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# Correlational Analysis of Academic Performance in General Education Courses During the Digital Learning Space

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**Abstract.** The integration of digital learning setups in higher education has revolutionized the educational landscape, necessitating a reevaluation of academic performance in General Education Courses (GECs). This correlational analysis study examines the interconnectedness of student grades across eight GECs during the transition to digital learning environments. By investigating the relationships between GEC subjects, the study sheds light on potential interdisciplinary connections and offers insights into overall academic performance trends. Findings reveal significant correlations between various GECs, highlighting the importance of fostering interdisciplinary learning experiences and promoting critical skills development among students in digital educational contexts. The study underscores the imperative of designing curriculum frameworks that encourage holistic learning experiences, prioritizing the development of communication skills, scientific literacy, and ethical reasoning. Additionally, it emphasizes the need for continuous evaluation and improvement initiatives to enhance the quality of education in digital learning environments. This research contributes to a deeper understanding of academic performance trends in GECs and informs pedagogical practices aimed at preparing students for success in an increasingly complex and interconnected world.

**Keywords:** General Education Courses (GECs); Academic performance; Digital learning environments; Interdisciplinary connections.

## 1.0 Introduction

In the dynamically evolving landscape of educational paradigms, the pervasive integration of technology has become increasingly pronounced, particularly in the transition from conventional classroom settings to online modalities, including emergent hybrid systems. Within this context, the digital literacy proficiency of educators in higher education has garnered heightened significance as a pivotal determinant of their efficacy within online educational environments. This study seeks to assess the digital literacy competencies of higher education instructors, focusing on their utilization of academic platforms, incorporation of digital instructional materials, and adeptness in conducting virtual assessments. An integral aspect of this inquiry involves the consideration of student feedback, providing valuable insights into the intersection of instructor digital literacy and student engagement. The anticipated findings of this investigation hold considerable implications for educational administrators, highlighting the imperative of instituting comprehensive digital training initiatives for instructors amidst the backdrop of global technological advancements. Such insights stand to inform strategic decision-making at the Technological University of the Philippines, fostering an environment conducive to embracing digital literacy advancements and fostering innovation within the academic sphere.

The widespread adoption of digital learning platforms and online instructional materials has made a significant transformation in education. The instructors' digital proficiency plays a significant role in identifying online learning effectiveness.

The GEC instructors' digital literacy at the Technological University of the Philippines-Taguig in online education is a crucial factor in the student's academic performance. Suspendra (2019) and Mega (2022) emphasize the significance of digital literacy in the ability of students to utilize online learning materials and have an engagement in an online setting. Moore (2001) cited that digital literacy has a big role in creating an effective online learning environment. Yuen, Yaoyuneyong & Johnson (2011) mentioned the importance of being adaptable in the advancement of technology to sustain the needs of tech-savvy learners, as well as the need to navigate effective educational transformation from traditional to online education.

Teachers' digital literacy plays a central role in students' academic performance, influencing not only their mastery of technological tools but also their higher-order thinking skills (Nawaz & Kundi, 2010; Akturk & Ozturk, 2019). Santos et al. (2019) highlight the significant impact of teachers' digital support on students' learning outcomes and academic achievement. Numerous studies have demonstrated a positive correlation between teachers' digital literacy and students' academic success (Lee, Moon, & Cho, 2015; Tondeur et al. (2017). Ali, Thomas, & Hamid (2020) emphasize the importance of teachers' technology pedagogical content knowledge (TPACK) in enhancing student achievement, stressing the effective integration of technology into classroom instruction (Voogt & McKenney, 2017). Additionally, research underscores the significance of professional development programs in enhancing teachers' digital literacy skills (Ding et al.,(2019) with Falloon (2020) advocating for continuous support and training to maximize the potential of technology in education.

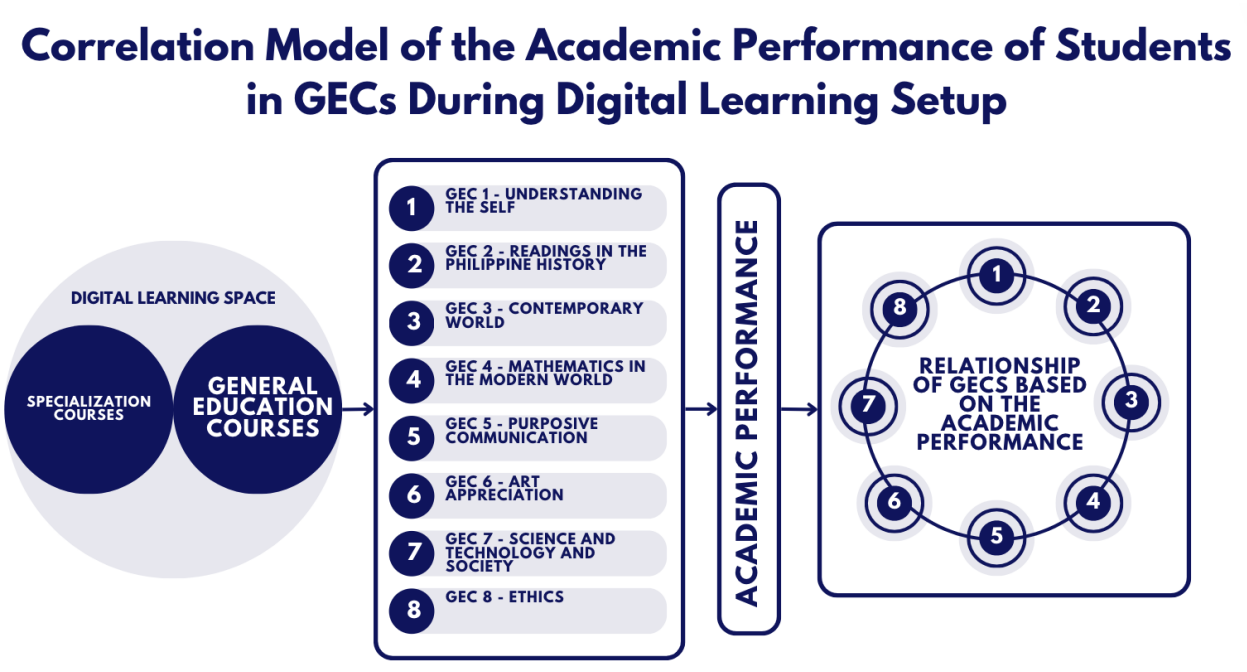


**Figure 1.** Correlation Model of the Academic Performance of Students in GECs During Digital Learning Setup

## 2.0 Methodology

The methodology employed for this study aimed to investigate the correlation among the grades of students who have completed all eight General Education Courses (GECs) at the Technological University of the Philippines – Taguig. The population of 300 students who have completed all eight GECs, a sample size of 172 was determined using Slovin's formula at a 95% confidence level with a 5% margin of error. This sample size was selected to ensure a representative subset of the population while maintaining practical feasibility in data collection and analysis.

The methodology involved several key steps to ensure the validity and reliability of the data collected. Firstly, all students who were at least 18 years old were asked to provide consent to participate in the study. This ethical

consideration ensured that participants voluntarily agreed to take part in the research. Secondly, the anonymity of names was maintained to protect the privacy and confidentiality of participants. By anonymizing participant identities, the study aimed to encourage honest responses and minimize potential biases or concerns related to privacy. Thirdly, grades were obtained from the student's responses and then verified by the registrar to ensure accuracy and reliability. This validation step was crucial in confirming the authenticity of the data collected and minimizing the risk of errors or inconsistencies.

Limitations are acknowledged when interpreting the findings of the study. Firstly, the pedagogy of instructors, their teaching approach, and academic freedom may have influenced student grades in GECs. Variations in teaching styles and instructor biases could have impacted the consistency and fairness of grading across courses. Secondly, the study focused exclusively on GEC courses, neglecting potential correlations with grades in other courses or academic disciplines. Future research could explore the relationship between GEC grades and grades in major-specific courses to provide a more comprehensive understanding of academic performance. Lastly, the implementation of online learning during the study period may have introduced additional challenges or confounding factors that were not accounted for in the methodology. The shift to online education could have influenced student performance in GECs due to factors such as technological limitations, access to resources, or changes in instructional delivery methods.

## 3.0 Results and Discussion

**Table 1.** Summary of grades as reference to academic performance

| Groups | Average | Variance |
|---|---|---|
| GEC 1 Understanding the Self | 1.58 | 0.38306 |
| GEC 2 Readings in the Philippine History | 1.86 | 0.14148 |
| GEC 3 Contemporary World | 1.92 | 0.31061 |
| GEC 4 Mathematics in the Modern World | 1.92 | 0.18109 |
| GEC 5 Purposive Communication | 1.75 | 0.69079 |
| GEC 6 Art Appreciation | 1.85 | 0.10748 |
| GEC 7 Science and Technology and Society | 2.17 | 0.84470 |
| GEC 8 Ethics | 1.90 | 0.20975 |

**Legend:** 1.00 – Excellent, 1.25 – Superior, 1.50 to 1.75 – Very Good/ Above Average, 2.00 to 2.50 – Good/ Average, 2.75 – Satisfactory, 3.00 – Passed, 5.00 Failed

The table presents a summary of grades, providing insight into the average performance and variance among students across eight General Education Courses (GECs). Firstly, it is notable that the average grades vary across the different GECs, ranging from 1.58 to 2.17. GEC 7 (Science and Technology and Society) has the highest average grade of 2.17, indicating relatively stronger performance in this course compared to others. Conversely, GEC 1 (Understanding the Self) has the lowest average grade of 1.58, suggesting comparatively weaker performance in this particular GEC.

Secondly, the variance in grades within each GEC reflects the degree of dispersion or spread of grades around the average. Higher variance values indicate greater variability in student performance within a particular GEC. For instance, GEC 7 (Science and Technology and Society) exhibits the highest variance of 0.8447, implying a wider range of grades among students in this course. On the other hand, GEC 6 (Art Appreciation) has the lowest variance of 0.10748, indicating more consistent performance among students in this GEC.

These findings suggest that while some GECs may have higher average grades, there can be significant variability in student performance within each course. Factors such as course content, teaching methods, and individual student characteristics may contribute to these variations. Understanding these patterns of academic performance can inform educators' efforts to address challenges and enhance learning outcomes in General Education Courses.

**Table 2.** Correlation matrix of the academic performance of students in general education courses during the onset of pandemic

| | GEC 1 | GEC 2 | GEC 3 | GEC 4 | GEC 5 | GEC 6 | GEC 7 | GEC 8 |
|---|---|---|---|---|---|---|---|---|
| GEC 1 | **1.00000** | 0.52702 | 0.62992 | 0.40681 | 0.91570 | 0.34802 | 0.90669 | 0.65862 |
| GEC 2 | 0.52702 | **1.00000** | 0.78145 | 0.46515 | 0.74529 | 0.62589 | 0.60144 | 0.53947 |
| GEC 3 | 0.62992 | 0.78145 | **1.00000** | 0.76264 | 0.83815 | 0.73596 | 0.58421 | 0.38584 |
| GEC 4 | 0.40681 | 0.46515 | 0.76264 | **1.00000** | 0.49173 | 0.75627 | 0.39239 | 0.18983 |
| GEC 5 | 0.91570 | 0.74529 | 0.83815 | 0.49173 | **1.00000** | 0.39410 | 0.95027 | 0.83950 |
| GEC 6 | 0.34802 | 0.62589 | 0.73596 | 0.75627 | 0.39410 | **1.00000** | 0.27657 | 0.00315 |
| GEC 7 | 0.90669 | 0.60144 | 0.58421 | 0.39239 | 0.95027 | 0.27657 | **1.00000** | 0.80090 |
| GEC 8 | 0.65862 | 0.53947 | 0.38584 | 0.18983 | 0.83950 | 0.00315 | 0.80090 | **1.00000** |

**Legend:** , GEC 1 - Understanding the Self, GEC 2 - Readings in the Philippine History, GEC 3 - Contemporary World, GEC 4 - Mathematics in the Modern World, GEC 5 - Purposive Communication, GEC 6 - Art Appreciation, GEC 7 - Science and Technology and Society, GEC 8 - Ethics

**GEC 1 Correlation with other GECs**

The positive correlation coefficients suggest a potential association between academic performance in GEC 1 and other GECs, indicating that students who excel in Understanding the Self may also perform well in courses spanning diverse subjects such as history, communication, science, and ethics. The notably high correlations observed for GEC 5 (Purposive Communication) and GEC 7 (Science and Technology and Society) suggest a particularly strong relationship with GEC 1, possibly indicating shared themes or complementary skill sets.

A possible explanation for these findings is that GEC 1 fosters critical thinking, self-reflection, and analytical skills, which are transferrable across various academic domains. Moreover, topics related to communication and the societal implications of science and technology may intersect with themes explored in Understanding the Self, thereby reinforcing learning outcomes and enhancing academic performance.

**GEC 2 Correlation with other GECs**

The positive correlations observed between academic performance in GEC 2 Readings in Philippine History and other GECs highlight the interconnectedness of knowledge and skills across different disciplinary domains. The moderate to strong correlations suggest that students who excel in understanding historical contexts and perspectives may also demonstrate proficiency in areas such as self-awareness, communication, mathematics, art appreciation, science, technology, and ethics.

A probable insight for these findings is that GEC 2 Readings in Philippine History may foster critical thinking, analytical skills, and a deeper understanding of societal dynamics, which are transferable to other academic subjects. Moreover, the themes explored in GEC 2 may intersect with those addressed in other GECs, reinforcing learning outcomes and enhancing academic performance across the curriculum.

**GEC 3 Correlation with other GECs**

The substantial positive correlations observed between academic performance in GEC 3, Contemporary World, and other GECs underscore the interconnectedness of knowledge and skills across diverse disciplinary domains within the university curriculum. The findings suggest that students who excel in understanding contemporary global issues may also demonstrate proficiency in areas such as self-awareness, historical analysis, mathematical reasoning, communication, art appreciation, science, technology, and ethics.

A probable explanation for these findings is that GEC 3, Contemporary World, provides students with a broad understanding of global challenges, societal dynamics, and cultural perspectives, which are transferable to other academic subjects. Moreover, the themes explored in GEC 3 may intersect with those addressed in other GECs, reinforcing learning outcomes and enhancing academic performance across the curriculum.

**GEC 4 Correlation with other GECs**

The positive correlations observed between academic performance in GEC 4, Mathematics in the Modern World, and other GECs underscore the interconnectedness of knowledge and skills across diverse disciplinary domains within the university curriculum. The findings suggest that students who excel in mathematical reasoning and problem-solving may also demonstrate proficiency in areas such as self-awareness, historical analysis, communication, art appreciation, science, technology, and ethics.

One possible input for these findings is that GEC 4, Mathematics in the Modern World, provides students with quantitative reasoning skills and analytical tools that are applicable across various academic subjects. Moreover, the themes explored in GEC 4 may intersect with those addressed in other GECs, reinforcing learning outcomes and enhancing academic performance across the curriculum.

**GEC 5 Correlation with other GECs**
The substantial positive correlations observed between academic performance in GEC 5, Purposive Communication, and other GECs underscore the interconnectedness of communication skills and knowledge across diverse disciplinary domains within the university curriculum. The findings suggest that students who excel in purposive communication may also demonstrate proficiency in areas such as self-awareness, historical analysis, contemporary world issues, mathematics, art appreciation, science, technology, and ethics.

An idea for these findings is that GEC 5, Purposive Communication, equips students with effective communication skills and critical thinking abilities, which are essential for success in various academic subjects and professional contexts. Moreover, the themes explored in GEC 5 may intersect with those addressed in other GECs, reinforcing learning outcomes and enhancing academic performance across the curriculum.

**GEC 6 Correlation with other GECs**
The correlation coefficients observed between academic performance in GEC 6, Art Appreciation, and other GECs underscore the interconnectedness of aesthetic appreciation and knowledge across diverse disciplinary domains within the university curriculum. The findings suggest that students who excel in art appreciation may also demonstrate proficiency in areas such as historical analysis, contemporary world issues, mathematics, communication, science, technology, and ethics, albeit to varying degrees.

One possible explanation for these findings is that GEC 6, Art Appreciation, fosters critical thinking and cultural appreciation, which are transferable to other academic subjects. Moreover, the themes explored in GEC 6 may intersect with those addressed in other GECs, reinforcing learning outcomes and enhancing academic performance across the curriculum.

**GEC 7 Correlation with other GECs**
The significant positive correlations observed between academic performance in GEC 7, Science and Technology and Society, and other GECs underscore the interconnectedness of scientific literacy and societal understanding across diverse disciplinary domains within the university curriculum. The findings suggest that students who excel in understanding the interplay between science, technology, and society may also demonstrate proficiency in areas such as self-awareness, historical analysis, mathematical reasoning, communication, and ethics, albeit to varying degrees.

One possible idea for these findings is that GEC 7, Science and Technology and Society, provides students with a critical understanding of the implications of scientific and technological advancements on society, which are transferable to other academic subjects. Moreover, the themes explored in GEC 7 may intersect with those addressed in other GECs, reinforcing learning outcomes and enhancing academic performance across the curriculum.

**GEC 8 Correlation with other GECs**
The correlation coefficients observed between academic performance in GEC 8, Ethics, and other GECs underscore the interconnectedness of ethical reasoning and moral understanding across diverse disciplinary domains within the university curriculum. The findings suggest that students who excel in ethical reasoning and moral decision-making may also demonstrate proficiency in areas such as self-awareness, historical analysis, contemporary world issues, communication, and scientific literacy, albeit to varying degrees.
The findings show that GEC 8, Ethics, provides students with a critical understanding of moral principles and ethical frameworks, which are transferable to other academic subjects. Moreover, ethical considerations are pervasive in various aspects of human society, intersecting with themes explored in other GECs and reinforcing learning outcomes across the curriculum.

**Correlational Analysis of GEC Subjects**

The correlational analysis of General Education Courses (GECs) reveals insightful patterns in students' academic performance across diverse disciplinary domains. The summary highlights notable correlations among GEC subjects, ranging from strong to weak relationships, shedding light on potential interdisciplinary connections and overall academic performance trends.

***Strongest and Weakest Correlations***

The analysis identifies GEC 5 (Purposive Communication) and GEC 7 (Science, Technology, and Society) as having the strongest correlation, indicating a robust relationship between communication skills and scientific literacy. Conversely, GEC 6 (Art Appreciation) and GEC 8 (Ethics) exhibit the weakest correlation, suggesting a minimal association between appreciation of art and ethical reasoning.

***Interdisciplinary Connections***

Notably, correlations such as GEC 1 (Understanding the Self) and GEC 5 (Purposive Communication), as well as GEC 7 (Science, Technology, and Society) and GEC 1 (Understanding the Self), underscore the interconnectedness of self-awareness, communication skills, and societal understanding. These findings suggest that students who excel in understanding themselves may also demonstrate proficiency in effective communication and critical engagement with societal issues.

***Overall Academic Performance***

The average academic performance of students across GECs indicates a generally positive trend, with GEC 1 (Understanding the Self) exhibiting the highest average GPA, suggesting above-average performance. Conversely, GEC 7 (Science, Technology, and Society) demonstrates the lowest average GPA, indicating average performance. The overall average GPA falls within the range of "Very Good/Above Average" to "Good/Average," suggesting that students perform satisfactorily across GEC subjects.

The correlational analysis indicates a strong correlation between academic performance in GEC subjects, suggesting a cohesive academic experience for students across diverse disciplines. However, it is essential to interpret these findings cautiously, recognizing the need for further data validation and contextualization. Lateral data gathering and qualitative assessments could complement the quantitative analysis, providing a comprehensive understanding of student performance in GECs.

The correlational analysis offers valuable insights into interdisciplinary connections and overall academic performance trends in GEC subjects, it is crucial to approach the findings as developmental rather than conclusive. Further research and evaluation are necessary to deepen our understanding of student learning outcomes and inform pedagogical practices effectively.

## 4.0 Conclusion

The correlational analysis of the academic performance of students in General Education Courses (GECs) at the Technological University of the Philippines – Taguig yields valuable insights into interdisciplinary connections and overall performance trends. For the interdisciplinary connections, the study reveals significant correlations between various GEC subjects, indicating interconnectedness across diverse disciplinary domains. Strong correlations, such as those between Purposive Communication and Science, Technology, and Society, highlight the importance of communication skills and scientific literacy in academic performance. In terms of the academic performance trends, students demonstrate satisfactory performance across GEC subjects, with Understanding the Self exhibiting the highest average GPA and Science, Technology, and Society showing the lowest. The average GPA falls within the range of "Very Good/Above Average" to "Good/Average," suggesting a generally positive academic experience. Concerning the strongest and the weakest correlations, Purposive Communication, and Science, Technology, and Society exhibit the strongest correlation, indicating a robust relationship between communication skills and scientific literacy. Conversely, Art Appreciation and Ethics show the weakest correlation, suggesting a minimal association between aesthetic appreciation and ethical reasoning. And, for the implications for curriculum design, the findings underscore the importance of designing a curriculum that fosters interdisciplinary connections and emphasizes critical skills such as communication, scientific literacy, and ethical reasoning. By promoting integration across GEC subjects, educators can enhance student learning outcomes and

prepare them for diverse academic and professional challenges. This study contributes to a deeper knowledge of trends in the academic performance in GEC subjects and can prepare the students for the digital world that is constantly changing.

Based on the conclusions drawn from the correlational analysis, the following recommendations are proposed:

a) Enhance Interdisciplinary Learning. Educators should design curriculum frameworks that encourage interdisciplinary learning experiences, allowing students to explore connections between different GEC subjects. Integrated coursework, collaborative projects, and interdisciplinary seminars can facilitate holistic learning and promote critical thinking skills.
b) Promote Communication and Scientific Literacy. Given the strong correlation between Purposive Communication and Science, Technology, and Society, institutions should prioritize the development of communication skills and scientific literacy across the curriculum. Courses focused on effective communication, research methodologies, and ethical considerations in scientific inquiry can enhance student proficiency in these areas.
c) Facilitate Ethical Reflection. While Ethics exhibits a weaker correlation with other GEC subjects, ethical reasoning remains a vital component of holistic education. Institutions should incorporate opportunities for ethical reflection and moral deliberation into the curriculum, encouraging students to engage with ethical dilemmas and develop principled decision-making skills.
d) Continuous Evaluation and Improvements. To ensure the effectiveness of curriculum design and pedagogical practices, institutions should conduct regular evaluations of student learning outcomes and solicit feedback from stakeholders. Continuous improvement initiatives, informed by data-driven assessments and qualitative insights, can enhance the quality of education and support student success.

In conclusion, the correlational analysis provides valuable insights into the academic performance of students in GEC subjects and highlights opportunities for curriculum enhancement and pedagogical innovation. By fostering interdisciplinary connections, promoting critical skills development, and facilitating ethical reflection, institutions can empower students to thrive in an increasingly complex and interconnected world.

## 5.0 Contributions of Authors

**Lizette Terania**: She assumed responsibility for the conceptualization of the study, overseeing the development of its framework and methodology. Furthermore, she conducted the comprehensive collection of pertinent data integral to the research inquiry. Additionally, she crafted and refined the research instrument employed in data acquisition. Lastly, she encoded and proofread the study, ensuring its coherence, accuracy, and scholarly integrity.

**Jonathan Daved Dela Cruz:** He was assigned the responsibility of designing and conceptualizing the research models, which included developing theoretical frameworks and methodological strategies that were specific to the goals of the study. In addition, he carried out thorough data analysis using sophisticated statistical methods to extract insightful conclusions and meanings from the collected data.

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## 7.0 Conflict of Interests

The authors declare that there is no conflict of interest.

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