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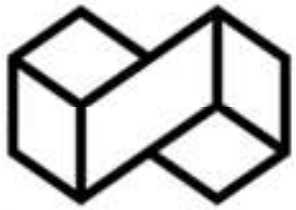

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2. To support academicians and teachers in creating work beneficial to the academic community
3. To stimulate and support education at the university level

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Editorial Note

The Interdisciplinary Research Review (IRR) was established with academic cooperation by The Royal Society of Thailand Committee of Interdisciplinary Research and Development, Rajabhat University (Western Group), and Rajamangala University of Technology Rattanakosin. This Issue, Volume 20, No. 4, July – August 2025. This issue contains of three interesting articles in multidisciplinary fields: (1) Uncovering Key Predictors of Statistics Achievement among Postgraduate Students: A Stepwise Regression Model,(2) Development of the Trainer's Methodology Workbook for Bachelor of Technical and Vocational Teacher Education Students (3) Informing Organic Agriculture Policy in the Philippines through Local Farmers' Knowledge, Attitudes, and Practices (KAP),(4) Utilization of Philippine School for the Deaf (PSD) E-Sign Library to Improve the Signing Skills of Deaf, Hard-of-hearing (DHH) Learners,and Stakeholders

The Editorial Board of the IRR encourages anyone to submit articles for evaluation and review. The processes of submission, review and publication of articles are described on the journal's website, https://www.tci-thaijo.org/index.php/jtir. The Editorial Board and Committees of the IRR sincerely thank all peer reviewers who have sacrificed their time to help us produce a better journal, and also wish to thank all teachers, researchers and other academicians for submitting their valuable research to this journal. Finally, we thank readers of our journal who help to spread the knowledge and benefits gained to others. With your feedback and suggestions, we will strive to improve the quality and relevance of the IRR.

Yongyudh Vajaradul
Editor
Interdisciplinary Research Review

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Uncovering Key Predictors of Statistics Achievement among Postgraduate Students: A Stepwise Regression Model

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Abstract

Academic performance in statistics remains a significant challenge for many postgraduate students, despite its vital role in fostering research competence and overall academic success. This study aimed to identify key predictors of academic performance in statistics among postgraduate students enrolled in higher education institutions. Employing a quantitative approach with a descriptive correlational design, the study examined three potential predictors: satisfaction with the statistics class, basic computer literacy, and prior academic performance in statistics. The outcome variable was students' final performance in the statistics course. Data were collected through a complete enumeration of all 587 postgraduate students who enrolled in the course during the academic years 2021-2023. As the entire target population was included, no sampling technique was applied. Pearson's product-moment correlation was used to assess the associations among variables, while stepwise multiple linear regression was employed to develop a predictive model for academic performance in statistics. Model adequacy and the proportion of variance explained were evaluated using standard fit indices and the coefficient of determination (R^2). The findings revealed statistically significant correlations between the predictors and academic performance. Moreover, the regression model demonstrated acceptable fit, although the explained variance was relatively low. Among the predictors, satisfaction with the statistics class emerged as the most influential factor affecting academic performance.

Keywords: Academic performance; class satisfaction; computer literacy; statistics

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1. Introduction

The level of academic success that students achieve in their first semesters of college has far-reaching implications for their personal and professional lives. Students' academic success has an immediate influence on their academic self-esteem and determination to persevere in higher education. Success in early semesters at college also impacts students' post-college experiences, such as career choice, level of success and degree, and nature of participation in community life. Hence, the students' experience in introductory college courses can have a significant influence on their adult life. Ironically, introductory college mathematics courses such as statistics is one of the least enjoyed and least understood subjects in the post-college academic career. Aside from this, many students detest mathematics because according to them, it is a worthless, dreary, and even difficult course. This could be the reason why many students perceive mathematics as one of the most challenging academic disciplines. [1] As a consequence, many students perform poorly in their mathematics class and because of that, they discontinue attending class. Poor performance in introductory college courses has become a global serious problem and despite the high regard and recognition of the importance of mathematics as a precursor for most science courses, poor achievement and lack of interest in mathematics among students remain a lingering issue in educational institutions at all levels. [2]

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At Ifugao State University, many graduate students exhibit poor academic performance in statistics demonstrated by their passiveness in class discussions, sluggish grasp of basic concepts and generally below-average performance ratings in every assessment task. These adverse performances of the students in statistics can be attributed to several factors, such as the level of academic preparation which includes students' previous exposure to statistics classes; the quality of preparation with regards to the entry-level knowledge and skills particularly on the functional use of technology in learning mathematics; and the attitudes and feelings of the students concerning their experience with the way teachers handle statistics course.

The review of related literature on the predictors of academic performance in statistics offers valuable insights into the various factors that impact student learning outcomes [3-7]. It underscores the significant impacts of class satisfaction [8-11], prior knowledge, [12-14] and computer literacy [15-19] as key predictors of academic performance. Several research works have shown a favorable association between these variables and improved academic achievement, emphasizing their significance for educators and those seeking to improve student academic achievement. The literature has identified several predictors of academic performance thus far, and much of the research has looked at these variables separately. However, few studies have systematically looked into how computer literacy and prior knowledge interact with class satisfaction to affect academic performance. By taking a more thorough approach and looking at how these three predictor variables interact and affect academic performance as a whole, this study seeks to bridge this gap. This study fills a significant gap in the existing literature by emphasizing the interactions between these factors rather than examining each one independently. This study not only adds new insights to the subject matter but also establishes the framework for further research undertakings.

2. Methods

2.1 Research Design

employed a quantitative research approach using a correlational design to investigate the relationships among key variables. The dependent variable was the academic performance of the students, while the independent or predictor variables included class satisfaction level, basic computer literacy, and previous statistics course performance level. Data were gathered through complete enumeration involving all 587 postgraduate students at Ifugao State University who took the statistics course during the 2021–2023 academic years. No sampling technique was applied, as the entire population relevant to the study was included

Pearson product-moment coefficient of correlation (Pearson's r) was utilized to identify the degree and magnitude of relationships between the academic performance in statistics course and each of the independent variables such as basic computer literacy level, academic performance level in previous statistics course and statistics class satisfaction level. The study employed regression analysis as the modeling technique which was intended to determine the causal effect of the relationship between academic performance in statistics course and the multiple independent variables. In relation, Multiple Linear Regression (MLR) analysis was utilized since multiple identified independent variables were analyzed against a lone dependent variable. Further, the selection of the best grouping of predictor variables that account for the most variance in the academic performance in the statistics course was carried out through stepwise regression. From a pool of structural models resulting from stepwise regression, the best model was selected based on the R-squared value.

3. Results and Discussion

3.1 Results

Performance Level of the Respondents

The basic computer literacy level, previous Statistics course performance level, and statistics course satisfaction level is summarized in Table 1.

Table 1. Descriptive Statistics

Predictor Variables	N	Minimum	Maximum	Mean	Std. Deviation
Statistics Class Satisfaction Level	587	1.00	5.00	3.49	1.28
Basic Computer Literacy Level	587	1.00	5.00	2.71	1.28
Previous Performance in Statistics Course	587	1.00	5.00	2.92	1.10

Scale

Rate	Statistics Class Satisfaction	Previous Statistics Course Performance	Basic Computer Literacy level
4.50 – 5.00	Very much satisfied	Excellent	Very much proficient
3.50 – 4.49	Much satisfied	Above Average	Very proficient
2.50 – 3.49	Satisfied	Average	Proficient
1.50 – 2.49	Moderately satisfied	Below Average	Minimum knowledge
0 – 1.49	Not satisfied	Poor	No knowledge

A descriptive statistic, particularly the mean, was used to represent the statistics course class satisfaction level, previous statistics course performance level, and basic computer literacy level. A qualitative description of the respondents' report on their experiences about the identified predictor variables was likewise provided. Results revealed that the statistics class satisfaction level (M=3.49) emerged as the predictor with the highest mean rating followed by previous performance in statistics course (M=2.92). Basic computer literacy level (M=2.71) had the lowest mean. As regards qualitative description, class satisfaction level was reported as 'satisfied', previous statistics course performance level as 'average', whereas basic literacy level was reported as 'proficient'.

Table 2. Correlation matrix of Academic Performance in Statistics Course and Basic Computer Literacy Level, Previous Performance in Statistics course and Statistics Course Satisfaction Level

Variables		SCSL	BCLL	PPSC	APS
SCSL	Pearson Correlation	1	0.104	0.400**	0.484**
	Sig. (2-tailed)		0.204	0.000	0.000
BCLL	Pearson Correlation	0.104	1	0.402**	0.233**
	Sig. (2-tailed)	0.204		0.000	0.004
PPSC	Pearson Correlation	0.400**	0.402**	1	0.415**
	Sig. (2-tailed)	0.000	0.000		0.000
APS	Pearson Correlation	0.484**	0.233**	0.415**	1
	Sig. (2-tailed)	0.000	0.004	0.000	

*Note: ** correlation is significant at the 0.01 level (2-tailed)*

Legend

SCSL - Statistics Class Satisfaction Level
BCLL - Basic Computer Literacy Level
PPSC - Previous Performance Statistics Course
APS - Academic Performance in Statistics

Relationship Between the Dependent Variable and the Independent Variables

Table 2 shows the correlation coefficient between academic performance in

Bivariate correlation analysis using Pearson Product-moment coefficient of correlation was pursued to determine the relationship between academic performance and the identified predictor variables. Results revealed significant relationship between academic performance and class satisfaction level ($r = 0.484$, $p<0.001$), previous performance in statistics ($r = 0.415$, $p<0.001$) and basic computer literacy level ($r = 0.233$, $p<0.001$). This validates the research hypothesis, stating that academic performance of students in statistics is related to their class statistics and class satisfaction level, previous academic performance in mathematics, and basic computer literacy level. The coefficients describe the strength of linear relationship between each pair of variables. [20]
satisfaction level, prior academic performance level and basic computer literacy level.

Model for Predicting Academic Performance in Statistics Course

Table 3 discloses the results of the analysis of variance (ANOVA), which indicate the statistical significance of the regression model. Table 4 also displays the model summary, including the R, R squared, and the adjusted R squared values. Lastly, Table 5 provides the estimated model coefficients for regression model

Table 3. ANOVA Results

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1856.530	3	618.843	21.322	0.000[b]
	Residual	4295.541	148	29.024		
	Total	6152.071	151			

a. Dependent Variable: APS

b. Predictors: (Constant), SCSL, BCLL, PPSC

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.549[a]	0.302	0.288	5.38739

a. Predictors: (Constant), SCSL, BCLL, PPSC

Table 5. Coefficients Results

		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	76.208	0.437		174.399	0.000
	SCSL	2.461	0.480	0.386	-5.132	0.000
	BCLL	0.669	0.480	0.105	2.394	0.016
	PPSC	1.395	0.521	0.219	2.678	0.008

a. Dependent Variable: APS

Results of the multiple linear regression analysis conducted to predict academic performance in statistics based on the respondents' Statistics Class Satisfaction Level (SCSL), Basic Computer Literacy Level (BCLL), and Previous Performance in Statistics Course (PPSC) revealed a significant regression equation ($F(3,148) = 21.322, p < 0.001$), with an R^2 value of 0.302. Hence, the participants' predicted academic performance in statistics (APS) can be represented by the equation below;

$$APS = 1.395(PPSC) + 0.669(BCLL) + 2.461(SCSL) + 76.208$$

This means that an increase in one unit in PPSC results to an increase in the APS by 1.395 units holding the other independent variables constant. As regards prediction power of the each of the independent variables, it can be seen in Table 6 that basic computer literacy level (BCLL), previous performance in statistics course (PPSC) and statistics class satisfaction level (SCSL) were significant predictors of statistics course outcomes. In addition, among the three predictors, statistics class satisfaction level was found to the most potent predictor of academic achievement in statistics.

3.2 Discussion

This inquiry generally sought to determine the predictors of academic performance of postgraduate students in statistics at higher education institutions. It specifically aimed to: understand the perception of the respondents as regards their class satisfaction level, prior knowledge in mathematics level and basic computer literacy level; determine whether class satisfaction level, prior knowledge in mathematics level and basic computer literacy level is related to their academic performance; and determine the best regression model. With regards to the first specific objective, it was found that student-reported previous statistics course performance level had the highest mean rating while basic computer literacy level had the lowest mean. However, based on the qualitative description of the mean rating, it can be interpreted that the students had same level of experience with regards to their class satisfaction level, background knowledge in mathematics, and basic computer literacy. Understanding students' needs enables teachers to react, adjust and direct students towards a satisfying learning experience. More importantly understanding student satisfaction can help teachers identify areas that are exceeding expectations and which areas that are falling behind that need improvements. Regardless of year level, in general, the respondents of the study seem to be satisfied with their learning experience in statistics in the university. With this, it can be argued that postgraduate students taking statistics in the university are generally engaged with their studies and feel that they are part of the knowledge and skill-gaining process.

With regards to the relationship between the dependent variable and the independent variables, results revealed significant positive relationship between academic performance and class satisfaction level. This implies that students who reported high statistics class satisfaction rating, previous academic performance rating in statistics and basic computer literacy level were more likely to obtain high marks in statistics. This finding corroborates with the results of Martirosyan et al [9], Dhaqane & Afrah [10], and Kim [11]. However, this finding run contrary to that of Khan and Iqbal [21]. They argued that class satisfaction and class achievement were not significantly correlated. The linkage between class satisfaction and academic performance could be attributed to the fact that class satisfaction involves issues of perception and experiences of students on learning and teaching. [21] Furthermore, students' success or failure may depend on the following: their level of interest in course-related activities, passiveness towards tasks unless constantly encouraged by teachers and teacher-related factors that impacts negatively their self-esteem and future expectations. [22] Previous statistics class performance rating was likewise found to have a direct relationship with academic performance in postgraduate statistics, suggesting that students who possess great deal

of knowledge or adept on basic statistics concepts were more likely to obtain high academic performance in postgraduate statistics. This supports the argument that higher academic achievement rating can be attained by students with high prior knowledge than those with low prior knowledge. [13] This could be explained by the fact that when learning complex concepts, new experiences and ideas interact with existing knowledge to form understanding through cognitive adaptation. Moreover, it was discovered that performance in statistics was directly correlated with basic computer literacy suggesting that students who are adept at using computers are more likely to receive good grades. This conforms with the findings of Aitokhuehi & Ojogho [18], Gabejan & Takenaka [15], Simoes et al [17], and Schenker [23]. The capacity to use technology to navigate the ever-changing digital environment is known as computer literacy. It gives the users the information and abilities they need to use computers, software, and the internet. Students with computer literacy are better able to efficiently access opportunities, resources, and information. They can conduct research, engage in online groups, and communicate effectively thanks to it. Students may use technology to advance both personally and professionally if they know how to use it. Additionally, self-directed learning via online courses and interactive learning environments is made possible by computer literacy, opening new learning opportunities. Furthermore, given the increasing reliance on technology in the classroom, computer literacy might be necessary for students to interact with statistical software and resources in an efficient manner, which could improve their academic performance. As regards model predicting academic performance in statistics, the R squared value of 0.302 suggests that approximately 30.2% of the variance in students' academic performance in statistics can be explained by the model. This implies that the remaining 69.8% of the source of variance can be attributed to other factors other than the three factors. Although the predictors have a significant relationship with academic performance in statistics, the moderate effect size indicates that other factors, such as study habits, classroom amenities, personal motivation, and attitudes toward mathematics, should also be taken into account. The results of this study have important ramifications for educators, legislators, and other education stakeholders. The multiple linear regression analysis produces a robust regression model that provides insightful information about how to predict academic outcomes in statistics courses based on factors such as prior performance, computer proficiency, and satisfaction with learning. Notably, the finding that a one-unit increase in prior performance in statistics corresponds to a 1.395-unit increase in academic performance highlights the critical role of a strong foundational knowledge base for future success. Owing to this insight, educators can further emphasize the significance of continuous learning and skill improvement throughout their programs. Furthermore, the finding that a basic level of computer literacy is a major predictor highlights the increasing significance of technical abilities in modern education. To ensure that students can fully participate with the curriculum, educators should think about introducing support measures for students who might not have these necessary abilities.

Above all, the fact that the best indicator of students' academic success in statistics courses is how satisfied they are with their statistics classes emphasizes how vital it is to provide supportive learning environments. This insight suggests that motivation and student involvement are important factors that influence effective educational results. Therefore, to improve learning outcomes, educators should give top priority to approaches that raise student satisfaction and involvement in the classroom.

4. Conclusion

This study investigated the relationship between students' satisfaction with their statistics class, their performance in previous statistics courses, their basic computer literacy, and their academic achievement in statistics. The results showed that these factors play a significant role in helping students succeed in postgraduate statistics. Higher levels of satisfaction with the class are associated with increased motivation and engagement, which in turn can lead to improved academic performance. In addition, with the widespread reliance on technology in education, computer literacy may be essential for students to

effectively engage with statistical software and materials, potentially resulting in better performance. Moreover, prior academic performance is likewise essential as it may provide foundational knowledge and skills that are critical for success in advanced statistical analysis. With this, students should then be afforded with educational interventions to improve their satisfaction level. One of the approaches the college may adopt is to focus on the resources and tools in guiding these students to success. Concerning this, there is a need to foster a safe, conducive, and inclusive institution because an increase in student satisfaction is expected to occur when harmful actions are minimized, student support is strong, and a sense of well-being and belonging is promoted. As regards previous statistics course performance, students should be encouraged to activate their prior knowledge in statistical concepts through the use of anticipation guide. Students are surveyed through a series of statements to determine their perception of a particular topic. The purpose of the anticipation guide is for students to think about what they already know and identify what they do not know. Using anticipation guides as a strategy may increase interest and inquisitiveness about the succeeding lesson. However, while the multiple linear regression analysis revealed significant predictors of academic performance in statistics, it also highlighted the necessity for future research to examine additional variables that could contribute to a more comprehensive model of academic achievement in this field. Future studies could explore the influence of factors such as student motivation and engagement, diverse learning styles and strategies, as well as other contextual factors that may influence academic success in statistics.

5. Recommendations

Based on the study's findings, several key recommendations emerge to enhance students' academic performance in postgraduate statistics. Improving student satisfaction should be a priority, as it is closely linked to motivation and engagement. This can be achieved through student-centered teaching methods, relevant course content, supportive classroom environments, and strong institutional support services. Instructors should foster inclusive and safe learning spaces where students feel a sense of belonging, which is crucial for maintaining high levels of satisfaction and academic persistence.

In addition, equipping students with strong computer literacy skills is essential, given the increasing reliance on statistical software in postgraduate studies. Institutions should offer training sessions and ensure access to technological resources. To build on prior academic knowledge, instructional strategies like anticipation guides can be used to help students activate and assess their understanding before tackling new content. While the study identified satisfaction, prior performance, and computer literacy as significant predictors, future research should explore other factors such as motivation, learning styles, and contextual influences to develop a more comprehensive model of academic success in statistics.

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Development of the Trainer's Methodology Workbook for Bachelor of Technical and Vocational Teacher Education Students

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Abstract

Many BTVTEd students encounter difficulties in demonstrating the required core competencies under Trainer's Methodology I (TM I), particularly in hands-on tasks such as assessment, facilitation, and work-based learning supervision. Addressing these gaps is essential to improve the preparedness of future vocational educators.

This study assessed the perceived level of core competencies in TM I among BTVTEd students of Southern Luzon State University – Dual Training and Learning Center. It focused on six key areas: planning training sessions, facilitating sessions, supervising work-based learning, conducting competency assessments, maintaining training facilities, and utilizing electronic media in training. The study also examined differences in perceived competency levels based on sex, year level, and area of specialization. In addition, it aimed to develop and evaluate a workbook to enhance students' competencies and support learning outcomes.

A descriptive-developmental research design was employed. A total of 158 BTVTEd students from SLSU-Lucena Campus were selected through total population sampling. Six expert validators were purposively chosen to evaluate the instructional material. Data collection tools included a researcher-adapted questionnaire and a standardized evaluation checklist. Statistical methods used were frequency, percentage, weighted mean, independent t-test, and one-way ANOVA.

Results indicated generally low perceived competency levels, especially in developing assessment tools, monitoring training activities, and maintaining facilities. No significant differences were found based on sex and year level, while specialization showed a significant effect. The workbook was rated effective, with recommendations for improvement in hands-on tasks and instructional alignment.

Keywords: core competency, workbook, instructional material, Trainer's Methodology

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1. Introduction

Vocational education teacher training prepares individuals to teach in career-focused fields. While this training varies globally, effective TVET (Technical and Vocational Education and Training) teachers must combine strong pedagogical and industry-specific skills to meet evolving job market demands [53]. Rapid technological advancements and the COVID-19 pandemic have further emphasized the need for TVET trainers to remain adaptable and continually upskill (Minghat et al., 2023).

Globally, countries face unique challenges in TVET. Germany addresses its skilled labor shortage by opening vocational training to underqualified youth. UNESCO stresses the need to upskill trainers to match labor market needs [48]. Indonesia's SMK revitalization (Presidential Instruction No. 9, 2016) and Malaysia's Education Blueprint 2013–2025 highlight issues such as outdated trainer skills and low student motivation.

In the Philippines, TVET has expanded through initiatives like the National Qualification Framework, unified registration systems, and DepEd Orders No. 40 series of 2021) [12] and No. 35 series of 2020 [13]. TESDA plays a key role in providing trainer development programs (RA 7796). However, challenges persist, including insufficient training, limited resources, and difficulties in integrating ICT into teaching [52, 42, 9].

Effective TVET instruction depends largely on teacher competency [3]. Technical

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Vocational Teacher Education programs aim to equip teachers with both instructional and industry skills. As UNESCO-UNEVOC notes, these educators are critical agents of change, essential to workforce skills development and achieving educational goals [50].

This study explored the importance of teacher competency training in Technical Vocational Teacher Education, emphasizing the dual role of TVET educators in improving vocational learning and addressing workforce needs.

2. Research Problems

The delivery of effective technical-vocational education requires instructors to possess not only content knowledge but also strong instructional competencies, especially in the framework of competency-based training. This study aimed to assess the perceived core competencies in Trainer's Methodology 1 (TM 1) among BTVTEd students at Southern Luzon State University – Dual Training and Learning Center. It seeks to identify gaps in essential training skills to improve student preparedness as future technical-vocational educators and to guide the development of more effective learning interventions.

This study aimed to assess the perceived level of core competencies in Trainer's Methodology 1 (TM 1) among BTVTEd students at Southern Luzon State University – Dual Training and Learning Center. It sought to determine the students' competencies in areas such as planning and facilitating training sessions, supervising work-based learning, conducting assessments, maintaining training facilities, and using electronic media. The study also examined differences in competencies based on gender, year level, and specialization. Based on the findings, it proposed supplementary training materials to enhance student competencies, which were evaluated for adequacy, appropriateness, coherence, and usefulness .

3. Methods and Materials

3.1 Research Methodology

This study utilized a descriptive-developmental educational research approach to design an alternative workbook that addresses the least-learned and least-practiced concepts and skills among BTVTEd students. Descriptive research was employed to determine the perceived level of students' core competencies in trainer's methodology through a checklist questionnaire.

3.2 Respondents of the Study

Two groups participated in the study: 159 BTVTEd students from SLSU Lucena Campus (44 fourth-year and 115 third-year students) and six expert validators (one instructional material specialist and five content experts) with Trainer's Methodology I and relevant teaching and training experience. The experts assessed the workbook based on adequacy, coherence, appropriateness, and usefulness.

3.3 Research Procedure

The study followed four phases.

Phase I involved securing informed consent and ethical clearance.

Phase II included data collection via a Google Forms questionnaire administered to third- and fourth-year students.

Phase III entailed organizing and analyzing data using descriptive, correlation, and inferential statistics.

Phase IV involved developing the workbook based on Training Regulations, which was then validated by experts, and revised according to their feedback for clarity and quality.

3.4 Data Analysis

Data were analyzed using frequency and percentage for respondents' profiles, and weighted mean for assessing training methodology levels and workbook quality. Independent Samples T-Test and One-Way ANOVA were used to determine significant differences across demographic groups, with a significance level of $p = 0.05$.

4. Results and Discussion

The following section presents the analyzed data and key findings based on the study's research problems.

Figure 1 showed that 64.2% (102) of the respondents are female, while 35.8% (57) are male, indicating a higher representation of female students in the BTVTEd program. This trend aligns with the NTESDP 2023–2028, which reported that 50.92% of TVET graduates in 2020 were female [54]. Similarly, studies by Roble [41] and Catangui [11] also found higher female enrollment in TVL and BTVTEd programs, often linked to the popularity of Home Economics specializations among women.

4.1. Profile of the Respondents

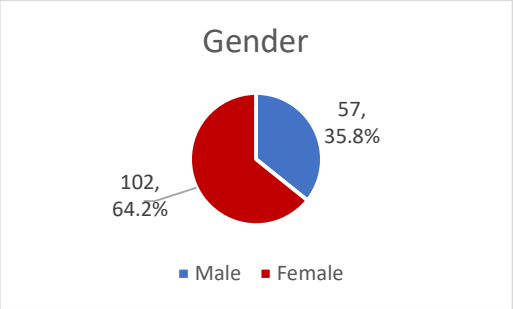

Figure 1. Distribution of the Respondents by Gender

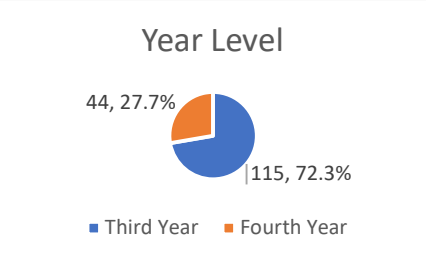

Figure 2. Distribution of the Respondents by Year Level

Figure 2 showed that 27.7% (44) of the respondents are fourth-year students, while 72.3% (115) are in their third year. This indicates that most respondents are still in the intermediate stage of their academic journey, which may explain lower exposure to core competencies in Trainer's Methodology I. Moreira-Choez [28] support this, noting that higher academic levels are linked to greater development of digital and complex thinking competencies, highlighting the role of academic progression in skill acquisition.

Figure 3 showed that most BTVTEd students specialize in Food Service Management (51.6%), followed by Computer Programming (18.9%). Other specializations—Electrical Technology (8.8%), Automotive Technology (8.2%), Electronics Technology (6.3%), and Civil Technology (6.3%)—have lower but relatively balanced enrollment. This suggests that students tend to choose fields like hospitality and IT, which are perceived to offer better job prospects. As noted by Schlott [55], students increasingly pursue vocational paths aligned with market demand, financial stability, and personal interest.

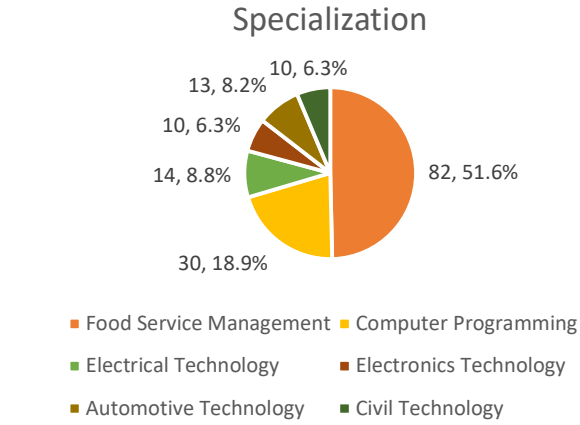

Figure 3. Distribution of the Respondents by Specialization

3. Recommendations

Based on the study's findings, several key recommendations emerge to enhance students' academic performance in postgraduate statistics. Improving student satisfaction should be a priority, as it is closely linked to motivation and engagement. This can be achieved through student-centered teaching methods, relevant course content, supportive classroom environments, and strong institutional support services. Instructors should foster inclusive and safe learning spaces where students feel a sense of belonging, which is crucial for maintaining high levels of satisfaction and academic persistence.

In addition, equipping students with strong computer literacy skills is essential, given the increasing reliance on statistical software in postgraduate studies. Institutions should offer training sessions and ensure access to technological resources. To build on prior academic knowledge, instructional strategies like anticipation guides can be used to help students activate and assess their understanding before tackling new content. While the study identified satisfaction, prior performance, and computer literacy as significant predictors, future research should explore other factors such as motivation, learning styles, and contextual influences to develop a more comprehensive model of academic success in statistics.

Table 1. Perceived Level of Students' Core Competencies in Trainer's Methodology 1 in terms of Plan Training Session

Indicators *When planning training session, I can…*	**Mean**	**Standard Deviation**	**Verbal Interpretation**
1. prepare instructional blueprint and learning engagement plan.	2.37	1.010	Low Competent
2. finalize session plan according to required format.	2.49	1.043	Low Competent
3. prepare clear and appropriate presentation materials.	2.49	1.078	Low Competent
4. identify and select suitable assessment methods appropriate with the learning outcome of a module.	2.38	1.118	Low Competent
5. prepare assessment instruments in accordance with the content and learning outcome.	2.38	1.146	Low Competent
Overall	2.42	.0984	Low Competent

Legend: 1.0-1.49 (Never/Not Competent); 1.50-2.49 (Rarely Low Competent); 2.50-3.49 (Sometimes/ Competent); 3.50-4.0 (Always/Highly Competent).

Table 1 showed that the students' perceived competency in planning training sessions falls within the Low Competent category, with mean scores ranging from 2.38 to 2.49. The highest scores (2.49) were in finalizing session plans and preparing presentation materials, indicating slight proficiency in these areas. The lowest scores (2.38) were in selecting assessment methods and preparing assessment instruments, suggesting difficulty in designing effective evaluation tools. The overall mean of 2.42 reflects limited competency in structuring training plans, echoing Enama's [15] findings that student teachers struggle with aligning outcomes and assessments.

Table 2. Perceived Level of Students' Core Competencies in Trainer's Methodology 1 in terms of Facilitating Training Session

Indicators *When facilitating training session, I can…*	**Mean**	**Standard Deviation**	**Verbal Interpretation**
1. prepare appropriate training facilities/resources based on the session requirement.	2.43	1.082	Low Competent
2. explain the context and procedures of pre-training assessment according to the guidelines.	2.49	1.102	Low Competent
3. provide competency assessment tools, materials and equipment to learners.	2.49	1.084	Low Competent
4. use appropriate feedback mechanism to inform learner of his/her progress.	2.48	1.146	Low Competent
5. monitor work and learning activities based on training plan.	2.40	1.126	Low Competent
Overall	2.46	1.014	Low Competent

Legend: 1.0-1.49 (Never/Not Competent); 1.50-2.49 (Rarely Low Competent); 2.50-3.49 (Sometimes/ Competent); 3.50-4.0 (Always/Highly Competent).

Table 2 revealed that students' perceived competency in facilitating training sessions falls under the Low Competent category, with mean scores ranging from 2.40 to 2.49. The highest scores (2.49) pertain to explaining pre-training assessment procedures and providing assessment tools, indicating a basic grasp of assessment tasks. The lowest

mean (2.40) in monitoring work and learning activities suggests challenges in actively guiding learners. The overall mean of 2.46 highlights a need for improvement, affirming TESDA's [48] call for competency-based training and supporting studies by Szczesny [47], Lafinier [25], and Rendino [40] which emphasize the importance of adaptability, learner engagement, and consistent support in effective facilitation.

Table 3 showed students' perceived competencies in supervising work-based learning, with an overall mean of 2.42 (SD = 1.059), classified as Low Competent. The highest-rated indicator (2.50) is "explaining training objectives and processes," suggesting some ability to communicate goals—an aspect emphasized by Goff [20] and Stümpfl [46] as vital for motivation and learning. The lowest score (2.35) in "evaluating training effectiveness" reflects challenges in assessing outcomes. These results point to limited hands-on experience in planning, monitoring, and evaluation, highlighting the need for real-world learning through internships and work-based training, as supported by Kamaliah et al. (2018) as cited by Utami [56] and Padagas [34].

Table 3. Perceived Level of Students' Core Competencies in Trainer's Methodology 1 in terms of Supervising Work-based Learning

Indicators *When supervising work-based learning, I can…*	**Mean**	**Standard Deviation**	**Verbal Interpretation**
1. prepare training plan in accordance with agreed outcomes.	2.43	1.150	Low Competent
2. explain to trainees the objectives for undertaking work-based training and the processes involved in this.	2.50	1.107	Low Competent
3. observe work performance and suggest alternative approaches	2.41	1.132	Low Competent
4. monitor OHS requirements to ensure health, safety, and welfare of trainees	2.38	1.135	Low Competent
5. evaluate the effectiveness of work-based learning against the extent of attainment of the objectives.	2.35	1.169	Low Competent
Overall	2.42	1.059	Low Competent

Legend: 1.0-1.49 (Never/Not Competent); 1.50-2.49 (Rarely Low Competent); 2.50-3.49 (Sometimes/ Competent); 3.50-4.0 (Always/Highly Competent).

Table 4 showed that students' perceived core competencies in conducting competency assessments under Trainer's Methodology 1 fall under the Low Competent category, with an overall mean of 2.41. The highest-rated indicators (both at 2.44) involve gathering and documenting evidence using relevant tools and explaining competency standards to candidates, indicating some familiarity with assessment procedures. However, the lowest scores (2.38) in obtaining resources and accurately recording results suggest difficulties in assessment preparation and documentation, which are essential for ensuring valid and reliable evaluations.

Table 5 revealed that students' perceived competencies in maintaining training facilities are rated Low Competent, with an overall mean of 2.42. The highest score (2.49) was in maintaining facilities according to OHS regulations, indicating basic awareness but limited practice. In contrast, the lowest-rated indicators (2.35) were in hazardous waste disposal and workplace inspections, highlighting weaknesses in essential safety practices. These findings align with studies (Qaraman [37] and Gerona [19]) that stress the gap between knowledge and compliance in OHS. To address this, Tims [49] recommends hands-on, immersive safety training, while Muladi [29] emphasize the role of well-maintained facilities in supporting student learning and competence.

Table 4. Perceived Level of Students' Core Competencies in Trainer's Methodology 1 in terms of Conducting Competency Assessment

Indicators *When conducting competency assessment, I can…*	**Mean**	**Standard Deviation**	**Verbal Interpretation**
1. obtain, check and arrange resources required for assessment as specified in the Evidence Guide and the assessment tools within a safe and accessible assessment environment.	2.38	1.078	Low Competent
2. explain the context and purpose of assessment to candidates in line with the requirements of the relevant Assessment Guidelines.	2.39	1.141	Low Competent
3. explain clearly the competency standards to be assessed and the evidence to be collected to the candidate.	2.43	1.122	Low Competent
4. gather and document evidence using the relevant assessment tools.	2.44	1.106	Low Competent
5. record accurately the assessment results in accordance with approved record keeping guidelines.	2.38	1.174	Low Competent
Overall	2.41	1.045	Low Competent

Legend: 1.0-1.49 (Never/Not Competent); 1.50-2.49 (Rarely Low Competent); 2.50-3.49 (Sometimes/ Competent); 3.50-4.0 (Always/Highly Competent).

Table 5. Perceived Level of Students' Core Competencies in Trainer's Methodology 1 in terms of Maintaining Training Facilities

Indicators *When maintaining training facilities, I can…*	**Mean**	**Standard Deviation**	**Verbal Interpretation**
1. identify training facilities and equipment to be maintained.	2.48	1.174	Low Competent
2. maintain facilities in accordance with Occupational Health and Safety regulations.	2.49	1.147	Low Competent
3. check disposal of waste and dangerous chemicals in accordance with Occupational Health and Safety, regulations and organizational policies and other regulations.	2.35	1.120	Low Competent
4. secure instructional materials and /equipment in safe places in accordance with procedures.	2.43	1.150	Low Competent
5. carry out regular inspections in the work area according to workplace procedures and standards.	2.35	1.185	Low Competent
Overall	2.42	1.074	Low Competent

Legend: 1.0-1.49 (Never/Not Competent); 1.50-2.49 (Rarely Low Competent); 2.50-3.49 (Sometimes/ Competent); 3.50-4.0 (Always/Highly Competent).

Table 6. Perceived Level of Students' Core Competencies in Trainer's Methodology 1 in terms of Utilizing Electronic Media in Facilitating Learning

Indicators *When utilizing electronic media in facilitating learning, I can…*	Mean	Standard Deviation	Verbal Interpretation
1. Operate electronic media equipment in accordance with the user's manual.	2.42	1.058	Low Competent
2. Implement teacher- and learner-centered learning principles as appropriate in the execution of the session plan.	2.52	1.107	Low Competent
3. Set up equipment in accordance with health and safety standards.	2.48	1.130	Low Competent
4. Create an interactive presentation.	2.43	1.209	Low Competent
5. Abide by safety practices related to electrical, radiation, and shock hazards.	2.33	1.172	Low Competent
Overall	2.44	1.058	Low Competent

Legend: 1.0-1.49 (Never/Not Competent); 1.50-2.49 (Rarely Low Competent); 2.50-3.49 (Sometimes/ Competent); 3.50-4.0 (Always/Highly Competent).

Table 6 indicated that students' perceived competencies in using electronic media for facilitating learning are Low Competent, with an overall mean of 2.44 (SD = 1.058). The highest-rated indicator (2.52) involves applying teacher- and learner-centered principles, showing occasional use of active learning strategies. However, the lowest score (2.33) pertains to safety practices related to electrical and radiation hazards, revealing a significant gap in OHS awareness. These results echo findings by Amiruddin [4], Kinhal [24], who stress the need for improved safety training and pedagogical integration. Overall, the data underscore the importance of hands-on, structured instruction to build both digital teaching skills and safety compliance [57].

4.3. Significant Difference in the Level of Students' Core Competencies in Trainers' Methodology 1 when grouped according to Demographic Profile

Table 7 presented the results of a Mann-Whitney U test, showing no statistically significant differences in Trainer's Methodology 1 competencies based on sex, as all p-values exceeded 0.05. The minimal mean differences (mostly around -0.200) suggest that sex does not notably affect competency levels.

Table 7. Significant Difference in the Level of Students' Core Competencies in Trainer's Methodology 1 when grouped according to Sex

		Statistic	p	Mean difference
PTSm	Mann-Whitney U	2713	0.484	-6.59e−7
FTSm	Mann-Whitney U	2578	0.236	-0.200
SWLm	Mann-Whitney U	2530	0.173	-0.200
CCAm	Mann-Whitney U	2461	0.107	-0.200
MTFm	Mann-Whitney U	2508	0.149	-0.200
UEMm	Mann-Whitney U	2533	0.178	-0.200

Note. H_a $\mu_{Male} \neq \mu_{Female}$

This aligns with findings by Bae [7] and Avila [6], who also reported no significant gender-based differences in student

competencies. While studies like Ray [39] and Fajardo [16] highlight gender-related challenges and perceptions in VET, the results support the notion that competency development in Trainer's Methodology 1 is generally not influenced by sex, reinforced by TESDA's efforts toward gender-sensitive education.

Table 8. Significant Difference in the Level of Students' Core Competencies in Trainer's Methodology 1 when grouped according to Year Level

		Statistic	p	Mean difference
PTSm	Mann-Whitney U	2221	0.233	0.200
FTSm	Mann-Whitney U	2148	0.140	0.200
SWLm	Mann-Whitney U	2179	0.174	0.200
CCAm	Mann-Whitney U	2290	0.354	0.200
MTFm	Mann-Whitney U	2320	0.416	3.85e-5
UEMm	Mann-Whitney U	2376	0.551	3.00e-5

Table 8 showed that the Mann-Whitney U test found no statistically significant differences in Trainer's Methodology 1 competencies based on year level, as all p-values exceeded 0.05. The minimal mean differences (mostly around 0.200) indicate that year level does not significantly impact competency levels. This aligns with Khan [23] and Ojeda [31], who emphasized that training structure, teaching quality, and resources influence competency more than academic standing. Ainley [2] and Amiruddin [58] suggest older or more advanced students may perform better, these findings underscore that competency development is multifactorial, relying heavily on pedagogy, curriculum, and learner differences.

Table 9. Significant Difference in the Level of Students' Core Competencies in Trainer's Methodology 1 when grouped according to Specialization

Core Competencies	F	df1	df2	P
Plan Training Session	3.09	5	153	0.011
Facilitate Training Session	5.89	5	153	<.001
Supervise Work-based Learning	5.74	5	153	<.001
Conduct Competency Assessment	5.86	5	153	<.001
Maintain Training Facilities	6.4	5	153	<.001
Utilize Electronic Media in Facilitating Learning	4.61	5	153	<.001

Table 9 showed the one-way ANOVA results indicating significant differences in students' Trainer's Methodology 1 competencies based on specialization ($p < 0.05$ for all competencies), with the highest variance in "Maintain Training Facilities" ($F = 6.4$, $p < 0.001$). Students in Food Service Management differed significantly from those in Electrical and Automotive Technology in areas such as "Supervise Work-Based Learning" and "Conduct Competency Assessment." Differences were also noted between Computer Programming and Electrical Technology in assessment tasks. These findings suggest that specialization significantly impacts competency development due to varying technical requirements and field-specific practices. This supports studies by Lomeda-Junio [26], Orlanda [33], and Adihardja [1], which highlight how specialization influences

curriculum alignment, readiness, and performance. The results underscore the importance of tailoring training programs to meet the distinct needs of each field for effective competency development.

Table 11. Evaluation of the Developed Trainer's Methodology Workbook in terms of Coherence

Indicators	Mean	SD	VI
1. Contains relevant activities	3.29	0.471	Agree
2. Activities provide practical work	2.86	0.577	Agree
3. Activities develop creativity and resourcefulness	3.43	0.500	Agree
4. Provides relevant information for better understanding	3.71	0.745	Strongly Agree
5. Activities conform with the concepts	3.29	0.577	Agree
Overall	3.37	0.269	Agree

Legend: 1.0-1.49 (Strongly Disagree); 1.50-2.49 (Disagree); 2.50-3.49 (Agree); 3.50-4.0 (Strongly Agree).

Table 11 revealed the evaluation of the Trainer's Methodology Workbook in terms of coherence, with an overall mean of 3.37 (SD = 0.269), indicating general agreement that the workbook maintains coherence across content and activities. The highest-rated indicator, "Provides relevant information for better understanding" (M = 3.71, SD = 0.745), reflects the workbook's strength in delivering clear and contextualized information that aids comprehension. This supports findings by Atondo [5] and Velasco [51], who emphasized the value of localized and subject-integrated content in improving understanding and learner engagement.

However, the lowest mean score (2.86, SD = 0.577) was recorded for "Activities provide practical work," indicating a need for more hands-on learning experiences. As highlighted by Oliveira [32] and Balayong [8], practical applications are essential for developing skills, sustaining interest, and deepening learning. Overall, while the workbook is coherent and informative, integrating more experiential and applied activities—such as real-world scenarios, hands-on tasks, and interactive exercises—could further enhance its effectiveness and learner engagement.

Table 12. Evaluation of the Developed Trainer's Methodology Workbook in terms of Appropriateness

Indicators	Mean	SD	VI
1. Adapted to intended learners	3.29	0.471	Agree
2. Based on the Training Regulation training competencies	3.00	0.373	Agree
3. Provides immediate needs	3.14	0.373	Agree
4. Arranged in the correct sequence	3.57	0.500	Strongly Agree
5. Provides varied activities to sustain interest	3.71	0.500	Strongly Agree
Overall	3.40	0.115	Agree

Legend: 1.0-1.49 (Strongly Disagree); 1.50-2.49 (Disagree); 2.50-3.49 (Agree); 3.50-4.0 (Strongly Agree).

Table 12 showed the evaluation of the Trainer's Methodology Workbook in terms of appropriateness, with an overall mean score of 3.40 (SD = 0.115), indicating general agreement that the material is suitable for its intended purpose. The highest-rated indicator, "Provides varied activities to sustain interest" (M = 3.71, SD = 0.500), highlights the workbook's effectiveness in engaging learners through diverse strategies, supporting findings by Valdez [50] and Sari [44] on the benefits of varied instructional methods in promoting critical thinking and improving performance.

However, the lowest score (M = 3.00, SD = 0.373) was observed in "Based on the Training Regulation training competencies," suggesting the need for stronger alignment with TESDA's prescribed standards. As emphasized by the NTESDP 2023–2028 [30] and Perna [36], aligning instructional materials with Training Regulations ensures relevance, standardization, and industry-readiness. Overall, while the workbook is engaging and well-structured, enhancing its alignment with training competencies would further strengthen

its effectiveness and compliance with national standards.

Table 13. Evaluation of the Developed Trainer's Methodology Workbook in terms of Usefulness

Indicators	Mean	SD	VI
1. Easy to understand	3.14	0.500	Agree
2. Provides knowledge and skill	2.86	0.816	Agree
3. Encourages creative and critical thinking	3.43	0.500	Agree
4. Serves as an instructional tool	3.29	0.687	Agree
5. Helps facilitate lesson presentation	3.43	0.687	Agree
Overall	3.27	0.249	Agree

Legend: 1.0-1.49 (Strongly Disagree); 1.50-2.49 (Disagree); 2.50-3.49 (Agree); 3.50-4.0 (Strongly Agree).

Table 13 showed the evaluation of the Trainer's Methodology Workbook in terms of usefulness, with an overall mean score of 3.27 (SD = 0.249), indicating that expert validators generally agree on its relevance and instructional value. The highest-rated indicators, "Encourages creative and critical thinking" and "Helps facilitate lesson presentation" (M = 3.43), suggest that the workbook effectively promotes higher-order thinking and supports lesson delivery. These findings align with studies by Valdez [50] and Rahayu [38], which affirm that structured materials enhance critical thinking and instructional efficiency.

However, the lowest mean score (2.86) for "Provides knowledge and skill" points to a need for strengthening the workbook's content depth. Effective instructional materials should balance knowledge acquisition with skill development. As noted by Pecson [35] and Sam [43], embedding core competencies such as creativity, collaboration, and problem-solving ensures learner preparedness. Gyamfi [21] also emphasized that workbooks enhance critical thinking through structured, practical tasks. Overall, while the workbook is seen as useful and engaging, refining its content to better support skill acquisition could enhance its overall effectiveness.

Conclusions

This study examined whether there were significant differences in the perceived core competencies in Trainer's Methodology I (TM I) among BTVTEd students when grouped according to demographic variables such as sex, year level, and area of specialization. The results led to a partial acceptance of the null hypothesis, which stated that there are no significant differences in competency levels across demographic groups.

No statistically significant differences were found in students' TM I core competencies when grouped by sex and year level, thus supporting the null hypothesis for these variables. In contrast, a significant difference was identified based on area of specialization, leading to the rejection of the null hypothesis for that factor.

These findings suggest that while sex and year level do not have a measurable effect on students' perceived competencies, specialization plays a meaningful role in shaping competency levels in TM I. This highlights the need for differentiated instructional support or curriculum enhancements tailored to specific areas of specialization within technical-vocational teacher education programs.

6. Recommendations

Based on the above findings and conclusions, the following recommendations are given.

Policy Level

1. Training institutions and HEIs offering the BTVTEd program may consider revising and enhancing their curriculum to address areas where competency gaps were identified. Incorporating more practical, hands-on activities and experiential learning opportunities can strengthen students' core competencies.
2. Training institutions and HEI offering BTVTEd program may provide additional training sessions or workshops for students struggling to meet competency standards can help bridge the gap and support their learning progress.
3. Educational policymakers may develop clear and updated guidelines to ensure

consistent implementation of Trainer's Methodology 1 (TM1) core competencies across all institutions.

Practical Level

4. Faculty members and trainers are encouraged to incorporate more hands-on, independent, and scenario-based activities to reinforce student competencies in real-world contexts.
5. It is recommended to enhance the alignment of instructions with activities, integrate more independent and practical tasks, and include additional visual elements to cater to diverse learning styles.
6. It is recommended that instructional materials, including the developed workbook, be revised to enhance alignment between learning objectives and activities. Materials should include visual aids and diverse learning tools to address varied learner needs and preferences.

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Informing Organic Agriculture Policy in the Philippines through Local Farmers' Knowledge, Attitudes, and Practices (KAP)

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Abstract

The study generally aims to design a policy framework that aims to leverage support of organic agriculture among local government units and communities in the SOCCSKSARGEN Region, Philippines for ecologically sound and sustainable community development. The study is descriptive-policy research that employed survey design to ascertain the knowledge, attitude, and practices of 300 farmers in five municipalities in Region XII, Philippines comprising Kidapawan City in Cotabato Province, Lake Sebu in South Cotabato, Palimbang in Sultan Kudarat, Maitum in Sarangani, and General Santos City. Purposive sampling was used in the identification of respondents while balanced selection was utilized in the determination of equal number of respondents in every municipality. The data were collected using adapted survey questionnaires and analyzed using mean. Results revealed that farmers' knowledge, attitude, and practices (KAP) toward organic farming were generally low, with poor practices largely reflecting limited knowledge and attitudes. Further, it can be gleaned in the data that their knowledge about organic farming is relatively higher than their attitude and practices of it, respectively. The findings of the study bridge the empirical and population gaps about the knowledge, attitude, and practices (KAP) toward organic farming of local farmers in the southernmost part of the Philippines which Filipino scholars and agricultural practitioners may use as a theoretical basis in constructing and measuring KAP toward organic farming. The study also designed a policy framework that local government units may use as a keystone in implementing programs and projects that will promote engagement in organic agriculture for a more environmentally friendly, safe, and sustainable Philippine agriculture.

Keywords: Attitude, farmers' practices, knowledge, organic farming, policy framework

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1. Introduction

In the 21st century, environmental issues such as climate change have become increasingly prevalent worldwide [1]. The National Economic and Development Authority (2021) has identified the Philippines as a vulnerable country to climate-related hazards, including tropical cyclones, floods, droughts, and sea-level rise [2]. In response to the escalating concerns about climate change, there is a growing recognition of the urgent need for effective strategies to address this pressing global challenge.

Meanwhile, agriculture remains as one of the leading sources of land degradation in the environment [3], which is manifested by the loss of soil fertility due to over-cultivation. For the last 20 to 30 years, farmers in the Philippines have been practicing chemical-based agricultural production strategies that can poison soil and greatly contribute to land degradation [4]. Given that organic farming remains limited to certain regions of the Philippines despite extensive government efforts, it is imperative to address the pressing issue of land degradation in the country and consider alternative solutions to various social, economic, and environmental agricultural challenges.

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Organic agriculture has emerged as a promising avenue for mitigating climate change due to its potential to reduce greenhouse gas emissions, promote carbon sequestration in soils, and conserve biodiversity [5]. In the early 1980s, the concept of organic agriculture began to gain traction, with the International Federation of Organic Agriculture Movements (IFOAM) defining it as a production system that places a premium on the preservation of soil health, ecosystems, and human welfare. Commonly, organic farming is perceived as an agricultural approach that promote social, environmental, and economic sustainability, alongside animal welfare considerations [6]. This approach entails minimizing reliance on external resources, optimizing the utilization of locally-derived renewable resources, adeptly managing agro-ecosystems, and incorporating market mechanisms to internalize external costs.

Organic agriculture encompasses three core dimensions, namely social, economic, and environmental aspects, that can contribute to providing solutions to pressing agricultural concerns. In the social dimension, organic agriculture demands more intensive labor and presents the potential to bolster long-term employment opportunities in rural regions. Its emphasis on hiring seasonal workers coupled with the rising demand for organic produce underscores its significance in rural employment. Moreover, organic farming fosters entrepreneurship and mitigates migration from rural areas, thereby facilitating the inclusion of diverse societal groups in agricultural pursuits and fostering employment growth. Furthermore, organic farming respects and integrates indigenous and traditional knowledge into its practices, thereby augmenting social resilience and empowering farmers and local communities, aligning with the overarching goal of addressing concerns in the agriculture sphere.

In the economic dimension, organic farming stands out as a financially wise choice for farmers, as it eliminates the need for costly chemical inputs. By opting for inexpensive methods like biological resources instead of chemical fertilizers and pesticides, organic farmers effectively reduce their operational expenses while maintaining sustainable agricultural practices [7]. Organic farming leverages local resources instead of depleting capital-intensive inputs, enabling economically disadvantaged farmers to enhance productivity and soil fertility without relying on costly external resources. There are a large number of economic opportunities that lead to the increase of added value of organic products through processing and marketing activities and the improvement of economic stability for farmers in the long run.

In terms of environment protection and conservation, organic farming serves as a catalyst for enhancing soil quality, ensuring the sustainability of farms, and safeguarding the environment. The cultivation of fertile soil under organic practices fosters stability and efficiency within the production cycle [8]. Moreover, enriching the soil with nutrients reduces erosion and enhances biodiversity, thus fortifying long-term food security. Additionally, in organic farming with minimum tillage, biological fertilizers, proper crop rotation and cover crops, green manure, etc., an increase in soil fertility occurs. Organic farming posts as a solution to various environmental problems by reducing soil erosion and protecting water resources at the same time maintaining and improving environmental services.

The Philippines, recognized for its heavy dependence on agriculture [9], embraces organic agriculture through the adoption of Republic Act No. 10068, commonly known as the "Organic Agriculture Act of 2010," spearheaded by the Department of Agriculture (DA). This legislative approach was motivated by the dual objectives of fostering ecologically sustainable farming methods and enhancing the economic viability of agricultural production. Consequently, the establishment of the National Organic Agriculture Program (NOAP) provided a structured framework for the implementation of organic agriculture initiatives within the Philippines [10].

Despite its growth, organic agriculture in the Philippines continues to account for only a modest portion of cultivated land. Against the national target of 5% conversion from 2012 to 2016, only about 107,911 hectares had been shifted to organic farming, even as the number of organic farmers increased significantly,

indicating uneven adoption [11]. Meanwhile, tangible premiums in consumer prices and strong returns for farmers highlight considerable economic potential: locally, organic herb producers achieved a return on investment of up to 127% (i.e., ₱1.27 earned per ₱1 invested), and organic carrot farmers saw net returns between ₱5,450 to ₱32,000 per hectare depending on farm size—a clear indicator that organic farming can boost farmer income [12]. These findings underscore the urgency of rigorous demand-side studies to quantify consumers' willingness to pay for green products, along with supply-side on-farm trials comparing income and health outcomes under organic versus conventional methods.

Given its abundant natural resources, SOCCSKSARGEN Region maintains a strong reputation in terms of agricultural production. In a 2014 report of the National Economic Development Authority, it was highlighted that SOCCSKSARGEN remains as one of the leaders in terms of crop production in the country [13]. Moreover, it is also known to be a top producer of high value crops such as coffee, banana, asparagus and oil palm and contributes greatly to the gross regional domestic product [8].

1.1. Problem statement

Given the abundant agricultural contribution of the SOCCSKSARGEN to the Philippine economy and its potential to significantly add to the escalating global problem on climate change, it is important to propose a policy that will encourage local farmers in the region to engage in organic agriculture. Moreover, considering the empirical and population gaps regarding organic farming adoption in the region, it is important to conduct a study that ascertains knowledge, attitude, and practices (KAP) toward organic agriculture of farmers among its localities. It is on this ground that the policy research is done to create a policy framework that aims to leverage stakeholders' support of organic farming for ecologically sound and sustainable community development. Through this initiative, the farmers who were historically silenced and marginalized as one of the most underserved sectors in the Philippines will finally be empowered to transform their silence into a collective force of social activism, ensuring that their insights not only reach the government but also contribute to advancing justice and structural support for Philippine organic agriculture [14, 15].

1.2. Objectives of the study

The study generally aims to design a policy framework that aims to leverage support of organic agriculture among local government units and communities in SOCCSKSARGEN Region in the Philippines for ecologically sound and sustainable community development. Specifically, it aims to: 1) Ascertain the level of knowledge, attitude, and practices toward organic farming of farmers in the SOCCSKSARGEN Region; and 2) formulate a policy framework that would address issues and problems related to organic farming.

1.3. Theoretical framework

The study is anchored on the Theory of Reasoned Action (TRA) of Fishbein [16] and Theory of Planned Behavior (TBP) of Fishbein and Ajzen [17]. Through these theoretical propositions, it can be asserted that the people's attitudes toward organic agriculture, considering both its risks and rewards, shape their interest and motives to engage in organic farming practices. Exhibiting positive attitudes toward organic agriculture, such as their beliefs to its environmental and health benefits to people, will increase the likelihood that they will adopt organic farming. Moreover, TRA and TBP suggest that farmers' perceived behavioral control could facilitate or hinder engagement in organic farming. Their level of knowledge and skills, access to resources, and farming constraints affect their adoption of organic agriculture.

1.4. Conceptual framework

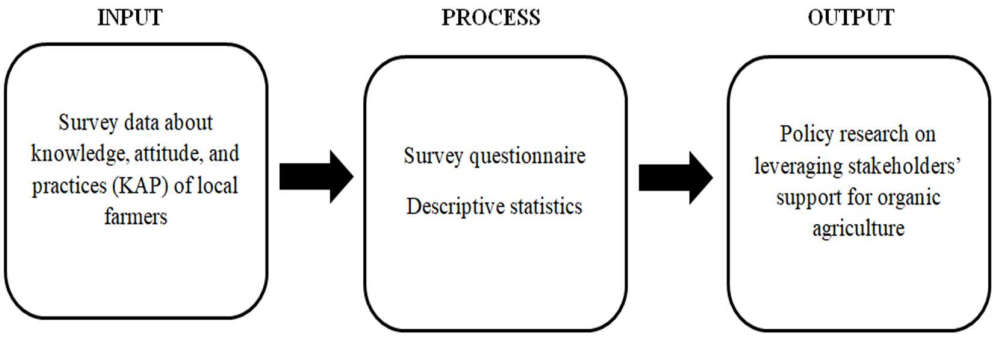

Figure 1. Input-Process-Output (IPO) as the conceptual paradigm of the study

2. Methodology

The study is policy research that employed a descriptive-survey research design. Descriptive survey was used to assess the level of knowledge, attitude, and practices toward organic farming among farmers in the SOCCSKSARGEN Region to formulate a policy framework to address the issues and problems related to organic farming knowledge, attitude, and practices (KAP). It aimed to provide a detailed and accurate representation of the data collected, allowing for the exploration of trends, patterns, and relationships between farmers' knowledge, attitude, and practices and the social, economic, and environmental benefits derived from organic agriculture [18].

Descriptive statistics was used in quantitative data analysis [19]. Firstly, frequency count and percentage were used in identifying the socioeconomic status of the farmers in terms of gender, age, ethnicity, and monthly income while mean was used in assessing the level of knowledge, attitude, and practices toward organic farming among farmers in the SOCCSKSARGEN Region.

The research was conducted in five municipalities in Region XII, comprising Kidapawan City in Cotabato Province, Lake Sebu in South Cotabato, Palimbang in Sultan Kudarat, Maitum in Sarangani, General Santos City.

Purposive sampling was used in sampling selection to safeguard the representativeness of the research population. Balanced selection was followed in the determination of the number of research respondents in every municipality [20]. 60 respondents were involved in the data collection from each municipality, producing a total of 300 research respondents in the entire region.

The respondents of the study are farmers from the selected municipalities in Region XII. As to their inclusion qualification, they are identified based on the following criteria: 1) They must be actively engaged in agricultural activities as their primary occupation; 2) they should have engaged in farming for 5 years and had sufficient understanding of farming practices relevant to the study to provide valuable insights about the phenomenon of interest; 3) they may be full-time or part-time farmers but farming must be a significant aspect of their livelihood; 4) and they involve in any type of agricultural production, including but not limited to crop cultivation, livestock rearing, mixed farming, or specialized horticulture.

Further, a common rule thumb on sampling adequacy requires inclusion of 200-300 respondents in estimating means and proportions in populations of a few thousand or fewer individuals [21, 22]. Hence, the study involved 300 respondents, who were equally distributed among five municipalities in the SOCCSKSARGEN Region. This sampling determination was also tested using Kaiser-Meyer-Olkin (KMO). Since the KMO values exceed 0.6, they are considered adequate [23]. Therefore, the Kaiser-Meyer Olkin measure of sampling adequacy, with a value of 0.665, is deemed acceptable.

3. Results and Discussion

3.1 Knowledge of farmers toward organic farming

Table 1 shows the knowledge of farmers towards organic farming in Region XII. The study revealed that respondents have a low level of knowledge towards organic farming (*M*=2.50). This implies that they have poor knowledge on ecologically balanced methods of farming that avoid the use of synthetic chemicals and other artificial and hazardous inputs to produce food in a manner that is environmentally sustainable, promotes biodiversity, and prioritizes the health and well-being of soil, plants, animals, and humans.

Furthermore, the finding is primarily attributed to the respondents' knowledge of crop rotation to control weed and pest and as well as improve soil fertility (*M*=2.89), the implementation of mono cropping system throughout the year to decrease diseases (*M*=2.88), and the use of trap methods to manage pests and diseases (*M*=2.86). However, it was also revealed that they are less likely to refrain from using chemical insecticides to control pests and diseases (*M*=2.14), chemical herbicides to manage weeds (*M*=2.14), and chemical fertilizers to increase plant growth (*M*=2.11).

Table 1. Knowledge of farmers towards organic farming in Region XII

Knowledge	Mean	Description
Rotating of crops to control weed, pest and also to improve soil fertility	2.89	Often
Using kitchen wastes, plant wastes and animal wastes to fertile soil and plants	2.41	Rarely
Doing pruning to reduce diseases that attack plants.	2.70	Often
Doing composting to improve soil fertility and water conservation	2.63	Often
Limiting the use of synthetic fertilizers to fertilize plants	2.41	Rarely
Avoiding controlling weed manually like hand weeding because it will only waste time	2.28	Rarely
Limiting the use of chemical pesticides to control pests	2.75	Often
Doing green manuring or plant cover crop to reduce soil erosion and increase soil fertility	2.32	Rarely
Using trap methods to control pests and diseases.	2.86	Often
Choosing resistant plant varieties to reduce damage to plants	2.26	Rarely
Avoiding practice of inter cropping / mixed cropping system because it can reduce soil fertility and water conservation	2.72	Often
Implementing mono cropping system for the full year to decrease diseases	2.88	Often
Refraining from using chemical insecticides to control pests and diseases	2.14	Rarely
Doing mulching to control weed	2.65	Often
Refraining from using chemical fertilizers to increase plant growth	2.11	Rarely
Refraining chemical herbicides to control weed	2.14	Rarely
Refraining from using biological control agents to control pests	2.42	Rarely
Overall	**2.50**	**Rarely**

Legend:

Response Scale	Range of Means	Descriptive Level	Interpretation
4	3.26 – 4.00	Always	Very High
3	2.51 – 3.25	Often	High
2	1.76 – 2.50	Rarely	Low
1	1.00 – 1.75	Never	Very Low

3.2 Attitude of farmers towards organic farming

Table 2 shows the attitude of farmers towards organic farming in Region XII. It was ascertained that respondents have a highly negative attitude towards organic farming (*M*=2.38). This implies that the farmers hold a poor impression toward organic farming as a sustainable and ecologically friendly agricultural practice.

Moreover, the finding is primarily attributed to respondents' perception that it is struggle to implement organic farming due to difficulties in obtaining organic matters (*M*=2.54), that it benefits the consumers more than the producers (*M*=2.53), and that it reduces the production cost by reducing the input purchases (*M*=2.48). However, they perceived that organic farming is less likely to increases their income (*M*=2.27), receive the necessary attention and support (*M*=2.25), or improve the texture and fertility of soil (*M*=2.12).

Table 2. Attitude of farmers towards organic farming in Region XII

Attitude	Mean	Description
Decreasing the production cost by reducing the input purchases	2.48	Rarely
Chemical pesticides that are more suitable to control pests	2.44	Rarely
Chemical herbicides that are more suitable to control weed	2.47	Rarely
Benefiting the consumers not the producers	2.53	Often
Acquiring the enough attention that is needed	2.25	Rarely
Struggling to implement organic farming due to difficulties in obtaining organic matters	2.54	Often
Struggling in implementation	2.35	Rarely
Increasing the texture and fertility of soil	2.12	Rarely
Increasing the income of farmers	2.27	Rarely
Overall	**2.38**	**Rarely**

Legend:

Response Scale	Range of Means	Descriptive Level	Interpretation
4	3.26 – 4.00	Always	Very High
3	2.51 – 3.25	Often	High
2	1.76 – 2.50	Rarely	Low
1	1.00 – 1.75	Never	Very Low

3.3 Practices of farmers towards organic farming

Table 3 shows the practices of farmers towards organic farming in different provinces in Region XII. The study revealed that farmers in the region poorly practice organic farming (*M*=2.37). This suggests that they often practice traditional and other forms of farming considering that the indicators of organic farming practices were not highly manifested among them. Furthermore, it was revealed that the respondents are less likely to engage in annual weeding or hand weed (*M*=2.30), use organic fertilizer (*M*=2.27), and follow green manuring or planting cover crop (*M*=2.00).

Table 3. Practices of farmers towards organic farming in Region XII

Practices	Mean	Description
Follow a crop rotation	2.49	Rarely
Engage in annual weeding or hand weed	2.30	Rarely
Follow inter cropping / mixed cropping.	2.39	Rarely
Use animal manure in farming	2.48	Rarely
Use plant waste in farming	2.41	Rarely
Use organic fertilizer	2.27	Rarely
Follow mulching in farming	2.47	Rarely
Follow green manuring or planting cover crop	2.00	Rarely
Use kitchen wastes in planting	2.34	Rarely
Use trap method to control pests	2.50	Rarely
Use insect predators to control pests	2.39	Rarely
Overall	**2.37**	**Rarely**

Legend:

Response Scale	Range of Means	Descriptive Level	Interpretation
4	3.26 – 4.00	Always	Very High
3	2.51 – 3.25	Often	High
2	1.76 – 2.50	Rarely	Low
1	1.00 – 1.75	Never	Very Low

3.4 Descriptive comparison of the knowledge, attitude, and practices of farmers toward organic farming

Table 4 shows the overall knowledge, attitude, and practices of farmers towards organic farming in different provinces in Region XII. It was determined in the study that the three variables were all rarely manifested among farmers in Region XII. The finding is supported by the theoretical framework of the study, comprising the Theory of Reasoned Action (TRA) of Fishbein [16] and Theory of Planned Behavior (TBP) of Fishbein and Ajzen [17], suggesting that the farmers' attitudes toward organic agriculture significantly shape their interest and motives to engage in organic farming practices. The study also revealed that that their knowledge about organic farming is higher than their attitude and practices of it, respectively.

Table 4. Overall knowledge, attitude, and practices of farmers towards organic farming in different provinces in Region XII

Dimensions	Mean	Description
Knowledge	2.50	Rarely
Attitude	2.38	Rarely
Practices	2.37	Rarely
Overall	**2.42**	**Rarely**

Legend:

Response Scale	Range of Means	Descriptive Level	Interpretation
4	3.26 – 4.00	Always	Very High
3	2.51 – 3.25	Often	High
2	1.76 – 2.50	Rarely	Low
1	1.00 – 1.75	Never	Very Low

3.5 Policy framework to leverage support for organic agriculture based on farmers' knowledge, attitude, and practices (KAP)

Table 5. Proposed matrix to address issues and problems related to farmers' knowledge, attitude, and practices

Domain	Findings	Policy Recommendation/s
Knowledge	• Farmers have poor knowledge about organic farming practices • Constant application of common agricultural practices (Monocropping System, Trap Method, and Crop Rotation) • Common use of chemical herbicides, fertilizers, and insecticides	• Implementation of educational programs and seminars about organic farming • Implementation of a program that provides for farmers' needs of organic materials (i.e., bio-fertilizers, organic pesticides, etc.)
Attitude	• Poor financial return in organic farming • Organic farming receives poor the attention from concerned stakeholders • Lack of access to organic farming materials	• Initiation of trade and promotion of organic farming produces • Implementation of an incentive-oriented program on organic agribusiness • Implementation of educational programs and seminars about organic farming • Inception of local organizational bodies that promote and support organic farming • Implementation of a systematic subsidization program.
Practices	• Poor practices of organic farming methods • Lack of organic materials resulting to limited engagement to organic farming	• Implementation of educational programs and seminars about organic farming • Implementation of a program that provides for farmers' needs of organic materials • Inception of local organizational bodies that promote and support organic farming

4. Conclusions

Several studies demonstrated how the agricultural sector significantly contributes to the escalating issue of greenhouse gases worldwide, and organic agriculture is found to be an important lever in moving the needle on climate change. It is a powerful tool to reduce climate change due to its potential to lessen global greenhouse gas emissions, enhance carbon storage in soil, and preserve biodiversity. Empirical and population gaps about organic farming adoption in the Philippines highlight the need to assess farmers' knowledge, attitude, and practices (KAP) toward organic agriculture to formulate an informed policy that will leverage support for organic farming among concerned stakeholders in the country, particularly in the Region XII. It was concluded that the three variables, namely the farmers' knowledge, attitude, and practices toward organic farming were all rarely manifested. This draws out an implication that the extent of their practices was largely attributed to their level of knowledge and attitude toward organic farming. Nevertheless, it can be gleaned in the data that their knowledge about organic farming is higher than their attitude and practices of it, respectively. At the end of the study, the researchers formulated a policy framework designed to strategically enhance support for the farming industry in the Philippines. The policy recommendations are particularly directed to the Department of Agriculture for the implementation of programs that address farmers' needs for organic materials and promote the trade and dissemination of organic farming procedures locally within one year. Finally, municipal agriculture offices of various local government units are encouraged to implement educational programs and seminars on organic farming to foster positive attitude toward its adoption in SOCCSKSARGEN, Philippines.

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Utilization of Philippine School for the Deaf (PSD) E-Sign Library to Improve the Signing Skills of Deaf, Hard-of-hearing (DHH) Learners, and Stakeholders

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Abstract

The acquisition of an extensive vocabulary is essential for young readers to recognize terms they are familiar with or have previously encountered through memory or visual recognition. The distinctive learning traits of Deaf and hard-of-hearing (DHH) learners can pose challenges in their reading abilities. Sign language serves as their principal mode of communication owing to their visual learning capabilities. The majority of Filipino DHH learners experience challenges in understanding written vocabulary. Results from the teacher-created evaluation administered to Key Stage 1 pupils and adult learners indicate that they are categorized at the Frustration Level. The primary objective of this project is to tackle the difficulties faced by DHH learners regarding written language and to enhance the sign language proficiency of adult hearing learners through an intervention known as the Philippine School for the Deaf (PSD) E-Sign Library. The intervention consisted of multimedia learning materials accessible on any Android or iOS device. The research employed a mixed-methods strategy to gather both quantitative and qualitative data. Quantitative data were collected by the administration of pre- and post-tests to 36 student participants from grades 1, 2, and 3. Nine parents or guardians of the learner-participants acted as the adult learner-participants. The pre- and post-test results indicate a substantial increase in the mean percentage score, which implies that the PSD E-sign Library is an effective multimedia learning intervention for enhancing the sign language and literacy of Key Stage 1 DHH learners and adult learners. The learners' post-test results were classified as Independent Reading Level, indicating that they were able to independently communicate using sign language with exceptional comprehension following the intervention. Qualitative data were gathered using survey questionnaires and focus group interviews with the chosen stakeholders. The stakeholders' overall assessment of the PSD E-Sign Library was overwhelmingly positive, indicating a strong recommendation for its use as a learning intervention to enhance literacy and sign language knowledge among grades 1, 2, 3 DHH learners and adult learners. Stakeholders advocate augmenting the intervention by incorporating a slow-motion component and integrating further new sign varieties of Filipino Sign Language.

Keywords: deaf and hard-of-hearing education, Filipino Sign Language, e-sign

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1. Introduction

Language plays a crucial role in human interaction, serving as a foundation for communication, socialization, and cognitive development. For the Deaf and hard-of-hearing (DHH) community, sign language is an essential means of expression that enables them to engage meaningfully with the world. Nonetheless, a considerable issue emerges when numerous deaf children are born to hearing parents who possess minimal to no familiarity with sign language. This communication gap can hinder the linguistic and social development of deaf children, making it difficult for them to acquire early literacy skills and interact effectively with their families. Recognizing this need, the PSD E-Sign Library is an initiative designed to promote Filipino Sign Language (FSL) awareness and literacy by providing video learning materials tailored for young learners, parents, and other stakeholders.

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The majority of deaf children are born to hearing parents who are not familiar with sign language at birth, which can lead to limited language exposure during early childhood. Despite the increasing recognition of the importance of sign language in education, the lack of accessible and structured learning resources remains a pressing issue. Online learning resources for the DHH and adult hearing learners are essential to gain awareness of proper communication in FSL. Research has shown that families who learn sign language together experience stronger emotional bonds, better communication, and improved educational outcomes for their deaf children [1]. However, in the Philippines, access to formal FSL education is limited, particularly for hearing parents who may not have the time or resources to attend traditional sign language classes. As a result, many deaf children grow up in environments where their primary caregivers struggle to communicate effectively with them, leading to delays in language development and potential barriers to academic success.

Additionally, studies indicate that most hearing adults who learn sign language do so for professional purposes, such as becoming interpreters or educators, rather than for direct family communication [2]. This underscores the deficiency in resources specifically tailored for parents who require proficiency in FSL to engage with their deaf children on a regular basis. Effective communication strategies, including visual cues, shared book reading, and structured vocabulary-building, are crucial for fostering language acquisition among young deaf learners [3][4]. In the absence of sufficient support, numerous families turn to informal and frequently unreliable communication strategies, which may fail to establish the linguistic foundation essential for their child's cognitive and social development.

The necessity of tackling this issue is clear due to the lasting effects of early language exposure. Deaf children who lack early access to a fully accessible language may experience delays in cognitive and academic development, limiting their opportunities for future success. By providing structured and accessible video learning materials, the PSD E-Sign Library seeks to empower parents, guardians, and educators with the tools needed to bridge the communication gap. Lessons in this program will be aligned with vocabulary from the Philippine Registry of Interpreters for the Deaf to ensure accuracy and cultural relevance. The availability of these resources through digital platforms will further enhance accessibility, allowing more families to benefit from FSL education.

The PSD E-Sign Library is a crucial step toward fostering a more inclusive environment for the Deaf community. By equipping hearing parents and other stakeholders with essential FSL skills, this initiative promotes early literacy, strengthens family relationships, and advocates for greater awareness of Deaf culture. Given the limited resources available for FSL education in the Philippines, this innovation serves as a valuable tool for improving Deaf education and ensuring that all children, regardless of their hearing ability, have the opportunity to develop strong communication skills.

2. Research Questions

The primary objective of this research is to develop an appropriate intervention to spread Filipino Sign Language (FSL) awareness among DHH learners, hearing adult learners, and other stakeholders who are responsible for the upbringing of children who are DHH. This study aims to identify the level of FSL proficiency before and after the implementation of PSD E-Sign Library. It also aims to describe the development process of this innovation. Moreover, it shows the suggestions from the stakeholders based on their experiences in utilizing PSD E-Sign Library. Finally, this research seeks to determine if there is a significant relationship between parents' sign language proficiency and their children's academic performance. Specifically, the objectives of this investigation are to address the subsequent inquiries:

1. What is the sign language proficiency level of Key Stage 1 learners, parents, guardians, and

other stakeholders before the implementation of the PSD E-Sign Library intervention?

2. How can the PSD E-Sign Library be developed and validated as an effective learning tool for Filipino Sign Language education?

3. What changes in sign language proficiency can be observed among parents, guardians, and other stakeholders after implementing the PSD E-Sign Library?

4. What are the issues and challenges encountered in the implementation of the PSD E-Sign Library?

5. Is there a significant relationship between parents' sign language proficiency and their child's academic performance?

By addressing these questions, this study aims to assess the effectiveness of the PSD E-Sign Library, identify challenges in its implementation, and explore ways to enhance its impact on Deaf education. The findings will contribute to improving communication between deaf children and their families, ultimately fostering a more inclusive and supportive learning environment.

3. Methodology

In this research endeavor, mixed methods were utilized. The said design involved quantitative and qualitative data collection [5]. In addition, the mixed-method design allows embedding qualitative data within the research process within the research process. Such an approach can help the researcher obtain a qualitative information, through survey questionnaires and focus group interview, after the implementation of the intervention.

3.1 Participants and/or Other Sources of Data and Information

The investigation included learners in grades 1, 2, and 3 who were enrolled in the Philippine School for the Deaf during the 2024-2025 academic year. The gender distribution of participants is illustrated in Table 1. Males comprised 19 or 53% of the population, while females comprised 17 or 47% of the total population.

Table 1. Distribution Learner Participants According to Gender

Gender	Grade 1	Grade 2	Grade 3	Total	Percentage
Male	4	9	6	19	53%
Female	7	5	5	17	47%
Total	11	14	11	36	100%

The study assumes that males are more prevalent than females in the actual execution of this research study. The entire lower grades or key stage 1 population of PSD during the school year 2024-2025 is represented by a 100% participation rate.

Table 2. Profile of the Participants in the Evaluation of the PSD E-Sign Library Intervention and Focus Group Discussion (FGD)

Participants	Age	Gender	Profession	Hearing Ability/Loss
A	35	Male	Parent	Hearing
B	48	Female	Teacher	Regular Hearing
C	34	Female	Teacher	Profound Hearing loss
D	38	Female	Teacher	Hard-of-hearing

Table 2 delineates the characteristics of the stakeholders who assessed the tools and the PSD E-Sign Library Intervention. It delineates their age, occupation, and auditory capability or impairment. Purposive sampling method was utilized to represent the different stakeholders who have strong interest in the Deaf education, namely, parents, teachers, and representatives from the hard-of-hearing and Deaf communities.

3.2 Research Instrument

The study collected quantitative data using a validated evaluation tool to gather expressive FSL skills of the adult learners

composed of hearing parents, guardians , and stakeholders. It adapted the rubrics being utilized by the Philippine Registry of Interpreters for the Deaf (PRID) which include expressive signing of words. It utilized a 100-item test for the adult learners which contains basic sign language vocabulary. Quantitative data from Key Stage 1 learners were gathered through 50-item test through a video presentation. Both DHH and hearing adult learners are expected to execute the sign once they see the vocabulary.

The researcher sought the assistance of experts in the field of Deaf Education to evaluate the appropriateness and coherence of the test questions. The instrument was presented to a panel of specialists, including special education teachers, sign language interpreters, and sign language instructors, for content validation. The recommendations provided by these validators were carefully reviewed and incorporated into the final version of the test.

The PSD E-Sign Library intervention is in the form of video learning material. FSL is executed with a word on the lower right. Likewise, there is a caption at the lower part of the video. Their scores are recorded in the PSD E-Sign scoresheet which contain Pre Test, Post Test, and the remarks columns. The research modified the "Reading Level Proficiency Rubric" from the Philippine Informal Reading Inventory (Phil-IRI) [6] to assess and characterize the respondents' vocabulary proficiency. The scale is rated as follows: 0-15, Frustration Reading Level, indicating that the learner encounters terminology so challenging that they are unable to comprehend it well; Individuals aged 16-35 possess an Instructional Reading Level, indicating that they benefit significantly from teacher-led education in Filipino vocabulary. Conversely, those aged 36-50 exhibit an Independent Reading Level, demonstrating practically flawless reading and comprehension abilities autonomously via Filipino Sign Language.

Most of the vocabulary was derived from the Basic Sign Language Module of the PRID. Adapted Proficiency Level for adult learners are rated as: 0-35, Frustration Reading Level, 36-74, Instructional Reading Level, and 75-100, Independent Reading Level.

This study employed the PSD E-Sign Library Feedback Form for qualitative data collecting to assess the overall impression and usefulness of the intervention for content, layout, and accessibility. It comprises a five-point Likert Scale that can be completed by marking the number corresponding to the assessors' responses. The criteria on the specified scale were assessed as follows: 5 - Strongly Agree; 4 - Agree; 3 - Neutral; 2 - Disagree; 1 - Strongly Disagree. The weighted means were analyzed using the same arbitrary scale: 5 – Strongly Agree, indicating strong endorsement of the PSD E-Sign Library as an intervention; 4 – Agree, indicating endorsement of the PSD E-Sign Library as an intervention. 3 – Neutral, indicating that the PSD E-Sign Library may or may not be appropriate for intervention and requires more changes; 2 – Disagree, indicating a negative assessment of the PSD E-Sign Library as an intervention; and 1 – Strongly Disagree, signifying a very negative assessment of the proposed intervention, suggesting its unsuitability for DHH learners. It also includes a comments box for targeted feedback and suggestions from stakeholders. Additionally, a focus group discussion (FGD) was done to identify the obstacles, views, and opinions regarding the execution of the study.

4. Results and Discussions

In the field of education, the integration of diverse learning tools is essential to address the varying needs of students. Among those requiring special attention are children who are deaf or hard of hearing, as they encounter distinct challenges that go beyond the scope of the traditional classroom. In the study conducted by Mingsiritham and Chanyawudhiwan [7], the DHH learners' academic achievement scores after the implementation of online learning resources showed a significant increase compared to their scores prior to its use. Similarly, the present research yielded parallel findings, demonstrating a marked improvement in learners' performance. The online sign language intervention also produced positive learning outcomes among DHH students, as evidenced by the study conducted by Madronio [8].

The following are the results of the study:

4.1 Problem 1: What is the sign language proficiency level of Key Stage 1 learners,

parents, guardians, and other stakeholders before the implementation of the PSD E-Sign Library intervention?

A pretest was conducted in order to measure the current level of sign language proficiency of Key Stage 1 learners. It is in the form of 50-item test where results are shown in Table 3.

Table 3. Mean Percentage Scores (MPS) of Pre-Test of Key Stage 1 Learners

Grade Level	No. of Items	Average Pre-Test Score	Mean Percentage Score (MPS)	Level of Proficiency
1	50	11	22%	Frustration
2	50	14	28%	Frustration
3	50	15	30%	Frustration

Table 4. Mean Percentage Scores (MPS) of Pre-Test of Parents, Guardians, and other Stakeholders

Adult Learners	No. of Items	Individual Pre-Test Scores	Mean Percentage Score (MPS)	Level of Proficiency
1	100	26	26%	Frustration
2	100	10	10%	Frustration
3	100	27	27%	Frustration
4	100	21	21%	Frustration
5	100	18	18%	Frustration
6	100	11	11%	Frustration
7	100	35	35%	Frustration
8	100	31	31%	Frustration
9	100	44	44%	Instructional
10	100	20	20%	Frustration

The result of the pre-test shows that 9 out of 10 adult learners fall under Frustration Reading Level while 1 fell under the category of Instructional Reading Level.

4.2 Problem 2: How can the PSD E-Sign Library be developed and validated as an effective learning tool for Filipino Sign Language education?

Development of the PSD E-Sign Library was done through a consultative meeting and focus group discussion (FGD) with the school-based registered FSL interpreters, Deaf, and hard-of-hearing teachers. Thematic analysis was employed to identify and interpret recurring patterns, themes, and underlying meanings from the FGD. Basic words included in this study were carefully chosen and executed to include the current and emerging FSL. The themes that emerged from the meeting and FGD are: inclusion of FSL variations, captioning, and video creation by category or subject area.

Inclusion of new variations of FSL. Considering that the Philippines is an archipelago, it is no surprise that variations in Filipino Sign Language (FSL) have naturally emerged. These regional differences are a reflection of the country's geographic diversity and cultural richness. Just as spoken languages in the Philippines have developed into distinct regional dialects, FSL has evolved unique sign variations influenced by local customs, traditions, and interactions within Deaf communities. These variations highlight the dynamic and living nature of FSL as a language shaped by context, community, and culture. They also serve as a testament to the resilience and creativity of the Filipino Deaf community in preserving their identity while embracing linguistic diversity [9].

Inclusion of captioning in the video. Captioning accuracy plays a vital role in promoting accessibility, ensuring that Deaf and hard-of-hearing individuals can fully engage with information, communication, and entertainment. When captions are inaccurate—whether due to omissions, misspellings, or misinterpretations—they create barriers that can lead to confusion, misinformation, frustration, and ultimately, social exclusion. This not only undermines the viewer's right to

equal access but also affects their ability to participate meaningfully in education, employment, and public discourse. Recognizing the importance of accurate captioning means understanding its impact on the daily lives of millions. By advocating for higher standards, investing in professional captioning services, and holding media platforms accountable, we take concrete steps toward building a society that values inclusivity, respect, and equal opportunity for all [10].

Video Creation by Category or Subject Area. During the Focus Group Discussion (FGD), it was agreed that the videos to be developed should be categorized by subject area. The identified topics include: Alphabet, Numbers, Days of the Week, Months of the Year, Adverbs of Time, Greetings and Polite Expressions, Personal Information, People, Family and Relationships, Question Words, Pronouns, Basic Action Words, Basic Adjectives, Quantity, Colors, Sizes and Shapes, Parts of the Body, Mental Actions, Emotions, Clothing and Hygiene, Places (Directions/Locations), Parts of the House and Household Items, and Food and Drinks. The development of the video learning materials follows a structured three-phase process to ensure accuracy, relevance, and accessibility. These phases are:

Gathering Phase. This initial stage involves the collection of essential content, including key vocabulary, concepts, and themes based on the curriculum and learning needs of Deaf and hard-of-hearing learners. Input from subject matter experts, teachers, and members of the Deaf community is gathered to ensure cultural and linguistic appropriateness, particularly in the use of Filipino Sign Language (FSL).

Developing Phase. In this stage, the actual creation of the video materials takes place. This includes scripting, sign language interpretation, filming, and editing. The focus is on producing clear, engaging, and pedagogically sound content that aligns with identified subject areas. Visual elements, pacing, and sign clarity are carefully considered to support comprehension and retention.

Validation Phase. The final stage ensures the quality and effectiveness of the materials. Videos are reviewed by a panel composed of Deaf educators, language experts, and instructional specialists. Feedback is used to refine content, correct any inaccuracies, and confirm alignment with educational goals and FSL standards. Only validated materials are finalized for classroom or online use.

The evaluators rated the PSD E-Sign Library intervention at 4.61, indicating a Strongly Agree consensus, which suggests that this intervention is highly recommended as a learning resource to enhance the literacy and expressive signing abilities of DHH and adult learners.

4.3 Problem 3: What changes in sign language proficiency can be observed among key stage 1 learners, parents, guardians, and other stakeholders after implementing the PSD E-Sign Library?

A Post-test was conducted in order to measure the changes in the level of sign language proficiency of Key Stage 1 learners. The 50-item test was given with the results shown in Table 6.

Table 5. Results of PSD E-Sign Library Validation from the Stakeholders

Criteria	Evaluator				WM	INT
	1	2	3	4		
The contents of PSD E-Sign Library are …						
1. accurate and are based on the needs of its learners for Basic Sign Language	4	4	4	5	4.25	Agree
2. current and are based on the needs of its learners for Basic Sign Language	5	4	4	5	4.5	Strongly Agree
3. suited for the deaf and hard-of-hearing (DHH) learners	5	5	5	5	5	Strongly Agree
4. suited for adult hearing learners	4	5	5	4	4.5	Strongly Agree
The layout …						
5. makes it easy for the DHH learners to process graphics, text and sign language	4	5	4	5	4.5	Strongly Agree
6. of the PSD E-Sign Library intervention is consistent	4	4	5	5	4.5	Strongly Agree
7. is clear and logical	4	5	4	5	4.5	Strongly Agree
8. words and subtitles are clearly visible	5	4	5	5	4.75	Strongly Agree
Accessibility…						
9. The PSD E-Sign Library intervention accommodates the unique learning style of DHH pupils and adult learners.	4	5	4	5	4.5	Strongly Agree
10. The PSD E-Sign Library intervention can be utilized by the DHH and adult learners without much help from the teacher.	4	5	5	5	4.75	Strongly Agree
11. The PSD E-Sign Library intervention can be accessed in any type of computer and devices	5	5	5	5	5	Strongly Agree
Total:					**4.61**	**Strongly Agree**

Legend: WM – Weighted Mean; INT – Interpretation

Table 6. Mean Percentage Scores (MPS) of Post-Test of Key Stage 1 Learners

Grade Level	No. of Items	Average Post-Test Score	Mean Percentage Score (MPS)	Level of Proficiency
1	50	43.45	86.90%	Independent
2	50	45.14	90.28%	Independent
3	50	47	93%	Independent

Result of the Post-test shows mean percentage scores of 86.90%, 90.28%, and 93% of grades 1, 2, and 3, respectively. The results yielded under the Independent Level of Reading Proficiency. The result of the 100-item post-test of the adult learners is presented in Table 7.

Table 7. Mean Percentage Scores (MPS) of Post-Test of Adult Learners

Adult Learners	No. of Items	Individual Post-Test Scores	Mean Percentage Score (MPS)	Level of Proficiency
1	100	80	80%	Independent
2	100	91	91%	Independent
3	100	87	87%	Independent
4	100	90	90%	Independent
5	100	88	88%	Independent
6	100	79	79%	Independent
7	100	85	85%	Independent
8	100	99	99%	Independent
9	100	100	100%	Independent
10	100	90	90%	Independent

Result of the Post-test Shows that 10 out of 10 adult learners fall under Independent Reading Level.

4.4 Problem 4: What are the issues and challenges encountered in the implementation of the PSD E-Sign Library?

Table 8 encapsulates the comprehensive concerns, challenges, perspectives, and recommendations of many stakeholders regarding the execution of the PSD E-Sign Library intervention. It encompasses the qualitative data collected via focus group discussions and survey surveys.

Table 8. Issues, Challenges, Opinions, and Suggestion of the Stakeholders in the Implementation of the PSD E-Sign Library Intervention

Positive Feedback

- Good way to practice expressive sign language skills
- Basic vocabulary is very important for daily communication
- Video learning materials are beneficial to both learners and parents.

Perceptions/Suggestions

- Audio of the word may still be incorporated instead of music
- May include intermediate and advanced level vocabulary in the future

Stakeholders reported no notable issues or challenges during the implementation of the PSD E-Sign Library. On the contrary, the intervention was widely regarded as an effective and accessible tool that enhances the expressive sign language skills of both Deaf and Hard-of-Hearing (DHH) learners as well as adult users. It has proven particularly helpful in supporting daily and practical communication. Several users recommended the inclusion of audio features or pronunciation guides to benefit individuals with residual hearing, thereby increasing the tool's inclusivity. Additionally, there is a growing interest in expanding the E-Sign Library's content to include more advanced vocabulary relevant to specific domains such as education, religion, media, legal, and medical settings. This expansion aims to equip learners with the necessary linguistic tools to navigate diverse real-world environments confidently and competently.

4.5 Problem 5: Is there a significant relationship between parents' sign language proficiency and their child's academic performance?

The t-test results in Table 9 demonstrate the significant difference between the pre-test and post-test.

Table 9. T-Test Result on Finding the Significant Difference in the Means of the Key Stage 1 and Adult Learners Before and After the Utilization of the PSD E-Sign Library Intervention

Key Stage 1 Learners							
Variables Compared	**DF**	**MPS**	**Computed t-value**	**Critical t - value**	**Decision**	**P-Value**	**Impression @ 0.05 Level**
Grade 1							
Pre-Test (X_1)	10	10.18	33.24	1.81	Reject H_o	<0.001	Significant
Post-Test (X_2)		86.91					
Grade 2							
Pre-Test (X_1)	13	7.14	35.37	1.77	Reject H_o	<0.001	Significant
Post-Test(X_2)		90.29					
Grade 3							
Pre-Test (X_1)	10	30.73	16.60	1.81	Reject H_o	<0.001	Significant
Post-Test(X_2)		93.45					

Variables Compared	**DF**	**MPS**	**Computed t-value**	**Critical t - value**	**Decision**	**P-Value**	**Impression @ 0.05 Level**
Adult Learners							
Pre-Test (X_1)	10	28.6	9.58	1.83	Reject H_o	<0.001	Significant
Post-Test (X_2)		88.9					

The null hypothesis was rejected by the researcher, as the Grade 1 learners' computed t-value of 33.24 and critical level of 1.81 are significant at the 0.05 level. The null hypothesis was denied by the researcher once more, as the grade 2 participants achieved a computed t-value of 35.37 and a critical t-value of 1.77, both of which are statistically significant at the 0.05 level. In the grade 3 data, learners achieved a computed t-value of 16.60, while the crucial t-value was 1.81; consequently, the researcher rejected the null hypothesis, which is significant at the 0.05 level. The adult learners obtained a computed t-value of 9.58 and a crucial t-value of 1.83, leading the researcher to reject the null hypothesis. All of the respondents showed significant increase in their post-test after the PSD E-sign Library intervention. The results indicate a substantial enhancement in the sign language proficiency of Grade 1, 2, and 3 students, as well as adult learners, according to the notable increase in mean percentage scores.

5. Conclusions and Recommendations

In light of the findings and discussions derived from this study, the subsequent conclusions and recommendations proposed by the teacher-researcher are as follows:

1. The intervention program called PSD E-Sign Library is an effective intervention in improving the literacy and sign language skills of Key Stage 1 learners and adult learners.
2. Stakeholders rated the effectiveness and applicability of the PSD E-Sign Library regarding content, layout, and accessibility as strongly agree, indicating a high level of acceptance of the intervention as an online learning resource to enhance the literacy and sign language skills of Key Stage 1 learners and adult learners.
3. The PSD E-Sign Library was successfully implemented for Grades 1, 2, and 3 and adult learners, as evidenced by the results of the pre- and post-tests. Additionally, it was noted that the learners sign as they view the multimedia intervention's content, which is comparable to reading the words orally.
4. The established PSD E-Sign Library intervention is highly suitable and is recommended for use as an educational resource for DHH and adult learners in enhancing their literacy and sign language competencies.
5. PSD E-Sign Library requires enhancements to incorporate emerging variations of Filipino Sign Language used across the Deaf community throughout the entire Philippine archipelago. Therefore, in order to be cognizant of the other sign variations, it is advisable to establish a close working relationship with them.
6. This study has the potential to establish a standard for future research in the Philippines that pertains to the field of deaf and hard-of-hearing education.
7. Additional analogous research may be conducted to mitigate the identified shortcomings of this study.

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