

PROCESS-ORIENTED GUIDED INQUIRY LEARNING: A QUASI-EXPERIMENTAL STUDY ON COLLABORATIVE LEARNING APPROACH IN TLE 10

Leo Rey D. Cagas¹ and Roel P. Villocino, EdD.²

¹ Faculty member, Bango National High School, DepEd-Division of Davao de Oro, Philippines

² Faculty, Graduate School, Assumption College of Nabunturan, Davao de Oro, Philippines

ABSTRACT

This is a quasi-experimental study which aims to investigate the effects of Process-Oriented Guided Inquiry Learning (POGIL) on teaching Technology and Livelihood Education (TLE) as a collaborative learning approach. POGIL, which highlights learning by guided activities and structured inquiry, was employed in order to gauge its influence on students' level of academic performance in TLE. Students' performance were assessed through pretest and posttest research design, whereby a pretest prior to the beginning of the lesson, and posttest after the conduct of the lesson, were administered. Class proficiency and t-tests were employed as statistical approaches to assess results. The results specified that there was a significant improvement in success levels between the pretest and posttest. These findings suggest that POGIL approach effectively enhanced students' understanding in table napkin folding. Additionally, students revealed enhanced critical thinking skills, problem-solving abilities, and collaborative skills. Therefore, the study concluded that the use of the POGIL approach was recommended as an intervention for enhancing practical skills in TLE.

Keywords: *teaching strategy, practical skills in TLE, Process-Oriented Guided Inquiry Learning (POGIL) approach, competency level, quasi-experimental study*

1. INTRODUCTION

Teaching occupational skills towards the young generation is an essential move to prepare them with practical aptitudes that nurture occupation readiness and adaptability in today's rapidly developing world. Technology and Livelihood Education (TLE) is a subject taught in schools which goal is to provide learners with practical skills and understanding related to technology, entrepreneurship, and various livelihood activities. Collaborative learning can be a highly effective strategy for learning the TLE (Technology and Livelihood Education) subject. Collaborative group work nurtures the growth of important social abilities such as cooperation, conflict resolution, and communication among students (Johnson et al., 2014). The purpose of TLE is to provide students with hands-on experiences and practical knowledge that can be applied in actual situations which makes the subject suitable for collaborative learning approach.

In Saudi Arabia, it had been noted that problems regarding teaching and learning TLE exist. The identified issues and challenges encountered by teachers relative to managing TLE instruction include motivating learners using the modality, communicating learners' progress, establishing educational partnership, need for professional development program, designing performance-based evaluation, navigating and utilizing in teaching, use of ICT on assessment, hands-on activities to reinforce learning, access to functional laboratories, and access and development of learning resources (Dungo et. al., 2023)

In the Philippines, particularly in National Capital Region (NCR), it was found out that TLE teachers encountered different challenges in teaching the subject (Calanog, 2019). These challenges include making the

prescribed daily lesson log (DLL) which were not parallel with the pedagogical approaches, choosing an approach due to the insufficient supplies of learning resources like modules, facilities, the making of educational materials directed by the academic approaches, and the lack of internet connection in accessing Learning Resource Management and Development System (LRMDS) wherein in this site, teacher were supposed to acquire additional knowledge and able to develop more meaningful ideas about the lesson.

The same problem was observed at Compostela National High School. The researcher is a TLE teacher for eight years. It has always been part of his job to closely monitor students' performance in TLE. In one of his monitoring during classes, it was shared by one of the students that lessons in the said subject are sometimes not of their interest, especially when lessons are delivered using the traditional way. The traditional approach used a knowledge transfer from the teacher to the students who are actively engaged in the teachings being addressed. Thus, the researcher feels the need of transforming traditional teaching and learning in TLE. As an intervention to the instruction-learning course, this marked the start of the adoption of the collaborative learning approach employing the Process Oriented Guided Inquiry Learning (POGIL) approach. By assigning each person a task as a contribution to the group's overall task, the researcher aimed to offer methods in which everyone could participate.

Therefore, this topic has the possibility to offer insights into the benefits and drawbacks of POGIL in the context of Grade 10 learners in TLE, and could be a valuable contribution to the field of education. Thus, this study tried to introduce the POGIL intervention and compare the results with the traditional method.

1.1 Research Questions

This study was conducted to examine the effectiveness of collaborative learning in improving the Grade 10 Technology and Livelihood Education to students' performance. Specifically, this aims to answer the following questions:

1. What is the level of performance of Grade 10 students as reflected in their pretest?
2. What is the level of performance of Grade 10 students as reflected in their posttest?
3. Is there a significant difference in the performance of Grade 10 students as reflected in the pretest and posttest scores?

1.2 Literature Review

This section provides an overview of previous research and literature on collaborative learning. Authors cited herein provide insights regarding strong points and limitations of the previous studies.

Human beings are inherently social. Men were created to be a "social being," not a "solitary being". Humans are inherently social beings, driven by an innate need for connection, interaction, and belonging. Lev Vygotsky's social learning theory enlightens us on how people engage in social settings and teaches us how to create active learning interactions with others. (Hurst, as cited in Maglangit, 2019) mentioned that social interaction increased learning by boosting students' reading and teaching knowledge as well as their analytical and problem-solving abilities. When students can interact with one another and are engaged, they learn more (Routman as cited in Maglangit, 2019). Through active participation in social interaction with others, students can take on the duty of learning by being the readers, writers, presenters, spectators, and thinkers in the learning environment (Vacca and Mraz, as cited in Maglangit, 2019). In conclusion, social engagement, such as collaborative learning, is essential to the educational procedure. In Sun et al. (2022) study, it was mentioned that children armed with extraordinary peer societal abilities meaningfully alleviated their behavioral problems during the crisis. It was further suggested that nurturing the child's societal abilities and attitude mechanism could have a lifelong progressive impact on kids' emerging conduct, particularly in overcoming crisis. Humans are inherently social beings, meaning that they have a natural inclination and need for social interaction, connection, and belonging. Throughout history, humans have lived and thrived in communities, forming complex social structures and relationships. The ability to communicate, cooperate, and collaborate with others is deeply ingrained in human nature.

Collaborative learning. The implementation of collaborative learning can be done in various settings like classrooms, group projects, or even in the online world. It has been revealed to enhance learner engagement, develop critical thinking and problem-solving skills, promote social skills, and foster a positive learning environment (Johnson et.al., 2014). In Kozlowski and Bell's study, as cited in Delice, et al., (2019), it was stated that

collaborative work is a joint effort where each work together to achieve a particular task or achieve a common goal. Collaborative learning is commonly utilized as an umbrella term to define a task whereby learners work hand in hand to attain a common learning goal (Barkley et. al., as cited in Loes, 2022). When it comes to working collaboratively, dividing tasks and roles among team members based on their strengths, skills, and expertise, is involved. Finally, collaborative work fosters an environment of mutual support and feedback. Team members provide assistance, share knowledge, and offer constructive feedback to help each other grow and improve their performance. This feedback loop enhances learning and promotes continuous development. Further, collaborative learning cultivates cooperation, skills in problem-solving, and a sense of societal accountability, nurturing a learning atmosphere conducive to intensified drive for learning (Ruijuan, 2023). This method offer a multi-layered approach to refining learning attainment and self-motivation between vocational students.

Gillies (2014) mentioned that the educational practice that allowed learners in working together has been extensively studied and revealed to have increased learner performance at age's varieties thru different tasks, in a of group work, group/ peer tutorial, or collective work with common accountability. He specified that learners had to vigorously involve themselves in collective problem-solving to resolve contradictory philosophies and develop meaningful solutions. They must be supported in taking on tasks which have been very challenging for learners, rather than being reliant on teachers. Moreover, he made mention that learners who actively take part in these courses displayed substantial advances in both performance development and educational outcomes. One of the benefits of the extensive varieties of methodologies is that educators have various practices of group learning to choose from. It was believed that collaborative learning can enhance the performance of the students. Responsibility among the participants to contribute to the group's success as a whole can grow during the socializing process and as tasks are formed inside the group. It will be rooted in socio-constructivism or socio-cognitive conflict theory, as its foundation (Roselli, as cited in Maglangit, 2019).

Social Interdependence on Collaborative Learning. Johnson and Johnson, as cited in McConnell et al., (2020) mentioned that there is social interdependence when a person's actions and of others have an influence in what way they turn out. Johnson et al., as cited in van der Meer, et al., (2022) mentioned that when neither the person nor others can have an effect on objective attainment, social powerlessness exists. The main duties of cooperative-based groups, which are lifelong, diverse accommodating learning groups with dependable association, are to aid, inspire, and help members progress academically and grow intellectually and generally in vigorous ways, as well as to hold one another accountable for making an effort to teach (Johnson et al., as cited in Kötter and Karlsson 2022). (Barkley, et al., 2014) described collaborative learning as instructional technique encouraging learners involvement in learning actively be it in pairs or in a group. (Altani, 2021) also mentioned that members of the group collaboratively do the job together in order to amplify mutually their individual and group learning during cooperative learning. Hence, sharpening social skills is some of the utmost significant goal.

Composition of group in collaborative learning. (Webb, as cited in Maglangit, 2019) proposed that in order for collaboration to prosper, students need be encouraged to actively contribute and to co-construct understanding with peers. This recommends that the structure and approaches of groups are imperative, as well as the efficiency of teachers at employing collaborative learning policies. Numerous studies review determined that cooperation must be particularly supportive to learners with low ability whenever they collaborate to learners with higher abilities. Thus a learner who is working unaccompanied had no noteworthy change, this is related to Vygotskian notion of the other skilled peer. Planned practice of mixed-ability coupling when engaging collaborative learning undertakings like peer tutorials will also be an operative intervention for incapacitated learners (Sills, et al., 2016). Roberts (2016) highlights the mutual advances both students can take from collaborative learning implementation, principally when operative approaches are imparted to all learners to upkeep with each other's understanding. As observed, the higher-ability partner inclined to develop inquiries with an absolute answer, while the lower-ability peer struggled with enclosing her views as a query, which directed the group to reflect, explain on, and develop questions built on deeper notions that had unclear answer. Overall, it can be concluded that students who are in low ability benefit from intermingling with higher-ability students, and students of advanced ability are not underprivileged by interacting in group of students with mixed-ability.

Teacher's role in a collaborative classroom setting. Stimulating operative collaboration amongst learners is vital not only for 21st-century learning but also on the contemporary place of work and community commitment (Altani, 2021). Instructors have to participate in collective practices throughout exercise to allow them to effortlessly devise tactics in their training. Diversely collaborating with different perceptions can be extremely inspiring, and

educators must be adept in with this method. Keefe and Jenkins, as cited in Altani (2021) stated that this is done to attain the goal which is for learners to share constructive involvement thru the course which comprises content preparation, group arrangement, and production. Krasniqi (2021) defined teaching as a collaborative, viable, and multifaceted career. According to her, it requires constant enhancements so that teachers master their abilities, understanding, and techniques needed for carrying out their responsibilities professionally, responsibly, and effectively. Educators are expected to have set the authority in the classroom. During teaching-learning process, they functioned as guide for the instruction. Therefore, the role of educators in a collaborative classroom should be carefully reflected. Teachers must serve as a guide for students to be actively engaged in verbal co-reasoning in order to make the most of the effectiveness of peer teaching Gillies (2014). He believed that in peer collaboration, schemes such as demonstrating, instigation, scaffolding, looking for explanation, summarizing, and debriefing to act as a catalyst for further student-driven discussion and debate, must be employed. Therefore, as an alternative to telling learners the precise response, it may be better to incorporate collaborative learning by posing right questions, prompting active dialogue, and stimulating learners to elucidate and rationalize their reasoning. Groupings for the duration of teaching plays a dynamic part to the realization of the strategy. Its composition should always be observed by the teacher-facilitator.

POGIL approach. Hanson's work as cited in Maglangit, (2019) which state that the Process Oriented Guided Inquiry Learning (POGIL) is an effective instructional approach that promotes active learning, critical thinking, and deep conceptual understanding among students. The POGIL approach allocated roles in clusters, which gave learners a supportive system that encourages significant collaborative learning and limits the function of the teacher in the classroom to that of a learning facilitator. A POGIL is founded on learning science (Zull, as cited in Maglangit, 2019) and exhibits traits common to other active, discovery-based learning strategies (Minderhout et al., as cited in Maglangit, 2019). POGIL combines efficient teaching methods in a difficult approach, as mentioned. In POGIL, groups of students (usually 3–6) engage in scripted investigations and inquiry activities that are meant to assist students in building their own knowledge, frequently by simulating the initial steps of discovery and research (Moog et al., as cited in Maglangit, 2019).

POGIL in other subjects. While Technology and Livelihood Education (TLE) has its advantages, there are also some negative insights or criticisms associated with the subject. One of which is some argue that it can be seen as less academically rigorous or prestigious compared to traditional academic subjects. This perception may lead to a societal bias against vocational education and can result in stigmatization or undervaluing of TLE programs. This feeling was observed to have hindered students' potential to learn and understand the concepts of TLE effectively. As a consequence, TLE teachers had to employ innovations in the learning process in addressing learners' need in overcoming their uncertainties and develop their performance on the subject.

In the study conducted on organic chemistry, Casey et. al. (2023) was mentioned that the sense of belonging is notable given which was associated to many valuable outcomes, such as improved enthusiasm and self-efficacy, better perseverance, and enhanced academic achievement and health outcomes. One reported study, as cited by Casey et. al. (2023), relates the integration of POGIL in Computer Science which explores its effect on student belonging. In this study, it was emphasized that students must have a strong foundation in cross-cutting models, and teachers have to sufficiently prepare them so they will not fail. Therefore, educational institutions must support the employment of research-backed teaching approaches that enrich learning for every individuals in every classroom like POGIL.

In a study conducted by Mamombe et al. (2021) in South Africa, which discovered the insights of teachers and learners concerning the practice of POGIL to teaching stoichiometry, it was noted that learners who were taught using the POGIL approach were very active and were not disengaged during the intermediation, which is not similar when lecture method is used. According to them, the POGIL worksheet which were used were neither too hard nor too easy which allowed them to stay focused on the learning tasks which were understandable. As the teachers acted out as facilitators, it allowed for a learner-centered approach which is opposite to teacher-centered approach. In this implementation, unlike in the lecture method where they will be given answers, learners are engaged by asking questions.

Another study by Alghamdi and Alanazi (2020) in Saudi Arabia was definite that affinity can exist when using POGIL even with the embedded gendered differences in the educational system of Saudi. It was highlighted in

their study, that if POGIL is used, students in Saudi Arabia can be taught in Science, in the same way, regardless of their sexes.

In a study conducted by Aiman et al., (2020) in Indonesia, it was mentioned that there is a need to implement learning media and model which is in line with the features of science learning, since the strains on the insistence of enhancing facets of scientific knowledge and learners' critical thinking skills is compulsory. Through this, students' recognition and reception will be at alleviated. They added that the ideals in Process Oriented Guided Inquiry Learning (POGIL) approach has potentials in dealing with the implementation of realia media which is already aligned with studies conducted previously.

2. METHODOLOGY

2.1 Research Design

This study utilized a quasi-experimental method in gathering the data for the research. This method was utilized to examine the effects of POGIL in teaching lessons in TLE. The research employed a one-group pretest-posttest research design wherein a pretest was provided prior to the beginning of the lesson, and a posttest was given at the end of the period (Padua, 2000). Before the start of the study, the teacher administered the pretest performance task on performing different table napkin folds. Students were given a performance task sheet for them to perform. After the lesson, posttest performance tasks were given to the students in order to determine whether the impact of POGIL as an intervention in addressing the concerns of students in terms of their interest towards the lessons was evident. The scores of the pre-test and posttest were used for statistical analysis.

There was one section of Grade 10, specifically, section Special Program in Sports (SPS) which was taught using the collaborative learning approach (POGIL) wherein the class was divided into small groups and each of the members of the group were given a role to portray. The treatment of the experiment adopted the Pretest-Posttest design by Padua (2000) as patterned:

Section	Pretest	Treatment	Posttest
SPS 10	O	X	O

where O - pretest and posttest
X – treatment

2.2 Research Locale

The study was conducted at Compostela National High School in the municipality of Compostela, province of Davao de Oro.

2.3 Subjects of the study

The target subjects are Grade 10 Special Program in Sports (SPS) students of Compostela National High School during the academic school year 2023-2024, wherein this distinct group has specific training, experience and needs in sports that differ from general student population which is best for sampling and testing significant relationship. The researcher utilized purposive sampling method in the recruitment of respondents, ensuring that the sample accurately reflects the population of interest.

2.4 Research Instruments

The researcher used standardized research questionnaires for pretest and posttest, a performance assessment consisting of 100 points. To measure the performance of the learners, rubrics was utilized to provide clear, consistent and objective criteria offering detailed feedback, promoting transparency to align assessment with learning objectives. In addition, an observation note was developed during the conduct of the experiment. The material used shall cover the topic Demonstrate Basic Table Napkin Folding. The results were analyzed, then some improvements and refinements were added to the questionnaires before the administration to the respondents.

2.5 Validation of Instrument

Panels of external and internal validators were assigned to check the instrument before it was administered to the target subjects. To test the reliability and validity of the instrument, pilot testing was implemented wherein 25 students who were not involved in the study were asked to perform the instrument to determine if the performance task would really ask what was intended to measure. Should any problems arise, the researcher would look into it and made some revisions on the instrument. The 25 students in the pilot testing were selected and scores were analyzed for the indices of difficulty and discrimination. The results of the analysis were then submitted for revision and finalization to his peers, advisers and other authorities for refinement.

2.6 Research Procedure

A permission was sought by sending a letter to the office of the Division Superintendent of Department of Education in the Division of Davao de Oro, regarding the conduct of the study in Compostela National High School, Poblacion, Compostela, Davao de Oro. A letter of permission for conducting research was also submitted to the school head of CNHS. By the start of the study, students were asked to fill up information sheets for reference.

Daily Lesson Plan and modules were used by the researcher to the experimental group. The experimental group used collaborative learning using the POGIL approach. Students were divided into groups of 6 to 7 members working as a team, sharing and collaborating to do their assigned task. Each member of the group portrayed a role which includes manager or facilitator, checker, encourager, questioner, recorder, reflector and spokesperson or presenter to develop social responsibility. They had discovered new found knowledge by collaborating with others and sharing their group outputs to the class as a team.

Before the start of the treatment sessions, a unified pretest performance assessment was administered by the researcher. After the treatment, posttest performance assessment was administered to the students. In rating the works of the students both pretest and posttest, the researcher invited external judges to ensure objectivity and reduce bias, adding credibility and legitimacy to the evaluation process. Their specialized knowledge and diverse perspective enhanced the quality of assessment while maintaining consistent standards and providing benchmarks against broader criteria.

2.7 Statistical Treatment of Data

In testing the hypothesis formulated, the following statistical tools were used:

Mean. Used to provide a succinct numerical value that signifies the average performance of the research subject in taking the pre-test and posttest for table napkin folding.

Paired t-test. A tool used for calculating the t-value, comparing the mean difference between the pre- and post-intervention scores to the variability or standard error of the differences.

3. RESULTS

3. 1 Level of performance of the students' pre-test scores in table napkin

This section reveals the results to the number 1 statement of the problem which examines the level of performance of the students' pre-test scores in table napkin folding. Table 1 reveals the results of the pre-test performance of the Grade 10 students.

Table 1
Pre-test Performance of the Grade 10 Students

TASK	NAPKIN FOLDS	CLASS MEAN	QUALITY INDEX
1	PYRAMID	10	NEEDS IMPROVEMENT
2	ARROW	11	NEEDS IMPROVEMENT
3	BIRD OF PARADISE	7.9	NEEDS IMPROVEMENT
4	CONE	9.9	NEEDS IMPROVEMENT

5	STANDING FAN	9.2	NEEDS IMPROVEMENT
OVERALL		9.6	MODERATELY SATISFACTORY

As shown in table 1, the students were tasked with creating various table napkin folding. These tasks included creating a fold of pyramid, arrow, bird of paradise, cone, and standing fan. As presented above, the class mean across all tasks was 9.6. The quality index categorizes the performance of the students. Here, the performance is assessed as "Needs Improvement" for all tasks, indicating that the students were not able to meet the standard for these tasks. The overall assessment of the students' performance in TLE is classified as "Moderately Satisfactory" according to Department Order (D.O.) 8, Series of 2015.

Based on this data, it's clear that while the students' performance in TLE is not meeting expectations, there are still some positive aspects to note. For instance, the class mean is relatively high at 9.6, indicating that there were some individual successes. However, the fact that all tasks were categorized as needing improvement suggests a systemic issue that needs to be addressed.

3. 2 Level of performance of the students' posttest scores in table napkin folding

This section reveals the results to the number 2 statement of the problem which examines the level of performance of the students' posttest scores in table napkin folding. Table 2 reveals the results of the posttest performance of the Grade 10 students.

Table 2
Posttest Performance of the Grade 10 Students

TASK	NAPKIN FOLDS	CLASS MEAN	QUALITY INDEX
1	PYRAMID	18	EXCELLENT
2	ARROW	18	EXCELLENT
3	BIRD OF PARADISE	18	EXCELLENT
4	CONE	18	EXCELLENT
5	STANDING FAN	18	EXCELLENT
OVERALL		18	EXCELLENT

As shown in table 2, the class mean across all tasks was an 18. This indicates that every student achieved the highest possible score on each task. The quality index for each task was categorized as "Excellent." This means that students demonstrated exceptional performance and mastery of the skills required for each task. The overall assessment of the students' performance in TLE is classified as "Excellent" according to Department Order (D.O.) 8, Series of 2015.

This implies that increased in table napkin folding performance of the students in the posttest is noteworthy. The results further displayed that POGIL would significantly support the development of abilities of the students.

3. 2 Null Hypothesis

Table 3 reveals the test of difference of means in Pre-test and Posttest performances of the Grade 10 students.

Table 3
Test of Difference of means in Pre-test and Posttest
Performances of the Grade 10 Students

	Mean	p-value	t-value	Remarks
Pre-test	9.6	0 .001	-61.969	Significant
Posttest	18			

Table 3 reveals the test of difference of means in pre-test and posttest of the performances of the students under POGIL approach. In the pre-test, students' performance has a mean of 9.6 while the mean for the posttest is 18. A p-value of 0.001 and t-value of -61.969 was discovered which signifies that the null hypothesis was rejected and accept the alternate hypothesis that there is a significant difference between the pre-test scores and posttest scores of the respondents.

4. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

4.1 Level of performance of the students' pre-test scores in table napkin folding

The table napkin folding skills of Grade 10 students in the pre-test was assessed as "Needs Improvement" for all tasks, indicating that the students did not meet the expected standards for these tasks. According to Department Order (D.O.) 8, s 2015, the learners' assessment was under the classification Moderately Satisfactory.

From the result, it is clear that a difficulty on table napkin folding was seen among the Grade 10 learners. Their lack of prior knowledge had an impact on their table napkin folding performance. Prior knowledge of students means the knowledge they already have prior to engaging to learning activity. This previous knowledge is vital as it aids as a foundation which the learner's learning progression discloses efficiently (Rajagukguk et al. in 2022). Mulyono (2021), as cited in Rajagukguk et al. (2022), made mention about how prior knowledge establishes the awareness students have already gained before proceeding to advanced stages of learning. The essence of distinguishing learners' prior knowledge as a requirement for actual partaking in learning periods, guaranteeing the smooth growth of the learning course, is acknowledged in this perspective. Therefore, gauging the prior knowledge of learners is vital in order to address their learning needs.

According to Gulacar et al., (2019), learners are likely to develop a tougher appreciation of the lesson which leads to better attainment in the class, when newly found ideas are closely related to previously learned ones, and major concepts yield on a more dominant role on their structure of knowledge. In addition, Neisser et al., as cited in Thurn et al., (2022) mentioned that the capability to recognize multifaceted concepts, to be commendably familiar to the learning setting, to nurture learning from experience, to involve oneself in numerous forms of reasoning, and to astound obstacles by taking belief reveals tough relationships with educational performance. Further, numerous studies have shown that prior knowledge significantly impacts imminent attainment (Holmes, as cited in Thurn et al., 2022). This effect remains strong even when general cognitive abilities are taken into account (Siegler et al., as cited in Thurn et al., 2022).

4.2 Level of performance of the students' posttest scores in table napkin folding

The table napkin folding skills of Grade 10 students in the posttest was assessed as "Excellent" for all tasks, indicating that the students had demonstrated exceptional performance and mastery of the skills required for each task. According to Department Order (D.O.) 8, s 2015, the overall assessment of the students' performance in TLE is classified as "Excellent". This implies that increased in scores in the performance of the learners in the posttest is significant. Moreover, this revealed that POGIL approach could significantly develop students' skills improvement, as they will be working collaboratively.

(Roselli, as cited in Maglangit, 2019) believed that collaborative learning can enhance the performance of the students. Responsibility among the participants to contribute to the group's success as a whole can grow during the socializing process and as tasks are formed inside the group. It will be rooted in socio-constructivism or socio-cognitive conflict theory, as its foundation. Collaborative learning is a general term used to describe learning atmosphere whereby learners work collaboratively to realize a common objective (Barkley, Cross, and Major 2014, as cited in Loes, 2022). Further, collaborative learning fosters cooperation, skills in problem-solving, and a sense of collective accountability, raising a setting favorable to intensified motivation for learning (Ruijuan, 2023). This method offer a complex approach to cultivating learning attainment and self-motivation towards occupational students.

In Manila, a study revealed that collaborative learning advances collaboration among students and a concept of social responsibility, which stimulates students' development of learning and their competence to familiarize various teaching practices, and also their learning drive and fulfillment (Magen-Nagar and Shonfeld, 2018, as cited in Mapile and Lapinid, 2023). In the study conducted by Pathan et al. (2018), he described that Vygotsky's Zone of Proximal Development, which is a specific concept in Vygotsky's Socio-cultural Theory, is for children who are cognitively developing. He defined ZPD as the development determined by independently resolving problems and the possible growth under the supervision of an adult such as their parents, or in alliance with peers (Vygotsky, 1978, as cited in Pathan et al., 2018). Meaning, a difference can be observed in child development if he/she is with someone who is more capable. Significantly, when a child is guided by a mentor or teacher, he/ she learns quickly. This idea of Vygotsky describes the difference between a child whose learning is supported by a more knowledgeable other and a child that learns independently. In his Socio-cultural Theory, it is revealed that there is a possibility of development among children when they are guided their parents, teachers, or their peers. Thus, the findings of this study, which indicates that there is a noteworthy improvement in the students' performance when exposed to collaborative learning, is coherent to Vygotsky's Socio-cultural Theory.

4.3 Difference between the pre-test scores and posttest scores of the respondents

As shown in table number 3, the results lead to the rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting a significant disparity between the pre-test and posttest scores of the participants. As a result of this study, it was found out that students were able to familiarize their peers and eventually collaborate with them, involve themselves in brainstorming in order to arrive to best answers, work as what their role says in their own group, and appreciate the importance of learning in the classroom to their daily lives.

In a study conducted by Mamombe et al. (2021) in South Africa, which discovered the insights of teachers and learners concerning the practice of POGIL to teaching stoichiometry, it was noted that learners who were taught using the POGIL approach were very active and were not disengaged during the intermediation, which is not similar when lecture method is used. According to them, the POGIL worksheet which were used were neither too hard nor too easy which allowed them to stay focused on the learning tasks which were understandable. As the teachers acted out as facilitators, it allowed for a learner-centered approach which is opposite to teacher-centered approach. In this implementation, unlike in the lecture method where they will be given answers, learners are engaged by asking questions. It was also noted that classes integrated with the POGIL approach is noisy since they have to deliberate their answers, which is an indicator that students are stayed focused in their learning task.

Another study by Alghamdi and Alanazi (2020) in Saudi Arabia confirmed that compatibility can exist when using POGIL even with the embedded gendered differences in Saudi's educational system. It was highlighted in their study, that if POGIL is used, students in Saudi Arabia can be taught in Science, in the same way, regardless of their sexes. Additionally, on a study by Aiman et al. (2020) on the influence of POGIL in Indonesia, it was explained that POGIL was an ideal approach which made learners become active to work in groups, made them think critically in solving problems and develop these skills (Douglas and Chiu, as cited in Aiman et al., 2020). This was because the POGIL model was student-centered (Aiman, et al., 2020).

4.4 CONCLUSION

In view of abovementioned findings, the researcher concluded that the POGIL approach has significant effect on students' competency level in TLE subject as shown in the difference between the pretest and posttest. The

performance level of Grade 10 students in TLE increased in posttest as they were taught using the POGIL approach. Students were given the chance to think and discover answers of their own to each problem given, by collaboratively working with their team, being provided with guided inquiry activities. The increase of scores is a manifestation that there is development in the skills of students after being integrated with the POGIL approach, an implication that something better will happen when an intervention is employed. Though this study exposed a promising result, it should be noted that this must be sustained. Moreover, results in this study justify that teachers may be provided with an in-service training in POGIL. This could equip teachers with teaching strategies that would ensure students to gain lifelong skills necessary for success in their academics and in workplace.

4.5 Recommendations

The researcher believed that the employment of POGIL approach enabled and driven the learners, especially the Grade 10 learners to learn collaboratively. It was because they had been given the opportunity to work in teams and had been given the chance to have fun while learning.

Basing the conclusion resulting from the outcomes of the study, the following hereby recommended:

1. The integration of the POGIL approach on students significantly improve. Then, it is suggested to sustain such improvement by utilizing the POGIL approach in TLE lessons.
2. In order to ensure the sustenance of the improvement as shown on the results, teachers and students must be provided with the essential resources and facilities needed to enhance students' understanding on topics in TLE.
3. The administration must assure and highlight learners' literacy. Relatively, schools administration must support the efforts of teachers in providing interventions for students' needs.
4. The Department of Education (DepEd) must continue to support teachers in assessing updating instructional strategies needed to employ in order to enhance learners' skills, especially in TLE.
5. Since the analysis and presentation of the data presented in this study were substantial and provide insights relevant to how POGIL approach affected students' performance, it is therefore endorsed to use related techniques and methods in future studies in order to ensure an affirmative results.

5. REFERENCES

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BIOGRAPHIES

	<p>Leo Rey D. Cagas is a teacher at Compostela National High School, Bango, Ngan, Compostela, and Davao de Oro. She finished her Master of Arts in Educational Administration at Assumption College of Nabunturan.</p>
	<p>Roel P. Villocino, EdD is a faculty member of Assumption College of Nabunturan, Nabunturan, Davao de Oro, Philippines</p>