

Effect of Using Electronic Versus Printed Media on the GWA of 1st – 3rd year Medical Students at Centro Escolar University Manila, Semester 1, A.Y. 2021–2022: A Comparative Study*

Aggabao, Mirafior A.; Alegre, Julia Victoria P.; Andrade, Rojie A.; Basman, Amayabil S. Eamilao, Frances Marian M.; Inocencio, Abigail Sanchia B.; Khanna, Karan R. Naguit, Paolo Lorenzo V.; Ramos, Camille Antoinette A.; Resultay, Ma. Allysa Klaire D. Tuazon, Czarina C.; Villanueva, Brian Patryck Q. Alex J. B. Alip, Jr., MD, FPAFP¹

ABSTRACT

OBJECTIVE: To compare the effectiveness of the use of electronic media and the use of printed media in obtaining a higher general weighted average (GWA) among 1st to 3rd year medical students at Centro Escolar University (CEU), A.Y. 2021–2022

RESEARCH DESIGN: Cross sectional

SETTING: Centro Escolar University, San Miguel, Manila

PATIENT/SUBJECT SELECTION: The 140 subjects were selected by stratified random sampling design. Those currently enrolled full-time as regular CEU medical students and attending a complete number of units in the year level were included in the selection.

METHODS: The GWA of the participants were obtained from the Administrative Office of CEU–School of Medicine, while data for the independent variables were collected using questionnaires patterned after the Academic Reading Format International Study (ARFIS) and Perceived Stress Scale (PSS). Ethical considerations of the questionnaires were approved prior to the study proper. Both the questionnaires were administered using Google Forms.

OUTCOME MEASURES: Hypothesis testing and RxC contingency table were utilized to determine any significant difference and association among the groups who use printed and electronic on GWA.

KEYWORDS: electronic media, printed media, general weighted average

Disclosures: The author has formally acknowledged and signed a disclosure affirming the absence of any financial or other relationships (including personal connections), intellectual biases, political or religious affiliations, and institutional ties that could potentially result in a conflict of interest.

*Centro Escolar University, Manila

¹Adviser

INTRODUCTION

Background of the Study

Multiple studies have shown that students who use electronic textbooks show higher levels of affective and psychomotor learning than students who use the traditional printed textbook. Still, other references would claim that there is no difference seen in cognitive learning and comprehension. It was further observed that gadgets enable the students to effectively engage in learning activities, boosting their confidence and attention.

Thus, there seems to be equivocal evidence pertaining to the significant differences in studying using electronic media versus printed media. This is particularly true among medical students, for whom there is a dearth of research. The current investigators aimed to add information to this growing body of knowledge, especially geared towards future Filipino students and health practitioners. The researchers also looked at maximizing the target population's learning outcomes and adding knowledge to the efficiency of electronic media usage in the context of the new normal learning environment amidst the pandemic.

Research Problem

Is the use of electronic media more effective than the use of printed media in obtaining a higher GWA among 1st to 3rd year medical students of CEU Manila, 1st semester AY 2021–2022?

Review of Related Literature

Academic performance trends among Philippine medical schools

Students who have fixed their sights on becoming medical doctors (MD) take up medically related undergraduate courses. The belief is that the knowledge and experiences attained in these classes will aid them in future subjects in medical

school. The top five pre-medical courses of students at the University of the Philippines College of Medicine (UPCM) are BS Biology, BS Psychology, BS Public Health, BS Zoology, and BS Molecular Biology and Biotechnology (MBB)⁽¹⁾.

Moreover, there is a significant positive relationship between pre-med GPA and NMAT at the Adventist University of the Philippines (AUP). This is telling of medical schools since both undergraduate grades and NMAT percentile rank are among the foremost qualifiers for admission. NMAT percentile rank of the medicine students in AUP had an average of 72.01, with a Pre-Med GPA of 90.69 and first year Medicine GWA of 84.6. There is a significant positive relationship between NMAT score and Pre-Med grade to the first year Medicine GWA. Regression analysis revealed that Pre-Medicine course GPA and National Medical Admission Test Percentile Rank were both predictors of the first-year medicine GPA among College of Medicine students.⁽²⁾

In addition, apart from pre-med GPA, academic performance of medical students was also discovered to be related to their individual learning styles. Graduates of applied sciences preparatory courses preferred visual, group, and kinesthetic learning styles while they manifest moderate levels of study habits. It was found that these students displayed remarkably good academic performances in their first-year medical classes⁽³⁾.

The summary of a student's grades, or the GWA, has been considered as a crucial boundary in evaluating academic performance. This plays a vital role in evaluating and predicting student performance. However, raw GWA presents a risk of inaccurately assuming grades. In many educational settings, students may have an advantage to take courses which are uncomplicated and in which high grades are easier to achieve. In such cases, the raw GWA

would overlay the performance of a student who chooses a relatively uncomplicated course over another who chooses a more complicated one.

Raw GWA as a previous academic performance gauge is not a perfect indicator of achievement of medical knowledge. Although in undergraduate medical courses, it is said to be the predominant and most consistent independent predictor of success. Since grades and GWAs bring about accountability and constitute the currency of education, lack of accuracy and grade inflation in the grading process can have a profoundly negative impact on higher education.

Proportion of preferences for either electronic or printed media

In interviews conducted among readers, the first segment (aged 18 to 26 years), showed the largest use of digital reading in relation to the rest. Those who use digital formats recognize its practicality. In several cases though, they complain about visual fatigue. In the second segment (aged 27 to 35 years), digital reading is also present, but the traditional format is preferred. Still, people recognize the difficulty of carrying books. On the other hand, all respondents of the third segment (aged 36 to 50 years) preferred to read the traditional way. They preferred this format due to the sense of familiarity in being able to physically hold the material, as well as the sense of owning a library containing stacks of books and reading materials. The fourth segment (aged 51 to 65 years) expressed that they need to touch the pages of books, as well as to smell the ink and own them for keeping in their personal libraries. Interviews with librarians and editors showed that they accept the idea that in a couple of years, libraries will offer electronic services, and the practice of borrowing physical books will eventually become obsolete⁽⁴⁾.

Some students want both formats for their academic studies—and not the complete

obliteration of either one. Most (46.5%) shared the sentiment that electronic books will ultimately cause the disappearance of traditional print books. As for preference, the majority (44%) preferred both print and e-books as compared to print books only (34.5%) or electronic books only (21.5%). It can then be concluded that when students are asked to choose between print books and e-books, they preferred print books. However, if given a third option of the use of both formats, students preferred a combination of the two⁽⁵⁾.

When it comes to the hospital setting, residents and fellows are more likely to use tablet computers several times daily compared to medical students. The most common reported uses were for accessing medical reference applications (46%), reading e-books (45%), and studying for the boards (32%)⁽⁶⁾.

When conducted among 14 Chilean dental schools, students used both electronic and print textbooks. However, four out of five (80%) printed out their electronic texts—mainly female students and those in their first and second years. E-learning has allowed them to have greater access to information using electronic texts—including search and interactivity tools. It was concluded that Chilean dental students prefer print over electronic textbooks despite having access to electronic devices to read them⁽⁷⁾.

With the current pandemic, the use of newer technologies like tablets can be of great help. E-resources such as e-books, e-journals, and other documents are more easily accessible with the help of tablets. The assessment of use of such e-resources at the university library of UPD showed that 53% of respondents were affected considerably. They stated that it made it easier for them to find the materials they needed. However, with regards to the quality of their work, only 37% showed improvement⁽⁸⁾.

Characteristics of the Population that Engages in Electronic Media

Socioeconomic Status

When surveying online students, nearly 100% of them own some form of smartphone. The majority (61.4%) own iPhones; 36.3% own Android phones; and 22.2% own other brands. Laptop ownership outweighs desktop ownership among the respondents. More than half (57.6%) own PC laptops with the rest (41.5%) owning Mac laptops. Overall, 99% of online students own some type of laptop. With regards to preference, students overwhelmingly prefer laptops (73.1%) for accessing their Canvas Learning Management System (LMS) homepages. A total of 19.6% respondents prefer desktop computers, with desktop PCs selected by 16.6% and only 3% preferring desktop Macs. Only 4.3% preferred using their smartphones for accessing the LMS. There were very small numbers of students preferring iPads (1.4%) and other tablets (1.5%) when accessing their LMS course homepages. The survey focused on four main reasons for such: convenience, ease of use, effectiveness for the type of content, and student access to another device. The results showed that overall, regardless of what they chose as a preferred device, –convenience, ease of use, and effectiveness were all important reasons⁽⁹⁾.

There is a “digital divide” which distinguishes the gap between those who have easy and ample access to computers and the internet, and those who do not. This digital divide is highly influenced by the individual’s economic status, which is in direct correlation to income and educational attainment. It can be concluded that there are several sociological factors that drive digital literacy on whether a person engages in digital communications. However, the most pronounced of them all is the person’s socioeconomic status⁽¹⁰⁾.

Furthermore, it was reported that people who belong to the upper income threshold (USD 75,000) have more propensity to use both the internet and their cellphones (95%). By contrast, those below the upper income threshold (70%) use only the internet. Out of these internet users, 99% of the above USD 75,000 income bracket use the internet within the confines of their homes; and 93% of internet users below the threshold use the internet at home. In fact, even among Americans within the lower income level, internet and cellphone usage is quite high. Out of all adults that earn below USD30,000 per annum, close to two-thirds (66.67%) still use the internet. As a corollary, the utilization jumps sharply in the next income bracket for those making income at the range of USD30,000 – 50,000 annually, with 80% regularly using the internet⁽¹¹⁾.

Mental Health

Lifestyle, physical, and mental well-being clearly manifest in an individual’s routines. The interplay between mental health and learning contributes to the exploration of academic performance. It is an essential factor in identifying the effects and underlying events that may be relevant. Adolescents who consume more screen time, or are more emotionally invested in social media, tend to have poorer sleep quality, lower self-esteem and well-being, less curiosity, less self-control, and higher levels of anxiety, depression, and emotional instability⁽¹²⁾. Specifically, the incidence of anxiety and depression among individuals aged 2-17 may rise to twice the normal levels⁽¹³⁾. However, this does not discount the increased incidence of such in adults as well⁽¹⁴⁾.

Venturing into diagnostic medicine, there exists brain-health consequences of digital technology. Attention-Deficit / Hyperactivity Disorder (ADHD) symptoms intensify with continuous use of such, in that there is a decreased chance of interacting with people. Less time is also allowed for the brain to rest in between usage.

Social and emotional intelligence may be impaired. Particularly, a brain still within its course of development is sensitive to long-term exposure. Considering this, the American Academy of Pediatrics (AAP) suggests limiting the screen time of such individuals. With persistent use, social and emotional intelligence are being interfered with. This may lead to addictive behaviors, high risk of social isolation, and restriction of sleep and brain development. Although there still exist some video games, programs, and online educational tools that may impart mental exercises to initiate neural circuitry, enhance cognitive functioning, narrow anxiety, elevate restful sleep, and provide other brain-health benefits ⁽¹⁵⁾.

In contrast, there also exist effects of iPad use in children with autism-spectrum disorder (ASD) in three areas: quality of learning, communication skills, and social skills. It is proven that the iPad aids in communication and learning of children with ASD. The use of breakthrough technology in special education brings significant positive effects into the lives of such children despite its concurrent clear disadvantages ⁽¹⁶⁾.

Family Support

When it comes to factors that influence the adult learners' choice to drop out or persist in online learning, internal factors such as age, gender, or even educational attainment do not have a direct effect on the decision-making process. External factors such as organizational/family support, financial problems, and time constraints were more likely to influence the students' decision making. In conclusion, the lack of family and or organizational support, regardless of the learners' academic preparedness and aspiration, can lead them to drop out ⁽¹⁷⁾.

In conjunction with this, it is important to determine the degree of resilience of students throughout the medical course. It is also necessary to identify underlying mechanisms or processes

and vulnerabilities, as well as coping strategies that contribute to the students' ability to overcome stress. One of the factors that was considered was satisfaction with family and friends' support. Results showed a positive association between the degree of resilience and the students' degree of satisfaction with the social support from their family. High levels of support proved protective against the state of physical and mental exhaustion closely associated with academic life ⁽¹⁸⁾.

An analysis of factors including external environment, school support, and family support were found to have a significant positive relationship with online learning consciousness and behaviors. The study revealed that students who receive more interest and help from family members tend to have a high level of learning engagement. Family support included environmental support in that conducive areas for studying were provided, as well as emotional support and capability support. A healthy and harmonious relationship between students and their family members strengthened online learning engagement ⁽¹⁹⁾.

Factors affecting Academic Performance

Socio-economic Status

There is a moderate correlation between socio-economic status and academic performance. Socio-economic status indirectly predicts academic performance partially through the effect of self-concept. Families with higher socio-economic status help children form and attain positive self-concept, and they anticipate and actualize school performance. Students from low socio-economic status families usually experience more economic hardship, lack of various resources, and higher threats to social identity—which may lead to negative self-concept, stereotypes [regarding their intellectual ability], and lack of social belonging. These threats can undermine students' academic performance ⁽²⁰⁾.

There are positive and negative outcomes in using tablets for students. The use of such is supported by most teachers and students. Much lighter than print textbooks and capable of storing several copies, respondents justify usage because it is favorable especially when individuals need to change locations. Use of such bodes well for the environment, in that there is less waste produced and less use of paper in printing. Pricewise, digital textbooks are much cheaper than prints. Additionally, tablets aid in improvement of standardized test scores, increasing student interactivity and creativity.

When it comes to overall cost, the implementation for e-textbooks on iPad tablets are 552% higher than new prints. The annual cost per student per class with tablets is \$71.55, as compared to only \$14.26 for prints. This is due to costs associated with building wi-fi infrastructure, technological literacy training for teachers and administrators, and annual publishing fees in use of e-textbooks. Print textbook prices nearly tripled from 1986 to 2004, rising at twice the rate of inflation. As such, textbook wholesale prices have risen nearly four and a half times the rate of inflation from 1990–2009⁽²¹⁾.

Family

The family is the basic unit in the community and is the most crucial component in the holistic development of an individual. It is thus a key player in the ability of students to attain a more favorable academic performance.

A good parent–child relationship is a necessary component for healthy physical, mental, and cognitive development. It is therefore an important factor for promoting children's reading ability. Parents with higher levels of completed education have better parenting styles—and were found to be more knowledgeable on the approaches of addressing problems that arise in their relationships with their children. This

relationship facilitates better academic performance in children⁽²²⁾.

Considering the importance of investing in education, parents of financially challenged families usually are not able to sufficiently provide for their children's education. This affects the latter's academic achievements⁽²³⁾.

Social Media

This period being predominantly a digital age, it is unavoidable that connections between the studying generation's academic performance and their exposure to the various social media platforms will be made. As with any other variable, there will always be positive and negative effects.

Internet use is inevitable and actually essential in a student's daily routine. The majority report using social media to aid them in their tasks including communication with classmates and organization of their tasks and outputs. Prominently used as an outlet for the students, the internet helps in winding down from academic demands. But just as how use is directly correlated to favorable results, there comes a point where excess becomes negative⁽²⁴⁾. When it comes to the negative aspects, the culprit is addiction to social media, the use of which is indirectly correlated to academic performance. Among students, males are more likely to become addicted to social media than females⁽²⁵⁾.

Considering its effects on the general student population, technology has a positive influence when used in the classroom and other academic settings, especially on school experience and success. It is crucial, however, that teachers be provided with substantial professional development courses and opportunities to deepen their technological literacy. The integration of the devices they have should provide the most appropriate and effective learning experience for students⁽²⁶⁾.

Sleep Habits

Sleep plays an essential role in an individual's cognitive skills. Poor-quality sleep and daytime sleepiness may affect the physical and cognitive health of students and, in extension, the students' academic performance. When adequate, it contributes to efficient learning and memorization skills. Most students who report having bad sleep schedules (less than 5 hours) experience daytime dysfunction almost everyday and have lower GPA ⁽²⁷⁾.

Mental Health

Another predominant factor is mental health, especially risk factors such as anxiety and depression. Medical students are currently seen as a student population under greater stress and heavier physical and emotional demands compared to others. Although symptoms of depression show some association with the students' poor academic performance, it is not yet known how exactly these symptoms cause such. ⁽²⁸⁾.

In contrast, negative correlation of mental illness on academic success and degree completion is well-documented. The mentioned risk factors are mediated by perfectionism; thus, there is an interaction between types of perfectionism, depression, and anxiety. As such, educators should consider how mental health might affect students, and what courses of action to take in response ⁽²⁹⁾.

Relationship between academic performance and preferred learning media

In pursuit of more favorable outcomes, students have their own preferred learning styles and media. With its prevalence, the preference for e-books for both personal and professional development has shown significant increase. Students who use e-books have more developed affective and psychomotor learning ⁽³⁰⁾. However, there is no significant difference in reading speed and comprehension.

Aside from those mentioned above, there is also no difference seen in cognitive learning suggesting that e-books are feasible options in learning ⁽³¹⁾. There are no performance differences for textbook media, computer attitudes, or interaction ⁽³²⁾. Students use textbooks because they believe that it will lead to the level of comprehension that is expected of them ⁽³³⁾. Respondents identified that the disadvantages of e-reading were that large sections of text with hypertexts and skimming techniques pose distractions, impeding digital text comprehension and recall.

To expound on the improvement of students' creativity and outlook, the use of electronic media enables the student to engage in learning activities and gain confidence and attention, thus, producing a positive result on their academic performance ⁽³⁴⁾.

There are also findings that show digital learning has better outcomes and improved motivation ⁽³⁵⁾. Known as the process of applying digital media to learning, it is not limited to digital materials; it includes network- and computer-based learning, virtual classrooms, and digital cooperation. The probable increase in people preferring digital media over traditional prints may be mainly due to format medium, in which it is easier to adjust the visual settings ⁽³⁶⁾.

The patronage of mobile devices such as cellular phones, tablets, and iPads can enhance educational outcomes and serve as better platforms for students ⁽³⁷⁾. Development and innovation of tablets provide a multitude of choices for self-directed learning. Such instances include students who stay engaged in mathematics longer, hence the quicker task execution.

Barriers to adapting are mainly technical, which include errors and delays concerning the device's operating system (OS) and application

updates, software bugs, device management and administration, and internet connectivity ⁽³⁸⁾. Pedagogical issues are also considered. These involve classroom discipline around the devices, budgetary restrictions, training to understand and learn the applications, how to use the devices effectively in lessons, and how to administer the lessons and evaluation methods.

Considering the present trend of online and distance learning, the major contributing factors for the failure of students are the unfamiliarity of the study system and difficulty in the transition from conventional classroom-teaching to self-learning ⁽³⁹⁾. Students are inclined to pursue the proper study program befitting their personalities and habits. Solutions involve educators who can encourage students to have continuous, untiring commitment and self-motivation to arrive at the academic performance they wish to attain.

Mobile learning improves not only academic performance, but also motivation and attitude towards distance learning ⁽⁴⁰⁾. Cognitive overload is only one of the factors that may have a negative effect on academic performance or achievement. There have also been cases documenting that comprehension and assessment is much improved when the materials of instruction are the traditional conventional ones, rather than the digital ⁽⁴¹⁾. As to whether these differences are significant, however, is not yet analyzed.

Kinesthetic feedback generated by book manipulating has an impact on student learning outcomes, although the significance of which is not yet analyzed ⁽⁴²⁾. Reading time, level of engagement, word and sentence recognition scores and recall do not yield differences between media. However, the ability to correctly reconstruct temporal and chronological aspects of reading are better in paper readers. Paper readers can localize events in the story and have a more coherent

situation of the chronology of the story. In fact, learning capacities largely depend on the way information is received. Others would maintain that the use of textbooks is associated with better results in many aspects. Paper-readers have better memory function, longer attention span, faster processing speed, and even better mathematical and writing skills.

Despite these assertions, it is emphasized that learning is ever evolving, and further studies should be conducted to ensure that future generations are receiving and utilizing what can positively affect their cognitive skills and their academic performance ⁽⁴³⁾.

As for the neurological effects, brain activations related to memory, visual imagery, and language during the retrieval of specific information—as well as the deeper encoding of that information—are more evident and stronger in participants who take notes on paper than on electronic devices ⁽⁴⁴⁾. The use of a paper notebook affects high-order brain functions which could have important implications for education especially in these times of e-learning.

Questionnaire

PSS-10

The Perceived Stress Scale (PSS) is widely used to assess the degree to which situations in one's life are appraised as stressful ⁽⁴⁵⁾. As a global stress measure, the PSS items are general in nature rather than event specific. They evaluate the extent to which individuals perceive their lives to be "unpredictable, uncontrollable, and overloading". Respondents rate the frequency of their feelings and thoughts about life events and situations over the previous months using a five-point scale ranging from Never (0) to Very Often (4).

Scores on the PSS-10 demonstrate adequate internal consistency reliability ($\alpha = .78$). It also has moderate concurrent criterion validity

with the amount of stress experienced during an average week ($r = .39, p < .001$) and the frequency of stressful life events within the past year ($r = .32, p < .001$); and has adequate convergent validity as evidenced by expected negative associations with perceived health status ($r = -.22, p < .001$), positive associations with psychosomatic symptoms ($r = .28$ to $.34, p < .001$) and health service utilization ($r = .22, p < .001$).

Since then, other studies have similarly reported that the PSS-10 has good internal consistency reliability and adequate convergent validity based on associations with measures of physical and mental health.

Academic Reading Format International Survey

The Academic Reading Format International Survey (ARFIS) was initially developed and used on UCLA undergraduates to determine their reading format preferences. It was developed as an online survey of 22 questions based on student comments and findings by studies done previously by the author. It was piloted, refined, and extended by its authors into 16 Likert-style statements, six demographic questions, and an open-ended qualitative prompt for comments. The questionnaire was used further in a two-stage global survey in 2017 with 10,293 tertiary students in 19 countries as part of the first stage study. It aimed to determine if there are differences between countries that could influence preference for a particular format for academic reading as well as the learning engagement behaviors of students. Subsequently, it was followed by a second stage survey with a combined result of 21,266 students in 33 countries done in 2021.

The questionnaire has three dimensions: (1) format preference, (2) learning engagement, and (3) language. The demographic part asks about origin, gender, age, visual limitations, academic major, and academic rank of the respondent. Each question is offered responses including Strongly

Agree, Agree, Disagree, Strongly Disagree, and Neither Agree nor Disagree and a space for any explanation for the answer. The instrument also includes one statement that allows multiple answers regarding the devices that participants use for electronic academic reading. Opposing questions are written with avoidance of use of double negatives and slightly different terminology that are intended to limit redundancy and length in order to maximize the number of complete answers.

Each item in the scale contributes to a higher Cronbach's alpha for the scale except for one statement: "I like to make digital copies of my printed course materials" which was internally inconsistent ($r = 0.202$). After dropping said item, dimension 1 and 2 (format preference, learning engagement) has an overall alpha scale of 0.882 across 12 items and corrected item-total correlations range from 0.391 to 0.711. For dimension 3 (language), the first two statements do not correlate particularly well with each other so was dropped and the study focused on the third statement ("My preferred reading format. . depends on the language of the reading") instead as a stand-alone indicator⁽⁴⁶⁾.

Conceptual Framework

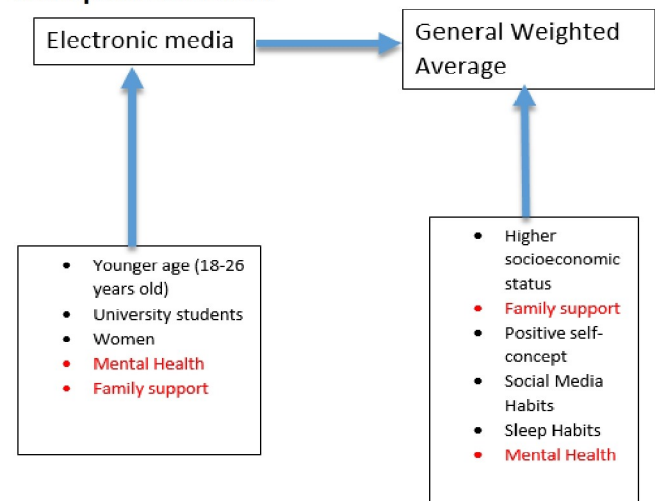


Figure 1. A conceptual framework of the study, depicting the confounding variables possibly affecting the disease (electronic media) and outcome (GWA) variables.

Significance of the Study

The emergence of a new learning set-up prompted the need for changes in medical students' learning styles to adapt. Universities were closed; libraries and possible sources of printed materials were limited. Additionally, technological advancements have led to the versatility of the internet and gadgets when it comes to aiding in education. However, there still exist students whose learning styles dictate their ease with the use of printed materials, as opposed to the digital ones.

Despite this, there exists lacking evidence of the superiority of one mode of learning over the other, especially among medical students. Their source of knowledge comes not only from text but also from visual aids due to their need to develop their clinical skills. For some, descriptive text is more effective; for others, information is better retained when they see the actual methods and procedures.

Considering these, this study aims to provide information as to which mode of learning provides a higher general weighted average (GWA): the use of printed material or electronic material. Specifically, it caters to experiences of 1st to 3rd year medical students of CEU Manila. Only the GWA from the 1st semester AY 2021-2022 will be considered for uniformity of available data.

Research Objectives

General Objective:

To compare the effectiveness of the use of electronic media and printed media in obtaining a higher general weighted average (GWA) among 1st to 3rd year medical students at Centro Escolar University, AY 2021-2022

Specific Objectives:

1. To determine the proportion of 1st to 3rd year medical students who prefer the use of electronic media and printed media in studying

2. To compare the general weighted average of 1st to 3rd year medical students who use
 - a. Printed media
 - b. Electronic media

METHODOLOGY

a. Research Design

The researchers will utilize a cross-sectional research design in which the exposure and disease status occur at one point in time. From the data that will be gathered, a prevalence ratio will be computed and will be expressed in percentage. The independent variables include electronic media and printed media, the dependent variable will be the GWA, and the confounders will be mental health problems and family support.

b. Schematic Diagram

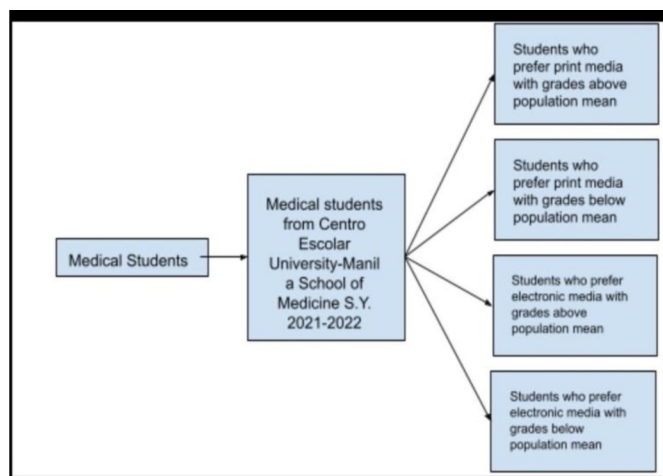


Figure 2. A schematic diagram of the study indicating a visual representation of its proposed methods.

c. Study Population

i. Source

Medical students of Centro Escolar University

ii. Selection Criteria

a. Inclusion Criteria

CEU-SOM students currently enrolled full-time as regular

attendees of A.Y. 2021–2022 will be included in the study. They should have the complete number of units for the year level they are in—YL1 = 40 units; YL2 = 40 units; and YL3 = 40 units.

b. Exclusion Criteria

Excluded from the study are students who cannot be categorized into print or electronic media users or those who use both types of study formats equally. Furthermore, students who acquire a score of 35 and above on the PSS–10 questionnaire and students with part-time jobs are also excluded from this study.

iii. Sampling design

Stratified Random Sampling

This sampling design will be utilized to ensure that the sample is evenly distributed among year levels, opting to arrange the stratum by year level. Age is also a factor that influences the type of media being used, and it is assumed that age increases with year level. The researchers chose probability sampling to ensure that any unknown or undefined confounding variables' influence on the outcome can be reduced.

iv. Sample Size

The researchers used the finite equation to compute the sample size. The total population of CEU–SOM first year students to third year students is 187. From the total population, the total sample size calculated was 127.42. The researchers added 10% more to the sample size, arriving at the final sample size of 140. 25 participants will be taken from the first-year students, 58 from the second-year students, and 57 from the third-year students.

D. Variables and Measurements

i. Operational definitions of variables

Dependent/Disease Variable: General Weighted Average (GWA)

It is a numerical representation of the overall scholastic standing of students and is used for evaluation. It is based on the grades in all subjects taken, whether passed or failed at a particular level, and the corresponding number of units of each class. It serves as the indicator of a student's academic performance in a given semester or school year. Educators typically measure academic performance based on a student's achievement in the classroom, including results from standardized examinations.

Independent/Exposure Variable: Electronic Media, Printed Media

Electronic Media

It refers to the type of media that utilizes electromechanical devices to access and view content. This type of media comprises aural and visual signals that are converted into electrical impulses. Electronic media includes screen-based activities such as computer, tablet, and smartphone use, electronic video games, and television viewing. Based on the scoring of the ARFIS questionnaire, a median of 1, 1.5, 2, and 2.5, will fall under electronic media preference of studying.

Printed Media

This is any written or pictorial form of communication produced through printing, photocopying, or digital methods from which multiple copies can be made through automated processes. More strictly, it is any form of 'ink and paper' communication that may be hand-written or reproduced—including handwritten lecture notes, books, circulars, journals, lithographs, memos, magazines, newspapers, pamphlets, and periodicals. Based on the scoring of the ARFIS questionnaire, a median of 3.5, 4, 4.5, and 5 will fall under printed media preference of studying.

Confounding Variables

Mental Health Problem

This refers to conditions that impact a student's thinking, emotions, and mood such that it interferes with memory and concentration or interferes with daily functioning at home and school. Perceived symptoms such as lowered mood, reduced cognitive function, lack of a sense of coping, lack of communication or interest in others, as well as lack of energy will be considered indicators of a mental health problem. Participants who have a total score of 35 and above in the PSS-10 will be considered as having a mental state that can predispose them to mental health problems and will be excluded from the study.

Family Support

This refers to the environmental, material, and emotional support that parents provide to their children. Environmental support includes creating a household environment conducive to learning by providing a quiet area and a clean, comfortable study space. Material support includes the provision of learning materials that the student needs and prefers, examples of which are books, printing machines, internet connection, and electronic media such as phones, tablets, laptops, and the like. Family members provide emotional support by verbal affirmations and encouragement, participating in solving learning difficulties, and allowing their children to freely express their negative and positive emotional experiences. Participants who have a total score of 35 and above in the PSS-10 will be considered as not having enough family support that can predispose them to problems in their academic performance.

ii. Data Collection Methods

a. Identified Data Collection Method

Records review will be the method to be used for the collection of GWA (General

Weighted Average). The researchers will procure the individual data sets, the GWA, from the existing database, the office of CEU School of Medicine. A school record review will allow the researchers to countercheck the information needed for the dependent variable of the research against the GWA of the respondents.

Preferred Medium

The self-administered questionnaire will be disseminated to conduct a survey and collect data on the independent variable which is the respondent's preferred medium of either electronic or printed medium. The questionnaire is patterned after ARFIS, initially developed, and used on UCLA undergraduates to determine their reading format preferences.

Mental Health and Family Support

The self-administered questionnaire will include the PSS-10 scale in consideration of the mental health and family support being received by each participant of the study. According to Baik et al. (2019), the PSS-10 scale is widely used to assess the degree to which situations in one's life are appraised as stressful. It also demonstrates psychometric properties which will serve as the basis for the exclusion criteria.

1. Formulation of pertinent documents for data collection

The questionnaire will be patterned after the PSS-10 and ARFIS. The technicalities, layout, and design of the Google Forms webpage will also be done during this phase. The email composition that will be sent out to the respondents will be formulated, as well as the consent forms that will

be filled out prior to the administration of the questionnaire.

Data collection tool

Preferred Medium

The Academic Reading Format International Study (ARFIS) questionnaire was developed, piloted, and validated in 2014. It has the objective of achieving a wider, more comparable, and more consistent data gathering method that pertains to learner reading format preferences among different contexts and over time. It will be used to classify the respondent's preferred medium. As stated, the preferred medium is considered as the study's independent variable.

Response choices to the Likert-style statements of the survey range from 5 (strongly agree) to 1 (strongly disagree). Median scores were calculated to categorize respondents' format preference. Statements that prefer print readings are scored as: Strongly Agree = 5; Agree = 4; Neither Agree nor Disagree = 3; Disagree = 2; Strongly Disagree = 1. For statements that inquire on how well they like or prefer e-readings, statements were reverse-scored.

Mental Health and Family Support

The Perceived Stress Scale (PSS) is a widely used measure that assesses the degree to which situations in one's life are evaluated as stressful. A shorter version, PSS-10, which will be used in this study, is derived from the original questionnaire without the items with the lowest factor loadings (items 4, 5, 12, 13). This questionnaire will be used to measure confounding variables identified by the researchers.

Respondents rate the frequency of their feelings and thoughts about life events and situations over previous months using a five-point scale ranging from Never (0) to Very Often (4) on a 10-item self-report measure of global perceived stress. A total score ranging from 0 to 40 is

computed by reverse scoring the four positively worded items and then summing all the scale items. Higher scores indicate greater levels of perceived stress. Subscale scores are computed by summing the six negatively worded items (Items 1, 2, 3, 6, 8, and 10) for Factor 1 (Negative) and the four positively worded items (Items 4, 5, 7, and 8) for Factor 2 (Positive), with higher scores indicating greater negative distress/stress feelings and greater positive stress feelings and coping abilities, respectively.

Type of Questions

Preferred Medium

The ARFIS questionnaire consists of 16 Likert-style statements, six demographic questions, and one multiple choice question. The Likert-style questions will also comprise a field for further comments or optional explanations of their response. The ARFIS questionnaire is utilized to investigate a particular type of reader with his or her own preferred engagement and preferences in academic reading. The questionnaire, however, will not only cater to items that focus on format preferences; some questions will ask regarding text engagement behaviors such as highlighting and annotating. It also consists of close-ended types of statements and added extra space in the event that the participants will provide qualitative answers. It also has one statement that allows multiple answers to choose from.

Mental Health and Family Support

The PSS-10 questionnaire is general in nature rather than event-specific. This 10-item instrument evaluates the extent to which an individual perceives his life to be "unpredictable, uncontrollable, and overloading" (Baik, 2017). There are two factors that have been identified in the questionnaire: the positive and the negative. This led to the proposal of a bifactor model of PSS-10 consisting of a single underlying general factor of perceived stress and two domain-specific factors

composed of negatively (Factor 1) and positively (Factor 2) worded items. It also consists of a Likert-style close-ended type of statements.

Mental health and family support being received by each participant of the study are the core information that will aid in generating the PSS-10 questionnaire. In this study, PSS-10 items will come first in the sequence of questions, followed by ARFIS items. This is done so that the flow of the questions will be from more general to more specific types.

Computer Software Used

The researchers will use Microsoft Excel, a spreadsheet program, to sort and calculate the data accurately. The measure of association between the research variables will be analyzed using the RxC contingency table run in the Statistical Package for Social Sciences (SPSS).

Ethical Considerations

Ethical Issues

The information and identities of the participants will not be disclosed to others outside the research team. Pre-selected members of the team will assign a control number to the participants and only they will have access to their name, student number, GWA, and answers, which will constitute the database available only in their personal Google drives. The participant's information will be kept private and deleted by June 2022.

The first part of the questionnaire requires the participants to answer questions relating to their important profile information relevant to the study. The researchers will then sort out the inclusion and exclusion criteria.

PSS 10 and ARFIS will comprise the second and third part respectively.

Should there be any specific questions that are too sensitive and personal for the participants to answer, such may be skipped.

This research study will benefit both the researchers and the participants. The participants will obtain a better understanding of their perceived stress level for the past month. This would likely affect their academic performance. Additionally, this study will shed light on the effectiveness and efficiency of their preferred reading format when studying as reflected by their academic performance.

This research is unfunded and will not provide any reimbursement or incentive for taking part in it. Further, the study design is such that there are no vulnerable populations involved.

The informed consent form (ICF) will be given to all participants in the selection process, and only those who will provide consent will be included. The inclusion and exclusion criteria that have been set will also be applied.

The researchers have no conflict of interest in any form (financial, proprietary, professional).

RESULTS

The researchers used Google forms to administer the questionnaires. Microsoft Excel and Google Sheets were used to accurately sort, tabulate, and calculate the data. The measure of association between the variables were analyzed using the RxC contingency table run in the Statistical Package for Social Sciences (SPSS).

A total number of 127 responses were calculated as an appropriate sample size for the study. The researchers added an extra 13 respondents to be recruited for a total of 140 CEU-SOM students. Of the 140, only 129 participated. 24 out of 25 students responded from YL1; 55 out of 58 students responded from YL2, and 50 out of 57

students responded from YL3. One respondent was excluded from the study because she exceeded a cut off-score of 35 on the Perceived Stress Scale (PSS-10).

Descriptive Statistics

Gender

Among 128 respondents, the majority were female (76.56%) (**Table 1**).

Table 1. Number (n) and percentage distribution among respondents based on gender.

	No. of respondents	Percentage, %
Female	98	76.56
Male	30	23.44

Age

In terms of age, as shown on **Table 2**, the majority of the respondents came from the 22-24 age group (n=85), followed by the 25-27 age group (n=35), and fewest from the age group 28-34 (n=7). The mean age is 24.4 with a standard deviation of 1.81. The median is 24, which means that half of the population is below 24. The most common occurring age is 23, which serves as the mode of the population.

Table 2. The number of respondents (n) corresponding to each age group. Also listed are the mean, standard deviation, median, and mode.

Age	n	Mean Age	SD	Median	Mode
22 – 24	85	24.4	1.81	24	23
25 – 27	35				
28 – 34	7				

Year Level

Students from YL2 composed the greatest number of participants. The least were from YL1. (**Table 3**)

Table 3. Number (n) and percentage distribution among respondents per year level

	n	Percentage, %
YL1	24	18.75
YL2	55	42.97
YL3	49	38.28
Total	128	100

Visual Impairment

Cases of visual impairment were reported by the respondents, as listed in **Table 4**. A total of 27 (21.09%) respondents reported visual impairments. As the year level increased, the number of respondents with visual impairments also increased. 5 were from YL1; 10 from YL2; and 12 from YL3. The most common complaints were astigmatism and eye strain.

Table 4. The types of visual impairments experienced and the number of respondents (n) experiencing such per YL.

	n	Types of visual impairments
YL1	5	- Astigmatism
YL2	10	- Eye Strain
YL3	12	- Others
Total	27	• Retinal Detachment • Myopia • Poor Eyesight • Visual Limitation/Disability

Commonly used Electronic Gadgets

Table 5 below gives details on the preferred medium for study. More respondents in both YL1 and YL2 preferred using laptops, followed by iPads/tablets, and phones. Electronic readers are seldom used.

On the other hand, the predominant gadget among YL3 students are iPads/tablets, followed by laptops, and phones. Media with audio are the least preferred. Additionally, only individuals belonging to YL3 answered none/never.

Taking the data as a whole, iPads/tablets (n=100) were the most used gadget among the 128 respondents. This was followed by laptops (n=97), phones (n=66), and electronic readers (n=7).

Table 5. Distribution of preferred digital medium per year level.

GADGET	YL1	YL2	YL3	TOTAL
Laptop	19	44	34	97
Desktop	7	12	7	26
iPad/Tablet	17	41	42	100
E-reader	3	0	4	7
Phone	15	30	21	66
Audio	4	6	3	13
Never/none	0	0	5	5

Preferred Medium

Gender

Out of the 128 respondents, 98 were females and 30 males. Out of the 98 females, 63 preferred using printed materials for studying, while only 35 used electronic materials. As for the male respondents, 18 used printed materials, while only 12 used electronic media (See **Figure 1** below). For both genders, printed material was the predominant preference.

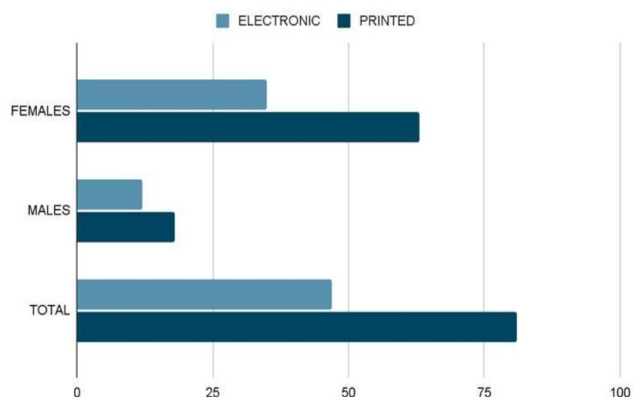


Figure 1. Preferred medium for study, for both genders.

Relationship of Gender and Preferred Medium

Based on the contingency table (**Figure 2**), the p-value=0.670, which is greater than the alpha value ($\alpha=0.05$) implies that the null hypothesis (H_0) was accepted, indicating that there was no significant difference between the gender of the student and their preferred medium when studying.

This was further supported by the $\chi^2=0.182$, which was less than the critical value of 3.841 (df=1), again indicating that the gender of the student and the preferred medium are independent of each other.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.182 ^a	1	.670
Continuity Correction ^b	.044	1	.834
Likelihood Ratio	.180	1	.671
Fisher's Exact Test			
Linear-by-Linear Association	.180	1	.671
N of Valid Cases	128		

Figure 2. A generated Chi-square test of independence (SPSS) between gender and preferred medium.

Age

Participants who are below median age (24) preferred printed media. This was also observed in participants who are above the median age. The mode in the ARFIS scale for both subgroups was 4, indicating preference for printed media.

Relationship of Age and Preferred Medium

Based on the contingency table (**Figure 3**), the p-value=0.778 is greater than the alpha value ($\alpha=0.05$), meaning H_0 is thus accepted, indicating that there is no significant difference between the age of the student and their preferred medium for studying.

Likewise, this is supported by the $\chi^2=6.427$ which is less than the critical value of 18.307 (df=10), so that the age of the student and the preferred medium for studying are independent of each other.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.427 ^a	10	.778
Likelihood Ratio	7.675	10	.661
Linear-by-Linear Association	1.381	1	.240
N of Valid Cases	128		

a. 15 cells (68.2%) have expected count less than 5. The minimum expected count is .36.

Figure 3. A generated Chi-square test of independence between age and preferred medium.

Year Level

Figure 4 below explains the distribution of the respondents per year level and their corresponding preferred medium. 14 out of 24 respondents of YL1, 34 out of 55 respondents of YL2, and 34 out of 49 respondents of YL3 claim they prefer printed media. On the other hand, 10 out of 24 respondents of YL1, 21 out of 55 respondents of YL2, and 15 out of 49 respondents of YL3 stated that they preferred electronic media. As a whole, more respondents from each year level preferred printed media. A total of 82 out of 128 of the respondents prefer printed media against a total of 46 chose electronic media as their preference.

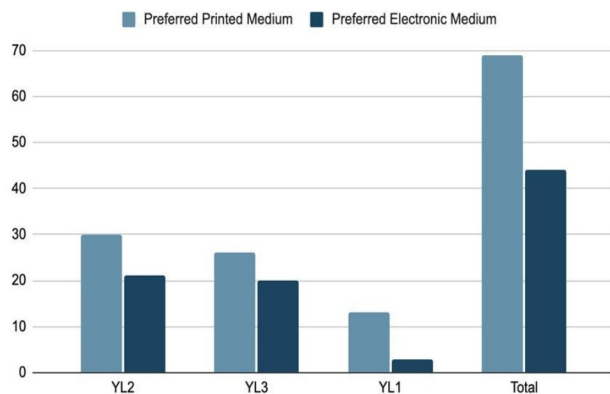


Figure 4. Bar graph plotting the distribution of respondents per year level and preferred medium

Relationship of Year Level and Preferred Medium

Based on the contingency table (**Figure 5**), we see that the p-value=0.587 is greater than the alpha value ($\alpha=0.05$). Hence, H_0 is accepted, indicating that there is no significant difference between year level and medium of preference when studying. H_0 is further supported by the $\chi^2=1.066$ which is less than the critical value of 5.991 (df=1). This is consistent with the finding that the YL of the student and the preferred medium for studying are independent of each other.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.066 ^a	2	.587
Likelihood Ratio	1.073	2	.585
Linear-by-Linear Association	1.004	1	.316
N of Valid Cases	128		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.63.

Figure 5. A generated Chi-square test of independence (SPSS) between Year Level and Preferred Medium

Characteristics of participants who preferred electronic media

Out of 128 respondents, 46 (35.93%) had a median scale of 2.5 or less in ARFIS, pointing to a preference for electronic devices while studying. The median score of this subgroup is 2. The 41 (32.03%) respondents from this subgroup had a score of 2 to 2.5, slightly leaning to neutrality, while 5 (3.91%) scored 1, suggesting a firm preference for electronic media.

Of this subgroup, 6 (4.69%) reported having visual impairment (versus 21.09% from the whole sample).

In terms of gadget preference, iPads/Tablets are the most preferred of this subgroup, which is the same as the most popular gadget from the whole dataset. Laptops also tied

with iPads/Tablets, followed by Phones in the electronic media subgroup.

Characteristics of participants who preferred printed media

In general, majority of the respondents preferred printed media for academic purposes. Out of 128 respondents, 82 (64.06%) had a median score of 3.5 or more in the ARFIS scale, which denoted printed media preference (**Figure 6**). To further describe the respondents who belong to the printed media group, the median scores of the whole subgroup was 4. There were 47 (36.71%) individuals who scored 4 or less, showing slight neutrality to their preferred media. 35 (27.34%) respondents scored 4.5 or more, showing firm preference for printed media. **Table 7** lists the breakdown of the median scores of the full subset.

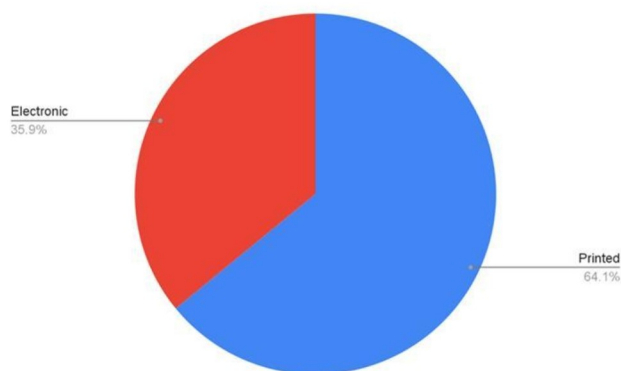


Figure 6. Distribution of Preferred Medium (n=128)

Table 7. ARFIS scores of respondents.

Median Scores	n	Frequency, %
1-1.5	5	3.91
2- 2.5	41	32.03
3.5-4	47	36.71
4.5-5	35	27.34
Total	128	100

Of this subgroup, 21 (16.41%) reported having visual impairment (versus 21.09% of the whole sample).

Gadgets used in this subgroup differed slightly from the full dataset. In the full dataset, the most popular devices were iPads/tablets, followed closely by laptops. This is also the trend in the printed subgroup. **Table 8** shows the reported gadgets used compared with the full subset.

Table 8. Gadget usage by preferred medium.

Gadget	All (n=128)	Electronic (n=46)	Printed (n=82)
Laptop	97	40	50
Desktop	26	10	16
iPad/Tablet	100	40	60
E-reader	7	2	5
Phone	66	25	41
Audio	13	8	5
Never/none	5	1	4

Academic Performance

Table 9 shows that out of the 128 respondents, 4 (3%) had 6 academic subjects with unsatisfactory grades. Going down the line, 5 students had 5 subjects with unsatisfactory grades, which comprised 4% of the total respondents. Those who had 4 subjects with unsatisfactory grades comprised 6% of the total respondents, numbering 8 students. For those who had a better academic performance, having less unsatisfactory grades, there are 7 (5%) that had 3 subjects with unsatisfactory marks. The total number of students who had only 2 unsatisfactory grades increased to 16 (13%). And following the same pattern, there are 31 students (24%) with only one unsatisfactory mark. Lastly, there are 57 students with no unsatisfactory grades, comprising 45% of the total number of respondents, a reflection of their school performance

Table 9. Distribution of number of subjects with unsatisfactory grade (Subjects with UNSATs)

Subjects with UNSATs	# of students	Frequency, %
6	4	3
5	5	4
4	8	6
3	7	5
2	16	13
1	31	24
0	57	45
Total	128	100

Measures of Association

Chi-square test for Independence

Figure 7 shows the distribution of grades relative to the preferred medium. Out of 57 students who did not incur any unsatisfactory grades, 21 (16.40%) of them are electronic media users while 36 (28.15%) are printed media users. For students who had incurred 1-2 unsatisfactory grades, 18 (14.06%) are electronic media users, while 29 (22.65%) students are printed media users. Further, for students with 3 or more unsatisfactory grades, 7 (5.46%) are electronic media users while 17 (13.28%) are printed media users.

Grade		Preference		Total
		Electronic	Printed	
0 Unsat		21	36	57
1 Unsat		10	21	31
2 Unsat		8	8	16
3 Unsat		2	5	7
4 Unsat		2	6	8
5 Unsat		1	4	5
6 Unsat		2	2	4
Total		46	82	128

Figure 7: Distribution of grades relative to preferred medium in crosstabulation (crosstabs) form.

Chi-square test for independence (SPSS) was applied to determine the relationship of these two variables. Based on **Figure 8**, with p-value=0.802 greater than the alpha value ($\alpha=0.05$), H_0 is accepted. This suggests that there is no significant difference between the use of electronic and printed media in obtaining a higher general weighted average among 1st to 3rd year medical students of Centro Escolar University - Manila, 1st semester, AY 2021-2022.

This is further supported by the $\chi^2=3.053$ which is less than the critical value of 12.592 (df=6), more proof that academic performance and the preferred medium for studying are independent of each other.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.053 ^a	6	.802
Likelihood Ratio	3.070	6	.800
Linear-by-Linear Association	.066	1	.797
N of Valid Cases	128		

a. 7 cells (50.0%) have expected count less than 5. The minimum expected count is 1.44.

Figure 8: Relationship of academic performance and preferred medium in Chi-square test for independence (SPSS).

Prevalence Ratio

Table 10 shows the distribution of the exposure relative to the outcome(or "disease") among the respondents. Exposure represented electronic media preference: the "without exposure" subgroup was printed media users. Outcome represented the presence of unsatisfactory grades regardless of number; those "without outcome" were respondents who did not incur a single unsatisfactory grade.

A prevalence ratio of 0.97 was interpreted as having no association between the outcome and exposure. This finding is similar to the previous chi-square test mentioned above, revealing that

preferred medium and academic performance have no association with each other.

Table 10. Distribution of respondents in relation to exposure and outcome

		Outcome		Total	Ratio
		With	Without		
Exposure	With	25	21	46	0.543478
	Without	46	36	82	0.560976
Total		71	57	128	0.968809

DISCUSSION

The literature involving the dichotomy of electronic versus printed media in so far as academic performance is concerned has conflicting results. Studies in relation to such showed no significant difference in academic performance among those using electronic media and those using the printed version. This suggests that electronic media can be a feasible option in learning. These studies were conducted with similar study populations, but were held in various foreign settings^(31, 32, 46).

By way of contrast, there are findings suggesting that electronic media produced better effects on learning motivation and outcome. However, these studies did not specify the demographic information of the respondents. Dissimilar sample populations may strikingly produce variations with the results⁽³⁵⁾. Moreover, one study presented a systematic critical review of papers concerned with digital text use in education. Results showed positive results on academic performance. However, since the electronic media was not juxtaposed with printed media, it was not established which among the two yielded a more significant impact on academic performance⁽³⁴⁾.

Another noteworthy information in previous literature is that results verified a relationship between age and preferred medium. However, it is possible that the differences observed between age and preferred medium were brought about by the variations in the study population and their motive for reading. Digital format understandably appears to be widely accepted by the younger segments, while printed formats are preferred more by the older population. However, the setting of the study was done in the context of reading for leisure and not for academic purposes⁽⁴⁾. This is in contrast with our study which focuses more on the latter and consists primarily of students wherein age had no effect on the preferred medium of reading materials.

The aim of this study is to determine the proportion of medical students who prefer using printed as against electronic media while studying. Studies have already been done to investigate the preference for utilizing a specific instructional medium while studying. This present study shows that 35.93% of the participants preferred the use of electronic media, which is higher compared to the original study of ARFIS, which revealed 10.04% of the same subgroup only⁽⁴⁶⁾. Conversely, a study showed 61% of the student participants perceived the use of e-books as an easier medium to use for research than printed materials⁽⁵⁾. In the same study, however, the preference of using both media when gathering information is the highest (44%) while the use of printed media only (34.5%) scored higher than the use of e-books only (21.5%).

Parallel to the results of this study, a research regarding Indonesian education concluded that electronic media has begun to take over printed media. Nevertheless, the role of printed media continues to dominate their education system given the situation in geographically remote areas of their country⁽⁴⁷⁾.

Possible explanations for printed media preference had been explored by other studies; It was stated that the lack of awareness on the availability of e-books affected the results of higher printed media preference ⁽⁴⁸⁾. While this may still be acceptable, with continuous technological developments and access to information, such is less likely to be a factor in the near future. In the same study, readability, ease of use, and portability were the top reasons for the students' preference of printed materials, and these may also be the same factors that could influence the outcome of this current study.

Other features may also be relevant regarding the effect of instructional media preference on academic performance. One study suggested that "the use of paper notebook promoted the acquisition of rich encoding information and/or spatial information of real papers", the reason why the duration is shorter, and accuracy is higher in writing down schedules using paper notebook compared to electronic tablet or smartphone ⁽⁴⁴⁾. Another explanation regarding the preference for printed media stated a higher risk of gadget addiction which may disrupt the process of getting higher academic grades ⁽⁴⁹⁾. Despite these reports, the results of this present study showed that academic performance and the preferred medium for studying are still independent of each other.

Although electronic media has its practicality and ease of use, it has been emphasized that respondents may still prefer the traditional way of studying due to a sense of familiarity in being able to hold the material. The use of textbooks to provide kinesthetic feedback is thought to be associated with better studying results with details like better memory function, longer attention span, faster processing speed, and even improved mathematical and writing skills⁽⁴³⁾.

Most of the hindrances to adopting electronic media may also have to do with technical aspects in their use, such as navigating the device's operating system, management, applications, bugs, and internet connectivity. Pedagogical issues such as discipline around devices, training to operate and learn the applications, and utilizing devices in lessons are also of concern ⁽³⁸⁾. Another explanation states that even with the present trend of online learning, students are unfamiliar with the study system and have difficulties in transitioning from traditional learning ⁽³⁹⁾. As high as 64% of subjects have also reported that they perceived the attention to and retention of information better in printed media.

The COVID-19 pandemic may have also influenced increasing gadget use today. In one study, students in higher education consider social media as useful for collaborative learning during this period ⁽⁵⁰⁾. Even with the above-mentioned studies, an increasing trend with electronic media use cannot be determined accurately, but it is still remarkable that the proportion of electronic media users of this study is higher than that of the pioneer research that used ARFIS.

Practical implications of academic performance and preferred medium occurring independently on shifting to an online or blended academic set-up, which relies on electronic media, should be studied more in depth. The researchers maintain that learning is ever evolving and further studies should be conducted to ensure that future generations are receiving and utilizing what can positively affect their individual cognitive skills and hence, their scholastic achievements ⁽⁴³⁾. Competing concerns such as comfort, readability, usability, and perceived learning and focus, versus the costs and convenience of e-formats, demonstrate that neither medium is categorically superior in all contexts ⁽⁵¹⁾.

Although the preferred medium has no influence on academic performance, several factors may be considered to have a direct relationship with the latter –such as socio-economic status, family, sleep habits, and mental health.

As regards socio-economic status, families with a higher socio-economic level help children attain a positive self-concept, which in turn leads to enhanced academic performance ⁽²⁰⁾. Families with parents belonging to higher levels of completed education have progressive parenting styles and are found to be more knowledgeable on approaching and addressing problems that arise in their relationships with their children, who then are able to have more significant accomplishments.⁽²²⁾

Adequate sleep habits also contribute to efficient learning and memorization skills ⁽²⁷⁾. Added to this, mental health seems to have a bearing on this notion. Symptoms of depression show some association with the student's poor academic performance, although, it is not yet known how exactly these can be quantified ⁽²⁸⁾. Despite these factors being mentioned, they were not substantially explored in the study.

Even with the overwhelming preference for printed media in various papers, one must not discount the advantages of using online learning. This was identified by Filipino medical students in a separate study, which enumerated improved accessibility of information, ease of standardizing and updating content, cost-effectiveness, accountability, and enhancement of the learning process ⁽⁵²⁾. Besides, a study conducted with Filipino senior high students as respondents concluded that the use of electronic gadgets were “very effective” and that the study habits of those who participated in the study were deemed to be “very good” ⁽⁵³⁾.

With all that said, one must not ignore the barriers of online learning in the Philippines. Filipino medical students encountered problems with poor internet connection, limited access to gadgets, and lack of study space. Students also experienced low morale, difficulty in concentrating, and other socioeconomic factors ⁽⁵²⁾.

Limitations of the Study

This study only covered the preferences of CEU-SOM students from YL1 to YL3. Additionally, only regular students enrolled with the standard number of units per year level were considered, so that academic requirements remain constant. This kept the sample population at a modest number of 128 students.

The study was conducted over the period of January to June 2022, during the online set-up because of the COVID-19 pandemic. The respondents adhered to this arrangement, attending classes in the safety of their homes.

While the results of this study may be construed as true, its reliability would be better established had triangulation been performed along with other populations of similar characteristics. This should further strengthen the outcomes and assure the repeatability of the methods ⁽⁵⁴⁾. Given this, the results cannot be readily extended to a broader cohort of medical students.

In the process of determining relationships, it was found out that there was no significance between the variable components considered (age, gender, year level) and the study medium of preference. This could be correlated to the limited sample pool and the differences in individual set-ups when it comes to online classes. Aside from this, the study does not claim to be exhaustive when it comes to other underlying factors that may play a role.

The initial plan for this study was to use the numerical grades of the students acquired within the 1st Sem S.Y. 2021-2022. Since such was not yet available as of this writing, the data gathered were limited to the qualitative report of partial grades (either Satisfactory or Unsatisfactory). If ordinal values (GWA) had been used instead, the researchers could have been better able to distinguish the variability among the respondents' performances. This would improve the reliability of Pearson correlation-derived analyses ⁽⁵⁵⁾.

Conclusion

The transition from traditional learning to online learning was abrupt and unprecedented. Before the pandemic, very rarely were medical schools in the Philippines reliant on online learning methods and materials. There was a growing concern among medical students regarding the challenges that come with virtual or remote modalities. These concerns ranged from a simple technical navigation and usage of electronic media to the more pedagogical aspects, such as exercising discipline around gadgets and educators incorporating online teaching methods. One of the components of online learning explored in this study was the use of electronic media (e.g., audio, phones, and laptops) as an alternative to the more familiar printed media (e.g., textbooks) used in the academic setting.

The study's general objective was achieved as results have shown that the preference of one medium does not show any academic advantages among YL1 to YL3 medical students. Other factors that could have an impact were not determined in this study. This finding can serve as an understanding that learners are able to adapt and shift to online mode which relies on gadgets to achieve learning outcomes. This type of learning comes with advantages such as time management, comfort, and accessibility. Educators and institutions should incorporate

electronic media and subsequently online learning to develop practicable teaching strategies as an alternative or adjunct to traditional learning to maximize the advantages of both learning modalities.

The specific objectives were also achieved as the demographic profile of the medical students in the context of preferred medium was ascertained. The study results were congruent with results from the Academic Reading Format International Study, the largest investigation of university students' behaviors towards preferred format of academic materials. Both studies showed that respondents were predominantly printed media users.

Recommendations

This study may be considered preliminary and introductory which, eventually, may be expanded to several more advanced phases. Given current physical distancing measures imposed during the pandemic when the study was being developed, there were limitations with recruitment and thus, a relatively small sample of medical students available for the survey. A comprehensive dataset in the future can involve multiple medical schools as study sites in order to capture a wider and broader representation of the Filipino medical students' preferences and its relationship with academic performance.

Controlled academic settings such as a subgroup of students strictly enrolled solely in online learning and a counterpart subgroup strictly enrolled solely in traditional learning, could also serve as a more precise estimation of correlation. This may be more conclusive in terms of determining actual effectiveness of online learning in achieving successful outcomes.

Lastly, the use of GWA as an evaluation for academic performance could be implemented in

future studies to reflect a quantitative analysis of the effectiveness of the preferred medium or academic setting.

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