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LEARNING STRATEGIES AND TECHNICAL WRITING COMPETENCY OF SENIOR HIGH SCHOOL STUDENTS

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Abstract

This study was conducted to determine the relationship between learning strategies and technical writing competency of senior high school students of Region XII. This study utilized the quantitative causal method. Four hundred respondents were selected using stratified random sampling. The respondents answered the survey questionnaire through Google Form. The mean, Pearson r, and regression were used in the analysis of data. Results showed that the learning strategy and technical writing were high and found that learning strategies significantly relate to students' technical writing ability. The strong correlation highlights that students who effectively employ cognitive, behavioral, and self-regulatory strategies are more likely to excel in technical writing. It suggests that learning strategies enhance students' knowledge, skills, and attitudes towards technical writing, leading to better academic outcomes. Consequently, educators may emphasize the development of learning strategies to improve students' technical writing proficiency, ultimately contributing to their overall academic and professional success.

Keywords: Learning Strategies, Technical Writing, Competency, Senior High School, Philippines.

INTRODUCTION

Technical writing is a specialized form of writing that conveys complex information clearly, concisely, and structured (Bölcskei, 2023). It is crucial for high school students as it equips them with essential skills needed for academic and professional success (Haviland & Robbins, 2021). Unlike creative or narrative writing, technical writing focuses on precision and clarity, often involving documents such as manuals, reports, instructions, and technical guides (Joswiak & Duncan, 2020).

Thornquist (2022) and Palmer (2023) emphasized the importance of technical writing in preparing students for higher education, particularly in STEM fields, where it is a key component. Droz and Jacobs (2019) point out that technical writing is a highly sought-after skill in the workforce. Garcia and Bontoc (2024) and Mosco (2012) note that it fosters critical thinking and problem-solving abilities.

Furthermore, Chekol and Teshome (2023) demonstrate that technical writing skills are interdisciplinary, aiding students in various subjects by promoting clarity and precision. Thus, technical writing is a vital competency that prepares high school students for academic and career success (Ama & Emetarom, 2020).

Alaraj (2022) highlights that mastering technical writing enhances students' research and analytical skills, making them more adept at logically presenting data and conclusions. By integrating technical writing into the high school curriculum, educators can help students develop these vital skills indispensable for academic success and future career opportunities (Garcia-Perez et al., 2021).

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Effective learning strategies are essential for high school students to develop strong technical writing skills (Sari et al., 2021). Learning strategies are crucial in optimizing educational outcomes and making learning more efficient (Weinstein & Underwood, 2014).

Harisson and Vallin (2018) said that learning strategies encompass cognitive approaches such as summarization and elaboration, metacognitive techniques like self-monitoring and regulation, and resource management practices including time management and study environment optimization.

Weinstein et al. (2011) highlight that effective learning strategies enable students to take control of their learning, leading to better understanding and retention of material. Students can improve their academic performance and develop skills essential for lifelong Learning by integrating these strategies into their study habits.

Likewise, Faust and Paulson (2024) emphasize that effective learning strategires engages students in hands-on activities like peer reviews and collaborative projects, fostering deeper understanding and retention.

Vygotsky's (1978) concept of scaffolding, as a learning strategy, where students receive structured support that gradually increases complexity, helps build their confidence and competence in technical writing. Brame (2016) suggest that integrating technical writing tasks across the curriculum shows students the relevance of these skills in various subjects, enhancing their overall writing proficiency.

Utilizing technology, as Purcell et al. (2023) advocate, allows students to draft, format, and collaborate on documents using digital tools, making writing more efficient and interactive. Finally, incorporating metacognitive strategies, based on Hornby and Greaves's (2022) work, encourages students to reflect on their writing processes, promoting self-awareness and effective writing habits.

These strategies collectively enhance students' technical writing skills, preparing them for academic and professional success. These learning strategies collectively contribute to developing strong technical writing skills, essential for academic success and future career opportunities. These grounds as basis for the conduct of this study, to determine the link between learning strategies and technical writing competences of high school students.

Objectives

The study aimed to determine the relationship between learning strategies and technical writing competency of senior high school students. Specifically, this study aimed to determine the level of learning strategies of senior high school students in terms of mental, behavioral, and self-regulatory; determine the level of learning in technical writing competency among senior high school students in terms of knowledge, skills, and attitudes; to determine the significant relationship between learning strategies and technical writing competency among senior high school students.

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METHODOLOGY

This study utilized the quantitative causal research method using the appropriate Structural Equation Model. Ercan and Marsh (2016) define causal research as explanatory research that investigates the causes and effects of relationships. To determine the cause, it is important to observe the difference in the variable that is assumed to cause the change in other variants and then measure the changes in other variables.

Respondents of the Study

The respondents of this study were 400 senior high school students from Region XII, Philippines.

Instruments of the Study

This study used a survey questionnaire. The instrument was subjected to expert validation and pilot test.

Procedure

In gathering the data, the researcher followed four steps proposed by San Jose et al. (2023) namely: formulating and validating interview guide questions, observing ethical protocols, gathering of data, and self-verification.

Before the formulation and validation, the researcher obtained authorization from the Regional Department of Education (DepEd) to carry out the study. Then, the research formulated the surveyed questionnaire and the same was subjected for validation of experts.

The survey questionnaire was encoded into the Google form. Following the protocol, the researcher made a Consent Form (CF) for the respondents. It was followed by the gathering of data. To obtain the reliability of the data, the researcher checked the answers of the respondents for completeness. Those with lacking or incomplete were verified. Then the data were tallied and tabulated.

Data were given to a statistician for data analysis and interpretation. The study used the quantitative non-experimental design using descriptive and correlational techniques. Firstly, the researcher employed the descriptive correlational method, which described a particular trait, aspect, or feature of a group with continuous data response and depicts an average level means (Forio, 2017).

According to Creswell (2012), correlational research is a type of quantitative non-experimental design in research that measures, describes, and establishes the relationship of variables using a correlational type of statistics.

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RESULT AND DISCUSSION

Table 1: Level of Learning Strategies in terms of Mental

Item	SD	Mean	Descriptive Level
1. I learnt things by going over them until I felt I knew them.	0.84	3.83	High
2. I copied out material in order to help me learn it.	0.93	3.66	High
3. I read through the material several times as a method of learning it.	0.85	3.86	High
4. I repeated in my mind things I wanted to learn.	0.92	3.89	High
5. I skimmed through the material several times in order to help me learn	0.89	3.83	High
6. I thought about new material and its implications rather than merely concentrating on the facts we were given.	0.83	3.75	High
7. I tried to develop an overall idea of how different bits of the material relate to each other.	0.81	3.78	High
8. In order to understand something better, I thought about how it made sense in terms of what I already knew.	0.81	3.95	High
9. I outlined the main points of the material and how they fit together.	0.81	3.76	High
10. I tried to understand how new information fitted into things I had learned before.	0.94	3.71	High
11. I worked out which were the key points of the material and which were less important	0.77	3.86	High
12. I looked for connections between course material and what I already knew.	0.78	3.86	High
13. I grouped those parts of the material that were connected.	0.84	3.72	High
14. I pulled together new material and other material which I already understood.	0.88	3.75	High
15. In order to understand things better, I tried to work out how they fit together.	0.79	3.89	High
Total	**0.54**	**3.81**	**High**

Table 1 shows the level of learning strategies of the students in terms of mental. It reveals that item 8 got the highest mean rating of 3.95 with an SD of 0.81, described as "High". The lowest mean rating is received by item 2 with an SD of 0.85, described as "High".

The section mean is 3.81 with an SD of 0.54, described as "High". When the "level of learning strategies of the students in terms of mental is high," students use advanced cognitive techniques such as metacognition, critical thinking, and problem-solving. They focus on deeply understanding concepts, using effective memory strategies, and actively engaging in their learning process.

Recent research indicates that Senior High School students exhibit a high level of mental engagement in their learning strategies. According to Uppal and Kumar (2021), these students are proficient in employing metacognitive strategies, which involve self-regulation, reflection, and the strategic planning of their learning processes.

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Table 2: Level of Learning Strategies in terms of Behavioral

Item	SD	Mean	Descriptive Level
1. I asked the instructor a question when I was uncertain about something	0.88	3.76	High
2. I asked other course members for their ideas when I did not fully understand something	0.87	3.86	High
3. I checked with other people when I needed clarification on some material.	0.85	3.89	High
4. I got someone to help me when I needed assistance.	0.93	3.77	High
5. I asked another course member about something that I needed help understanding.	0.84	3.92	High
6. I tried to understand something better by locating and studying a relevant document.	0.86	3.83	High
7. I filled in my knowledge gaps by getting some written material.	0.82	3.78	High
8. I tried to find a written account of something to help me learn.	0.85	3.79	High
9. I checked something I did not understand by looking it up in a document.	0.84	3.87	High
10. I sought out relevant documents to help me learn	0.89	3.76	High
11. Rather than spend time reading or asking someone's advice, I tried to understand something by working it out in practice.	0.85	3.67	High
12. I learned something by doing it rather than by studying a book or talking with someone	0.86	3.64	High
13. I learned things by trying them out in practice.	0.81	3.71	High
14. I used `trial and error' practically to help me understand something.	0.86	3.73	High
Section mean	0.55	3.79	High

Table 2 shows the level of learning strategies of the students in terms of behavioral. The data shows that item 5 received the highest mean rating of 3.92 with an SD of 0.84, described as "High".

The lowest mean rating is received by item 12 with an SD of 0.86, described as "High". The section mean is 3.79 with an SD of 0.55, described as "High".

It means that students consistently exhibit effective study habits and behaviors. This includes regular attendance, active participation in class, effective time management, organization of materials, and persistence in completing assignments and studying.

These positive behaviors support their Learning and academic success. According to recent studies, senior high school students exhibit high behavioral involvement in their approach to Learning.

As highlighted by Schunk and Zimmerman (2023), the use of goal-setting and time-management techniques reflects students' commitment to their academic responsibilities and their ability to self-regulate their learning activities.

This robust behavioral engagement indicates high commitment and discipline among Senior High School students, contributing significantly to their academic success and overall learning outcomes.

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Table 3: Level of Learning Strategies in terms of Self-regulatory

Item	SD	Mean	Descriptive Level
1. I told myself not to worry when things were difficult.	0.92	3.80	High
2. When I felt anxious about how things were going, I told myself things would work out all right.	0.86	3.91	High
3. I tried not to worry about possibly doing worse than I wanted.	0.87	3.78	High
4. I tried to persuade myself not to worry about the mistakes I made	0.92	3.80	High
5. I tried not to worry about the possibility of getting things wrong.	0.86	3.91	High
6. When I was feeling bored, I forced myself to pay attention	0.87	3.78	High
7. When my mind wandered during a learning session, I made a special effort to concentrate.	0.90	3.82	High
8. I increased my effort when the material did not interest me.	0.93	3.78	High
9. I pushed myself even harder when I began to lose interest.	0.81	3.75	High
10. Whenever I lost interest in my work, I made a special effort to pay attention.	0.89	3.66	High
11. I thought up questions to test how well I had learned something.	0.88	3.70	High
12. I asked myself questions about some material to test my understanding of it.	0.86	3.61	High
13. When I wanted to revise some material, I tried to test how well I already knew it.	0.83	3.81	High
14. In order to learn better, I set myself questions or tests.	0.78	3.83	High
15. I made a special effort to check how well I understood what was being taught	0.80	3.84	High
Section mean	0.55	3.79	High

Table 3 shows the level of learning strategies of the students in terms of self-regulation. The data shows that item 2 received the highest mean rating of 3.91 with an SD of 0.86, described as "High".

The lowest mean rating is received by item 12 with an SD of 0.86, described as "High". The section mean is 3.79 with an SD of 0.55, described as "High". When the "level of learning strategies of the students in terms of self-regulatory is high," students effectively manage their learning processes. They set goals, monitor their progress, adjust their strategies as needed, and stay motivated and focused.

This high self-regulation level helps them achieve better academic outcomes and maintain a consistent study routine. According to Vishwakarma and Tyagi (2022), these students are adept at employing self-regulation techniques, which include goal-setting, self-monitoring, and self-evaluation.

They effectively plan their learning activities, adjust their strategies based on performance feedback, and reflect on their progress, which enhances their academic performance and persistence.

Schunk and DiBenedetto (2022) emphasize that high levels of self-regulation are evident in students' ability to manage their time efficiently, maintain motivation, and overcome challenges through adaptive strategies.

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Table 4: Level of writing ability of Senior high school students through knowledge

Item	SD	Mean	Descriptive Level
1. Know the differences between technical writing and other forms of writing.	0.89	3.77	High
2. Know how to write using various technical writing styles	0.88	3.63	High
3. Know how to write technical documents with error-free sentences	0.88	3.68	High
4. Know how to write technical documents with correct grammar.	0.94	3.69	High
5. Know how to write technical documents with correct spelling.	0.90	3.64	High
6. Know the correct way of writing a list of references for a project report.	0.85	3.72	High
Section mean	0.69	3.69	High

Table 4 shows the level of learning strategies of the students in terms of knowledge. The data shows that item 1 received the highest mean rating of 3.77 with an SD of 0.89, described as "High". The lowest mean rating is received by item 2 with an SD of 0.88, described as "High". The section mean is 3.69 with an SD of 0.69, described as "High". The writing ability of senior high school students is typically high due to their advanced level of knowledge. By this stage, they have developed a strong foundation in language arts, including grammar, vocabulary, and composition skills. Their exposure to various texts, critical thinking exercises, and writing assignments throughout their education allows them to express ideas clearly and effectively. Additionally, they have learned to structure their writing, support arguments with evidence, and adapt their style to different audiences and purposes, demonstrating a sophisticated understanding of language use, Bean and Melzer (2021).

Table 5: Level of writing ability of Senior high school students through skills

Item	SD	Mean	Descriptive Level
1. Able to define technical terms in own words.	0.81	3.70	High
2. Able to write using various technical writing styles.	0.80	3.59	High
3. Able to write technical documents with error-free sentences	0.86	3.53	High
4. Able to write technical documents with correct grammar	0.84	3.55	High
5. Able to write technical documents with correct spelling.	0.86	3.71	High
6. Able to write technical documents with correct capitalization	0.84	3.81	High
7. Able to write technical documents with correct punctuation	2.13	3.78	High
8. Able to spot errors in a technical written document.	0.88	3.64	High
9. Able to distinguish between formal and informal English in technical writing	0.91	3.67	High
10. Able to construct concise objectives for a project.	0.86	3.65	High
Section mean	0.55	3.66	High

Table 5 shows the level of learning strategies of the students in terms of knowledge. The data shows that item 6 received the highest mean rating of 3.81 with an SD of 0.84, described as "High". The lowest mean rating is received by item 2 with an SD of 0.86, described as "High". The section mean is 3.66 with an SD of 0.55, described as "High". The writing ability of senior high school students is typically high due to their advanced skills. By this stage, they have honed their grammar, vocabulary, and composition techniques through years of practice and instruction. They can effectively organize their thoughts, construct coherent arguments, and

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use evidence to support their points. These skills, developed through regular writing assignments, critical feedback, and exposure to various texts, enable them to produce clear, articulate, and persuasive writing. According to Levin (2022), it helps students refine their analytical and writing skills. These contemporary texts introduce students to modern narrative techniques, diverse perspectives, and complex themes, further developing their ability to craft sophisticated, well-structured, and insightful writing.

Table 6: Level of writing ability of Senior High School students in terms of attitudes

Item	SD	Mean	Descriptive Level
1. Enjoy completing technical writing tasks in Filipino.	0.84	3.76	High
2. Good at technical writing in English.	0.87	3.62	High
3. Appreciate completing technical writing tasks in Filipino.	0.83	3.83	High
4. Confident in practising technical writing in Filipino.	0.87	3.62	High
5. Award of the importance of technical writing in English for my future career.	0.92	3.64	High
6. I know that Filipino oral and written communications are important within the engineering profession.	0.87	3.68	High
Section Mean	0.62	3.69	High

Table 6 shows the level of learning strategies of the students in terms of attitudes. The data shows that item 1 received the highest mean rating of 3.76 with an SD of 0.84, described as "High". The lowest mean rating is received by items 2 and 4 with an SD of 0.87, described as "High". The section mean is 3.69 with an SD of 0.62, described as "High". The students are often strongly committed to improving their writing skills, valuing constructive feedback, and engaging in the writing process. Their motivation and enthusiasm for exploring different genres, experimenting with styles, and tackling challenging topics contribute to their advanced writing abilities. This proactive approach and willingness to revise and refine their work enhance their capacity to produce clear, articulate, and effective writing. According to Mbue (2016), student interest in these modern texts motivates them to experiment with their writing, embrace feedback, and refine their skills. This proactive and engaged attitude helps students develop sophisticated, well-structured, and insightful writing.

Table 7: Significance of the Relationship between Learning Strategies and Technical Writing of Students

Learning Strategies	Technical Writing of Students			
	Knowledge	Skills	Attitudes	Total
Cognitive	.573** .000	.504** .000	.457** .000	.605** .000
Behavioral	.593** .000	.569** .000	.547** .000	.676** .000
Self-regulatory	.577** .000	.535** .000	.546** .000	.656** .000
Total	.639** .000	.589** .000	.568** .000	.710** .000

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Table 7 indicates a significant relationship between students' learning strategies and technical writing skills. The correlation coefficient (\(r \)) was 0.710, suggesting a strong positive correlation. The result was statistically significant with a p-value less than 0.05, leading to rejecting the null hypothesis, which claimed no relationship between these variables.

CONCLUSION

The study demonstrates a significant positive relationship between students' learning strategies and their technical writing skills. This strong correlation highlights that students who effectively employ cognitive, behavioral, and self-regulatory strategies are more likely to excel in technical writing. The findings suggest that these learning strategies enhance students' knowledge, skills, and attitudes towards technical writing, leading to better academic outcomes. Consequently, educators should emphasize the development of these strategies to improve students' technical writing proficiency, ultimately contributing to their overall academic and professional success.

Recommendation

Based on the results and conclusion, the following recommendations are made:

For Students. Leverage available resources such as writing centers, academic workshops, and online tools to enhance your learning strategies and technical writing skills.

For Faculty. Promote peer learning by organizing structured peer review sessions where students can critique and refine each other's work, fostering collaborative growth and the practical application of learned strategies.

For Administration. Invest in faculty development by offering workshops and training focused on effective teaching methods for enhancing learning strategies and technical writing proficiency among students.

For Future Researchers. Investigate further by conducting research that identifies and analyzes the most impactful learning strategies on technical writing skills across various disciplines, contributing to a deeper understanding of best practices in education

Compliance with Ethical Standards

The author(s) have declared that there are no potential conflicts of interest concerning this article's research, authorship, or publication**.**

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