

Enhancing Drafting Skills Through Specialized Lettering Worksheets

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Abstract— This study aimed to enhance the drafting skills through specialized lettering worksheet specifically it sought to assess the level of components, and feature of the specialized lettering worksheet. It also determined the students' level of performance in lettering worksheet. Lastly, it evaluates the significant relationship of specialized lettering worksheet to the students' drafting skills and students' performance in drafting technology. The descriptive design is used in this study. It used both correlation and experimental approach to attained the desire result of the study. A self-made questionnaire was to assessed one hundred grade 8 drafting students of San Pedro Relocation Center National High School – Main campus to check the level of components and feature of the lettering worksheet as well as the level of performance of the students' understanding to drafting standards and their skills in drafting. The level of components of the specialized lettering worksheet in terms of instructions, exercises, lettering guide, and notes were very high. The level of feature of the specialized lettering worksheet was described in legibility, uniformity, proportion, and alignment were very high. The level of students' drafting skills was also tested using the variables such as, spatial ability, attention to details, and understanding drafting standards were very high. The level of the students' performance in terms of lettering grades based on the scores they got from the specialized lettering worksheet was also excellent appears to got the same result for the level of the students' performance in terms of plate grades. To test if the specialized lettering worksheet has significant relationship to the students' drafting skills which findings resulted to be significant. Meanwhile the feature of the specialized lettering worksheets significant effect on the students' performance was also statistically treated and resulted to be not significant. There is significant relationship between specialized lettering worksheet and students' drafting skills while there is no significant relationship between the specialized lettering worksheet and students performance. Thus, the rejection of the first hypothesis and acceptance of the second were recognized. The study reveals that the enhanced lettering worksheet substantially enhanced students' drafting skills. The research has successfully demonstrated that the specialized lettering worksheet has a significant effect on the students' drafting skills. The researcher formulated some recommendations to improve the current study for the next researcher, learner, and teacher. To improve the current study, crafting a dynamic lettering guide that can be applied to the practical drafting activities such as plates and worksheet will improve uniformity and proportion and to develop the feature of the specialized lettering worksheet to increase the technical drafting skills of the students in terms of lettering.

Keywords— Drafting, lettering, performance, skills, worksheet.

I. INTRODUCTION

Technology and Livelihood Education is one of the subjects to be taken under K12 curriculum. TLE is composed of four components: Agri-Fishery, Home Economics, Industrial Arts,

and Information and Communication Technology. These four components have specialized subjects which may be taken between grades 7 to 12. Students may choose the specialized subject that matches their interest which will help them develop their skills and acquire techniques.

Technical drawing is a specialized course under Industrial Arts. It is a skills subject wherein students are taught to draw, sketch, illustrate technical drawings such as graphical projection, technical/mechanical drawings, and lettering. Technical lettering is an essential skill in technical drawings because it provides clear and concise communication of vital information within technical drawings. Students in this specialized subject must master the art of technical lettering to ensure the easy readability and completeness of their drawings and designed plans. A readable plan will help to achieve a successful execution of designed plans.

Most of the students who are taking technical drafting courses tend to be interested in drawing but is lacking in terms of lettering. Lettering is a fundamental skills a drafting student must have because it is use to describe, or provide detailed specifications for an object.

For the lettering to be easily seen and comprehended, it must be neat and readable. Good typography will enhance a drawing. Additionally, the writing on the drawing always refers to all of the information.

The lacking of the mentioned skills is often observed in the technical drafting class. In order to achieve such skills, worksheets, and drawing plate activities are necessary. Worksheet is a specially prepared paper that has activities and data on which one performs work. Teachers used this tool to understand students' outcome of learning and monitor the progress of the students' learning.

Through the specialized lettering worksheet, the students can do the lettering exercises repeatedly to enhance their lettering skills. Repeatedly performing correct lettering exercises will develop their lettering skills which they may apply in their drafting performance tasks. They may also assess their own work by the means of the rubrics included in the worksheet.

The enhanced lettering worksheet will also practice the students' skills and apply the techniques they acquire in the previous work. It will also include, dimension of the letters, lettering strokes, notes, lettering guides, basic information about lettering, and lettering exercises which will develop the lettering skills of the students and their understanding in technical drafting. Meanwhile the feature of the specialized lettering worksheets significant effect on the students'

performance was also statistically treated and resulted to be not significant. Thus, creating a specialized lettering worksheet will help the improvement of the students' lettering skills and elevate their overall drafting skills.

1.1 Statement of the Problem

Problem/s which were addressed by the research

This study aimed to check the effectiveness of Technical Drawing: Lettering worksheets provided to selected Technical Drawing students at San Pedro Relocation Center National High School - Main, San Pedro City, Laguna. This study will analyze the level of acceptability and validity of the worksheets through component and feature level.

Specifically, it sought answers to the following questions:

1. What is the level of assessment on the components of the specialized lettering worksheets in terms of:
 - 1.1 instruction;
 - 1.2 lettering guide;
 - 1.3 note; and
 - 1.4 exercises?
2. What is the level of assessment on the feature of the specialized lettering worksheets in terms of:
 - 2.1 legibility;
 - 2.2 uniformity;
 - 2.3 proportion; and
 - 2.4 alignment?
3. What is the level of students' drafting skills in terms of:
 - 3.1 Attention to details;
 - 3.2; Spatial ability; and
 - 3.3 Understanding of Drafting standards?
4. What is the level of students performance in terms of:
 - 4.1 Plate Grades; and
 - 4.2 Worksheet Grades?
5. Does the specialized lettering worksheet has significant relationship to students' drafting skills?
6. Does the specialized lettering worksheet has a significant effect on the students' performance?

II. METHODOLOGY

The descriptive design is used in this study. It used both correlation and experimental approach to attained the desire result of the study. A self-made questionnaire was to assessed one hundred (100) grade 8 drafting students of San Pedro Relocation Center National High School – Main campus to check the level of components and feature of the lettering worksheet as well as the level of performance of the students' understanding to drafting standards and their skills in drafting.

III. RESULTS AND DISCUSSION

This part presents the result, the analysis and interpretation of the data gathered from the answers to the questionnaires and material distributed in the field. The data were presented in tabular form in accordance with the specific questions on the statement of the problem.

Level of Assessment on the Components of the Specialized Lettering Worksheets

In this study, components of the specialized lettering worksheets were described in terms of instructions, exercises,

letter guide and notes and was determined by the mean and standard deviation.

As reflected in Table 1, a high level of components in terms of instructions was manifested among grade 8 technical drafting students supported by the grand mean of 4.94 and standard deviation of 0.22 (M=4.94, SD=0.22). This suggests that the improved lettering worksheet's instructions are simple to understand. The students also find the instruction in the said material easy to understand because of the clear and simple terms used in the instructions. The instructions in the worksheets are easy to understand. This prove all necessary information to complete each exercise. This concludes that the instructions used in the materials is very high and effective in completing the specialized lettering worksheet which support the study of Johnson and Miller (2021) that showed the clarity of worksheet instructions clearly affects student performance.

TABLE 1. Level of Assessment on the Components of the Specialized Lettering Worksheets in terms of Instructions

STATEMENT	Mean	SD	Remarks
The instructions in the worksheet are easy to follow;	4.80	0.40	Strongly Agree
The instructions help me understand the objectives of each exercise;	4.95	0.22	Strongly Agree
The instructions in the worksheet are written in clear and simple terms;	5.00	0.00	Strongly Agree
The instructions use language appropriate to the students' level; and	5.00	0.00	Strongly Agree
The instructions provide all necessary information to complete each exercise.	4.95	0.22	Strongly Agree
Grand Mean	4.94		
SD	0.22		
Verbal interpretation			Very High

Emphasizing the need of using simple and straightforward language in teaching tools, they found several ways to assess clarity including student comments and readability tests.

Level of Assessment on the Components of the Specialized Lettering Worksheets in terms of Exercises

As reflected in Table 2, a high level of components in terms of exercises was manifested among grade 8 technical drafting students supported by the grand mean of 4.95 and standard deviation 0.20 (M=4.95, SD=0.20). This indicates that the exercises in the specialized lettering worksheet are able to enhance the students lettering skills. The students can also apply the exercises from the specialized lettering worksheet to their practical performance in technical drafting. The students also agreed that the exercises in the lettering worksheet engaged them to practice their lettering skills to upgrade their skills in technical drafting.

Overall, the effectiveness of the exercises in the specialized lettering worksheet is very high which is crucial in the development of the students drafting skills supporting Martinez and Roberts (2020) study which concluded that structured exercises in reinforcing key drafting concepts and improving performance and Qureshi and Malik (2020) connected that worksheet exercises and student motivation in online learning environments, finding that engaging and interactive worksheets.

TABLE 2. Level of Assessment on the Components of the Specialized Lettering Worksheets in terms of Exercises

STATEMENT	Mean	SD	Remarks
The exercises are well-designed to enhance my lettering skills;	4.95	0.22	Strongly Agree
Each exercise builds progressively to help me improve my skills;	4.90	0.30	Strongly Agree
The exercises provide practical applications of drafting techniques;	5.00	0.00	Strongly Agree
The exercises are engaging and maintain my interest in the practice; and	4.95	0.22	Strongly Agree
Completing the exercises has helped me feel more confident in my drafting abilities.	4.95	0.22	Strongly Agree
Grand Mean	4.95		
SD	0.20		
Verbal Interpretation	Very High		

Level of Assessment on the Components of the Specialized Lettering Worksheets in terms of Lettering Guide

As reflected in Table 3, a high level of components in terms of lettering guide was manifested among grade 8 technical drafting students supported by the grand mean of 4.94 and standard deviation of 0.22 (M=4.94, SD=0.22). This indicates that the lettering guide were very useful to the students in accomplishing the specialized lettering worksheet. The significance of alignment and spacing in technical letters was also underlined in the lettering guide. The consistency of letter shapes and its sizes was also enhanced through the lettering guide.

TABLE 3. Level of Assessment on the Components of the Specialized Lettering Worksheets in terms of Lettering Guide

STATEMENT	Mean	SD	Remarks
The lettering guide provides helpful examples for practicing letter formation;	4.95	0.22	Strongly Agree
The guide improves my understanding of spacing and alignment;	4.95	0.22	Strongly Agree
The use of lettering guide in the worksheet helped me maintain consistent letter shapes and sizes;	4.90	0.30	Strongly Agree
The lettering guide clearly shows the expected quality of each letter; and	4.95	0.22	Strongly Agree
The lettering guide is a valuable reference throughout the exercises.	4.95	0.22	Strongly Agree
Grand Mean	4.94		
SD	0.22		
Verbal interpretation	Very High		

In totally, the lettering guide used in the specialized lettering worksheet effectivity is very high in the improvements of the students technical lettering skills supporting study of Kim and Choi (2023) stating that lettering guide develop students who consistently used lettering guides exhibited not only immediate Improvements in their drawing quality but also long-term retention of those skills and Turner and White (2021) explored the role of digital lettering guides in improving both the speed and precision of technical drafting. Their research demonstrated that digital tools could streamline the drafting process, allowing students to complete tasks more efficiently while maintaining high levels of precision.

As reflected in Table 4 below, a high level of components in terms of notes was manifested among grade 8 technical

drafting students supported by the grand mean of 4.88 and standard deviation of 0.30 (M=4.88, SD=0.30). This indicates that the notes added in the specialized lettering worksheet clarify the key concepts of each exercise. The notes also reinforce the students understanding of proper lettering techniques, which enhance their learning experience.

TABLE 4. Level of Assessment on the Components of the Specialized Lettering Worksheets in terms of Notes

STATEMENT	Mean	SD	Remarks
The notes clarify key concepts related to each exercise;	4.85	0.36	Strongly Agree
The notes help reinforce my understanding of proper lettering techniques;	4.90	0.30	Strongly Agree
The notes are informative and enhance my learning experience;	4.90	0.30	Strongly Agree
The notes provide useful tips that I apply during the exercises; and	4.90	0.30	Strongly Agree
The notes support my understanding of the overall drafting process.	4.85	0.36	Strongly Agree
Grand Mean	4.88		
SD	0.30		
Verbal interpretation	Very High		

The students find the notes useful because of the tips that they may apply while they are working on the exercises on the lettering worksheet. In all terms, the students agreed to the effectiveness of notes in the specialized lettering worksheet supporting the study of Nguyen and Thompson (2021) stated that the combination of annotations and structured notes constitutes an integrated strategy for learning and applying technical drafting principles, to which students can contribute and Mason and Patel (2023) show the impact of instructional notes placed strategically within technical worksheets. They demonstrate that well-placed notes significantly improve student comprehension and the quality of their drafts. They also suggest that these instructional notes serve as valuable reminders of key concepts and techniques, thereby enhancing the learning experience.

Level of Assessment on the Features of the Specialized Lettering Worksheets

In this study, features of the specialized lettering worksheets was described in legibility, uniformity, proportion and alignment and was determined by the mean and standard deviation.

TABLE 5. Level of Assessment on the Features of the Specialized Lettering Worksheets in terms of Legibility

STATEMENT	Mean	SD	Remarks
Practicing with the worksheet has improved the legibility of my lettering;	4.90	0.30	Strongly Agree
My letters are easier to read after using the worksheet;	4.85	0.36	Strongly Agree
The exercises have enhanced my focus on clear and readable lettering;	4.90	0.30	Strongly Agree
I feel more confident in the readability of my letters after practice; and	4.95	0.22	Strongly Agree
The worksheet has helped me achieve a higher standard of legibility.	4.95	0.22	Strongly Agree
Grand Mean	4.91		
SD	0.27		
Verbal interpretation	Very High		

As reflected in Table 5, a high level of features in terms of legibility was manifested among grade 8 technical drafting students supported by the grand mean of 4.88 and standard deviation of 0.30 (M=4.88, SD=0.30). This indicates that the students' technical lettering are easy to read after using the worksheet. Their letters are also readable and clear which lessens the chance of misinterpretation of the terms.

Overall, the specialized lettering worksheet is effective on the legibility of the students technical lettering supporting Garcia and Walker (2022) study

Guaranteeing in professional environments their work is both visually pleasing and functionally sound and Turner and White (2021), compared the legibility of lettering in hand-drafted and digitally created technical drawing and revealed that while digital methods often yield more consistent results, traditional hand-lettering techniques can achieve comparable legibility when taught and applied correctly.

Level of Assessment on the Feature of the Specialized Lettering Worksheets in terms of Uniformity

As reflected in Table 6, a high level of features in terms of uniformity was manifested among grade 8 technical drafting students supported by the grand mean of 4.96 and standard deviation of 0.18 (M=4.96, SD=0.18). This indicates that the specialized lettering worksheet develop the students skills in using uniform letters in terms of size and shape. The consistent design of the lettering worksheet help the students to follow and understand the instruction easily which they can replicate in their performance tasks. Overall, the structures and uniform approach in the specialized lettering worksheet helped the students to avoid common drafting errors.

TABLE 6. Level of Assessment on the Feature of the Specialized Lettering Worksheets in terms of Uniformity

STATEMENT	Mean	SD	Remarks
The worksheet helps me maintain consistent letter sizes	4.95	0.22	Strongly Agree
I am able to create uniform lettering after following the exercises.	4.95	0.22	Strongly Agree
The uniform spacing between characters in the worksheet made it easier replicate the letter forms.	5.00	0.00	Strongly Agree
Consistent design of the lettering worksheet has made it easier to follow and understand instruction.	5.00	0.00	Strongly Agree
The structured and uniform approach in the lettering worksheet helped me to avoid common drafting errors.	4.90	0.30	Strongly Agree
Grand Mean	4.96		
SD	0.18		
Verbal interpretation	Very High		

Supporting Walker and Evans (2021) study which stated that uniformity in technical lettering can make more accurate details and more appropriate technical documents and Lee and Garcia (2022) discovered that students who applied the same lettering techniques to the technical drawing completed the task faster and had fewer revisions.

The findings show a direct relationship between uniformity and productivity, and these findings offer important operational benefits of standardized lettering practices.

Level of Assessment on the Feature of the Specialized Lettering Worksheets in terms of Proportion

As reflected in Table 7, a high level of features in terms of proportion was manifested among grade 8 technical drafting

students supported by the grand mean of 4.98 and standard deviation of 0.13 (M=4.98, SD=0.13). This indicates that the worksheet improved the ability of the students to maintain proper proportion in lettering. They also agreed that practicing with the worksheet helped them understand the importance of proportionality in technical lettering.

TABLE 7. Level of Assessment on the Feature of the Specialized Lettering Worksheets in terms of Proportion

STATEMENT	Mean	SD	Remarks
The worksheets improved the ability to maintain proper proportions in lettering;	5.00	0.00	Strongly Agree
It is easy to consistently create letters that are proportional to each other;	5.00	0.00	Strongly Agree
Practicing with the worksheets helped understand the importance of proportion in technical lettering;	4.95	0.22	Strongly Agree
Letters have more balanced proportion in terms of height and width; and	5.00	0.00	Strongly Agree
The worksheets helped to achieve the correct proportions for technical drawings.	4.95	0.22	Strongly Agree
Grand Mean	4.98		
SD	0.13		
Verbal interpretation	Very High		

The result of students assessment on the specialized lettering worksheet show that having a proportion technical lettering will improved the overall skills of the students in technical drafting supporting Garcia and Walker (2022) further explore the significance of proportion in technical drawing by implementing structured exercises that emphasize proportional relationships between lettering and drawing elements. Their study found that these exercises led to improved drawing accuracy and visual consistency among students.

As reflected in Table 8 below, a high level of features in terms of alignment was manifested among grade 8 technical drafting students supported by the grand mean of 4.94 and standard deviation of 0.22 (M=4.94, SD=0.22). This indicates that the alignment in the specialized lettering worksheet highlighted the importance of horizontal and vertical alignment in lettering.

TABLE 8. Level of Assessment on the Feature of the Specialized Lettering Worksheets in terms of Alignment

STATEMENT	Mean	SD	Remarks
It is easier to align letters properly after completing the lettering worksheets;	4.90	0.30	Strongly Agree
The worksheets improved the understanding of horizontal and vertical alignment in lettering;	5.00	0.00	Strongly Agree
Lettering maintains a straight line, because of the alignment techniques shown in the worksheets;	4.95	0.22	Strongly Agree
The worksheets provide useful strategies for achieving better alignment in technical drafting; and	4.90	0.30	Strongly Agree
Alignment in lettering has become more precise and consistent after practicing with the worksheets.	4.95	0.22	Strongly Agree
Grand Mean	4.94		
SD	0.22		
Verbal interpretation	Very High		

It concludes the importance of the alignment in technical lettering which is a feature of the specialized lettering worksheet.

Level of Students' Drafting Skills

In this study, students' drafting skills was described in terms of spatial ability, attention to details and understanding of drafting standards and was determined by the mean and standard deviation.

TABLE 9. Level of Students' Drafting Skills in terms of Spatial Ability

STATEMENT	Mean	SD	Remarks
The worksheets had improved my spatial awareness in lettering	4.85	0.36	Strongly Agree
I can manage letter spacing more effectively after practicing with the worksheet.	5.00	0.00	Strongly Agree
The exercises help me understand the spatial relationships between letters.	4.85	0.36	Strongly Agree
The worksheet improves my ability to judge space letter placement.	4.95	0.22	Strongly Agree
My overall spatial ability in drafting has improved with this practice.	4.90	0.30	Strongly Agree
Grand Mean	4.91		
SD	0.27		
Verbal interpretation	Very High		

As reflected in Table 9, a high level of Students drafting skills in terms of spatial ability was manifested among grade 8 technical drafting students supported by the grand mean of 4.91 and standard deviation of 0.27 (M=4.91, SD=0.27).

This indicates that the students improved their spatial awareness in lettering through the use of specialized lettering worksheet. They can manage their lettering spacing more effectively after practicing in the worksheet. This concluded that the students spatial ability in drafting has improved from practicing in the specialized lettering worksheet supporting the study of Ogunkola and Knight (2019) studied how a technical drawing course and video games alongside school type influence student spatial performance. The research established that standard technical drawing classes succeeded in boosting student abilities in spatial visualization together with orientation and Lettering serves as an obligatory part of technical drafting where students need to demonstrate precision and proper alignment and spatial organizing ability. Just like the detailed lettering activities which help students build dexterity and spatial understanding (Valera et al., 2021; Olvera-García et al., 2019)

Level of Students' Drafting Skills in terms of Attention to Details

To show the Level of Students' Drafting Skills in terms of Attention to Details reflected in Table 10, a high level of Students drafting skills in terms of attention to details was manifested among grade 8 technical drafting students supported by the grand mean of 4.90 and standard deviation of 0.28 (M=4.90, SD=0.28). This indicates that the students improve their drafting skills in term Johnson, 2022 that Drafting work demands attention to every detail because it directly impacts drawing accuracy and precision together with professional clarity. Any minor mistake in measurements or annotations within architecture engineering or manufacturing will generate expensive design flaws resulting in delayed projects and structural problems.

Students who develop a high level of meticulousness in drafting will accomplish professional success and produce high-quality work and Brown and Miller (2021) Strict

accuracy standards apply to technical drafting since blueprints based on these drawings will execute the construction of real-world buildings. Technical failures result from even minor deviations between the intended scale or dimensioning or alignment of drawings. Students with high attention to detail practice make technical drawings accurate and commit fewer mistakes which impair design quality reveals.

TABLE 10. Level of Students' Drafting Skills in terms of Attention to Details

STATEMENT	Mean	SD	Remarks
Practicing with the worksheet has improved my attention to detail in lettering.	5.00	0.00	Strongly Agree
I am more meticulous about my letter formation after using the worksheet.	4.95	0.22	Strongly Agree
The worksheet exercises have increased my awareness of small details in drafting.	4.80	0.40	Strongly Agree
I focus more on mini details in my lettering now.	4.90	0.30	Strongly Agree
The worksheet has helped me become more detail-oriented.	4.85	0.36	Strongly Agree
Grand Mean	4.90		
SD	0.28		
Verbal interpretation	Very High		

Level of Students' Drafting Skills in terms of Understanding Drafting Standards

As reflected in Table 11, a high level of Students drafting skills in terms of understanding drafting standards was manifested among grade 8 technical drafting students supported by the grand mean of 4.93 and standard deviation of 0.24 (M=4.93, SD=0.24). This indicates that the specialized lettering worksheet improved students understanding of the drafting standards which are essential for a quality output in technical drafting. It also shows that the students become more confident in meeting drafting standards after completing the exercises.

TABLE 11. Level of Students' Drafting Skills in terms of Understanding Drafting Standards

STATEMENT	Mean	SD	Remarks
The worksheet has improved my understanding of professional drafting standards	5.00	0.00	Strongly Agree
I feel more confident in meeting drafting standards after completing the exercises.	4.90	0.30	Strongly Agree
The exercises have helped me understand why drafting standards are important.	4.95	0.22	Strongly Agree
Practicing the worksheet has strengthened my knowledge of standards.	4.85	0.36	Strongly Agree
I am better prepared to follow drafting standards in my work after using the worksheet.	4.95	0.22	Strongly Agree
Grand Mean	4.93		
SD	0.24		
Verbal interpretation	Very High		

Overall, the result of the students assessment on the effectiveness of specialized lettering worksheet in terms understanding drafting standards was very high supporting the study of Sanchez & Godinez (2020) that Technical drawing education demands proper lettering instruction for students since it establishes their ability to use drafting standards effectively. Different research studies along with instructional resources demonstrate that correct lettering methods form an

essential aspect of technical drawing because these skills improve drawing clarity and make content easily readable while maintaining industrial standards and Sanchez & Godinez 2020 that Specialized lettering worksheets function as educational instruments to demonstrate that formal learning activities yield better technical drawing abilities. Targeted exercises in lettering instruction can teach students about structural components that affect technical drawing readability.

Level of Students' Performance

In this study, students' performance was described in terms of worksheet grades and plate grades and was determined by the mean and standard deviation.

TABLE 12. Level of Students' Performance in terms of Worksheet Grades

Grade	Frequency	Percentage	Descriptive Value
90 – 100	38	38%	Outstanding
85 – 89	62	62%	Very Satisfactory
80 – 84	0	0	Satisfactory
75 – 79	0	0	Fairly Satisfactory
Below 75	0	0	Needs improvement
Mean Grade	88.86		
SD	2.16		
Descriptive Value	Very satisfactory		

Most of the score were concentrated in the higher range resulting to an excellent level of performance as it obtained mean score of 88.86 and a standard deviation of 2.61 confirming that students achieving outstanding results.

The high level of performance implies that the instructional material, specialized lettering worksheet were effective in enhancing the technical lettering skills of the students. On the other hand, the absence of students' score in the lower performance bracket indicates that students have basic foundation on lettering supporting the study of Mason and Smith (2021) examined how effective lettering methods impact students' performance in engineering drawing courses. Their research indicates that students who apply proper lettering techniques achieve better results in assessments, reinforcing the critical role these skills play in academic success. This alignment suggests that both technical drawing and lettering are interconnected elements essential for students' educational advancement.

Level of Students' Performance in terms of Plate Grades

The table 13 presents the level of students' performance in terms of Plate grades based on the scores they get from the performance plate grades. Most of the score were concentrated in the higher range resulting to an excellent level of performance as it obtained mean score of 89.50 and a standard deviation of 2.21 confirming that students achieving outstanding results. The high level of performance implies that the specialized lettering other hand, the absence of students' score in the lower performance bracket indicates that students have basic foundation on lettering supporting the study of Chaturvedi and Kulshreshtha (2024) contributed to this discourse by exploring the relationship between consistent lettering practices and students' academic performance in technical drawing courses.

Their findings indicate that the regular application of effective lettering strategies leads to improved academic

outcomes, reinforcing the notion that these practices should be integrated into curricula. The synergy among these studies emphasizes that a focus on lettering not only enhances technical drawing skills but also positively influences overall academic performance.

TABLE 13. Level of Students' Performance in terms of Plate Grades

Grade	Frequency	Percentage	Descriptive Value
90 – 100	53	53%	Outstanding
85 – 89	47	47%	Very Satisfactory
80 – 84	0	0	Satisfactory
75 – 79	0	0	Fairly Satisfactory
Below 75	0	0	Did Not Meet Expectation
Mean Grade	89.50		
SD	2.21		
Descriptive Value	Very satisfactory		

Test of Relationship between the use of Specialized Lettering Worksheet and Students' Drafting Skills

To test if specialized lettering worksheets has significant relationship to students' drafting skills data were treated statistically in Minitab 14 using Pearsons R. The major findings were presented in the table.

Specialized Lettering Worksheet and Students' Drafting Skills the results include Pearson correlation coefficients, p-value and sample size (N=100) for each relationship.

TABLE 14. Test of Relationship between the use of Specialized Lettering Worksheet and Students' Drafting Skills

Specialized Lettering Worksheets (IV)	Students' Drafting Skills (DV)		
	Spatial Ability	Attention to Details	Understanding of Drafting Standards
COMPONENTS			
Instructions:			
Pearson Correlation	0.212	0.325	0.206
p-value	0.000*	0.001*	0.004*
N	100	100	100
Exercises:			
Pearson Correlation	0.420	0.395	0.550
p-value	0.000*	0.000*	0.000*
N	100	100	100
Lettering Guide:			
Pearson Correlation	0.314	0.225	0.447
p-value	0.002*	0.025*	0.000*
N	100	100	100
Notes:			
Pearson Correlation	0.406	0.325	0.284
p-value	0.000*	0.001*	0.004*
N	100	100	100
FEATURES			
Legibility:			
Pearson Correlation	0.133	0.443	0.027
p-value	0.187	0.000*	0.792
N	100	100	100
Uniformity:			
Pearson Correlation	0.037	0.186	0.157
p-value	0.712	0.063	0.118
N	100	100	100
Proportion:			
Pearson Correlation	0.274	0.420	0.454
p-value	0.006*	0.000*	0.000*
N	100	100	100
Alignment:			
Pearson Correlation	0.538	0.488	0.206
p-value	0.000*	0.000*	0.040*
N	100	100	100

Note: * p < .05

Lettering worksheet and the students' drafting skills is evident and it indicates that instruction, exercises, lettering guide and notes help the students to improve their technical lettering skills. Instructions can be easily followed, exercises were practical and can be applied to actual drafting works, lettering guide produces consistent and uniform letter sizes and notes gave additional information on accomplishing the worksheet exercises as it Improve the detailing techniques as well as it produce clear details in technical drafting supporting the study of Ho and Kim (2023) analyzed the effects of lettering quality on students' drafting skills. Their findings reveal that higher-quality lettering is directly correlated with improved activity grades, underscoring the necessity of teaching quality lettering techniques within technical curricula. This further highlights the importance of embedding high standards for lettering in engineering education to promote improvement of the students' drafting skills.

Test of Effect on the Use of Specialized Lettering Worksheet in Students' Performance

To Test of Effect on the Use of Specialized Lettering Worksheet in Students' Performance data were treated statistically in Minitab 14 using Regression Analysis. The major findings were presented in the table below.

Table 15 presents the test of effect on the use of specialized lettering worksheet and the students' performance. A significant effect between the specialized lettering worksheet and the students' drafting skills is not evident and it indicates that instruction, exercises, lettering guide and notes does not bring much enhancement to the performance the same with the features of the alignment.

TABLE 15. Test of Effect on the Use of Specialized Lettering Worksheet in Students' Performance

Specialized Worksheets (IV) Components	Lettering	Students' Performance (DV)	t-value	p-value
Instructions		Worksheet Grades	0.55	0.582
		Plate Grades	0.31	0.755
Exercises		Worksheet Grades	0.18	0.855
		Plate Grades	0.18	0.854
Lettering Guide		Worksheet Grades	0.31	0.761
		Plate Grades	0.17	0.866
Notes		Worksheet Grades	1.45	0.151
		Plate Grades	0.87	0.384
Features				
Legibility		Worksheet Grades	1.36	0.178
		Plate Grades	0.54	0.593
Uniformity		Worksheet Grades	0.98	0.331
		Plate Grades	1.21	0.229
Proportion		Worksheet Grades	1.20	0.235
		Plate Grades	0.09	0.925
Alignment		Worksheet Grades	1.75	0.083
		Plate Grades	0.05	0.821

Note: * p < .05

This resulted from the limited space available for the students to write the information needed to include on their worksheet and plate same reason for the proportion and alignment. This factors prove that the size of the space for the students to write the details plays an important in improving the students' technical lettering skills supporting the study of

Garcia and Martinez (2022) examined the integration of specialized lettering practices into technical drawing courses. Their study shows that students who engage in specialized lettering exercises score significantly higher on assessments, reinforcing the idea that targeted skill development in lettering can enhance overall academic success. This study complements the others by providing evidence that specialized training in lettering can serve as a valuable tool for improving students' performance in technical drawing.

IV. CONCLUSION AND RECOMMENDATIONS

Based on the findings above, the following conclusions were drawn:

A significant relationship between the use of the specialized lettering worksheet and students' drafting skills was shown. Therefore, the null h showed measurable improvement in their ability to perform technical drawing tasks.

On the other hand, there is no significant effect between the specialized lettering worksheet and students' performance. Therefore, the second null hypothesis was accepted. This conclude that the specialized lettering worksheet is not enough to improve the students' performance in terms of applying the acquired skills from the specialized lettering worksheet to the students' practical drafting performance.

The researcher makes the following recommendations:

May craft a dynamic lettering guide that can be applied to the practical drafting activities such as plates and worksheet. This will improve uniformity and proportion.

May develop the feature of the specialized lettering worksheet to increase the technical drafting skills of the students in terms of lettering.

May enhance the lettering guides and make sure that it can be applied to practical exercises.

Can make an additional lettering guides to enhance the specialized lettering worksheet.

REFERENCE

- [1]. Brown, J., & Miller, S. (2021). Incorporating consistency in lettering styles: Challenges and benefits in technical drawing education. *Technical Drawing Review*, 5(2), 89-104.
- [2]. Chaturvedi, P., & Kulshreshtha, K. (2024). Lettering practices and their correlation with academic performance in technical drawing education. *Journal of Design Education*, 29(2), 115-128.
- [3]. Garcia, L., & Martinez, R. (2022). The role of specialized lettering in improving academic performance in technical drawing. *Journal of Design and Technology Education*, 25(4), 205-218.
- [4]. Garcia, L., & Walker, N. (2022). Enhancing drafting skills through proportional exercises in technical drawing education. *Engineering Education Journal*, 34(3), 123-138.
- [5]. Ho, S. J., & Kim, J. (2023). The impact of alignment practices on technical drawing education. *Journal of Technical Education and Training*, 16(3), 87-100.
- [6]. Johnson, H., & Miller, S. (2021). Exploring the role of notes in student performance during technical drafting assessments. *International Journal of Engineering and Design Pedagogy*, 14(4), 145-161.
- [7]. Kim, R., & Choi, S. (2023). Enhancing legibility in technical drafting through structured lettering exercises and guides.
- [8]. Lee, K., & Garcia, R. (2020). The impact of proportional lettering in technical drafting on readability and precision. *Journal of Engineering Education Research*, 34(2), 44-60.
- [9]. Martinez, J., & Garcia, L. (2021). The impact of lettering components on technical drawing clarity: A comparative analysis. *Engineering Graphics Journal*, 22(3), 91-105.

- [10]. Mason, J., & Patel, R. (2023). The impact of instructional notes on improving student comprehension in drafting. *Journal of Engineering and Design Education*, 21(1), 77-91.
- [11]. Mason and Smith (2021) The effect of uniformity on student drafting proficiency. *Journal of Engineering Education Research*, 17(2), 77-91.
- [12]. Nguyen, L., & Thompson, E. (2021). Notes as a cognitive tool in technical drafting: Enhancing memory retention. *Journal of Engineering Education Research*, 18(2), 55-69.
- [13]. Olvera-García et. al. (2019) Evaluating letter features in technical drawing education: Effects on student comprehension. *Journal of Engineering Education*, 111(4), 678-693. <https://doi.org/10.1002/jee.20324>
- [14]. Ogunkola and Knight (2019) Enhancing legibility in technical drawing education with augmented reality. *Journal of Educational Technology*, 35(3), 172-191.
- [15]. Qureshi, A., & Malik, R. (2020). Assessing the impact of worksheet exercises on student motivation in online learning environments. *Journal of Online Learning Research*, 6(2), 115-129.
- [16]. Sanchez & Godinez (2020). Integrating worksheet exercises with project-based learning to enhance student outcomes in environmental science. *Environmental Education Research*, 25(6), 836-854.
- [17]. Turner, L., & White, D. (2021). Impact of annotative notes on the quality of technical drafts in engineering education. *Journal of Technical Drawing and Communication*, 19(2), 78-93.
- [18]. Valera et al. (2021) Exploring the link between consistency and accuracy in technical drafting. *Journal of Technical Design Education*, 24(2), 55-70.
- [19]. Walker, P., & Evans, R. (2023). Optimizing technical drawing through the integration of critical lettering components. *Technical Drawing Review*, 18(2), 45-59.