INNOVATIVE INSTRUCTIONAL iPLAN IN TECHNICAL DRAWING FOR JUNIOR HIGH SCHOOL

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***ABSTRACT**: This research aimed to determine the effectiveness of the newly developed iPlan for Technical Drawing. The instructional plan was patterned from Merill's four phases of effective instruction: activation, demonstration, application, and integration. To determine the effectiveness of using the newly developed instructional plan (iPlan), the respondents were 30 Junior High school students of Subangdaku Technical Vocational School during the first quarter of the school year 2017-2018. The target data, an adapted questionnaire that was pilot-tested and validated by an expert had two parts-practical and theoretical. They were one of the instruments in the study of the said subject matter.*

Moreover, the reliability coefficient of 0.60 on the said instrument was computed using 20(KR20). The performance of both practical and theoretical areas of the two groups - the experimental and controlled were compared using the mean of each performance per competency. After the data were gathered, analyzed, and interpreted, it was revealed that the newly developed iPlan in Technical Drawing is more effective in improving students' performance; It was also observed how students enjoyed the phases of instruction through observing their participation and cooperation. Thus, the newly developed iPlan from Merill's four phases of instruction applies to Technical Drawing and must be recommended for Technical Vocational subjects.

Keywords: Technical Drawing, Instructional Plan based on Merill's Four Phases of Learning

1. INTRODUCTION

The instructional plan is concerned with understanding and improving one's aspect of education: the process of instruction where the teacher could be creative to synthesize the subject matter as he/she applies the pedagogy of teaching in today's generation. The result of instructional design as a professional activity is an "architect's blueprint" for what the instruction should be like. This "blueprint" is a prescription as to what methods of instruction should be used for particular content and specific students [1]

Due to the many problems arising in education, so much effort has been made for the improvement of the methods of instruction. As a result, industrial technology is required to use instructional materials that can simulate, test, and obtain specific data for the operation [2]. However, in subjects about the enhancement of skills such as in Technical Vocational Schools where TESDA standards have been considered, there has been no specific instructional plan that would help the teacher design his lesson, especially in Technical Drawing which is one of the mandated subjects in Technical Vocational Schools. The general plan introduced by the Department of Education doesn't cater for the learning outcome that is desired by the subject.

The urge for the continuous development of the instructional plan is an indication of increasing concerns that instruction is not enough in many public schools particularly to the mentioned subject, Technical Drawing. Many students develop an inadequate conception of their learning ability because of frequent failure to learn what was "taught" which seemed like an unending problem of the teacher. According to the available data from the Department of Education show that the incidence of dropout among high school students has continued to rise, albeit slowly since 2007 [3].

Many students in Technical Vocational Education find it harder to deal with the Technical Drawing subject due to unable to relate themselves on the importance of the subject and to further understand what the subject wanted to communicate to them and which part of the instructional planning. All these factors and other evidence show the need for better

methods of instruction in public schools, particularly in Technical Drawing. Technical Drawing is one of the mandated subjects in Technical Vocational Schools together with the Internet and Computing Fundamentals as stipulated in DepEd Order No. 69, s. 2009. The students to enroll in the said subject are Grades 7 and 8. Grade 8 students were able to adjust already with the usual routine and standard tasks in Technical Drawing, however, for beginners like Grade 7, it would be difficult them to deal with it since it is a newly introduced subject. Many are having difficulty with the concept of the drawing itself probably because they thought that the subject lacked enthusiasm for them to strive harder leading them a really poor performance on the said subject. When the students fail in the subject or have poor performance in the subject, the method of instruction is ineffective. The field of instruction can help the students improve themselves on such topics where they are weak.

Lesson planning evolves its format from one curriculum to another curriculum or one division to the other depending on what is stipulated in the Deped Order. Nowadays, DepEd Region 7 started formulating an instructional plan that would give a complete picture of what the teacher's lesson looks like.

Moreover, the instructional plan (iPlan) includes the highlight of today's curriculum which can be found on the curriculum guide-performance standard and competencies. Furthermore, the iPlan fits merely K to 12 curriculum packaging the core values needed for the students to absorb as they are learning the particular subject matter. Though iPlans involve enough time to prepare, their usage and presence are one indication how prepared a teacher is in delivering his/her lessons.

The topics for Technical Drawing in the first quarter are about lettering, sketching 2D objects, and sketching 3D objects. The students who were on these topics were the Grade Seven students. Their scores in such skills show how they had a poor performance in the subject. The researcher then, conducted this study to help further the students improve their performance when an instructional plan is changed to the newly developed plan of the researcher. In this study, the researcher aims to develop an instructional plan (iPlan) in Technical Drawing. The iPlan is patterned from Merrills's First Principle of Instruction, DepEd's standards in lesson planning and TESDA's Competency-Based Learning Materials (CBLM) format of Skills development. Furthermore, the researcher will also test the effectiveness of the iPlan making in students' performance towards Technical Drawing.

1.2 Theoretical Background

Instructional theories help teachers what instruction or teaching should be like. It outlines strategies that the teacher may adopt to attain the learning goals. Instructional theories are adapted based on the educational content and more importantly the learning style of the students. They are used as teaching guidelines or tools by teachers to facilitate learning. Instructional theories encompass different instructional methods, models, and strategies. This research was anchored from David Merrill's first principles of instruction which has four phases for effective instruction - Activation Phase, Demonstration Phase, Application Phase and the Integration Phase. The theories mentioned in this paper are believed to be necessary for effective and efficient instruction. Most of the theories reviewed in this research which pertain to the principles, stress problem-centred instruction and include some (if not all) of these four phases of effective instruction.

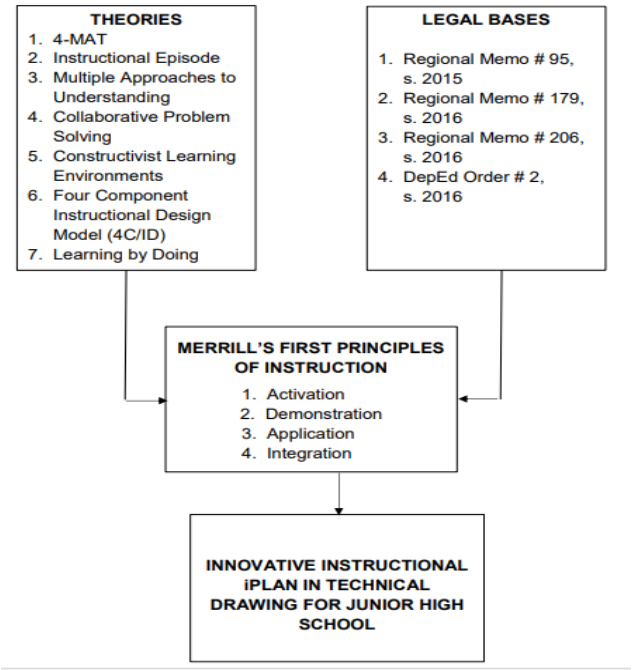


Figure 1: Theoretical – Conceptual Framework of the Study

[4] represented a model used by many teachers in K–12 education. McCarthy is seldom cited in the instructional technology literature. Her work is essential to our consideration of first principles because she made the learning cycle explicit. McCarthy approached this idea from a consideration of student learning styles but concluded that, although learners may have a preference for various approaches to learning, effective instruction requires them to be involved in the whole cycle of learning activities. He did not emphasize problem-solving as much as did the Learning Technology Center. Her emphasis was on the various types of activities that might be appropriate for each of the learning phases and how these learning activities reflect learning preferences of various types of learners. Her Phase 1 serves the role of activation, in which the learners share what they know and try to find meaning related to the new material they will learn. 4-MAT Phase 1 is similar to Star Legacy's generate ideas, but emphasizes a more learner-centered approach, whereas the Vanderbilt group is more problem focused. 4-MAT Phase 2 is the demonstrate phase, where the learners acquire new knowledge and relate it to what they already know. He included sub-phases, the description of which is beyond the scope of this presentation, but which provide practices and theory for making the transition from one phase to the next. Phase 3 is the application phase, where learners use what they know to do something, make something, or play with the ideas. McCarthy Phase 4 is where learners make the knowledge their own. This is the integration phase of first principles, and this research borrowed McCarthy's term integration for this phase. The formulation of the learning cycle for first principles and the graphic representation of these phases were influenced by McCarthy's work. She provided perhaps the most explicit articulation of the cycle of learning and the phases required for effective instruction.

[5] work was focused on the research supporting instruction rather than a theory. He described an instructional episode consisting of three major phases: (a) the activation phase from which first principles borrowed the term, (b) the instructional phase, and (c) the feedback phase. For him, the instructional phase consisted of presentation, discovery, and practice (the first principles demonstration and application phase). His feedback phase was only part of the first principles application phase. Andre did not emphasize problem-solving or integration following the practice-feedback phase. He described research findings that support a number of the results.

[6] performance approach to understanding emphasized understanding content ("important questions and topics of the world") rather than problem-solving, but his approach did embrace each of the four phases of instruction as described in this paper. He stressed that understanding could only be observed when students engage in "performances that can be observed, critiqued, and improved". He organized his theory around phases he identified as entry points, telling analogies, and approaching the core. Entry points are a form of activation. "One begins by finding a way to engage the students and to place them centrally within the topic. He then

described entry points from these six viewpoints: (a) narrational, (b) quantitative-numerical, (c) foundational-existential, (d) aesthetic, (e) hands-on, and (f) social. He also stressed application. "Multiple representations is one component of effective teaching; the complementary component entails the provision of many opportunities for performance, which can reveal to the student and others the extent to which the material has been mastered". Gardner did emphasize entry points and multiple approaches to the topic consistent with different kinds of intelligence, however, in his paper, he did not explicitly identify practice consistency with these different bits of intelligence.

1.3 Statement of the Problem

The research determined the effectiveness of the newly developed iPlan for Technical Drawing for Grade 7 students at Subangdaku Technical Vocational School, Subangdaku, Mandaue City during the school year 2017 – 2018 towards innovative instruction. Specifically, this answered the following questions:

1. What is the pre/post-test performance of the students using the conventional iPlan for Technical Drawing competencies as to:
   1.1. lettering,
   1.2. sketching 2D objects, and
   1.3. sketching 3D objects?
2. Using the developed iPlan, what is the posttest performance of the students on the aforementioned competencies?
3. What is the extent of the acquired identified competencies in Technical Drawing?

1.3 Significance of the Study

Schools that have Technical Vocational Curriculum have no distinctions with other curriculum's instructional plans. Such schools shouldn't be regarded as similar to the schools from the regular curriculum for there are some subjects that would focus on enhancing students' skills such as Technical Drawing. The skills to be developed in the said subject has to follow TESDA standards to assure that they will turn into someone what the industry needs in the future. The delivery of instruction plays a very vital role in making learning possible. Thus, it has to be taken into proper steps that will focus on what the subject intends to enhance and learn.

Though the study focused only on Grade 7, teachers who are handling higher grade levels may also try the newly developed instructional plan format. Furthermore, this can be the answer towards effective instruction that will create a positive response to the students. Although to be effective in the entrusted subject matter has been the quest of every teacher, this instructional plan incorporates DepEd's mission and vision to TESDA's standards as well which will inevitably develop the skills of the students through learning both the theoretical and practical side of Technical Drawing. Other specializations can also try this instructional plan. This has been developed to cater students' need when it comes to instructional clarity and phases, which can also be applicable, other specializations in Technical Vocational Curriculum.

2. METHODOLOGY

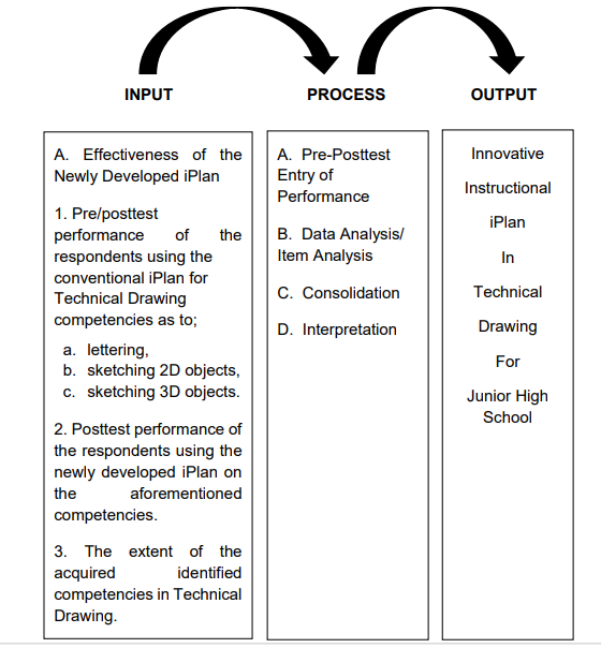
The study used the quasi-experimental method of research comparing the respondents' performance using the conventional lesson plan in technical drawing with the newly developed instructional plan applying the phases of first principles of Merill.

2.1 Flow of the Study

The flow of this research was illustrated in the diagram below (see Figure 2). It was highlighted on a system of input, process, and output. Since the study is about developing an instructional plan, entry of students' performance particularly the Pre-test and Post-test of both groups is necessary. The researcher utilized the newly developed instructional plan and the conventional iPlan to know which among those iPlans is more effective in dealing with Technical Drawing subjects. Moreover, the researcher made use of a rubric to score the practical performance of the students and the level of mastery indicators to know which among the competencies is/are the least mastered skill/s of the students.

The input includes the measurement of respondents' performance in Technical Drawing. Two groups were meant to be the respondents of the study. The said groups were labelled Grade VII – Courage and Grade VII – Hope groups, respectively. The groups' performance employing the conventional iPlan and the newly developed instructional plan using the four phases of instruction was monitored, analyzed and interpreted. The control group who was the grade 7 Hope was exposed to the usual instructional plan in Technical Drawing, while the grade 7-Courage who was the experimental group was exposed to the newly developed instructional plan patterned from Merill's first principle phases. The performance of the groups served as the effectiveness of any of those instructional plans. Moreover, the correct responses of the students were assessed to know their level of mastery towards the involved competencies in Technical Drawing.

After the collection, analysis, and interpretation of data, the expected outcome is to know which instructional plan is more efficient that would cater the needs of those students under the subject of Technical Drawing. The result of this comparison will be a great help to the schools who are having Technical Drawing subjects



.Figure 2: Flow of the Study

2.2 Environment

This study was conducted at Subangdaku Technical Vocational School, which also offers Senior High School (TVL Track) and was the only pilot school implementor of Senior High School under K to 12 Curriculum in Mandaue City, Cebu, Philippines Division.

2.3 Respondents

The study was conducted among the selected grade 7 students in Subangdaku Technical Vocational School who have Technical Drawing subject of S.Y. 2017-2018. Thirty students from Grade 7 Hope and another 30 students from Grade 7 Courage were purposively chosen as participants for the conduct of the study. Table 1 shows the sectioning composition of the population of the study

Table 1: Distribution of the Respondents Grade 7 SY 2017-2018

Section	Male	Female	Total
VII – Courage	15	15	30
VII – Hope	15	15	30

Table 1 shows the distribution of the respondents. All regular students of those sections from the table were included in the study. They are enrolled on the cited school year and are having Technical Drawing I subject.

2.4 Instrument

The researcher utilized 22 22-item self-made questionnaires which consisted of two parts; the theoretical part and the practical part of the test in Technical Drawing. The said test was validated by an expert and was pilot-tested on 10 students who were not part of the study. The test`s computed reliability coefficient of 0.60 was based on the Kuder-Richardson method 20 (KR20).

The test questions are fitted to the table of specifications that measured proportionally to the skills of knowledge, comprehension, application, analysis, synthesis and evaluation. Rubrics parameters and indicators were used as well and were based from the competencies in Technical Drawing.

2.5 Data Gathering Procedure

A written permission was sent to the Schools Division Superintendent and the school principal of Subangdaku Technical Vocational School for the conduct of the study to the expected students of grade 7 - Courage and Hope who are enrolled on the current school year 2017-2018. The students were oriented about what would be their participations in the research with regards to the purpose and the outcome of the study. Before the discussion of the involved topics, the pretest was given to the respondents who have the routine of K to 12 curricula before starting a new lesson. So as with the newly developed instructional plan. After the pre-test, discussions using both instructional plans were done. Furthermore, after the validation that those topics were discussed thoroughly, post-test were given to the subjects.

2.6 Statistical Analysis of Data

The following parametric treatment was used in the processing and analysis of the data:

* Mean. Used to compare the performance of both samples when employed by the conventional instructional plan and the newly developed instructional plan.

2.7 Scoring Procedure

The mean of the corresponding verbal descriptions was used as the mean of the evaluated item. Thus, the following parametric scale was employed to provide an appropriate description for every chance about the use of the instructional plan. Practical Test Scoring Rubric

The point system used in the practical test.

CRITERIA	POINTS
ACCURACY	2- Accurately Done 1- Not more than 30% error. 0- More than 30% error.
NEATNESS	2- No Erasures made to the output 1- With at least 1 erasure 0- With 2 or more erasures

3. RESULTS AND DISCUSSION

This chapter presents, analyzes and interprets the data gathered from the two groups of respondents with respect to their performance in using the newly developed instructional plan which uses four stages of instruction in comparison to their performance using the conventional instructional plan in Technical Drawing of S.Y. 2017-2018. The respondents' level of performance both in theoretical and practical was determined based on the results of their posttest which were administered after introducing the concepts and dealing with the appropriate skills to be enhanced. The total score of the pre/posttest performance is 58 which covers the competencies for lettering (26 pts), sketching 2D (22 pts), and sketching 3D (10 pts). The target mean is 60% of the total points which is 34.80 pts.

Pretest Performance of the Respondents using the Conventional iPlan in Technical Drawing as to Lettering, Sketching 2D objects and Sketching 3D objects.

The pretest was administered to Grade 7- Hope before they would be acquainted with the various competencies in Technical Drawing. This is one way of checking how far the students knew about the competencies. Table 2 shows the summary of respondents' pretest performance before introducing the topics on lettering, sketching 2D and 3D objects in Technical Drawing subjects for the first quarter, S.Y. 2017– 2018.

Table 2: Pretest Mean Scores of the Respondents using the Conventional iPlan in Technical Drawing as to lettering, sketching 2D objects and sketching 3D objects

Learning Competencies	Highest Possible Score	Target Mean Score	Actual Mean Score
1. Perform different lettering styles and techniques.	26	15.6	6.4
2. Sketch simple objects. (2D objects)	22	13.2	6.1
3. Perform freehand sketches. (3D objects)	10	6.0	3.0
Totality	**58**	**34.8**	**15.5**

From the Table,2 the respondents got 6.4, 6.1 and 3.0 mean scores for the competencies: Perform different lettering styles, sketch simple objects and Perform freehand sketches respectively with a total mean score of 15.5 which is below the total target mean of 34.80. It is because they just relied on their stocked knowledge from their Grade 6 subjects related to drawing. According to [7], traditional lecture-type approaches to delivering content have been reported by students as inadequate, and boring, and described as "death by PowerPoint." Therefore, it is important for teachers to explore new approaches by evaluating pedagogies that have the potential to enhance students' learning and teaching effectiveness.

Posttest Performance of the Respondents using the Conventional iPlan in Technical Drawing as to Lettering, Sketching 2D objects and Sketching 3D objects.

In this group, the instruction was given using the conventional instructional plan procedure.

Table 3: Posttest Mean Scores of the Respondents using the Conventional iPlan in Technical Drawing as to lettering, sketching 2D objects and sketching 3D objects

Learning Competencies	Highest Possible Score	Target Mean Score	Actual Mean Score
1. Perform different lettering styles and techniques.	26	15.6	12.0
2. Sketch simple objects. (2D objects)	22	13.2	13.2
3. Perform freehand sketches. (3D objects)	10	6	5.4
Totality	**58**	**34.8**	**31.0**

The discussion was conducted about the competencies and the rest of the parts were followed which include the activities pertaining to the concepts and practical performances. After such, the posttest was conducted pertaining to the competencies both in theoretical and practical aspects. Table 3 shows the summary of respondents' posttest performance using the Conventional iPlan format on the topics of lettering, and sketching 2-D and 3-D objects in Technical Drawing subjects for the first quarter, S.Y. 2017– 2018.

From Table,3, the respondents got 12.0, 13.2 and 5.4 mean scores for the competencies: Performing different lettering styles, sketching simple objects and Performing freehand sketches respectively, the group got a total of 31.0 mean scores during the posttest.

One of the few things that practically everyone agrees on in both education and training is that people learn at different rates and have different learning needs. Yet our schools and training programs typically teach a predetermined, fixed amount of content in a set amount of time. Inevitably, slower learners are forced to move on before they have mastered the content, and they accumulate deficits in their learning that make it more difficult for them to learn related content in the future. Also, faster learners are bored to frustrated and waste much valuable time waiting for the group to move on – a considerable squander of talent that our communities, companies, and society sorely need. A system that was truly designed to maximize learning would not force learners to move on before they had learned the current material, and it would not force faster learners to wait for the rest of the class [1].

Pretest Performance of the Respondents using the Newly Developed iPlan in Technical Drawing as to Lettering, Sketching 2D objects and Sketching 3D objects.

The pretest was administered to Grade 7- Courage before they were acquainted with the various competencies in Technical Drawing. This is one way of checking how far the students knew about the said competencies.

Table 4 shows the summary of respondents' pretest performance using the newly developed iPlan format on the topics of lettering, and sketching 2-D and 3-D objects in Technical Drawing subjects for the first quarter, S.Y. 2017– 2018.

Table 4: Pretest Mean Scores of the Respondents using the Newly Developed iPlan in Technical Drawing as to lettering, 2D objects and 3D object

Learning Competencies	Highest Possible Score	Target Mean Score	Actual Mean Score
1. Perform different lettering styles and techniques.	26	15.6	6.6
2. Sketch simple objects. (2D objects)	22	13.2	7.8
3. Perform freehand sketches. (3D objects)	10	6	4.0
Totality	**58**	**34.8**	**18.4**

From the Table, the respondents got 6.6, 7.8 and 4.0 mean scores for the competencies: Performing different lettering styles, sketching simple objects and Performing freehand sketches respectively with a total mean score of 18.4 which is

below the total target mean score of 34.80. It is because they just relied on their stocked knowledge from their Grade 6 subjects related to drawing.

Too often in instructional planning, we get focused on the small details (student activities and tasks) before we take a look at the larger picture [8]. In the instructional plan (iPlan), the skills and concepts for the students to learn are well emphasized and incorporated with the varied activities that suit what the learners need and that's one impact on the performance shown above. Several studies have emphasized the importance of a focus on high-quality instruction in supporting students' achievement which is highlighted in the iPlan. An effective teacher plans academic enrichment and remediation opportunities for students. Through the teacher's knowledge of the students, it is possible to offer alternatives to a student or a small group of students who have mastered the material faster than the rest of the class.

Posttest Performance of the Respondents using the Newly Developed iPlan in Technical Drawing as to Lettering, Sketching 2 D objects and Sketching 3D objects.

In this group, the newly developed instructional plan employing the four phases of Merill towards effective instruction was applied. The procedure of the instruction was different in comparison to the conventional instructional plan. The same set of tests was given to this group.

Table 5 shows the performance of the respondents in the post-test using the Newly Developed Instructional Plan (iPlan).

Table 5: Posttest Mean Scores of the Respondents using the Newly Developed iPlan in Technical Drawing as to lettering, 2D objects and 3D object

Learning Competencies	Highest Possible Score	Target Mean Score	Actual Mean Score
1. Perform different lettering styles and techniques.	26	15.6	18.3
2. Sketching simple objects. (2D objects)	22	13.2	18.4
3. Perform freehand sketches. (3D objects)	10	6	7.3
Totality	**58**	**34.8**	**44.0**

The response of the respondents got beyond the target mean of 34.80, Table 5. The respondents got 18.3, 18.4 and 7.3 mean scores for the competencies: Performing different lettering styles, sketching simple objects and Performing freehand sketches respectively, thus, the respondents got a total of 44.0 mean score. The researcher observed how the respondents were enjoying the various phases of instruction which made them perform well in the practical test. This simply shows the need for the teachers to add some spice to the instruction which is far different from the regular curriculum instructional plan. Although there were respondents who seemed not to like the subject, the phases showed them enthusiasm to learn towards it. Facilities are not a question of maximizing learning. It will be how the teacher deals with the students for them to give more.

Most of a student's time is spent performing authentic tasks, rather than listening to a teacher. Some talk about such task-based instruction in terms of the "student as worker" and the "teacher as manager," rather than the teacher as worker [9]. This could be fitted to the various tasks that the students have to perform whenever they deal with the subject. Collaboration is important in work life, civic life, and family life. Therefore, students need experience in collaborating on small teams. Team-based learning on a task provides an excellent opportunity for students to develop their collaboration skills, but it also provides a valuable opportunity for students to learn from each other.

The extent of the acquired identified competencies in Technical Drawing

This portion tells us to what extent the acquired identified competencies in Technical Drawing are. Table 6 shows the comparison of the performance of respondents using Conventional and Newly Developed iPlans.

Table 6: Comparison of the Respondents' Posttest Actual Mean Scores

Learning Competencies	Target Mean Score	Actual Mean Scores	
		Conventional iPlan	Newly Developed iPlan
1. Perform different lettering styles and techniques.	15.6	12.0	18.3
2. Sketch simple objects.	13.2	13.2	18.4
3. Perform freehand sketches.	6	5.4	7.3
Totality	**34.8**	**31.6**	**44.0**

Competencies serve as the core skills needed for students to absorb. The table presents that the respondents were able to perform different lettering styles and techniques using the newly developed iPlan for it is 6.3 higher in terms of mean in comparison to the conventional iPlan format. Moreover, the respondents had sketched simple objects as justified in the result from the table. The second competency got a 5.2 mean higher in favor of the newly developed iPlan. Furthermore, the respondents performed freehand sketches when the newly developed iPlan format was employed. Thus, the respondents were able to perform the said acquired identified competencies using the newly developed iPlan. It implies that the newly developed iPlan significantly improves students' ability to master core competencies, including lettering styles and freehand sketching, compared to the conventional iPlan format. The higher mean scores achieved by respondents using the new iPlan suggest it is more effective in enhancing these skills.

4. CONCLUSIONS

Based on the analysis and interpretation of the data, it was evident to conclude that the newly developed instructional plan (iPlan) is more effective to use in teaching Technical Drawing in comparison to the conventional instructional plan. Moreover, this development helps the learners to upgrade their knowledge and skills to adopt modern technology [10]. The phases of instruction used as the steps of maximizing learning, made the respondents enjoy the entire process. Furthermore, this new approach made the respondents more

comfortable towards the subject since their needs were met depending on their capacity to learn. The iPlan is more effective than conventional methods for teaching Technical Drawing, offering an engaging and personalized learning experience. It helps students improve their skills and adopt modern technology, making them more comfortable with the subject

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