



## TECHNOLOGY PROFICIENCY AND SELF-GENERATED COMPUTERIZED MIND MAPPING OF STUDENTS AS MEDIATED BY INFORMATION LITERACY COMPETENCE

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### **Abstract:**

This study aimed to determine the mediating effect of information literacy competence on the relationship between technology proficiency and self-generated computerized mind mapping of students from accredited programs in the University of Mindanao Professional Schools. Stratified random sampling was used which included 334 students as respondents. Three adapted instruments were used to gather the data from the respondents. The researcher personally supervised and administered the questionnaire to the respondents via email to ensure accuracy and prevent ambiguity. The tools used in analyzing the data were Mean, Pearson r, Regression Technique and Path Analysis. Results showed that students posted a very high level of technology proficiency, also a high level of self-generated computerized mind-mapping, and a very high level of information literacy competence. Findings also revealed that there is a significant relationship between technology proficiency and self-generated computerized mind mapping, technology proficiency and information literacy competence as well as information literacy competence and self-generated computerized mind mapping. There was a partial mediation on the effect of information literacy competence on the relationship between technology proficiency and self-generated computerized mind mapping. Therefore, information literacy competence is one of the reasons how technology proficiency can influence self-generated computerized mind mapping.

**Keywords:** library and information science, technology proficiency, self-generated computerized mind mapping, information literacy competence, multiple regression, mediation, Philippines

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## 1. Introduction

Students continue to get incorrect information despite today's diversified technology, which provides young people with unparalleled access to tools and resources for learning. People who do not use mind maps are more likely to be anxious and deemed disorganized. They probably have difficulties remembering all they are expected to accomplish daily. They frequently feel as if they are being torn in two ways (Mind Mapping Site, 2018). As a result of the attaining reading achievement, Kusmaningrum (2016) found that students were uneasy about finding ideas and determining the points generated in mind-mapping. It was implicated that having poor self-generated computerized mind mapping has negatively affected students' reading comprehension achievement.

On the one hand, most students indicated that utilizing mind-mapping in learning helped them enhance their writing more than their reading. For English instructors, mind-mapping as a learning tool can be a valuable alternative to traditional methods of teaching reading and writing. Research shows that the brain prefers to operate by association. Every thought, memory, or piece of information will be linked to tens, hundreds, or even thousands of other ideas and concepts. Students may already link their brains with anything by using color schemes, characters, and symbols, making learning even faster. This is why mind maps may be used for a wide range of tasks. Self-generated computerized mind mapping has an outstanding contribution and significance for students as it simplifies the extraction of ideas from their heads into something visible and structured. It is also significant because it harnesses techniques that are truly effective in increasing our thinking abilities, enhancing creativity, and improving memory (Cunnah, 2020; Kusmaningrum, 2016; Melton, 2017).

Given the nature of self-generated computerized mind mapping, the researcher conducted an extensive review of the literature and discovered that various studies had linked technology proficiency to self-generated computerized mind mapping. There is a significant link between technology proficiency to self-generated computerized mind mapping among students (Karim, 2018; Aydin, 2013). According to these authors, technologically assisted mind mapping techniques substantially improved students' writing attitudes. It is reasonable to conclude that students' technology proficiency and self-generated computerized mind mapping have a beneficial impact on their conceptual understanding. Additionally, a study conducted by Hinchiffe (2003) revealed that technology proficiency and information literacy competence are significantly correlated. It found a positive correlation between the two variables. The impact of technology proficiency on the concept of information literacy in libraries was significant enough to warrant a section in the introduction to the Information Literacy Competency Standards for Higher Education that distinguishes information literacy from information technology or computer literacy. Moreover, academic librarians frequently use maps as visual aids to teach library research procedures and information literacy skills since they may help students grasp otherwise complex operations (Beavers, 2014).

While studies correlate the three variables mentioned above, those were conducted in foreign settings. However, the researcher is unaware of any comparable studies conducted in the local area. Despite comprehending the impact of technology proficiency and self-generated computerized mind mapping, there is still a need to frame their skills, strategies, and dispositions essential to successfully utilize and adapt to the fast-changing technique of technology proficiency. Concerning the underlying issues of information literacy competence, technology proficiency, and self-generated computerized mind mapping, the researcher was interested in determining the impact of technology proficiency and self-generated computerized mind mapping of students using information literacy competence as a mediator and indicators explored. Thus, this study contributes to the generation of new knowledge for future researchers and can contribute to students in higher education.

## **2. Research Objectives**

The purpose of the study was to determine the mediating role of information literacy competence on the relationship between technology proficiency and self-generated computerized mind mapping. Specifically, the study sought to answer the following objectives:

1. To describe the level of technology proficiency in terms of:
  - 1.1 Email;
  - 1.2 World Wide Web;
  - 1.3 Integrated Applications; and
  - 1.4. Studying with Technology.
2. To ascertain the level of self-generated computerized mind mapping in terms of:
  - 2.1 Educational benefits;
  - 2.2 Enjoyment;
  - 2.3 Usability in future tasks; and
  - 2.4 Benefits for the brain and nerves.
3. To measure the level of information literacy competence of the students.
4. To establish the significance of the relationship between:
  - 4.1 Technology proficiency and self-generated computerized mind mapping;
  - 4.2 Technology proficiency and information literacy competence; and
  - 4.3. Information literacy competence and self-generated computerized mind mapping.
5. To determine the significance of the mediation of information literacy competence on the relationship between technology proficiency and self-generated computerized mind mapping.

### **2.1 Hypothesis**

The following null hypotheses were formulated and tested at a 0.05 level of significance:

1. There is no significant relationship between:
  - 1.1 technology proficiency and self-generated computerized mind mapping;
  - 1.2 technology proficiency and information literacy competence; and
  - 1.3 information literacy competence and self-generated computerized mind mapping.
2. The information literacy competence has no mediating significance on the relationship between technology proficiency and self-generated computerized mind mapping.

## **2.2 Theoretical Framework**

This study was based on Vygotsky's theory, emphasizing the learner's collaborative nature of much learning. Vygotsky's (1978) Social Constructivism Theory emphasized that learning did not simply comprise the assimilation and accommodation of new knowledge by learners; instead, it was the process by which learners integrated into a knowledge community. It is the main theoretical base for information literacy.

This study is supported by the proposition of Crone-Todd (2002), who stated that new knowledge and meaningful learning results when a person consciously and explicitly ties new knowledge to relevant concepts and propositions already possessed. It gives learners the opportunity for concrete, contextually meaningful experiences to search for patterns, raise their questions, and construct their own needs.

Karim's (2018) proposition asserted that the online mind mapping approach could assist students in writing a literary work. As students grow increasingly skilled at creating and molding more complicated ideas for writing, computerized mind mapping can help them develop creativity and critical thinking skills. Compared to students who did not utilize mind mapping, computerized mind mapping provided the same advantages for low- and mid-proficiency writers. Indeed, employing technology, in general, will aid in the teaching and learning process, particularly for contemporary students who have a strong interest in information and computer technologies (Adnan, Ilias, Ramalingam & Mt Tahir 2012; Adnan & Zamari, 2012a; Al-Jarf, 2009; Liu, 2011).

In addition, the impact of mind mapping on the student's reading success significantly relates to their information literacy skills. It suggests that the student's use of maps as visual aids to use library research procedures and information literacy abilities correlates to their information literacy competency. Further, mind mapping is a technique that may be included in the technique arsenal while teaching information literacy (Erasmus, 2015-2017; Goldberg, 2004; Wright, 2006).

This study is also anchored on the proposition of Liu (2011) that computerized mind mapping exhibited the same advantages for both low and mid-proficiency writers compared to students who did not utilize mind mapping at all. Students with a high level of writing competence did even better when given the room and opportunity to develop personalized mind maps.

Furthermore, Budd's (2004) proposition emphasized that computerized mind mapping is an excellent tool for helping students connect concepts more efficiently.

Dominic (2014) suggests that instead of constructing a mind map on paper, one method is to use mind mapping software that allows learners to alter and reconstruct the map.

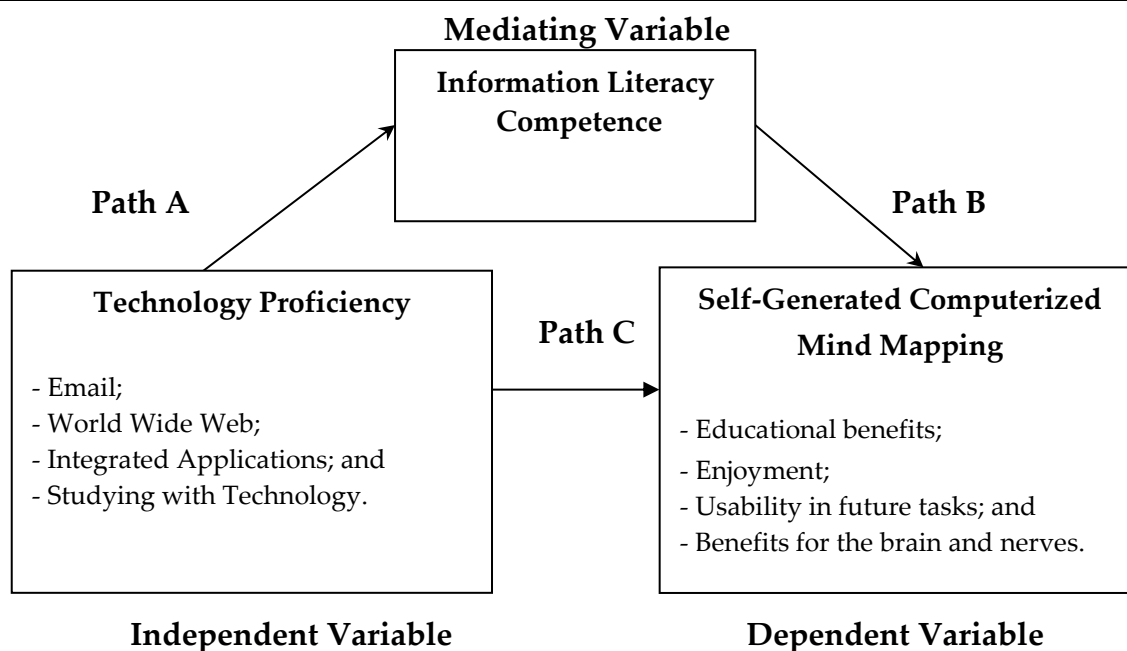
### **2.3 Conceptual Framework**

Shown in Figure 1 is the conceptual framework of the study. The independent variable focuses on the Technology Proficiency as reflected by the indicators, which are as follows: Email, World Wide Web, integrated applications, and teaching with technology. The email refers to students' capacity to explore and maintain files synchronously. World Wide Web refers to how students can use the Internet as a search engine and locate primary sources of knowledge. Integrated applications refer to the appropriate use of a computer to navigate between programs. Teaching with technology refers to the understanding and competence of using technology as a learning approach (Christensen & Knezek, 2015).

The study's dependent variable is Self-Generated Computerized Mind Mapping, measured in terms of educational benefits, enjoyment, usability in future tasks, and benefits for the brain and nerves. Educational benefits refer to enhancing students' learning and outputs in a more appealing manner; enjoyment refers to students' happiness and enjoyment from working on mind maps; usability in future tasks refers to the efficacy and efficiency of using mind maps; while mind maps have benefits for the brain and nerves in terms of retention and branching out of ideas, and helping to organize them (Sabbah, 2015).

The mediating variable is Information Literacy Competence. It refers to the capacity to express the extent of information required by evaluating its reliability and the credibility of its source, and the ability to comprehend and use the best search keywords and search methods effectively and efficiently with comfort and confidence (Igbinovia, 2016).

A mediating variable is a variable that is in the middle of a causal chain and an outcome. It also tries to calculate how a variable influences the impact of X and Y. The outcome is seen to be caused by a mediator, not the other way around. Typing to understand the mechanism via which the initial factors impact the outcome is one motivation for evaluating mediation (Baron & Kenny, 1986). Information literacy competency may act as a mediator regarding variances in technological proficiency and self-generated computerized mind mapping on students' reading success. The direct relationship between technological proficiency and self-generated computerized mind mapping is no longer substantial—the differences in information literacy competence account for considerable variances in self-generated computerized mind mapping.



**Figure 1:** The Conceptual Framework Showing the Variables of the Study

Furthermore, when a variable fulfills the following criteria, it can act as a complete mediator: variations in the independent variables' levels account for a large portion of the variability in the presumed mediator, variations in the mediator account for large variations in the dependent variable, a previously significant relationship between the independent and dependent variables are no longer significant when both independent and mediating factors present in the model, and when the direct path is zero (Baron & Kenny, 1986).

Technology proficiency and self-generated computerized mind mapping are shown in the figure below as interdependent variables in Path C. At the same time, technology proficiency and information literacy competence are depicted as mediating variables in Path A. Information literacy competence and self-generated computerized mind mapping are also shown as interdependent variables in Path B (mediating variable and dependent variable).

### 3. Methods

#### 3.1 Research Design

This study used mediation testing to investigate the relationship between three variables: information literacy competence, technological proficiency, and self-generated computerized mind mapping. Mediation analysis was used to examine and understand how a mediator variable influenced variable X over variable Y (Cohen et al., 2003). When the independent and dependent variables appear unrelated, this allows for a better understanding of the relationship between variables.

Further, a mediating variable (information literacy competency) is a variable that lies between two independent causative factors (technology proficiency) and an outcome

(self-generated computerized mind mapping). Its goal is to simulate how the influence of X (TP) on Y (SGCMM) is affected by a variable Z (ILC) (Baron & Kenny, 1986). MacKinnon (2012) also described that the mediator variable intercepts the direct connection between variables X and Y, giving insight into the nature of variable X's connection on variable Y, rather than variable X having a direct causal relationship link over variable Y. In other words, information literacy competence (ILC) diverts the direct relationship between technological proficiency (TP) and self-generated computerized mind mapping in the context of this study (SGCMM).

### **3.2 Research Locale**

The study was conducted in the Davao Region, designated as Region XI, one of the regions of the Philippines located on the southeastern portion of Mindanao, particularly within the University of Mindanao, Matina Campus. As the largest campus in Mindanao, UM is a 28-hectare lot encompassing the Matina area going up to Ma-a. It is convenient for most forms of commute, access to commercial establishments, and the like. Enrolment increased right at the main campus at Bolton Street in the heart of Davao City.

UM is known for its autonomous status and various accredited programs, which can be found in the heart of Davao City. As shown in Figure 2, it is bounded on the North by the CARAGA region, on the east and south by the Philippine Sea, on the west by Bukidnon and SOCCSKSARGEN Region. UM is part of Davao Region that consists of five provinces, namely Davao de Oro, Davao del Norte, Davao del Sur, Davao Occidental and Davao Oriental. Its capital is the City of Davao.

The inclusion criteria observed in the selection were the accredited programs of the UM Professional Schools. UMPS comprises forty-seven (47) programs – 37 programs for Graduate Studies and ten (10) programs for Postgraduate Studies. It comprises 32 accredited programs wherein a survey questionnaire administered was randomly selected.

Learners and educators perceived self-generated computerized mind mapping in the study area as an effective way to take and make notes, develop concepts, organize pre-existing knowledge, and motivate and improve learning. They find it beneficial since they can use it at home, in class, or both.

### **3.3 Population and Sample**

The respondents of this study were the students from UMPS accredited programs of the main campus, Davao City and were enrolled in the summer of 2020-2021. The sample size of 300 was computed and obtained through Slovin's formula. Slovin's procedure was appropriate because the sample is taken from a large population, and there was a need to consider confidence levels and margins of error.

Stratified random sampling was used in determining the total population and selection of the respondents. Stratified random sampling, as described by, is a sampling method from a population that divides the population into subgroups and selects the units randomly from the subgroups. It is often used in business designs, government,

and social science research (Frey, 2018). Moreover, since a population was divided into homogeneous subpopulations and diverse populations, the researcher wanted to ensure that every characteristic was adequately represented in the sample; stratified random sampling was considered appropriate in this study (Thomas, 2021).

The inclusion criteria of this study were the UMPS main campus only. The research respondents were students from all year levels of the UMPS and were exclusive only to students from its accredited programs. Hence, students who were not enrolled for summer, students from UMPS' candidate status of accreditation, students from other UMPS branches, and not PS students were excluded. The review was voluntary. Therefore, students who declined to answer the survey questionnaire were not forced to do so. Respondents were given a chance to withdraw at any time without being asked to provide reasons for declining to participate in the study. They were given information about their right to withdraw their participation from the study if they felt uncomfortable responding to the questionnaire. Withdrawal from the study did not cost them anything or impose a penalty. It ensured that no coercion, undue influence, or inducement was involved in selecting the respondents. Since the respondents were informed of their voluntary participation, only those who affixed their consent letter signatures were considered part of the study.

### **3.4 Research Instruments**

The study employed questionnaires adapted from different studies and was modified to the context of respondents. The instrument was divided into three parts: technology proficiency, self-generated computerized mind mapping, and information literacy competence. The first part dealt with technology proficiency adapted from the study of Christensen and Knezek (2015), with the following indicators: email, World Wide Web, integrated applications, and teaching with technology. The instrument used in the study was a survey questionnaire in the form of a checklist which comprised 20 item questionnaires on a scale and was divided into four parts. The said instrument was contextualized to suit the setting and objective of this study and ensure the validity of the modified questionnaire by experts; pilot testing was carried out to 30 participants who were not part of the study. It has a computed Cronbach's alpha of 0.843 which means that the internal consistency was good.

The second tool was the self-generated computerized mind mapping of students. The questionnaire, which was adapted from the study of Sabbah (2015), was a survey questionnaire in the form of a checklist as well which comprised 37 item questionnaires on a scale and was also divided into four parts, namely: educational benefits, benefits for the brain and nerves, usability in future tasks, and enjoyment. It has achieved a Cronbach's alpha of 0.965 and was rated as excellent.

The third and last part of the questionnaire dealt with information literacy competence from the work of Igbinovia (2016). A survey questionnaire in a checklist consisted of 15 item questionnaires on a scale. The reliability obtained a Cronbach's alpha value of 0.922, indicating excellent reliability and consistency among the items.



All these instruments were constructed based on some relevant studies and literature reviews. Prior to the administration, the drafts of these instruments were tested for face and content validity by the panel of experts in librarianship. The validation resulted in a mean rating of 4.77, described as very high.

### 3.5 Data Collection

In the conduct of the study, the researcher underwent data collection and analysis with an estimated 2-month maximum length, including manuscript writing. The following were the steps used in gathering the study's data: the researcher had the questionnaires validated by the experts and conducted through Pilot Testing. Results of pilot testing were sent to the Statistician, who measured the validity and reliability of the questionnaires.

The researcher preceded the following steps and procedures in data collection: First, the researcher secured a permission letter for the conduct of the study from the Dean of the Professional Schools as proof that the University of Mindanao officially acknowledged this research. The letter's content was to ask permission to study students' technology proficiency and self-generated computerized mind mapping as mediated by information literacy competence.

After such, an Informed Consent Form (ICF) was given to the participants in an online medium to follow the proper health protocols and asked permission to be part of the study. It cannot be denied that there were PS students who opted not to participate in the study, but the researcher explained that all data they have given were handled with maximum confidentiality; thus, consent was granted. Nevertheless, the researcher personally administered the questionnaire to the study participants to ensure 100% retrieval. After the respondents answered the questionnaire, they sent it back to the researcher via email. The researcher had difficulty collecting the data since the questionnaire was distributed electronically. After the questionnaires were retrieved, they were tallied and recorded accurately. The results were encoded, tabulated, analyzed, interpreted, drawn conclusions, and formulated recommendations based on the results.

### 3.6 Statistical Treatment of Data

The gathered data were classified, analyzed, and interpreted using the appropriate statistical treatment as follows:

- **Mean.** This was used to characterize the level of technology proficiency, self-generated computerized mind mapping, and information literacy competence.
- **Pearson-r.** This was used to determine the significance of the relationship between information literacy competence and technology proficiency, information literacy competence, and self-generated computerized mind mapping, and technology proficiency and self-generated computerized mind mapping can be determined.
- **Medgraph using Sobel z-test.** This was used to determine the mediating effect of information literacy competence on the relationship between technology proficiency and self-generated computerized mind mapping of students.

### 3.7 Ethical Considerations

This investigation was submitted to the University of Mindanao Research and Ethics Committee (UMERC) for review to guarantee that the quality of this research project was based on the researcher's ability to present valid argumentation to readers while giving a fair presentation of data. The researcher ensured the proper implementation in anonymizing the respondents since the findings were confidential. After which, the researcher complied with the recommendations and requirements set by the UMERC. Also, the researcher obtained informed consent from the survey respondents specifying their awareness and purposes of the study.

## 4. Results

**Table 1:** Level of Technology Proficiency

Indicator	SD	Mean	Descriptive Level
Email	0.52	4.39	Very High
World Wide Web	0.70	3.99	High
Integrated Applications	0.61	4.22	Very High
Study with Technology	0.60	4.23	Very High
<b>Overall</b>	<b>0.53</b>	<b>4.21</b>	<b>Very High</b>

With a mean of 4.21 or very high, Table 1 shows that students' level of technology proficiency is manifested. With a standard deviation of 0.53, it is possible to deduce that the indicator email with the highest mean rating of 4.39 has significance. The data could glean that the second-highest indicator was studying with technology with a mean rating of 4.23 or very high, followed by integrated applications with a mean rating of 4.22 or still very high, and World Wide Web has the lowest mean rating of 3.99 or high.

The table reflected that this variable's indicators were analyzed and interpreted, as shown in the appendices. The standard deviation was less than 1.00, which indicated consistency of responses. Based on the findings, data revealed that three out of four indicators of technology proficiency manifested a very high satisfaction of students. This means that technology proficiency is always manifested among students.

**Table 2:** Level of Self-Generated Computerized Mind Mapping

Indicator	SD	Mean	Descriptive Level
Educational Benefits	0.58	4.15	High
Benefits for the Brain and Nerves	0.59	4.17	High
Usability in Future Tasks	0.65	4.00	High
Enjoyment	0.62	4.13	High
<b>Overall</b>	<b>0.57</b>	<b>4.11</b>	<b>High</b>

The level of self-generated computerized mind mapping is presented in Table 2, with the corresponding indicators arranged as is per item in the questionnaire. Each indicator is analyzed and interpreted in a simplified manner to understand the readers better. The

self-generated computerized mind mapping had an overall mean of 4.11 (SD=0.57), described as high.

Data revealed that the mean scores among the indicators are all in the same category at a high level. The indicator with the highest mean rating of 4.17 or high is benefits for the brain and nerves, and the indicator with the lowest mean rating of 4.00 or still high is usability in future tasks. Other indicators arranged from highest to lowest mean ratings of 4.15 or high to 4.13 or high are educational benefits and enjoyment. The high-level result means that the self-generated computerized mind mapping is manifested most of the time.

**Table 3:** Level of Information Literacy Competence

Item	SD	Mean	Descriptive Level
I use information effectively to accomplish a specific purpose.	0.62	4.44	Very High
I evaluate information and its source's credibility and incorporate selected information into my knowledge base and value system.	0.63	4.35	Very High
I understand the use of databases and online search engines for information seeking and retrieval.	0.64	4.34	Very High
I understand and apply the best search terms and search strategies for a given topic when in quest for information.	0.61	4.33	Very High
I am comfortable and confident on my ability to develop and acquire information through my literacy competence and knowledge.	0.60	4.33	Very High
I access needed information effectively and efficiently	0.63	4.32	Very High
I am aware of how to go about my search for required information.	0.64	4.32	Very High
I define and articulate the nature and extent of my information need.	0.62	4.31	Very High
I understand the ethical, legal and socio-economic issues surrounding information and information technology.	0.66	4.28	Very High
I consciously identify and apply any improvement that will lead to my information literacy enhancement.	0.62	4.25	Very High
I can recognize how information is formally and informally produced, organized and disseminated.	0.66	4.25	Very High
I can evaluate retrieved information with ease and effectiveness.	0.65	4.21	Very High
I can successfully confront obstacles and barriers encountered in my quest for information.	0.68	4.20	Very High
I can easily identify sources of information required for a given task.	0.67	4.16	High
I have the ability to use library information retrieval systems like catalogue, thesaurus, index etc.	0.78	4.10	High
<b>Overall</b>	<b>0.47</b>	<b>4.28</b>	<b>Very High</b>

The level of information literacy competence concerning its 15-item statements is shown in Table 3. It can be seen in the table that the overall mean score is 4.28 with a standard deviation of 0.47, described as very high. Hence, the following indicators got the very high levels: I use information effectively to accomplish specific purpose ( $\bar{x}$ =4.44, SD=0.62), I evaluate information and its source's credibility and incorporate selected information

into knowledge base and value system ( $\bar{x}=4.35$ ,  $SD=0.63$ ), I understand the use of databases and online search engines for information seeking and retrieval ( $\bar{x}=4.34$ ,  $SD=0.64$ ), I understand and apply the best search terms and search strategies for a given topic when in quest for information ( $\bar{x}=4.33$ ,  $SD=0.61$ ), I am comfortable and confident on my ability to develop and acquire information through my literacy competence and knowledge ( $\bar{x}=4.33$ ,  $SD=0.60$ ), I access needed information effectively and efficiently ( $\bar{x}=4.32$ ,  $SD=0.63$ ), I am aware of how to go about my search for required information ( $\bar{x}=4.32$ ,  $SD=0.64$ ), I define and articulate the nature and extent of my information need ( $\bar{x}=4.31$ ,  $SD=0.62$ ), I understand the ethical, legal and socio-economic issues surrounding information and information technology ( $\bar{x}=4.28$ ,  $SD=0.66$ ), I consciously identify and apply any improvement that will lead to my information literacy enhancement ( $\bar{x}=4.25$ ,  $SD=0.62$ ), I can recognize how information is formally and informally produced organized and disseminated ( $\bar{x}=4.25$ ,  $SD=0.66$ ), I can evaluate retrieved information with ease and effectiveness ( $\bar{x}=4.21$ ,  $SD=0.65$ ), and I can successfully confront obstacles and barriers encountered in my quest for information ( $\bar{x}=4.20$ ,  $SD=0.68$ ).

Furthermore, I can easily identify sources of information required for a given task ( $\bar{x}=4.16$ ,  $SD=0.67$ ), and I have the ability to use library information retrieval systems like catalog, thesaurus, index etc. ( $\bar{x}=4.10$ ,  $SD=0.78$ ) got the high levels.

The very high level of these measures indicated that students in higher education manifest technology proficiency related to these always. In addition, the high level of students to easily identify sources of information required for a given task and the ability to use library information retrieval systems like catalog, thesaurus, index, etc. are often seen to manifest technology proficiency.

**Table 4.1:** Correlation between Technology Proficiency and Self-Generated Computerized Mind Mapping

Technology Proficiency	Self-generated Computerized Mind Mapping				
	Educational Benefits	Benefits for the Brain and Nerves	Usability in Future Tasks	Enjoyment	Overall
Email	.527** .000	.539** .000	.464** .000	.526** .000	.553** .000
World Wide Web	.561** .000	.536** .000	.625** .000	.570** .000	.619** .000
Integrated Applications	.575** .000	.560** .000	.575** .000	.594** .000	.621** .000
Studying with Technology	.642** .000	.650** .000	.613** .000	.653** .000	.689** .000
<b>Overall</b>	<b>.666**</b> <b>.000</b>	<b>.659**</b> <b>.000</b>	<b>.664**</b> <b>.000</b>	<b>.678**</b> <b>.000</b>	<b>.719**</b> <b>.000</b>

Data outputs of the correlation tests between technology proficiency and self-generated computerized mind mapping are displayed in Table 4. The overall coefficient or

correlation is .719 with a  $p \leq 0.05$  level of significance. Thus, the null hypothesis of no significant relationship between technology proficiency and the students' self-generated computerized mind mapping relationship was therefore rejected. Further, the indicators of technology proficiency correlated with self-generated computerized mind mapping yielded the following results: Email correlated with educational benefits, benefits for the brain and nerves, usability in future tasks, and enjoyment yielded an overall r-value of .553 at a  $p \leq 0.05$ . World Wide Web correlated with educational benefits, benefits for the brain and nerves, usability in future tasks, and enjoyment yielded an overall r-value of .619 at a  $p \leq 0.05$ .

Moreover, integrated applications correlated with educational benefits, benefits for the brain and nerves, usability in future tasks, and enjoyment yielded an overall r-value of .621 at a  $p \leq 0.05$ . Studying with technology correlated with educational benefits, benefits for the brain and nerves, usability in future tasks, and enjoyment yielded an overall r-value of .689 at a  $p \leq 0.05$ .

In addition, the correlation test between the indicators of technology proficiency and self-generated computerized mind mapping yielded the following: Educational benefits linked with the email, World Wide Web, integrated applications, and studying with technology yielded an overall r-value of .666 at  $p \leq 0.05$ . Benefits for the brain and nerves linked with the email, World Wide Web, integrated applications, and studying with technology got an overall r-value of .659 at  $p \leq 0.05$ . Usability in future tasks linked with the email, World Wide Web, integrated applications, and studying with technology got an overall r-value of .664 at  $p \leq 0.05$ . Enjoyment linked with the email, World Wide Web, integrated applications, and studying with technology got an overall r-value of .678 at  $p \leq 0.05$ .

To sum it up, technology proficiency and self-generated computerized mind mapping show a very high relationship. This implies that technology proficiency has to do with self-generated computerized mind mapping. So, if the technology proficiency improves, the students become more skilled in creating mind maps. On the other hand, if the technology proficiency diminishes, the students become less skilled in creating mind maps.

**Table 4.2:** Correlation between Technology Proficiency and Information Literacy Competence

Technology Proficiency	Information Literacy Competence
Email	.558** .000
World Wide Web	.507** .000
Integrated Applications	.542** .000
Studying with Technology	.615** .000
<b>Overall</b>	<b>.639**</b> <b>.000</b>

Shown in Table 4.2 is the result of the correlation between technology proficiency and information literacy competence. When correlated with information literacy competence, technology proficiency yielded an overall r-value of .639 with a  $p \leq 0.05$ . Therefore, the two variables are significantly related to each other. Thus, the null hypothesis of no significant relationship between technology proficiency and information literacy competence relationship of the student from the accredited programs was therefore rejected. In addition, the data in the table reveals that the indicators of technology proficiency significantly correlate with information literacy competence.

The indicators email, World Wide Web, integrated applications, and studying with technology signify moderate relationships towards information literacy competence with the obtained mean scores of .558, .507, .542, and .615, respectively. This means that students can be more information literate if they are more proficient with technology.

Lastly, since technology proficiency shows a positive moderate relationship towards information literacy competence, it can be said that information literacy is influenced by technology proficiency.

**Table 4.3:** Correlation between Information Literacy Competence and Self-Generated Computerized Mind Mapping

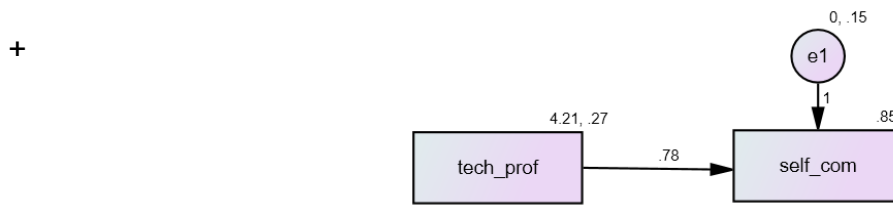
Information Literacy Competence	Self-Generated Computerized Mind Mapping				Overall
	Educational Benefits	Benefits for the Brain and Nerves	Usability in the Future Tasks	Enjoyment	
	.605**	.600**	.578**	.598**	.641**
	.000	.000	.000	.000	.000

Table 4.3 reflects the correlation between information literacy competence and self-generated computerized mind mapping. Results yielded an overall r-value of 0.641 with a  $p \leq 0.05$ ; therefore, information literacy competence is significantly related to self-generated computerized mind mapping. Thus, the null hypothesis of no significant relationship between self-generated computerized mind mapping and information literacy competence of students from accredited programs was therefore rejected.

All the four indicators of self-generated computerized mind mapping: educational benefits, benefits for the brain and nerves, usability in future tasks, and enjoyment are significantly related to information literacy competence with a  $p \leq 0.05$ , with an r-value of .605, .600, .578, .598, respectively. This means that information literacy competence affects the educational benefits, benefits for the brain and nerves, usability in future tasks, and enjoyment of students in some aspects. Thus, it can be said that information literacy competence somewhat drives the students to reach the optimum levels and be more engaged with the benefits of mind maps.

Further, as an overall view, the technology proficiency shows a moderate correlation to information literacy competence with a mean score of .641. This means that some aspects of information literacy enable the students to create mind maps.

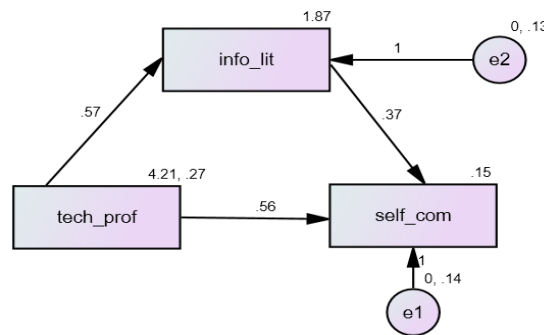
**Table 5:** Mediation Analysis of the Three Variables



$C = .78$  and  $C' = .56$

**Regression Weights: (Group number 1 – Default model)**

			Estimate	S.E.	C.R.	P	Label
self_com	<---	tech_prof	.776	.041	18.863	***	



Legend:

tech\_prof – Technology Proficiency

self\_com – Self-generated Computerized Mind Mapping

Info\_lit – Information Literacy Competence

**Figure 2:** Path Diagram for the Regression Mode

**Regression Weights: (Group number 1 - Default model)**

			Estimate	S.E.	C.R.	P	Label
info_lit	<---	tech_prof	.572	.038	15.148	***	
self_com	<---	tech_prof	.563	.050	11.214	***	
self_com	<---	info_lit	.371	.056	6.612	***	

Partial Mediation

There are multiple schools of thought and discussions regarding mediation. In this study, the mediator, information literacy competence, explains how or why a relationship exists between the predictor, technology proficiency, and dependent variable, self-generated computerized mind mapping.

The first step aims to establish that there is an effect to mediate. If the effect is not statistically significant, the analysis stops in the causal steps approach. If the effect of the IV on the DV becomes non-significant at the final step in the analysis, full mediation will be achieved. It means all of the effects are mediated by the mediating variable. If the regression coefficient is substantially reduced at the final step but remains significant, only partial mediation is obtained. It means that the MV mediates part of the IV, but other parts are either direct or mediated by other variables not included in the model. In this

case, the effect of the IV on DV is significantly lessened after controlling MV. Therefore, only partial mediation took place since the effect is still significant.

Shown in Table 5 is the mediation analysis of technology proficiency, self-generated computerized mind mapping, and information literacy competence. The computation on the effect size in the mediation test conducted among the three variables is shown in Figure 3. As reflected in the table, three steps were met for the third variable (information literacy competence) to be acting as a mediator. In the table, these are categorized as Steps 1 to 4. In step 1, technology proficiency was found to significantly predict the information literacy competence, the mediator, at 0.05 level of significance. In step 2, the information literacy competence significantly predicts the self-generated computerized mind mapping relationship with a 0.05 level of significance. In step 3, technology proficiency was also found to significantly predict self-generated computerized mind mapping at a 0.05 level of significance.

Since the three steps (Paths A, B, C) are significant, further mediation analysis through MedGraph is warranted. Further, this implies that part of the independent variable (technology proficiency) is mediated by the mediator (information literacy competence). However, other parts are either direct or mediated by other variables not included in the model. Therefore, partial mediation took place since the effect was significant at the 0.05 level.

Furthermore, supported by Figure 3 that showed the effect size measures how much of the effect of information literacy competence on self-generated computerized mind mapping relationship could be attributed to the indirect path. As shown in the figure, results revealed that the total effect size is 0.78, which is obtained by getting the sum of direct effect, which is 0.56, and indirect effect size (product of path A and B), which is 0.21. Meanwhile, the ratio index, which is obtained by dividing the indirect effect by the total effect, obtained a value of 0.26, indicating that about 26 percent of the total effect of the independent variable on the dependent variable goes through the mediator variable. About 79 percent of the total effect is either direct or mediated by other variables not included in the model.

To conclude, since it is only partial mediation, it could not be claimed that information literacy competence is the sole reason how technology proficiency can influence self-generated computerized mind mapping. This indicates that information literacy competence is only one of the reasons how technology proficiency can influence self-generated computerized mind mapping.

## 5. Discussion

### 5.1 Technology Proficiency

The very high rating of technology proficiency among students is due to the very high ratings on email, the World Wide Web, integrated applications, and studying with technology.



The email has the highest mean rating of all the indicators. This very high-level response corresponds to the study of Criss (2020), which found that email may be a valuable tool for establishing new communication channels in the classroom. It is also a fun way to exchange material, movies, images, classwork, connect with people from different locations, and practice languages.

The very high level of the item studying with technology is always manifested since it is in line with the findings of Straumsheim (2016), who found that most students believe that technology makes studying easier, helps them get high grades, and increases their focus.

Also, integrated applications are likewise given a very high-level rating, ranking third among the indicators. It can be described that Integrations allow applications to communicate with one another, share information, and collaborate (MobiChord, 2016).

Finally, the World Wide Web was last, which received a high-level rating. The World Wide Web is an exciting arena for exploration and creativity, as Erickson (2017) found. This entails connecting two documents so that the second may explain a word or concept from the first. The World Wide Web is a web of information and connections that extend beyond hypertext and audiovisuals.

Technology proficiency is frequently mentioned as the most challenging aspect of learning. This supports the assertion of Immerse Education (2019) that students who develop tech skills now are quietly moving ahead of the competition and learning skills that will be directly relevant to future industries and careers. Being technology proficient not only helps to acquire immediately relevant abilities for bringing technology-related ideas to life, but it also helps to develop desirable, transferable skills. The results were similarly consistent with pilot testing among students from University of Mindanao Professional Schools accredited programs.

## **5.2 Self-Generated Computerized Mind Mapping**

The level of self-generated computerized mind mapping as perceived by the UMPS students is high based on the respondents in the areas of educational benefits, benefits for the brain and nerves, usability in future tasks, and enjoyment. Each indicator is analyzed and interpreted straightforwardly to aid readers' understanding.

Among the indicators, benefits for the brain and nerves had the highest mean score, indicating a high-level rating. Research indicates that the brain prefers to operate based on association. Every thought, memory, or piece of information will be linked to tens, hundreds, or even thousands of other ideas and concepts. This is why mind maps are helpful for various activities (Cunnah, 2020).

The second rank indicator, educational benefits, received a high-level rating. It says that educators may use mind mapping to set out lesson plans and prepare lectures for a class and promote creativity among students. This technique enables teachers to demonstrate to students a new way of thinking about and solving issues and generating discussion and debate about a topic that aligns with the study (Sperl, 2021). In addition, researchers claim that mind mapping makes it simpler to extract thoughts from the head

into something visual and organized (Cunnah, 2020). As per research, the brain prefers to operate based on association. Every thought, memory, or piece of information will be linked to tens, hundreds, or even thousands of other ideas and concepts. As a result, mind maps are helpful for a wide range of tasks.

Students also gave a high-level rating to enjoyment, which was placed third among the indicators. Students create swirly, whimsical connecting lines from personal and job to a new objective, following McArdle's (2008-2022) study, to depict the relaxed, meandering character of mind mapping delight.

Finally, usability in future tasks last but received a high-level rating. Frey (2019) found that the future of industries lies beyond mind maps. Instead, Respondents seek to create a work management system that allows users to visualize and interact with their data in whatever format is most convenient for them.

The preliminary findings of Freeman (2021) support the hypothesis that a mind map might help individuals think more critically while also improving problem-solving abilities.

### **5.3 Information Literacy Competence**

The level of information literacy competence as perceived by the UMPS students obtained an overall descriptive level of very high. The majority of the items in this variable have a very high descriptive level. This finding demonstrates that students have consistently recognized the necessity of becoming information literate (Garbaciak, 2020). As a response, students viewed information literacy as a survival skill that impacts their day-to-day decisions and choices due to the increasing information overload.

Additionally, big data shows that, despite similar formal structure and resources, components of learning methodology, such as information literacy competence, differ among schools, which support the study of Zhu et al. (2021). Further, Yevelson-Shorsher and Bronstein (2018) found that better collaboration and communication between teachers, librarians, and students are required to improve students' information literacy abilities.

This is also in line with Soleymani (2014), who asserts that no student can ever achieve his academic goals unless he uses his information literacy skills. These skills are required for them to become lifelong learners. One of the most critical factors that lead to educational achievement is information literacy; educators must offer students information literacy-related skills to improve their academic performance. Anunobi and Udem (2014) found that adequate information literacy allows students to develop the capacity for independent critical analysis and equips them to update their knowledge and skills after graduation, which is supported by research.

### **5.4 Significance of the Relationship between Technology Proficiency, Self-Generated Computerized Mind Mapping and Information Literacy Competence**

The level of relationship using the correlation analysis using Pearson product-moment correlation between independent (technology proficiency), dependent (self-generated

computerized mind mapping), and mediator (information literacy competence) variables revealed a varied relationship among the variables mentioned. Technology proficiency was positive and strongly associated with self-generated computerized mind mapping. Thus, the null hypothesis of no significant relationship was therefore rejected. With the same relationship, technology proficiency and information literacy competence consequently reject the null hypothesis of no significant relationship between variables. Nevertheless, the third pair, mediator (information literacy competence) and dependent (self-generated computerized mind mapping) variables fall to reject the null hypothesis of no significant relationship between the variables mentioned.

Furthermore, all indicators of technology proficiency are significantly related to all self-generated computerized mind mapping indicators tangibly. The findings support a positive relationship proposition: have positive effects on students' technology proficiency, whereas mind mapping has a positive impact on students' opinions about understanding concepts better and easier, as well as how courses are taught, by being technology proficient (Aydin, 2013). Within particular research, either a student creates mind maps manually, or on a computer, educators should disclose past information and discover how students build connections between concepts.

The findings are also consistent with the study of Educators technology (2014), which claims that with the spread of web 2.0 technologies, individuals no longer need to rely on pen and paper to draw their ideas. Furthermore, the findings complement the study of Karim (2018), which found that students' opinions about the use of technology-assisted mind mapping techniques grew considerably more favorable. Today's technology makes it feasible to build mind maps on computers, making them simple to style, evaluate, modify, and store.

Moreover, the indicator World Wide Web of the variable technology proficiency has something to do with educational benefits, an indicator of the variable self-generated computerized mind mapping. The use of the World Wide Web as a technique of education, as stated by Mathew and Doherty-Poirier (2000), allows students to investigate topics in several ways and helps teachers address students' different needs in single classes.

Another indicator of technology proficiency is that studying with technology is significantly related to self-generated computerized mind mapping that is enjoyment. Using technology in the classroom, such as a computer, tablet, or other devices, may help convert incredibly dull courses into participatory and enjoyable experiences (Walden University, 2013). This is confirmed by the Briggs (2019) research, which found that instructors think that using technology in the classroom makes learning more engaging and enjoyable since students like to use laptops and tablets. With virtual lectures, a video, or the use of a tablet, difficult or dull subjects may be made fascinating.

Since there is a correlation between the independent variable, technology proficiency, and the dependent variable, self-generated computerized mind mapping, Baron and Kenny (1986) the first stage of the procedure was developed in this mediation study.

Moreover, the capacity to comprehend and use technology to obtain and apply knowledge is vital to success in today's academic and corporate environments, as per research by ACT, et al. (2014). This supports the proposition of Sherubtse College (n.d.), which states that information literacy enables an individual to become technology proficient. By retrieving and utilizing information effectively to achieve a wide range of academic, work-related, and personal goals using computers, software applications, databases, and other technologies. As a result, information literate individuals must learn specific technological skills.

Since most students in the millennial generation are savvy in using technology, it is easy for them to assume that navigating the Internet for information related to the acquisition and use of knowledge will come naturally to them. This is why many students significantly lack information literacy skills (Denial, 2016). As improvements in technology and availability of information have led to changes in technological proficiency, students with better information literacy competency tend to view themselves as a catalyst for establishing a justification for the concept's relevance.

It is no surprise that technology and information literacy have become increasingly important in the last decade. Fitzgerald (2004) discovered that while millennial students are more digitally oriented than centennial students, college instructors had high expectations for their information literacy skills. Information literate includes students who understand how to use technology and get the most out of it. Technologically literate students can evaluate the quality of information, take advantage of lifelong learning, and, as a result, develop in their future jobs and differentiate themselves from the competition (Sunarjo, 2021).

Since there is a significant relationship between the independent variable, technology proficiency, and the mediator, information literacy competence, the Barron and Kenny (1986) procedure for mediation in the second phase was created in this study. Goldberg (2004), Erasmus (2015-2017), and Wright (2006) also asserted that information literacy and mind mapping are intrinsically linked. Students' use of maps as visual aids to use library research procedures and information literacy skills are connected to their information literacy skills. Mind mapping is regarded as a way to be included in an educator's technique repertoire.

This finding is also in line with Beavers' (2014) suggestion that mind mapping is a valuable tool for educators who wish to assist students in working through complicated ideas and processes understandably. Students can better comprehend complicated procedures by using maps that depict the phases of information literacy.

Further studies are explored with self-generated computerized mind mapping indicators when correlated with information literacy competence. The ability to read and understand information is essential for academic achievement. As a result, students must be taught the abilities and skills of how to learn through honing reasoning and critical thinking skills. Students that are proficient in information literacy will have an easier time obtaining higher education (Ranaweera, 2020).

Due to the importance of the mediator variable, information literacy competence, to the dependent variable, self-generated computerized mind mapping, the Baron and Kenny (1986) procedure for testing the hypothesis was established in this study.

### **5.5 Mediating Effect of Information Literacy Competence on the Relationship between Technology Proficiency and Self-Generated Computerized Mind Mapping**

After establishing the Baron and Kenny (1986) procedure, a regression analysis was used to assess the mediating effect utilizing the causal stages approach for further analysis. Baron and Kenny (1986) the first stage in the mediation guidelines method is to establish a correlation between the independent, technology proficiency, and the dependent variable, self-generated computerized mind mapping. Furthermore, the second step was developed in this study since the independent variable, technology proficiency, has a significant relationship with the mediating variable, information literacy competence. Finally, the importance of the mediating variable, information literacy competence, to the dependent variable, self-generated computerized mind mapping, was used to re-establish the hypothesis in this study. Due to the importance of all three processes, only partial mediation took place. However, because the mediating variable still influences the relationship between the independent and dependent variables, this is a good outcome.

The relationship between technology proficiency and self-generated computerized mind mapping has been studied in the past. However, the lack of enough research studying the relationship between these two factors where information literacy competence acts as a mediator was the reason for this research.

The study aimed to contribute to the literature regarding potential indirect, mediating variables for the relationship between technology proficiency and self-generated computerized mind mapping. The information literacy competence was investigated as a potential mediating construct to explain how technology proficiency affects self-generated computerized mind mapping. While full mediation was not found in this study, substantial and direct solid effects were identified, which are consistent with the work of Herring (2009) that may be useful in improving existing studies on technology proficiency and self-generated computerized mind mapping.

As a result, it is firmly in agreement with Goldber, et al. (2004) that information literacy competence substantially influences the level of self-generated computerized mind mapping on students' reading performance and skilled technology proficiency. Furthermore, as evidenced by the findings, information literacy competence may be a mediator to improve technology proficiency, which has been identified as a significant element in achieving excellent outcomes.

Specifically, competence is a positive and partial mediator of technology proficiency and self-generated computerized mind mapping. It complies with the mediation rules of Baron and Kenny (1986), which state that a third variable must meet three stages to function as a mediator. The media information literacy competence explained the relationship between the predictor, technology proficiency, and dependent

variable, self-generated computerized mind mapping. Since the first test aims to establish that there is an effect to mediate, thus, if the effect is not statistically significant on the first step, then the analysis stops in the causal steps approach. Further, if the effect of the IV on the DV becomes non-significant at the final step in the analysis, then full mediation will be achieved.

The regression coefficient is substantially reduced at the final step and remained significant, with signs unchanged; therefore, only partial mediation was obtained. This means that the MV mediates part of the IV, but other parts were either direct or mediated by other variables not included in the model. In this case, only partial mediation took place since the effect is still significant at the final step.

Subsequently, findings revealed that technology proficiency is a significant predictor of self-generated computerized mind mapping and information literacy competence. Information literacy competence has a significant effect on self-generated computerized mind mapping. Lastly, information literacy competence has a mediating effect on technology proficiency and self-generated computerized mind mapping. This means that the information literacy competence intervenes in the technology proficiency and self-generated computerized mind mapping. This suggests that students would develop strong technology proficiency and result in substantial self-generated computerized mind mapping per the research of (Goldberg, 2004; Erasmus, 2015-2017; Wright, 2006).

## **6. Conclusion**

With the study's findings, conclusions are drawn in this chapter. The findings provide evidence that the considerations of these variables are relevant to each other. On the one hand, the results confirm a significant relationship between technology proficiency and self-generated computerized mind mapping among students. Similarly, there is a significant relationship between technology proficiency and information literacy competence. Moreover, the result of the study also suggests that information literacy competence significantly mediates the relationship between technology proficiency and self-generated computerized mind mapping among UMPS students.

Lastly, the findings supported the anchored theory of Vygotsky's (1978) Social Constructivism Theory. For this reason, information literacy competence significantly mediates the relationship between technology proficiency and self-generated computerized mind mapping. The propositions cited above discuss the association among the variables used in the study. Thus, these propositions are parallel in the present investigation since it deals with technology proficiency and self-generated computerized mind mapping as mediated by information literacy competence.

## 7. Recommendations

In the light of the aforementioned results, the following recommendations are presented. Since it was established that there is a very high level of technology proficiency of students from accredited programs of UMPS, a high level of self-generated computerized mind mapping, and a very high level of information literacy competence, it is suggested that students may maintain their skills through some mechanisms to consistently sustain the very high levels of technology proficiency and adequate information literacy competence for achievable self-generated computerized mind mapping.

To maintain the very high technology proficiency level, learners should be up-to-date and in the know for the present technological trends in retrieving information that enhances their technological skills, especially in this millennial era. Specific mechanisms like training on how to properly send, subscribe to a discussion list, send a document as an attachment to an email message and keep copies of outgoing messages that were sent to others, considerable use of technology in work, using technology to collaborate with others who are in distant places, finding primary sources of information on the Internet that can be used in work, using spreadsheets in creating charts, saving documents in many formats, and using the computer to create a slideshow presentation are recommended to consistently sustain the very high level of students' technology proficiency. Further, since the World Wide Web got the lowest rate among the indicators of technology proficiency, students may take classes from e-learning websites that discuss improvement to ensure better technology proficiency.

Consequently, a high level of self-generated computerized mind mapping means that students foster a creative flow of ideas. Therefore, students may sustain and improve their desirable creativity by exposing and enrolling themselves in more classes/capability buildings to boost their skills to maintain and improve high-ability performance in creating mind maps and self-reward. Further, since the usability in future tasks got the lowest rate among self-generated computerized mind mapping indicators, this may be enhanced to build up better self-generated computerized mind mapping amongst students to meet the demands of the changing technological system by creating programs that let students enjoy and be interested and will find creating mind maps to be helpful. On the other hand, the very high level of information literacy competence's attributes means that the use of information effectively, evaluate credibility, understand database usage, apply the best search terms, confident to develop and acquire information, effectively and efficiently access information, aware of how to go about research, define the nature of information need, understand the ethical and legal issues, identify information literacy enhancement, recognize information organization and dissemination, evaluate retrieved information, confront obstacles encountered, and identify sources of information have been established by the students among themselves at school. Furthermore, these may be carried out for the rest of their learning to achieve adequate competence in information literacy. However, since having the ability to use library information retrieval systems like catalog, thesaurus, index, and so on. got the

lowest rating among the items of information literacy competence, this may be strengthened by enrolling in classes to continue education, particularly in information retrieval training to insure proper retrieval of information.

Additionally, this study's mediating effect causal steps approach showed a significant relationship between information literacy competence and self-generated computerized mind mapping, indicating its partial mediating effect on the variables. The result agrees with the theory of Baron and Kenny (1986), which states that a mediator causes the outcome and not vice versa. It has been observed that the effect of technology proficiency on self-generated computerized mind mapping is through the information literacy competence attribute but does not reverse the direction.

The regression coefficient is substantially reduced at the final step and remained significant, with signs unchanged; therefore, only partial mediation was obtained. This means that the MV mediates part of the IV, but other parts are either direct or mediated by other variables not included in the model. In this case, only partial mediation took place since the effect is still significant at the final step.

Subsequently, it is suggested to future researchers that they consider the weak points of the IV and the DV, and it should be closed with the intervention program. Finally, future studies toward examining other variables not included in the study that can be feasible to mediate the relationship between the variables will be of utmost importance to the research community.

### **Conflict of Interest Statement**

The authors declare no conflicts of interest.

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