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Digital Competence and Academic Performance of First-Year College Students from a Higher Education Institution in Angeles City During the COVID-19 Pandemic

Chellsie A Dimla, Joshua P Aquino, Mariah Dominique M Dela Pena, Hanna Trixie T Galang, Genesis Marie C Miranda, James Carl A Razon and Sunshine Y Miranda*

Department of Radiologic Technology, Angeles University Foundation, Angeles City, Pampanga.

Corresponding Author: Sunshine Y. Miranda, Department of Radiologic Technology, Angeles University Foundation, Angeles City, Pampanga.

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Abstract

Due to the COVID-19 pandemic, college students in Angeles City began to practice asynchronous learning as a means of ensuring their safety since face-to-face learning was no longer advisable in A.Y. 2020-2021. They were obliged to study modules, complete assignments, and take exams using their own digital electronics. This study aimed to correlate the digital competence and the academic performance of first-year college students during the first semester of A.Y. 2020-2021 using the Digital Competence Wheel developed by Center for Digital Dannelse (2021). A quantitative approach and correlational research design were adopted for the study with a sample size of 188 first-year college students in Angeles City. Their academic performance and each area of their digital competence were described in this study. The findings revealed that there was no significant relationship between the digital competence and the academic performance of first-year students during the first semester of A.Y. 2020-2021. Because of the prevalence of online education, it's critical for students to become digitally competent in the use of technology in all aspects of their lives.

Keywords: Academic Performance, Communication, Digital Competence, Information, Production

1. Introduction

Digital Competence is a must-have and a right of citizens who wish to contribute to the society of today [1]. Regarded as one of the eight key competencies, digital competence refers to the confidence and critical application of the full range of digital advances for information, communication, and basic problem-solving in all parts of life, as stated by Akgün [2]. According to Skov there are four main areas of digital competence- Information, Communication, Production, and Safety [3]. An individual can be called digitally competent if he/she is confident in using technology for leisure and communication, and if he/she is possessing logical and critical thinking skills in solving digital problems with support from digital solutions [4,5]. The development and progression of it should start at an early age; however, the choices of the types of technologies and the amount of time spent with them must be given attention.

As today's youth is living in the Digital Era, the role of technology has become vital in education, for it is rapidly developing and advancing [6]. In the Philippines, college students are required to use their own mobile phones, laptops, or desktop computers for reading modules, submitting requirements, and taking examinations; by doing those tasks, the college students are able to enhance their digital learning skills. On the other hand, relying on the work of Ilomäki digital competence creates a much more complex understanding and usage of technology [7]. To some of the students, technology may become a hindrance as it may affect the academic performances of those who lack the skills in communicating with others online if they do not know how to access a specific application, configure settings, or back up an important file. Additionally, students may lack in creating, editing, and refining presentable PowerPoint presentations and documents that they need to submit to their professors using their school's Learning Management Systems like Canvas, Google Classroom, BlackBoard, Schoology, etc. in order to obtain an acceptable or passable grade.

There have been valuable studies concerning digital competence and teaching professionals conducted [8- 12]. However, only a few studies regarding the students' digital competence have been conducted [13-15]. With this research, the current body of knowledge is extended into determining the relationship between digital competence and academic performance of college students in the midst of the COVID-19 outbreak in the Philippines. The significant findings of a survey carried out by Calvani were- as the cognitive, critical, and logical levels of the test increase, the scores decrease: adolescents correctly answer questions about technological events that involve less challenging cognitive processes but achieve low scores when more complex conceptual aspects

are involved [16]. Poor outcomes are produced when more complicated conceptual components are included, such as those inherent in tasks such as information comparison, critical evaluation of a website's dependability, or extracting inferences from data.

Due to the COVID-19 pandemic, the first-year college students in Angeles City have begun to practice asynchronous learning to serve as an alternative method of learning for the safety of the students since face-to-face learning was no longer advisable starting from A.Y. 2020-2021. Because of the situation, the pandemic opened an opportunity to test the level of each college student's digital competence and academic performance. This study was conducted to know if there's an impact on the enhancement of online educational institutions and the student's academic performance in relation to their digital competence in new technologies and digital gadgets. Also, this was conducted to recognize the level of digital competence that might or might not have sustained the students' capability to compensate for the e-learning as part of the new normal.

1.1. Objectives

1.1.1. General Objective

This study aimed to correlate the digital competence and the academic performance of first-year college students from a higher education institution in Angeles City during the first semester of the A.Y. 2020-2021 using the Digital Competence Wheel developed by the Center for Digital Dannelse [17].

1.1.2. Specific Objectives

This study also sought to

❖ Describe the main areas of digital competence of the respondents in terms of:

• Information
• Communication
• Production and
• Safety

❖ Describe the academic performance of the respondents.

❖ Determine if there's a significant relationship between the respondents' digital competence and their academic performance.

2. Methods

2.1. Research Design and Locale

In this research study, a quantitative approach and correlational research design were used to develop the research solutions. This study sought to find the relationship between digital competence and the academic performance of first-year college students during the COVID-19 pandemic. The researchers chose the first-year college students studying at a higher education institution taking up BS Medical Technology, BS Occupational Therapy, BS Pharmacy, BS Physical Therapy, and BS Radiologic Technology from an allied medical professions department in Angeles City. They were selected due to the researchers being in the same setting, thus conducting data collection would be accomplished efficiently. As for the conduction of the study, it was done online due to the COVID-19 pandemic.

2.2. Study Participants

2.2.1. Sample Size

The population of first-year college students is six hundred and fifty-two (652). The researchers used the Raosoft sample size online calculator with a 90% confidence level and a 5% margin of error, arriving at a proposed sample size of one hundred and ninety-two (192). The data collection was done from 15 January to 16 November 2021 using the quota sampling technique. Only one hundred and eighty-eight (188) responses out of 192 were valid in the study.

COURSE	Frequency	Percentage
BS Physical Therapy	13	6.91
BS Pharmacy	15	7.98
BS Radiologic Technology	18	9.57
BS Occupational Therapy	36	19.15
BS Medical Technology	106	56.38
Total	188	100

Table 1: Distribution of Respondents

Table 1: Shows the Frequency and Percentage Distribution of Respondents per Department in the Allied Medical Professions from a Higher Education Institution in Angeles City to Summarize the Demographic Data of this Study. Among the 188 Respondents, 106 or 56.38% are bs Medical Technology; 36 or 19.15% are bs Occupational Therapy; 18 or 9.57% are bs Radiologic Technology; 15 or 7.98% are bs Pharmacy and 13 or 6.91% are Physical Therapy. The Majority of the Student-Respondents Fall on bs Medical Technology because they Occupy 406 or 62.27% of the First-Year Population while the Student-Respondents with the Least Frequency Fall on bs Physical Therapy because they Occupy 83 or 12.73% of the Population.

2.2.2. Inclusion and Exclusion Criteria Inclusion Criteria

• First-year college students
• Taking an allied medical profession course
• Studying in Angeles City

2.2.3. Exclusion Criteria

• First-year dropout students during the first semester

2.3. Research Procedure

2.3.1. Research Tool Instrument

The researchers collected the first-year college students' General Weighted Average (GWA) of the first semester A.Y. 2020-2021 and their scores (in %) from the Digital

Competence Wheel. The researchers requested for the list of names for the first semester A.Y. 2020-2021 to the College Secretary via email. Recruitment of participants was done through my Class Inbox by sending them the link for the informed consent form.

2.3.2. Research Collection Procedure

To gather the General Weighted Average of the students, a letter of request was sent to the Office of the University Registrar of a higher education institution in Angeles City endorsed by the dean of the Allied Medical Professions department. The Digital Competence Wheel developed by the Center for Digital Dannelse (2021) is an online testing tool that maps one's digital competence. The Digital Competence Wheel questionnaire for each participant was accessed by the link provided by the researchers. After answering the questionnaire, the researchers gave one email address where all results were forwarded. The data analysis started once all the said requirements have been collected online.

2.4. Ethical Considerations

The Ethics Review Committee (ERC) of a higher education institution in Angeles City has reviewed and discussed the application to conduct this study. The rights of human subjects were recognized and protected according to the National Ethical Guidelines for Health and Health-related Research prepared by the Philippine Health Research Ethics Board. To render the study ethically, the rights to confidentiality, anonymity, and informed consent were observed. E-permission to conduct the research study was obtained. The study participants each received a letter of informed consent containing the description, purpose, benefits, and risks of the proposed study before providing them the questionnaire. After collecting the survey data, anonymity and confidentiality were maintained in reporting the results of the research.

2.4.1. Informed Consent Process, Duration of Participation and Withdrawal Criteria

The researchers gave the participants informed consent forms from Google Forms that contain the description, purpose, duration of participation, confidentiality, benefits, and risks of the study. The duration of participation is 15 minutes. For withdrawal, participants had the right to withdraw from the research at any time, without loss of value.

2.4.2. Risks and Inconveniences

In line with the situation of the country, for the safety of the researchers and participants, the researchers came up with the decision of collecting the data and surveys needed for the study online. Although conducting surveys online might face struggle and inconvenience for some participants due to loss of time and unstable internet connection, and it could interrupt them in answering the questionnaire, the researchers stayed in touch with the respondents and were open to assist them if ever the stated issues occur.

2.4.3. Benefits of the Study

This study might greatly impact the enhancement of delivery of distance learning and students' utilization of technologies and digital gadgets. Considering the situation where the widespread COVID-19 pandemic is continuously growing and affecting the whole world, it would be beneficial to society as it would help them understand the status and performance of the students on how they tried their best to catch up with the lessons online. Also, the government would be able to identify the digital competence and the effectiveness of online learning for the students which could eventually influence the improvement of the educational system in the Philippines. This study may be cited and referenced by future researchers to support their study concerning digital competence and academic performance.

2.4.4. Privacy, Confidentiality and Data Management

Upon answering the survey questions, the student id of participants was kept on the document for the data analysis to avoid duplication of results. Each participant's student id, course, section, and other identifying data/information were not reported in accordance with the Data Privacy Act of 2012 upon publication. All gathered data were opened to access exclusively for the researchers and participants conducting this study. The key, linking the names and situations of the participant to the data, were kept in a google account and destroyed using appropriate data deletion and account deactivation methods after data analysis had been completed to guarantee that all personal and confidential information contained therein were permanently and securely destroyed.

2.5. Data Analysis

The researchers proceeded to data analysis wherein they studied and examined the gathered data. The software used for statistical analysis in Microsoft Excel to accurately analyze and interpret the data needed in answering the research question of the study. The data gathered was collected, collated, tabulated, and interpreted to facilitate analysis of the data and to describe the first-year college students on their Digital Competence and Academic Performance. The following statistical tools were used to quantify the obtained data:

1. Frequency and the percentage were used to determine the distribution of the respondents of first-year college students.
2. Weighted Mean was also used to determine the Digital Competence of the first-year college students. It was used in assessing the freshmen on their academic performance. Table 2 and Table 3 (see Appendix A) were used in order to determine the quantitative and qualitative responses of the respondents. The competence was based on the point percentage that the students got on their General Weighted Average.

The formula used to arrive at the weighted mean value was:

$$M = \frac{\Sigma MV}{N}$$

Where:
M = Mean
MV = Mean Value
N = Number of cases/respondents Σ = Summation

3. Pearson product-moment correlation was used to determine the significant relationship between digital competence and academic performance of first-year college students. The formula is shown below [18].

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n(\Sigma x^2) - (\Sigma x)^2][n(\Sigma y^2) -}}$$

Where:
r = Pearson Coefficient
n = total number of respondents
N = Number of cases/respondents
Σxy = sum of the products of the paired responses
Σx = sum of the x scores
Σy = sum of the y scores
Σx^2 = sum of the squared x scores
Σy^2 = sum of the squared y scores

3. Results

Indicators	Mean	Verbal Description
STORAGE OPTIONS - I understand the many advantages and limitations of different storage options	5.97	To a large extent
EVALUATE INFORMATION - I have the habit of evaluating information very critically (considering both the source and the placement)	5.97	To a large extent
AVAILABLE SELF-SERVICE - I know the most relevant digital self-service options and understand how to use them	5.81	To a large extent
BACKUP - I can make backups and restore data on all relevant digital devices (and have a habit of doing so)	5.75	To a large extent
SEARCH FILTERS - I can make good use of search filters to limit the number of search result	5.72	To a large extent
PROACTIVE SEARCH - I have a very proactive attitude towards finding and collecting information from the internet	5.72	To a large extent
SEARCH ENGINES- I understand how search engines operate, classify and display results	5.71	To a large extent
IDENTITY FOOTPRINTS - I can do an in-depth search for information and the digital footprints of me and others	5.69	To a large extent
ONLINE SELF-SERVICE SOLUTIONS - I proactively look for online self-service solutions	5.69	To a large extent
SEARCH ENGINES - I can identify the most suitable keywords that fit with the width and depth of the topic	5.59	To a large extent
NEW TECHNOLOGY - I thrive on the continuous requirement to stay up to date with new technology	5.50	To a large extent
TROUBLESHOOTING - I know how to, step-by-step, locate a problem and search for a solution	5.34	To some extent
DATABASES - I can make efficient use of databases to store large amounts of data	5.25	To some extent
Composite Mean	5.67	To a large extent

Table 4: Mean and Descriptive Ratings on the Digital Competence of First-Year College Students in Terms of Information

Table 4 Fulfills Specific Objective 1 (A) and Shows the Mean and Descriptive Rating on the Digital Competence of First-Year College Students in Terms of Information with a Verbal Description of to a Large Extent and a Composite Mean of 5.67.

The table shows the following which are ranked accordingly and. "Storage Options" and "Evaluate Information" (5.97 = to a large extent); "Available Self-Service" (5.81 = to a large extent); "Backups" (5.75 = to a large extent); "Search Filters" and "Proactive Search" (5.72 = to a large extent); "Search Engines" (5.71 = to a large extent); "Identity Footprints" and "Online Self-service Solution" (5.69 = to a large extent); "Search Engines" (5.59 = to a large extent); "New Technology" (5.50 = to a large extent); "Troubleshooting" (5.34 = to some extent) and "Databases" (5.25 = to some extent).

The "Storage Option" and "Evaluate Information" indicators with the same mean of 5.97 and with a descriptor of to a large extent expressed that the first-year college students could understand the many advantages and limitations of different storage options and had the habit of evaluating information very critically (considering both the source and the placement). The "Databases" indicator with a mean of 5.25 and with a descriptor of to some extent expressed that first-year college students had the lowest ratings in making efficient use of databases to store large amounts of data.

Indicators	Mean	Verbal Description
CHOICE OF COMMUNICATION - I have a thorough understanding of the effects of communicating through different types of media	6.10	To a large extent
TONE - I always carefully consider what the most appropriate tone is when communicating with others	6.08	To a large extent
DEMOCRATIC IMPACT - I have an in-depth understanding of how social media enable different forms of communities and democracy	6.06	To a large extent
RELEVANT NETWORKS - I am familiar with a wide range of digital communities, networks and social media	6.05	To a large extent
EMPATHY - I am good at showing empathy and creating communities with others through digital communication	5.97	To a large extent
BEHAVIOR MANAGEMENT - I have developed good strategies for handling the improper behavior of others	5.81	To a large extent
DIGITAL COORDINATION - I appreciate and enjoy the benefits of technology when coordinating with other	5.74	To a large extent
TECHNOLOGICAL SUPPORT - I have a good understanding of when technology can support a process (and when it cannot)	5.74	To a large extent
DATA SECURITY - I can encrypt, password-protect, or otherwise secure access to data when it is sent or stored	5.64	To a large extent
WRITTEN LANGUAGE - I can communicate effectively and accurately through written language	5.64	To a large extent
EVALUATION Of COMMUNICATION - I am very curious and like to experiment with new digital devices and applications	5.53	To a large extent
TERMS AND CONDITIONS - I am in the habit of familiarizing myself with the terms and conditions for using various services	5.28	To some extent
IT PATIENCE - I have a good deal of patience when trying to solve a problem	5.22	To some extent
ACTIVE PARTICIPATION - I enjoy expressing thoughts and opinions through relevant social media	4.80	To some extent
Composite Mean	5.69	To a large extent

Table 5: Mean and Descriptive Ratings on the Digital Competence of First-Year College Students in Terms of Communication

Table 5 Fulfills Specific Objective 1 (B) And Shows the Mean and Descriptive Rating on the Digital Competence of First-Year College Students in Terms of Communication with a Verbal Description of to a Large Extent and a Composite Mean of 5.69.

The table shows the following which are ranked accordingly. “Choice of Communication” (6.10 = to a large extent); “Tone” (6.08 = to a large extent); “Democratic Impact” (6.06 = to a large extent); “ Relevant Networks” (6.05 = to a large extent); “Empathy” (5.97 = to a large extent); “Behavioral Management” (5.81 = to a large extent); Digital Coordination and Technological Support (5.74 = to a large extent); “Data Security” and Written language” (5.64 = to a large extent); Evaluation of Communication (5.53 = to a large extent); “Terms and Conditions” (5.28 = to some extent); “IT Patience” (5.22 = to some extent) and “Active Participation” (4.80 = to some extent).

The “Choice of Communication” indicator is shown to have a 6.10 mean value and with a verbal description of to a large extent which denotes that first-year college students had a thorough understanding of the effects of communicating through different types of media. The “Active Participation” indicator having a 4.80 mean value with a verbal description of to some extent has the lowest mean value, showing that most of the respondents prefered to be private and had limitations in expressing their thoughts and opinions in relevant social media.

Indicators	Mean	Verbal Description
FILE FORMAT - I can choose the most appropriate format to store data	6.13	To a large extent
QUICK DIGITAL LEARNER - I can easily figure out new technologies and applications	5.93	To a large extent
MEDIA CHOICE - I am good at choosing the most suitable type of media (e.g. text, photo, video, animation, etc.) to achieve the desired result	5.88	To a large extent
DIGITAL CURIOSITY - I am very curious and like to experiment with new digital devices and applications	5.79	To a large extent
SETTINGS - I can easily edit advanced settings on digital devices, online services, and applications	5.76	To a large extent
APPLICATIONS - I am highly skilled at using applications to create relevant multimedia	5.64	To a large extent
INSTALLATION - I can install and update all relevant applications	5.63	To a large extent
DIGITAL CREATION - It excites me to create or edit digital content	5.61	To a large extent
MENTAL OVERVIEW - The connection of websites, domains, servers, and the different purposes of the content (e.g. personal, commercial, informative)	5.39	To a large extent
HARDWARE - I have an overall understanding of the components of a computer and how it is connected to other devices	5.06	To a large extent
SOFTWARE DEVELOPMENT - I have a good understanding of how applications and websites are developed and built	5.04	To a large extent
PROGRAMMING LANGUAGE - I can create content or enhance functionalities through advanced use of programming	4.27	Partially
Composite Mean	5.51	To some extent

Table 6: Mean and Descriptive Ratings on the Digital Competence of First-Year College Students in Terms of Production

Table 6 Fulfills Specific Objective 1 (C) and Shows the Mean and Descriptive Rating on the Digital Competence of First-Year College Students in Terms of Production with a Verbal Description of to a Large Extent and a Composite Mean of 5.51.

The table shows the following which are ranked accordingly. "File Format"(6.13 = to a large extent); "Quick Digital Learner" (5.93 = to a large extent); "Media Choice" (5.88 = to a large extent); "Digital Curiosity" (5.79 = to a large extent); "Settings" (5.76 = to a large extent); "Applications" (5.64 = to a large extent); "Installation" (5.63 = to a large extent); "Digital Creation" (5.61 = to a large extent); "Mental Overview" (5.39 = to some extent) "Hardware" (5.06 = to some extent); "Software Development" (5.04 = to some extent); and "Programming Language" (4.27 = partially).

The "File Format" indicator gained a mean value of 6.13 with a verbal description of to a large extent. This means that the first-year college students had adequate knowledge on how to choose an appropriate format for their data to be saved or stored with. The "Programming Language" indicator with a mean of 4.27 and with a descriptor of partially expressed that first-year college students had partial knowledge about the programming language, making it inefficient for them to create or produce such content related to programming.

Indicators	Mean	Verbal Description
PERSONAL INFORMATION - I carefully consider what personal information to share (and not share) on the web	6.26	To a large extent
INAPPROPRIATE VS ILLEGAL - I can easily differentiate between inappropriate and illegal behavior	6.22	To a large extent
SENSITIVE DATA - I can easily differentiate between personal information and sensitive data	6.17	To a large extent
CHOICE OF STORAGE - I carefully consider where and how digital content is saved and stored	6.12	To a large extent

THE EFFECTS OF ONLINE BEHAVIOR - I pay close attention to how online activities can affect the life, reputation, and career of me and others	6.06	To a large extent
COPYRIGHT - I am aware of copyright, licensing, and other regulations when downloading or publishing digital material	6.02	To a large extent
IDENTITY - I have a good understanding of how others can contribute (positively or negatively) to my digital identity	5.95	To a large extent
PHYSICAL SYMPTOMS - I pay close attention to physical symptoms that may be related to technology	5.89	To a large extent
PASSWORD - I have good strategies for creating and remembering (or saving) passwords	5.83	To a large extent
HOTKEYS - I have the ability to efficiently use advanced hotkeys for relevant applications	5.69	To a large extent
ERGONOMICS - I know the principles of an ergonomic computer station and a healthy working posture	5.65	To a large extent
LEGAL FRAMEWORK - I have extensive knowledge of the legal framework with regards to publishing, commenting, or selling online	5.46	To some extent
PHISHING - I know different methods for identifying phishing and malware (malicious programs)	5.44	To some extent
BALANCED CONSUMPTION - I pay close attention to maintaining a balanced use of technology	5.36	To some extent
SAFETY - I feel completely safe when shopping online, using online banking, or using public services that require private data	5.22	To some extent
Composite Mean	5.82	To a large extent

Table 7: Mean and Descriptive Ratings on the Digital Competence of First-Year College Students in Terms of Safety

Table 7 Fulfills Specific Objective 1 (D) and Shows the Mean and Descriptive Rating on the Digital Competence of First-Year College Students in Terms of Safety with a Verbal Description of to a Large Extent and a Composite Mean of 5.82.

The table shows the following which are ranked accordingly. "Personal Information" (6.26 = to a large extent); "Inappropriate vs Illegal" (6.22 = to a large extent); "Sensitive Data" (6.17 = to a large extent); "Choice of Storage" (6.12 = to a large extent); "The Effects of Online Behavior" (6.06 = to a large extent); "Copyright" (6.02 = to a large extent); "Identity" (5.95 = to a large extent); "Physical Symptoms" (5.89 = to large extent); "Password" (5.83 = to a large extent); "Hotkeys" (5.69 = to a large extent); "Ergonomics" (5.65 = to large extent); "Legal Framework" (5.46 = to some extent) "Phising" (5.44 = to some extent); "Balanced Consumption" (5.44 = to some extent); and "Safety" (5.22 = to some extent).

The "Personal Information" indicator is shown to have a 6.26 mean value and with a verbal description of to a large extent. The result implies that first-year college students had carefully considered what personal information to share (and what not to share) on the web. The "Safety" indicator got the lowest mean value of 5.22 because some of the respondents prefered buying or shopping things, personally. Shopping or buying items in person helped them to see the actual product they would want to buy, which made them satisfied with the product.

Main Areas	Mean	Verbal Description
Information	5.67	To a large extent
Communication	5.69	To a large extent
Production	5.51	To a large extent
Safety	5.82	To a large extent
Composite Mean	5.67	To a large extent

Table 8: Summary Table of the Overall Digital Competence of First-Year College Students

The summary table of the overall digital competence of first-year college students is shown in table 8, it gives a descriptive rating of to a large extent and a composite mean of 5.67. Safety (5.82 - to a large extent); communication (5.69 = to a large extent); information (5.67 = to a large extent); and production (5.51 = to a large extent). With the

given mean for each area, it shows that the indicators under Safety obtained the highest mean of 5.82 and the lowest mean is the Production with 5.51, but all indicators have the same verbal descriptive rating to a large extent. Some of the indicators under Safety have indeed been understood by the first-year college students. When they agreed to the "Terms and conditions" of various online services, they typically had a fair understanding of what they're getting into. They were aware of who to notify when they discovered that their account had been compromised, if they discovered that humiliating photographs of themselves were being shared without their consent, or if they encountered anything else that is really distressing. The majority of indicators under Production obtained a verbal description of to a large extent, and this area had the lowest mean value among the other areas because the majority of respondents were unable to create a personal blog or website on the internet, or unable to produce and edit their own photographs and videos.

Group	SD	Mean Score	Descriptor	r	c-value
Digital Competence	14.1866	78.4535	Very Satisfactory	0.0154	0.087
Academic Performance	5.5240	90.4911	Excellent		

Table 10: Pearson r Correlation between Digital Competence and Academic Performance of First-Year College Students

One hundred one (101) or 53.72% of first-year college students gathered a general weighted average of 87-92; 93-98 GWA (69 or 36.70%); 81-86 GWA (14 or 7.45%); 63-68 GWA (2 or 1.06%); 69-74 and 45-50 GWA has 1 or 0.53%, respectively. It means that among the 188 respondents, 101 or 53.72% of first-year college students obtained a general weighted average in the range of 87-92, having the highest frequency and percentage. It could mean that they attended online meetings regularly, they were organized when it came to keeping track of their homeworks and projects, and they found ways to improve their study habits. Meanwhile, the lowest possible frequency of 1 and percentage (0.53%) fall under the general weighted average ranging from 45-50 consisting of 1 respondent. Because he/she had a low GWA, it could mean that he/she had a difficult time taking classes of his/her choice of course. It could also imply that he/she was still adjusting or learning how to be a college student during the semester when she was too preoccupied or stressed to complete her school activities.

Table 10 above examines the significant relationship between two measurable variables. The mean of digital competence was obtained by adding up all the values (in %) that were shown in the Digital Competence Wheel developed by the Center for Digital Dannelse (2021) and then divided by the number of respondents (188) while the mean of academic performance was calculated by adding up all the general weighted average (GWA) of each respondent, divided by 188.

Digital competence has a standard deviation of 14.1866, a mean score of 78.4535, and a very satisfactory descriptor while academic performance has a standard deviation of 5.5240, a mean value of 90.4911, and an excellent descriptor. The table reveals the correlation between digital competence and the academic performance of first-year college students. Pearson r correlation was utilized to obtain the results for the fulfillment of the main objective of this study. Findings indicate that there was no significant relationship between digital competence and academic performance (r = 0.0154, cv = 0.087). This implies that a student's digital competence in their learning had no significant association with what they acquired and learned on their academic performance.

4. Discussion

The COVID-19 outbreak had prompted many colleges to switch to online programs, resulting in a slew of major issues that must be addressed [19]. Some educational institutions found it difficult to select the ideal platform for both students and teachers due to the proliferation of online learning platforms; Students perceived tests, quizzes, and assignments to be significantly more difficult than in traditional schooling as explained by Maqableh & Alia [20]. Based on the Specific Objective 1 (a), which sought to describe the main area of digital competence in terms of Information. In this area, various aspects were rated. These referred to access, search, management, etc. of information. As per the result shown in table 4, "Storage options" and "Evaluate information" indicators had the highest mean value indicating that a large number of freshmen students could understand the many advantages and limitations of different storage options and had the habit of evaluating information very critically (considering both the source and the placement). The lowest indicator in table 4 is the "database" which is a classified collection of information or data that is usually stored in a computer system and is operated by a database management system. Database management is a critical component of in-depth data applications. As stated by Van Aken, database configuration is traditionally difficult especially for novices; it has many "knobs" such as memory that is needed for the storage of data and that they need to be up and running for the system to function properly [21]. It is just comprehensively difficult for the freshmen to have exceptional knowledge in databases because it is declared that the database complexity has already surpassed the abilities of humans in order to meet the expected requirements of an application.

The Specific Objective 1 (b) sought to describe the main area of digital competence in terms of Communication. Communication includes contact via digital devices and apps, the sharing of information, data, and content with other persons, and understanding of resource representation and citation [22]. As per the result shown in table 5, the lowest mean value in the communication category is shown by the "Active Participation" indicator. Students demonstrate

that they continue to favor privacy and have constraints in sharing their views and opinions on important social media platforms. "Active Participation" is more than just observing; it refers to situations in which students must read, write, discuss, create, or solve problems.

Stowell and Nelson (2015) (as cited in Starmer gave evidence that improving active student interaction can increase motivation and achievement [23]. The Specific Objective 1 (c) and table 6, which specified the Mean and Descriptive Ratings on the Digital Competence of the first-year college students in terms of Production, this category refers to the ability to create, configure, and edit digital content, as well as the ability to solve digital problems, and explore new ways to use technology. The results shown in table 6, the programming-related topic has the lowest mean value. This means that only a small percentage of students can modify or edit, manage, and produce content using programming concepts. Programming is first and foremost a problem-solving activity, but it should also be viewed from a broad viewpoint, involving creativity, simulation, and democratic components [24]. In many aspects, students' spontaneous use of technology reflects 21st-century abilities such as critical thinking, communication, teamwork, and creativity [25]. Based on Specific Objective 1 (d) and Table 7: Mean and Descriptive Ratings on the Digital Competence of first-year college students in terms of Safety, the digital competence of the respondents in terms of online safety and awareness are discussed. According to Porln and Snchez the category of "safety" has something to do with information and personal data protection, digital identity protection and security measures, as well as responsible technology and Internet use [26]. Communication on the threats of internet usage or online safety, is a context where personal accountability is especially important. [27].

Out of 188 respondents, 0.53% and consisting of 1 respondent had the lowest general weighted average ranging from 45-50, implying that he/she was still adjusting to college life. Higher education exposes students to a variety of new challenges, such as academic demand, autonomy in their needs and activities, and greater responsibility in learning than previous education [28]. This transition causes a variety of problems and some of them are college dropout, difficulty managing stress and dealing with educational needs, lack of enthusiasm to learn, and poor academic performance [29]. As shown in Table 9, safety had the highest mean in the overall digital competence with a verbal description of to a large extent. This means that the respondents are capable of using digital technology safely and in a sustainable manner in relation to data. This is followed by communication (WM= 5.69) and information (WM= 5.67). Ferrari A recognizes safety, together with information and communication as areas of digital competence [30]. As technology becomes more accessible, students should be knowledgeable about online safety in terms of privacy, copyright, and security concerns [31]. While production had the lowest mean (WM=5.51). The majority of students are incapable of creating content or solving digital problems. Students struggled to grasp the fundamental concept of programming structures and designing a program to solve specific tasks [32].

The study of Calvani argues that the buoyant representation of younger generations' digital competence is ill-founded [33]. When the focus is redirected from strictly technical issues to critical cognitive and socio-ethical components concerned in the utilization of technologies, their knowledge and competencies are shown to be insufficient. Since there is no significant relationship between the two variables shown in table 10, this current study implies that even if the student is not digitally competent, it would not affect his/her academic performance and vice versa. Results obtained from this study are similar to results reported in a paper conducted by Claro which states that the students' academic performance is not correlated with the amount of time they spend using Information and Communication Technology (ICT) in school [34]. Additionally, a similar study by Hatlevik shows that a strong emphasis on ICT is placed in the curriculum; yet, increased usage of ICT at school does not always translate into increased academic or digital competence [35]. With these findings, the study implied that the digital competence of first-year college students during the A.Y. 2020-2021 did not have a significant relationship with their academic performance.

5. Conclusion and Recommendation

Digital competence has become increasingly vital as new technologies and applications continue to evolve, many of which have been created by progressively ubiquitous internet access and the development of personal, mobile digital devices. This study sought to determine the relationship between digital competence and the academic performance of students. The researchers, therefore, conclude that the digital competence of first-year college students is not significantly related to their general weighted average; this simply means that the researchers found no evidence that digital competence was associated with the academic performance among the 188 respondents which are the 1st year students of an allied medical professions department from a higher education institution in Angeles City. Learning tools and technology enable students to develop effective self-directed learning skills. Students should develop their digital competence; possessing digital competence has many advantages in different facets of daily life, specifically in education since online learning is still implemented.

Although the findings of the current study do not establish any association between digital competence and academic performance, it is still suggested that:

❖ Students should maintain high grades or improve their academic performance to obtain higher grades.

❖ Students should be able to:

• Obtain the ability to discover, retrieve, organize and analyze digital information and determine its usefulness, relevancy, and purpose.

• Interact and communicate effectively with others via electronic means in the context of a virtual team or network.

• Know the digital content creation and configuration, as well as digital problem solving and creative approaches to utilize technology.

• Know the legal rights and responsibilities when it comes to digital technology use and data protection.

❖ Since online learning is still applied in the current situation of the world and technology is continuously improving, having the capacity to effectively use a digital platform allows the students to have a critical understanding of the Learning Management Systems provided by the school and to have confidence in using applications or sites as additional learning resources given by professors.

❖ Larger sample size can be used to generalize the findings of further studies.

❖ Similar studies can be conducted in other college courses.

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References

1. Ferrari, A. (2012). *Digital competence in practice: An analysis of frameworks* (Vol. 10, p. 82116). Luxembourg: Publications Office of the European Union.
2. Dimla, C., Aquino, J., Pena, M. D. D., Galang, H. T., Miranda, G. M., Razon, J. C., & Miranda, S. (2024). Digital Competence and Academic Performance of First-Year College Students from a Higher Education Institution in Angeles City during the COVID-19 Pandemic.
3. Vindača, O., & Ļubkina, V. (2021). Digital Competence Structural Model in the Context of Higher Education Institutions Following Covid-19 Renewed Trends. In *EDULEARN21 Proceedings* (pp. 1009-1019). IATED.
4. Corrall, S. M. (2021). Foreword: Cases on research support services in academic libraries.
5. Ferrari, A. (2012). *Digital competence in practice: An analysis of frameworks* (Vol. 10, p. 82116). Luxembourg: Publications Office of the European Union.
6. Zhao, Y., Llorente, A. M. P., & Gómez, M. C. S. (2019, October). An Empirical Study of Students and Teaching Staff's Digital Competence in Western China: Based on a case study of Gansu Agricultural University. In *Proceedings of the Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality* (pp. 1012-1019).
7. Ilomäki, L., Kantosalo, A., & Lakkala, M. (2011). What is digital competence?. In *Linked portal* (pp. 1-12). European Schoolnet (EUN).
8. Casillas Martín, S., Cabezas González, M., & García Peñalvo, F. J. (2020). Digital competence of early childhood education teachers: attitude, knowledge and use of ICT. *European journal of teacher education, 43*(2), 210-223.
9. Krumsvik, R. J. (2014). Teacher educators' digital competence. *Scandinavian Journal of Educational Research, 58*(3), 269-280.
10. Mannila, L., Nordén, L. Å., & Pears, A. (2018, August). Digital competence, teacher self-efficacy and training needs. In *Proceedings of the 2018 ACM Conference on International Computing Education Research* (pp. 78-85).
11. Ottestad, G., Kelentrić, M., & Guðmundsdóttir, G. B. (2014). Professional digital competence in teacher education. *Nordic journal of digital literacy, 9*(4), 243-249.
12. Røkenes, F. M., & Krumsvik, R. J. (2014). Development of student teachers' digital competence in teacher education-A literature review. *Nordic Journal of Digital Literacy, 9*(4), 250-280.
13. Arango-Morales, A. J., Delgado-Cruz, A., & Tamayo-Salcedo, A. L. (2019). Digital competence of tourism students: Explanatory power of professional training. European *Journal of Investigation in Health, Psychology and Education, 10*(1), 310-326.
14. Hatlevik, O. E., & Christophersen, K. A. (2013). Digital competence at the beginning of upper secondary school: Identifying factors explaining digital inclusion. *Computers & education, 63*, 240-247.
15. Heidari, E., Mehrvarz, M., Marzooghi, R., & Stoyanov, S. (2021). The role of digital informal learning in the relationship between students' digital competence and academic engagement during the COVID-19 pandemic. *Journal of Computer Assisted Learning, 37*(4), 1154-1166.
16. Calvani, A., Fini, A., & Ranieri, M. (2010). Digital Competence in K-12: theoretical models, assessment tools and empirical research. *Anàlisi: quaderns de comunicació i cultura,* (40), 157-171.
17. Center for Digital Dannelse (2021). The Digital Competence Wheel [Internet].
18. Belecina, R., Baccay, E., Mateo, Efren. (2016). Statistics and Probability. Rex Bookstore; 300 p.
19. Heidari, E., Mehrvarz, M., Marzooghi, R., & Stoyanov, S. (2021). The role of digital informal learning in the relationship between students' digital competence and academic engagement during the COVID-19 pandemic. *Journal of Computer Assisted Learning, 37*(4), 1154-1166.
20. Maqableh, M., & Alia, M. (2021). Evaluation online learning of undergraduate students under lockdown amidst COVID-19 Pandemic: The online learning experience and students' satisfaction. *Children and youth services review, 128,* 106160.
21. Van Aken, D., Pavlo, A., Gordon, G. J., & Zhang, B. (2017, May). Automatic database management system tuning through large-scale machine learning. In *Proceedings of the 2017 ACM international conference on management of data* (pp. 1009-1024).
22. Ferrari, A., & Punie, Y. (2013, April). *DIGCOMP: A framework for developing and understanding digital competence in Europe.*
23. Starmer, D. J., Duquette, S., & Howard, L. (2015). Participation strategies and student performance: An undergraduate health science retrospective study. *Journal of Chiropractic Education, 29*(2), 134-138.
24. Nouri, J., Zhang, L., Mannila, L., & Norén, E. (2020). Development of computational thinking, digital

competence and 21st century skills when learning programming in K-9. *Education Inquiry, 11*(1), 1-17.
25. Downes, J. M., & Bishop, P. (2012). Educators engage digital natives and learn from their experiences with technology: Integrating technology engages students in their learning. *Middle School Journal, 43*(5), 6-15.
26. Gutiérrez Porlán, I., & Serrano Sánchez, J. L. (2016). Evaluation and development of digital competence in future primary school teachers at the University of Murcia. *Journal of New Approaches in Educational Research, 5*(1), 51-56.
27. Boehmer, J., LaRose, R., Rifon, N., Alhabash, S., & Cotten, S. (2015). Determinants of online safety behaviour: Towards an intervention strategy for college students. *Behaviour & Information Technology, 34*(10), 1022-1035.
28. Alipio, M. (2020). Adjustment to college and academic performance: Insights from Filipino college freshmen in an allied health science course.
29. Reddy, K. J., Menon, K. R., & Thattil, A. (2018). Academic stress and its sources among university students. *Biomedical and pharmacology journal, 11*(1), 531-537.
30. Ferrari, A., & Punie, Y. (2013, April). *DIGCOMP: A framework for developing and understanding digital competence in Europe.*
31. Hatlevik, O. E., & Tømte, K. (2014). Using multilevel analysis to examine the relationship between upper secondary students Internet safety awareness, social background and academic aspirations. *Future Internet, 6*(4), 717-734.
32. Derus, S. R. M., & Ali, A. M. (2012, September). Difficulties in learning programming: Views of students. In *1st International Conference on Current Issues in Education (ICCIE 2012)* (pp. 74-79).
33. Calvani, A., Fini, A., Ranieri, M., & Picci, P. (2012). Are young generations in secondary school digitally competent? A study on Italian teenagers. *Computers & Education, 58*(2), 797-807.
34. Claro, M., Preiss, D. D., San Martín, E., Jara, I., Hinostroza, J. E., Valenzuela, S., ... & Nussbaum, M. (2012). Assessment of 21st century ICT skills in Chile: Test design and results from high school level students. *Computers & education, 59*(3), 1042-1053.
35. Hatlevik, O. E., Ottestad, G., & Throndsen, I. (2015). Predictors of digital competence in 7th grade: a multilevel analysis. *Journal of Computer Assisted Learning, 31*(3), 220-231.

Appendix A

Tables

Range of the Weighted Mean Value	Verbal Description
80.01 - 100.00	Excellent
60.01 - 80.00	Very Satisfactory
40.01 - 60.00	Satisfactory
20.01 - 40.00	Fair
0.00 - 20.00	Poor

Table 2: Scale Value and Descriptive Rating of Academic Performance of the First-Year College Students

Table 2 and 3 show the scale value and descriptive rating of academic performance of the first-year college students.

Point Scaling	Range of the Weighted Mean Value	Verbal Description
7	6.50 – 7.00	To a very large extent
6	5.50 – 6.49	To a large extent
5	4.50 – 5.49	To some extent
4	3.50 – 4.49	Partially
3	2.50 – 3.49	To a lesser extent
2	1.50 – 2.49	To a small degree
1	1.00 – 1.49	To a very small degree

Table 3: Scale Value and Descriptive Rating of Digital Competence of the First-Year College Students

GWA	f	%
93 - 98	69	36.70
87 - 92	101	53.72
81 - 86	14	7.45
75 - 80	0	0.00
69 - 74	1	0.53
63 - 68	2	1.06
57 - 62	0	0.00
51 - 56	0	0.00
45 - 50	1	0.53

Table 9: Frequency and Percentage Distribution of General Weighted Average of First-Year College Students

Table 9 fulfills Specific Objective 2 and shows the frequency and percentage distribution of the general weighted average of first-year college students to summarize the data.