i.e., gender, age, type of residence, and family income) and educational (i.e., type of university, year in the university, and excellence criterion) characteristics were the direct predictors that were examined as exogenous variables for both digital capital and belonging. Results indicate that type of residence (β=0.200, p<0.05), family income (β=0.220, p<0.001), and excellence criterion (β=0.271, p<0.01) are major determinants of digital capital. The model also shows that belonging is significantly predicted by age (β=0.087, p<0.05), family income (β=−0.207, p<0.001), and digital capital (β=0.576, p<0.001). Lastly, the findings reveal that the impacts of type of residence (β=0.116, p<0.05), family income (β=0.127, p<0.001), and excellence criterion (β=0.156, p<0.001) on belonging are successfully mediated by digital capital. These results suggest that there are indeed differences in students' abilities to accumulate digital capital and that digital capital enhances the sense of belonging to and together in academic spaces for certain groups.

KEYWORDS

digital capital, belonging, social inequalities, universities, Philippines, digital divide, higher education

1. Introduction

As educational institutions transitioned to online distance learning amid the COVID-19 pandemic, students in the Philippines became increasingly familiar with the strain of acquiring quick and reliable internet connections and other digital technologies. The country's poor high-speed internet penetration, which lags behind neighboring middle-income countries, has been identified as a major barrier to the digitization of educational processes (World Bank, 2020). In addition, millions of households—nearly 60% of all households—are without effective internet connectivity, preventing them from taking advantage of digitalization (PH Digital Justice Initiative, 2021). Thus, students may not have access to the necessary technologies during this pandemic to succeed in online learning (Ratledge et al., 2020). Indeed, in a nation of 108 million people where less than 5% of homes have internet connection and many lacking in digital technologies, the transition to online classrooms and self-learning modules has proven to be quite difficult (World Bank, 2020).

This digital divide in the country has foregrounded the shift to online learning which called for prompt action for inclusivity among higher educational institutions amid students' varying access to and competencies in digital technologies. Sociological studies have focused on various social inequalities connected to digital technologies (Seale, 2012; Park, 2017; Ragnedda et al., 2020; Ragnedda and Ruiu, 2020). Researchers, in particular, have identified the need to conceptualize a distinct form of capital, namely digital capital, to better understand the digital divide in the academic setting (Park, 2017; Ragnedda, 2018).

Digital capital, as defined by Ragnedda (2018), is a "set of internalized ability and aptitude" as well as "externalized resources that can historically be accumulated and transferred" (p. 2). It involves the development of digital skills, including communication, problem-solving, information retention, and content creation through computers and other technological devices (Park, 2017; Ragnedda, 2018). This particular type of capital considers how much and competently people use digital technologies (Ragnedda and Ruiu, 2020) and refers to how competencies and the materiality of digital technologies could be advantageous and beneficial in an individual's social standing (Seale, 2012). Hence, it denotes the social positions of people based on their digital competencies and usages.

This distinct form of capital related to digital technology usage and capacities is usually associated with the youth. The youth are adept at using digital tools and engaging in online exchanges in routine social interactions (Kennedy et al., 2008; Nagler and Ebner, 2009; Margaryan et al., 2011). Furthermore, the youth, particularly university students, are viewed as "digital natives" (Seale, 2012). In the context of the Philippines, social media and digital technologies are widely embraced by Filipino students among whom a sizable fraction owns a mobile phone and uses the internet (Cruz, 2014; Velasco, 2020).

Students navigate social inclusion and exclusion processes in university settings continuously. Among the mediums of such navigations are digital technologies in preparation for "real life," as presented by neoliberal prose in educational institutions. According to Burawoy (2007), the contemporary neoliberal economy has resulted in increased forms of social exclusion and the reproduction of inequalities in the navigation toward inclusion. In the case of the university, students must navigate changing social and cultural practices to belong (Thomas, 2002; Zepke et al., 2006). The notion of institutional habitus also helps explain this reality (Berger, 2000; Thomas, 2002; Reay et al., 2005; Zepke et al., 2006). The institutional habitus describes how an organization mediates the impact of one's group on a specific behavior (Thomas, 2002). Students who exhibit routinized institutional behavior while explicitly using digital technologies find it easier to fit in and have a sense of belonging (Berger, 2000). To feel a sense of belonging to a specific group, one must develop a sense of commonality usually expressed as a shared identity; a sense of mutuality often conveyed as reciprocity and social allegiance; and finally, a sense of attachments expressed as emotional investments and strong group connections (Pfaff-Czarnecka, 2011). Commonality, mutuality, and attachments are the three dimensions of belonging. With human sociability anchored on connectedness, affinities, and attachments, belonging and non-belonging in contemporary universities are inevitably mediated by one's possession of digital capital. The putative coupling of belonging with digital capital has varied implications on students' university life, from being a part of groups and organizations to having interactions with peers and instructors to the (non)completion of a degree program.

However, due to the dearth of theoretical frameworks for understanding digital capital, its relationship with belonging still needs to be fully understood (Seale, 2012). Additionally, there is a need for more research and literature that specifically measure this form of capital. For example, Ragnedda et al. (2020) claim that no researcher in the field has made an effort to offer a specific conceptualization and an empirical assessment of digital capital. The COVID-19 pandemic and global South conditions are two additional dimensions to the study of digital capital in Philippine higher educational institutions. By presenting a model for comprehending digital capital and how it relates to belonging and social inequality in university spaces, this article is a contribution to closing this knowledge gap.

2. Conceptualizing digital capital and belonging

Following Ragnedda (2018), our concept of digital capital describes it as a collection of internalized skills and externalized digital assets that have been acquired over time and are useful in a variety of contexts. Digital capital has at least two sets of indicators: digital access and digital competence (Ragnedda and Ruiu, 2019).

The conceptualization of digital capital can be traced back to the works of Marx (1967) and Bourdieu (1986). Capital, in general, is defined by Marxists as the accumulation of assets that can be used as a resource by an individual to perform economic work. According to Marxian economics, capital is the financial assets or money used to purchase a specific material to resell it for a profit (Marx, 1967). In addition to Marxian economics, capital accumulation is viewed as an investment into the economic system that increases the total quantity of capital. As a result, capital is, by its very nature, dynamic, which tends to increase in value. This idea is typically represented through the example of money becoming profitable through effort (Marx, 1967). Individuals can also employ capital to acquire surplus or additional value.

Bourdieu's ideas of cultural and social capital strongly influence our concept of digital capital (Bourdieu, 1986). On the one hand, cultural capital refers to symbolic meanings that signal social standing. Cultural capital can take the shape of embodied, objectified, or institutionalized states, according to Bourdieu (1986). Individuals' preferences, talents, values, and knowledge are among these states (Bourdieu, 1986). Thus, cultural capital is regarded as a crucial tool utilized by people to maintain their social standing and uphold their social positions in society. Additionally, this resource represents the concept of a "field," a social setting in which people compete for symbolic dominance and social positions.

On the other hand, social capital consists of social networks formed as a resource with expected returns. Furthermore, social capital comprises physical or virtual networks, and ties people have (Seale, 2012). Having social networks and connections in social capital can facilitate the flow of information, providing a person with vital information about potential opportunities. Furthermore, these social ties may influence organizational personalities such as recruiters and supervisors. Individuals can benefit economically from social relationships in this way. Overall, cultural and social capital will benefit individuals (Bourdieu, 1986). Hence, in this study, digital capital is viewed as a distinct form of capital even if, at its root, it is determined by economic capital much like how the accumulation of

cultural capital and social capital are influenced by one's possession of economic capital.

In sociological analyses, capital accumulation can be examined as a social practice. Reckwitz (2002) defines a practice as "habitual or routineized behavior in everyday life." Practices are made up of many interconnected and linked elements. According to Schatzki (1996), practices are coordinated entities, and performances are written and performed doings and sayings. Furthermore, these routine behaviors can only be studied in a practical context or field (Schatzki, 1996). Warde (2005) and Shove and Pantzar (2005) conceptualize practices by drawing on the work of Schatzki (1996) and Reckwitz (2002). Warde (2005) defines practices as procedures, comprehensions, engagements, and consumption items. In their study on the practice of Nordic Walking, Shove and Pantzar (2005) presented practice as a combination of materials (things), skill (competence), and image (symbolic meanings) as elements.

A practice approach to digital capital sees the accumulation of digital capital among university students as 'doings' and 'sayings' that have three components. These three components are access to digital resources (Reckwitz, 2002; Shove and Pantzar, 2005; Warde, 2005; Ragnedda and Ruiu, 2019), which describes the material conditions, infrastructures, and physical objects such as digital technologies (Reckwitz, 2002; Shove and Pantzar, 2005; Ragnedda and Ruiu, 2019); digital skills which pertain to how students have acquired and use their digital capabilities and aptitude, as well as digital understandings (Schatzki, 1996; Reckwitz, 2002; Warde, 2005) which speaks of the actualization of the connotations associated with digital technologies. The third element are the norms and institutions that support or not support the accumulation of digital capital among university students (Shove and Pantzar, 2005).

An emphasis on practices is useful in digital divide-level analyses. The digital divide, in essence, is a socioeconomic issue related to the growth in information and communications technologies (ICTs), specifically internet usage among individuals (Tsiavos et al., 2001). Earlier scholars defined the digital divide as the division between people who have access to ICTs and those who do not (Katz and Aspden, 1997; Hoffman and Novak, 1999). This idea of the digital divide resonates with the ideas of Marx (1967) on how access and ownership to various materials and resources are the basis of prevailing social inequalities.

Different factors influence the discrepancies in accumulating various elements of digital capital. Inequalities are presumed to be shaped by sociodemographic characteristics such as gender (Hargittai, 2002; Blank and Groselj, 2014), age (Kennedy et al., 2008), type of residence (Ragnedda et al., 2020), and family income (Kennedy et al., 2008; Seale, 2012). Inequalities in gender in research are manifested mediates the increased participation through the gap between sexes in accessing the internet (Blank and Groselj, 2014) and the intensity of internet usage (Hargittai, 2002). According to Goulding and Spacey (2002), men have historically been perceived to have greater internet knowledge and usage than women. This assumption stems from the notion that men were the first to employ these technologies, as opposed to women. This idea is supported by Sutton's (1991) study, which found that historical data revealed male dominance in educational technology. In terms of age, Kennedy et al. (2008) mentioned younger individuals were more seen as "digital natives" than elderly individuals, who are coined to be "digital immigrants." The type of residence also plays a critical role in digital capital. Urban dwellers tend to have more digital capital than rural settings (Ragnedda et al., 2020). Lastly, individuals who belong to higher economic groups are more likely to have more digital capital. According to van Deursen and van Dijk (2019), individuals in the higher financial group tend to have multiple access to digital technologies. Also of interest to this study is the presumed influence of educational characteristics on digital capital. Students from prestigious schools (Andersson and Grönlund, 2009), higher educational levels (Goldin and Katz, 2009), students with academic awards who perform better in schools (Selwyn, 2008) tend to have more digital capital. With these previous understandings of digital capital, this study hypothesizes:

> *H1*: Sociodemographic characteristics such as gender, age, type of residence, and family income influence digital capital accumulation.
>
> *H2*: Educational characteristics such as type of university, year in the university, and excellence criterion influence digital capital accumulation.

Both Marx (1967) and Bourdieu (1986) establish that accumulating capital can be beneficial for a person to acquire various returns. For them, capital accumulation can have a significant influence on the increase of one's social standing and possible positive life chances. Relating both ideas to this study, the returns of digital capital include potential opportunities in the life of an individual.

Conceptualizing the returns of digital capital accumulation in the context of students, this study hypothesizes that belonging can be a product of this distinct form of capital. The concept of belonging focuses on inclusion and exclusion in a specific social group. It relates to legal membership (Sicakkan and Lithman, 2005; Krzyżanowski and Wodak, 2008) and identity politics (Yuval-Davis et al., 2005). Furthermore, to feel a sense of belonging to a specific group, one must share the social organization's values, networks, and practices (Pfaff-Czarnecka, 2011).

Pfaff-Czarnecka's (2013) definition of belonging will be used in this study. Pfaff-Czarnecka (2013) defines belonging as "an emotionally charged, ever-dynamic social location" (p. 13). Furthermore, there are three dimensions to belonging: commonality, mutuality, and attachments (Pfaff-Czarnecka, 2013). According to the dimension of commonality, members who "belong" to a specific group express a shared identity. This dimension recognizes the concept and identification of in-group and out-group members. The second dimension, mutuality, investigates individuals' social allegiance. Members' sense of belonging is enhanced by reciprocal interaction. Mutuality in this dimension is based on member participation and engagement. Finally, attachments allow for emotional investments and strong group connections. This is when members are enthusiastic about participating in bonding activities and social interactions.

In belonging to and together in universities, the utilization of digital technology among educational institutions is perceived as an opportunity for social inclusion in the school setting (Andersson and Grönlund, 2009; Bolu and Egbo, 2014). However, it also led to disparities among students regarding capacity and access to these digital technologies. Hence, this negatively affects their belonging (Buzzard et al., 2011).

Various works of literature have documented inequalities among social groups as they navigate toward belonging in and together in the university setting. Based on socio-demographic characteristics,

women (Good et al., 2012), low-income families (Reay et al., 2005), racial minorities, and students from the provinces (Walton and Cohen, 2007) tend to be excluded due to stereotypes. Concerning educational characteristics, freshmen (Junco, 2015), non-elite schools or universities, and students with no academic awards (Goodenow and Grady, 1993) tend to be excluded due to low academic motivation and performance levels. With these findings on belonging, this study also hypothesizes:

> *H3*: Sociodemographic characteristics such as gender, age, type of residence, and family income influence belonging among students.

> *H4*: Educational characteristics such as type of university, year in the university, and excellence criterion influence belonging among students.

In the pandemic context, there is also a shift of unsuccessful navigations among students. According to Mooney and Becker (2021), there is an intersectionality between gender and race regarding their sense of belonging in the middle of the pandemic. The study found that COVID-19 had a more significant impact on students' sense of belonging in a matter of months than the authors had seen in the preceding 2 years. Furthermore, in terms of intersectionality, male and female students who do not identify as members of any minority appear to have seen similar decreases in their sense of belonging (Mooney and Becker, 2021). As a result of the pandemic, other groups of individuals are also having difficulty navigating.

Thus, digital capital influences students' (un)successful navigation of university life. This is because of the idea that the use of digital technologies mediates the increased participation and engagement of university students (Timmis and Muñoz-Chereau, 2022). However, the role of digital capital in either exacerbating or mitigating social inequalities is yet to be fully understood. Hence, this study hypothesizes:

> *H5*: Digital capital mediates the influence of sociodemographic and educational characteristics on belonging.

All in all, this study hypothesizes how sociodemographic (i.e., gender, age, type of residence, and family income) and educational (i.e., type of university, year in the university, and excellence criterion) characteristics predict digital capital and belonging. Also, this study hypothesizes that digital capital mediates the effects of sociodemographic and educational characteristics on belonging. These hypotheses are illustrated in Figure 1.

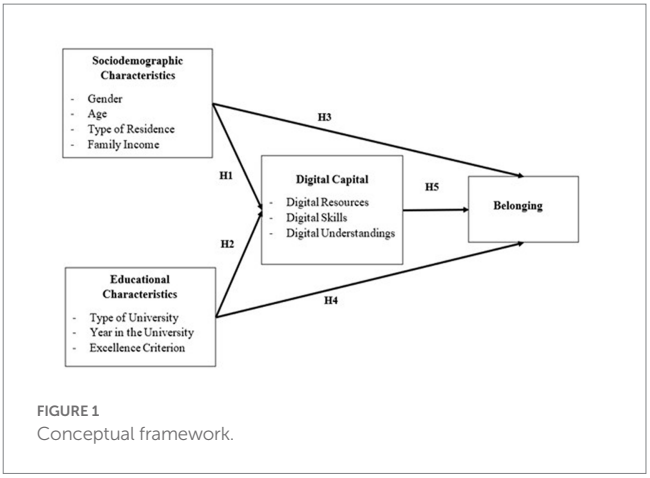

FIGURE 1
Conceptual framework.

3. Quantifying the relationship between digital capital and belonging to the university

This study used a quantitative approach to sampling and data analysis of online learning situations in Philippine universities in the pandemic context. Specifically, it employs a cross-sectional survey design, an approach that analyzes a specific population of interest at a single point (Setia, 2016). Moreover, a cross-sectional survey design describes and makes inferences about a population based on the phenomenon being studied. To do this, quantitative data on the trends or levels of the interrelationships among digital capital, sociodemographic and educational characteristics, and sense of belonging were collected and analyzed.

As to the characteristics of the study population, there is evidence that the Filipino youth frequently embed digital technologies in everyday life (see Cruz, 2014; Velasco, 2020). As digital natives, university students heavily rely on digital technologies in the pedagogical practices of classroom settings (Ilomäki and Lakkala, 2018). Moreover, students in the pandemic context are called remote learners since the protocol in educational institutions shifted to online distance learning (Contreras, 2020; Villarin, 2020). Data from the Commission of Higher Education (2020) indicate that there are 2,396 higher education institutions (including satellite campuses) and 3,048,318 students enrolled in universities in the country during that period. Slovin's Formula was used to calculate an appropriate sample size based on the population size. Using a 5% margin of error and 95% confidence level, the study's sample size was calculated to be a minimum of 385 university students around the country. The period of data collection was from May to August 2022 Data was collected through online survey forms. Enumerators asked students through online spaces due to the COVID-19 situation. Nevertheless, due to accessibility, the research went beyond the minimum sample size to generalize the national population of students.

The sample was identified using a quota sampling technique combined with snowballing. According to Etikan et al. (2016), quota sampling enables the researcher to divide conveniently and proportionately the target population into different categories. Moreover, this technique intends to attain the best representation among different groups in the final sample (Etikan et al., 2016). This study also combines quota sampling with snowballing. The snowball technique enables the researcher to recruit participants through the networks of other participants. However, the recruited participants should have experienced using learning management systems in educational processes and instruction during the pandemic. In this study, the sample is divided into controls such as gender, age, type of residence, family income, type of university, educational level, and excellence criterion.

In total, this survey examined 677 Philippine university students (see Table 1). The majority of the respondents were females (f = 432, 64%), on average 21 years old, from rural communities (f = 498, 73.6%), with a household income of less than Php 9,520 (f = 240, 35.5%), attending public universities (f = 383, 56.6%), on their second year of college (f = 407, 60.1%), and are not part of the honor roll (f = 407, 60.1%).

TABLE 1 Profile of respondents, n=677.

Variable	Categories	*f*	%	Mean	SD
Gender	Male	198	29.2	–	–
	Female	432	63.8	–	–
	Non-binary	47	6.9	–	–
Age		–	–	20.65	2.48
Type of residence	Urban	179	26.4	–	–
	Rural	498	73.6	–	–
Family income	Less than PHP 9,520	240	35.5	–	–
	Between PHP 9,520 to PHP 19,040	159	23.5	–	–
	Between PHP 19, 040 to PHP 38,080	108	16.0	–	–
	Between PHP 38,080 to PHP 66,640	74	10.9	–	–
	Between PHP 66,640 to PHP 114,249	45	6.6	–	–
	Between PHP 114,249 to PHP 190,400	25	3.7	–	–
	At least PHP 190,400	26	3.8	–	–
Type of university	Private	294	43.4	–	–
	Public	383	56.6	–	–
Year level		–	–	2.11	1.10
Excellence criterion	Honor	270	39.9	–	–
	Non-honor	407	60.1	–	–

This study used an online survey questionnaire as a tool for gathering quantitative data. The survey considered four main topics: sociodemographic characteristics, educational characteristics, digital capital, and belonging. Sociodemographic characteristics involve gender, age, type of residence, and family income. The set of questions about educational characteristics asked about the type of university, educational level, and excellence criterion.

Digital Capital was measured by accessing digital resources, utilizing digital skills, and acquiring digital understandings. This study adopted the measures of the Digital Access and Digital Competence Index (Ragnedda et al., 2020) and Digital Understanding Model (Doteveryone, 2018) as digital capital measures. Respondents were asked through a five-point Likert scale from 'Strongly Disagree' to 'Strongly Agree' in measuring the extent of digital materials, skills, and understanding accumulation.

Lastly, Belonging was measured following Pfaff-Czarnecka's (2011) conceptualization of belonging as commonality, mutuality, and attachments. Furthermore, this study adopted the measures of the Social Connected Scale (Lee et al., 2011) and The Challenged Sense of Belonging Scale by Fuchs et al. (2021). The latter scale was heavily influenced by the conceptualization of Pfaff-Czarnecka (2011) on Belonging. Respondents were asked through a five-point Likert scale from 'Strongly Disagree' to 'Strongly Agree' in measuring their self-assessed sense of belonging.

During data analysis, data were checked for errors, and statistical assumptions (i.e., multivariate normality, removal of outliers, and large sample size) were assessed before the data analysis. Furthermore, data were analyzed to generate different descriptive and inferential statistics using Statistical Package for Social Sciences (SPSS) and SmartPLS ver. 4. Descriptive statistics such as frequency counts and percentages to measure respondents' socio-demographic and educational characteristics as well as mean and standard deviation were used to measure digital capital and belonging. Inferential statistics, particularly bivariate analysis, were likewise employed to determine the relationship among digital capital, belonging, and social inequalities. Independent Sample T-test and Analysis of Variance (ANOVA) were utilized to determine the disparities and similarities between characteristics in digital capital, belonging, and social inequalities.

Structural equation modeling (SEM) was useful in identifying direct and indirect effects. Among the direct effects examined were those of sociodemographic variables (gender, age, type of residence, and family income) and educational characteristics (type of university, educational level, and excellence criterion) as exogenous variables on both digital capital and belonging. In addition, the study also analyzed the indirect effects of the exogenous variables through digital capital on belonging. In testing the goodness of fit in the model, SRMR (Root Mean Square Residual), D_LS (Squared Euclidean Distance) and D_G (Geodesic Distance), and NFI (Normed Fit Index) were used to assess the validity of model fitness using SmartPLS (Hair et al., 2010).

4. Measures of digital capital and belonging

Digital capital is conceptualized as accumulating internalized capacity and abilities and externalized resources related to digital technologies. In the context of the Philippines, Table 2 shows that university students tend to have high levels of digital capital (M = 3.787, SD = 0.628). This finding suggests that university students in the Philippines generally accumulated internalized competencies and utilized digital materials in different contexts.

This study further conceptualizes the accumulation of digital capital as a form of social practice that has three elements: acquiring

access to digital resources (Reckwitz, 2002; Shove and Pantzar, 2005; Warde, 2005; Ragnedda and Ruiu, 2019), which describes how people use digital technologies; utilizing digital skills (Reckwitz, 2002; Shove and Pantzar, 2005; Ragnedda and Ruiu, 2019), which describes how they acquire and use their digital competence and capabilities; and gaining digital understandings (Schatzki, 1996; Reckwitz, 2002; Warde, 2005) which discusses how the meanings attached to digital technology have been realized.

Table 2 shows that the acquisition of digital understanding has the highest average scores ($M = 4.049$, SD = 0.644), followed by the accumulation of digital skills ($M = 3.705$, SD = 0.663) and digital resources ($M = 3.606$, SD = 0.970). This suggests that university students acquire a wide range of meanings and actualizations related to digital technologies, use digital materials for various purposes, and accumulate capabilities in using different digital resources.

As a return of digital capital, belonging is viewed as a feeling of being included in social organizations, in this case, the university. Based on the results, university students tend to experience high levels of belonging to and together in the university ($M = 3.855$, SD = 0.629). This finding suggests that university students in the Philippines feel included in university processes in the pandemic context.

5. Measures of social inequalities based on socio-demographic characteristics

Based on digital divide studies, various factors influence the accumulation of different elements of digital capital. This study conceptualizes that various social inequalities are shaped by socio-demographic factors (Hargittai, 2002; Kennedy et al., 2008; Seale, 2012; Blank and Groselj, 2014; Ragnedda et al., 2020). Hence, this study hypothesizes that sociodemographic characteristics (i.e., gender, age, type of residence, and family income) influence digital capital accumulation and belonging. Table 3 presents the discrepancies in the accumulation of digital capital and belonging based on different socio-demographic characteristics.

Results suggest differences in the accumulation of digital capital based on the student's gender, type of residence, and family income. Regarding gender, there is a statistical difference between categories concerning digital capital accumulation ($F = 3.145$, $p < 0.05$). Descriptive statistics suggest that students who identify as non-binary (M = 3.99) have more digital capital than males ($M = 3.80$) and females ($M = 3.76$). This states that non-binary students tend to accumulate more digital capital compared to males and females. This is also true in digital skills ($F = 6.290$, $p < 0.01$). Students who identify as non-binary ($M = 3.94$) tend to have more digital skills accumulated during the pandemic compared to males ($M = 3.78$) and females ($M = 3.64$). This finding does not align with the initial hypothesis stating that males have more digital capital compared to other gender categories.

In terms of the type of residence, Table 3 presents that there is a significant difference between students living in urban and rural areas concerning digital capital accumulation ($t = -3.978$, $p < 0.001$). This result echoes the hypothesis stating that there are differences in the type of residence among university students. Based on the results, students living in urban communities ($M = 3.84$) tend to have more digital capital than those in rural settings ($M = 3.64$). This aligns with the assumption that urban dwelling students have more digital capital compared to rural dwelling students.

Family income is also seen as a significant factor in accumulating digital capital. Statistics show a positive and moderate correlation between family income and digital capital accumulation ($r = 0.307$, $p < 0.01$). This finding states that the higher the family income, the more the student accumulates digital capital. This result is also the same for all elements of digital capital. Among all dimensions, digital resources strongly correlate with family income ($r = 0.293$, $p < 0.01$).

Lastly, in terms of belonging, there is a discrepancy concerning the age of students. Statistics show a significant positive correlation between age and belonging ($r = 0.131$, $p < 0.01$). This finding suggests that older students tend to belong more compared to younger students.

TABLE 2 Descriptive results on digital capital and belonging.

Variable	Mean	Standard deviation	Interpretation
Digital capital	3.787	0.628	High level
Digital resource	3.606	0.970	Moderate level
Digital skills	3.705	0.663	High level
Digital understandings	4.049	0.644	High level
Belonging	3.855	0.629	High level

Low = 1.00–1.33, Moderate = 2.34–3.66, High = 3.67–5.00.

TABLE 3 Differences based on sociodemographic characteristics.

Variable	Categories	Digital capital measures			Digital capital	Belonging
		Digital resources	Digital skills	Digital understandings		
Gender	*F*-value	2.404	6.290**	0.380	3.145*	1.681
	Mean of males	3.59	3.78	4.04	3.80	3.80
	Mean of females	3.58	3.64	4.04	3.76	3.88
	Mean of non-binary	3.90	3.94	4.13	3.99	3.79
Age	Correlation coefficient	0.063	0.062	0.028	0.064	0.131**
Type of residence	*t*-value	−3.352**	−3.884***	−2.550*	−3.978***	−0.323
	Mean of rural residents	3.40	3.54	3.94	3.63	3.84
	Mean of urban residents	3.68	3.76	4.09	3.84	3.86
Family income	Correlation coefficient	0.293**	0.251**	0.199**	0.307**	−0.040

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

6. Measures of social inequalities based on educational characteristics

This study hypothesized that social inequalities are present in accumulating digital capital and belonging in the university based on educational characteristics. Studies alluded to the idea that educational characteristics are significant factors of digital capital accumulation and belonging (Selwyn, 2008; Andersson and Grönlund, 2009; Goldin and Katz, 2009; Chiang, 2015; Junco, 2015). Hence, this study hypothesizes that educational characteristics (i.e., type of university, year in the university, and excellence criterion) influence digital capital accumulation and belonging among students.

The findings suggest that there are inequalities in the accumulation of digital capital based on educational characteristics such as the type of university, year level, and excellence criterion of university students. Concerning the type of university, there are significant differences between students from public and private schools ($t = -3.733$, $p < 0.001$). Table 4 suggests that students from private universities ($M = 3.89$) tend to have more digital capital than public university students ($M = 3.71$). Also, results show that there are significant differences in the utilization of digital resources ($t = -4.143$, $p < 0.001$) and accumulation of digital skills ($t = -3.949$, $p < 0.001$) based on the type of university. Both findings suggest that students from private universities have more digital resources and skills than students from public schools.

The year level of the student also influences the accumulation of digital capital and belonging to the university. Both findings suggest that the year level of the students has a positive but very weak correlation on year level with digital capital accumulation ($r = 0.101$, $p < 0.01$) and belonging ($r = 0.105$, $p < 0.01$). Therefore, there is little to no bearing on the correlation between year level with digital capital and belonging.

Lastly, the excellence criterion of students has a significant influence on digital capital accumulation. Statistics show a significant difference between honor and non-honor students concerning the accumulation of digital capital ($t = -4.761$, $p < 0.001$). This is also true in all elements of digital capital. Furthermore, the results state that honor students have more digital capital compared to non-honor students.

7. Associating digital capital, belonging, and social inequalities

The association between digital capital, belonging, and social inequalities among university students in the Philippines during the pandemic was examined using structural equation modeling (SEM). According to Hair et al. (2010), a two-step method should be used for SEM: first, evaluate the measurement model, and then evaluate the structural model.

A factor analysis revealed that the initial measurement model offered a good fit for the data (see Table 5). Hair et al. (2010) claim that several model misspecifications can be found using the SRMR (Root Mean Square Residual), D LS (Squared Euclidean Distance), D G (Geodesic Distance), and NFI (Normed Fit Index) indices (Dijkstra and Henseler, 2015). As a result, Table 4 determined that the four-factor hypothesized measurement model was appropriate for the SEM.

The standardized factor loadings must all be significant (t-value >1.96; value >0.50) as the first requirement for convergent validity (Janssen et al., 2008). Table 6 reveals that all factor loadings for digital capital have significant t-values ($p < 0.01$), and standardized factor loadings are more than 0.60. This demonstrates strong convergence validity for digital capital.

Furthermore, CR = 0.70 or above is advised for the composite or construct reliability to be satisfactory (Nunnally and Bernstein, 1994). The composite reliability of digital capital is higher than the advised 0.70, as demonstrated in Table 5. The findings also reveal that the AVE estimate is higher than the suggested cutoff point of 0.50. (Fornell and Larcker, 1981). These findings indicate that there is good construct reliability for the measures of digital capital.

The second phase, which involved SEM, was to test the structural model after a measurement model that satisfied all requirements had been established. The structural equation model tests the hypothesized associations of digital capital, belonging, and social inequalities. The estimated coefficients of the causal links among the constructs were analyzed after the fit indices for the measurement model had been evaluated.

Table 7 presents the direct effects of sociodemographic and educational characteristics on digital capital and belonging. In terms of digital capital and its predictors, the model accounts for 10.6% of the variance in measuring the accumulation of this distinct form of capital. Furthermore, the model suggests age ($\beta = 0.200$, $p < 0.05$), family income ($\beta = 0.220$, $p < 0.001$), and Excellence Criterion ($\beta = 0.271$, $p < 0.01$) are significant predictors of digital capital. These findings suggest that older, wealthy, and honor students are more likely to accumulate digital capital based on the positive direct effects presented in the results. In terms of age, the result disagrees with the assumption that younger students have more digital capital. Nevertheless, it is seen that results on family income and excellence

TABLE 4 Differences based on educational characteristics.

Variable	Categories	Digital capital index			Digital capital	Belonging
		Digital resources	Digital skills	Digital understandings		
Type of university	t-value	−4.143***	−3.949***	−0.623	−3.733***	0.139
	Mean of public university students	3.47	3.62	4.04	3.71	3.86
	Mean of private university students	3.78	3.82	4.07	3.89	3.85
Year level	Correlation	0.059	0.112**	0.090*	0.101**	0.105**
Excellence criterion	t-value	−4.158***	−3.865**	−3.607***	−4.761***	−1.358
	Mean of non-honor students	3.48	3.63	3.98	3.69	3.82
	Mean of honor students	3.79	3.82	4.15	3.92	3.90

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

TABLE 5 Assessment of measurement model.

Fit indices	SRMR	D_LS	D_G	NFI
Values in the study	0.046	0.141	0.055	0.834
Suggested value	<0.100	>0.050	>0.050	>0.800

TABLE 6 Factor loadings, convergent validity, and reliability.

Dimensions of digital capital	Factor loading	*t*-value	Alpha	CR	AVE
Digital resources	0.747	31.977***	0.768	0.791	0.683
Digital skills	0.901	101.257***			
Digital understandings	0.825	53.608***			

***$p < 0.001$.

criterion significantly align with the hypothesis based on existing literature.

Regarding belonging, the model presents a 32% variance accounted for. The model infers that family income ($\beta = -0.207$, $p < 0.001$), and digital capital ($\beta = 0.576$, $p < 0.001$) are significant and substantial predictors of belonging. The findings suggest that less wealthy, and students with high levels of digital capital tend to belong to and together in the university during the pandemic. The results on family income significantly differ from the hypothesis stating that students from low income families tend to be more excluded. Nonetheless, it is seen that digital capital significantly increases one's sense of belonging based on the initial assumptions of the study.

Lastly, this study hypothesizes that digital capital mediates social inequalities related to belonging in the university. Table 8 presents the indirect effects of various sociodemographic and educational characteristics on belonging as mediated by digital capital. Based on the results, digital capital successfully mediates the effects of type of residence ($\beta = 0.116$, $p < 0.05$), family income ($\beta = 0.127$, $p < 0.001$), and excellence criterion ($\beta = 0.156$, $p < 0.001$). These findings suggest that digital capital increases the chances of students from urban communities, wealthy families, and the honor list to belong to and together in the university.

8. Social inequalities in universities and mediating role of digital capital: a discussion

This study hypothesizes that both sociodemographic (i.e., gender, age, type of residence, and family income) and educational (i.e., type of university, year in the university, and excellence criterion) characteristics significantly influence digital capital accumulation. Statistics show that social inequalities are present in accumulating digital capital. Findings suggest that characteristics such as gender, type of residence, family income, type of university, and excellence criterion have a significant association with digital capital accumulation.

In terms of gender, the hypothesis states that male students have more digital capital compared to other gender categories based on studies (e.g., Sutton, 1991; Goulding and Spacey, 2002). However, solely from the test of difference, results revealed that students who are part of the LGBTQ+ have more digital capital than those who fall under the traditional binary categories. This finding contradicts the initial hypothesis of this study. However, this finding aligns with a study by Adel (2021) stating that online communities among students have emerged for lesbian, gay, bisexual, transgender, and queer plus (LGBTQ+) movements, particularly during the COVID-19 pandemic. Adel (2021) also mentioned that LGBTQ+ organizations had launched social media-mediated campaigns, events, lectures, and performances for gender equality and LGBTQ+ rights, which presents the skills and capabilities of students in using digital technologies. Furthermore, a study by Cleofas et al. (2022) mentioned that youths from gender-disadvantaged groups, such as LGBTQ+, engage more actively in online spaces through various digital technologies. These studies present that students who are non-binary in gender tend to have more digital capital.

The bivariate analysis and SEM also suggest that type of residence has a significant association with digital capital accumulation. Furthermore, the results reveal an association between the type of residence and all elements of digital capital. Among all elements, the highest discrepancy between students living in urban and rural communities can be seen in the utilization of digital resources. This finding suggests that students living in urban settings tend to have more access to digital resources than students in rural areas. This result affirms the initial hypothesis stating that urban dwelling students tend to have more digital capital compared to rural dwelling students. These results parallel the findings of Ragnedda et al. (2020), stating that urban dwellers tend to have more digital capital since cities tend to have avenues for buying and using new technologies in different contexts and for various reasons such as educational purposes.

It is also presumed that students who come from higher socioeconomic backgrounds have more digital capital. The findings likewise suggest differences and predictive power of family income on digital capital accumulation stating that the higher the family income, the more the student utilizes digital technologies. Furthermore, there are also commonalities in works of literature presenting positive relationship of family income with digital capital (Mardis, 2003; van Deursen and van Dijk 2010; Ragnedda and Muschert, 2013; Ragnedda et al., 2020). These results reflect the findings of van Deursen and van Dijk (2010) wherein individuals who are seen in the higher financial categories tend to have multiple access to digital technologies. This is because these individuals have the financial resources to accumulate such distinct form of capital. In addition, according to van Deursen and van Dijk (2010), individuals in the higher financial group tend to have multiple accesses to digital technologies. This idea implies that students who belong to higher economic groups have more digital capital.

In terms of educational characteristics, the type of university was also seen to embed social inequalities associated with accumulating digital capital. Results revealed that students from private universities tend to have more digital capital than public universities. These findings align with the idea of Andersson and Grönlund (2009), suggesting that students from prestigious universities have more digital resources and skills due to the idea that these universities require the use of new technologies in educational processes as well as embedding them with pedagogical practices in the classroom (e.g., use of Learning Management Systems).

Lastly, findings highlighted that the excellence criterion has a crucial impact on digital capital accumulation. Students who are on

TABLE 7 Direct effects on digital capital and belonging.

Predictors	β	t-value	value of p	R^2	Adj. R^2
Digital capital				0.114	0.106
Gender (Male)	0.014	0.159	0.874		
Age	0.050	1.248	0.212		
Type of residence (Urban)	0.200*	2.143	0.032		
Family income	0.220***	5.810	0.000		
Type of university (Private)	0.117	1.353	0.176		
Year in the university	0.048	1.193	0.233		
Excellence criterion (Honor)	0.271**	3.477	0.001		
Belonging				0.327	0.320
Gender (Male)	−0.118	1.686	0.092		
Age	0.087*	2.385	0.017		
Type of residence (Urban)	−0.108	1.311	0.190		
Family income	−0.207***	5.609	0.000		
Type of university (Private)	0.013	0.176	0.860		
Year in the university	0.044	1.193	0.233		
Excellence criterion (Honor)	0.018	0.249	0.804		
Digital capital	0.576***	18.850	0.000		

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

TABLE 8 Indirect effects on belonging.

Indirect effects	β	t-value	value of p
Gender (male) – > digital capital – > belonging	0.008	0.159	0.874
Age – > digital capital – > belonging	0.029	1.242	0.214
Type of residence (urban) – > digital capital – > belonging	0.116*	2.120	0.034
Family income – > digital capital – > belonging	0.127***	5.347	0.000
Type of university (private) – > digital capital – > belonging	0.067	1.357	0.175
Year in the university – > digital capital – > belonging	0.028	1.187	0.235
Excellence criterion (honor) – > digital capital – > belonging	0.156**	3.377	0.001

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

the honor list tend to have more digital capital. According to Selwyn (2008), students with academic awards who perform better in schools tend to have more digital capital since these students use more digital technologies in studying, utilize digital skills to solve course-related problems, and are more aware of the negative impacts of digital technologies.

In terms of belonging, it is hypothesized that sociodemographic, and educational characteristics, and digital capital has a significant impact on the belonging of students during the pandemic. Based on the results, only family income and digital capital have substantial influence based on the results of the study. In terms of family income, students from high-income families tend to have difficulties belonging to Philippine universities. This is in contrast to the idea of Reay et al. (2005) stating that low-income families tend to have issues belonging in various settings. In the case of the results of this study, students from upper class families may have tendencies to be excluded and have difficulties in creating attachments and experiencing mutualities and commonalities since only a small portion of the population in the Philippines is part of the upper class.

Digital capital also plays an important influence on belonging. Results show that high levels of digital capital accumulation leads to better belonging to and together in the university among students. This aligns with the classical and contemporary sociological notions of Marx (1967) and Bourdieu (1986) stating that accumulating capital leads to various outcomes. Furthermore, accumulating capital can increase one's social standing and potential opportunities in the life of an individual.

Lastly, this study hypothesizes that digital capital mediates the influence of sociodemographic and educational characteristics on belonging. Statistics reveal that digital capital successfully mediates social inequalities related to belonging. Results show that students who are from urban areas, coming from higher socioeconomic backgrounds, and are considered part of the honor roll increase their belonging by accumulating digital capital despite the social inequalities present in the university context. This finding relates with Andersson and Grönlund (2009) and Bolu and Egbo (2014) stating that the utilization of digital technology in educational institutions is seen as a chance to promote social inclusion in the classroom. Additionally, this conclusion is connected to the notion that university students'

greater engagement and participation are mediated by the accumulation of digital capital (Timmis and Muñoz-Chereau, 2022).

9. Conclusion

This study measures the social inequalities in accumulating digital capital and belonging among students in Philippine universities. Based on the hypotheses, sociodemographic and educational characteristics influence digital capital accumulation and belonging among students in the pandemic context. The analysis documented differences in the accumulation of digital capital and belonging based on the sociodemographic (i.e., gender, age, type of residence, and family income) and educational (i.e., type of university, year in the university, and excellence criterion) characteristics of university students in the Philippines.

The use of structural equation model revealed that the type of residence ($\beta = 0.200$, $p < 0.05$), family income ($\beta = 0.220$, $p < 0.001$), and excellence criterion ($\beta = 0.271$, $p < 0.01$) are major determinants of digital capital. The model also shows that belonging is significantly predicted by age ($\beta = 0.087$, $p < 0.05$), family income ($\beta = -0.207$, $p < 0.001$), and digital capital ($\beta = 0.576$, $p < 0.001$). Lastly, the findings reveal that the impacts of type of residence ($\beta = 0.116$, $p < 0.05$), family income ($\beta = 0.127$, $p < 0.001$), and excellence criterion ($\beta = 0.156$, $p < 0.001$) on belonging are successfully mediated by digital capital.

These results suggest that there are indeed differences in students' abilities to accumulate digital capital and that digital capital enhances the sense of belonging to and together in academic spaces for certain groups. It is important to have a sound understanding of the inequalities among university students not only in terms of sociodemographic, economic, and educational characteristics but more importantly in their possession of digital capital and sense of belonging as it sheds light on vital aspects of university life seldom linked to educational and communication technologies.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the University Research Ethics Office Ateneo de Manila University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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