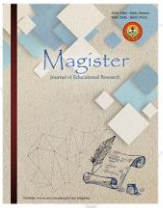

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Amplifying ICT Proficiency via Collaborative Assessment: Exploring Group Collaboration's Influence on Instructing Principles of Visual Message Design Using Infographics

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Abstract

In 21st-century education, collaboration has emerged as an essential skill, forming integral competencies needed in the learning process. Collaborative learning adopts subject mastery, hones critical thinking, cultivates problem-solving ability, and refines interpersonal competencies. The current work investigates the efficacy of collaborative assessment tasks in enhancing ICT skills, specifically focusing on the principles of visual message design using infographics. A quantitative approach and observational study design were utilized. A pre-test-post-test design was implemented to evaluate the impact of the intervention. The data collection strategies include classroom surveillance via eight CCTV cameras, student activity capture, survey questionnaires, and validation through cross-checking interviews. Results showed that optimal collaboration attainment hinges on four core criteria: team cooperation, shared responsibility, joint decision-making, and interdependent contributions. The assessment task positively influenced student performance, reinforcing its pedagogical value. In addition to teamwork, the assessment tasks have stimulated 21st-century skills, including communication, critical thinking, creativity, and information and media literacy proficiency.
Keywords: *ICT Skills, Collaborative Assessment, Infographics, 21CLD, Infographics*

1. Introduction

In today's increasingly digital world, effectively communicating information is critical for success in various fields. In education, the imperative to refine students' collaboration skills has gained paramount importance, with classroom activities designed to foster collaboration offering a platform for skill development (Qureshi et al., 2023). Collaboration is a pivotal skill permeating every facet of human

existence, spanning home, work, and school domains (Evans, 2020). Collaborative learning is gaining traction as research consistently demonstrates its effectiveness. Studies by İşman & Çelikli (2009) and Lin et al. (2010) highlight its ability to enhance self-efficacy, motivation for learning, and active learning behaviors, leading to improved outcomes as noted by Huang & Wu (2011). The efficacy of collaborative learning is evidenced by its positive outcomes, including elevated student achievement, heightened self-esteem, and increased motivation, transcending socioeconomic and cultural contexts (Johnson & Johnson, 2013). The contemporary educational landscape consistently highlights collaboration as a pivotal educational objective, evident in diverse models of 21st-century skills, specifically in developing countries such as the Philippines.

The Philippine educational system has undergone a paradigm shift, prioritizing 21st-century skills within its curriculum framework. Learning institutions actively redesign student experiences to mirror real-world scenarios (Long & Meglich, 2013). This shift emphasizes the learner's active role in acquiring knowledge, moving away from the traditional teacher-centric approach. The K-12 Curriculum materializes this paradigm shift, emphasizing standards and competencies. Notably, it fosters inclusivity and caters to the specific needs of both learners and communities.

Collaborative learning fosters more profound content mastery, enhanced critical thinking and problem-solving skills, and vital interpersonal skills (Johnson et al., 1998; Johnson & Johnson, 1999). A task becomes easier if done together. Students enjoy group activities more than individualized ones. It reduces their stress and makes them more comfortable with the task. It reduces their burden, thus making them relaxed and more capable of acquiring new knowledge and skills. Students learn better whenever they are calm. Students also tend to produce more creative and far better output or performance when working with their peers or collaborating (Da Luz, 2015). Over the past two decades, organizations have increasingly emphasized new structures that encourage and facilitate team-based work. Teamwork is the synergistic alignment of resources and inputs to accomplish organizational objectives (Sala et al., 2008). Within this framework, each team member is assigned specific roles, challenges are tackled collectively, and continuous improvement is actively pursued (Fajana, 2002). Effective collaboration can lead someone to success. Even in the

workplace, how workers collaborate can sometimes determine the company's future.

Generally, teachers use learning activities only during specific lessons. Nevertheless, the manners in which such activities are conducted still need to truly reflect the level of collaboration that should take place among team members (Heron & Reason, 2006). This is especially true in assigning tasks to groups of students required to perform a task. Collaboration fosters a dynamic learning environment where students actively develop their negotiation skills, strengthen their decision-making abilities, and learn to delegate tasks effectively. This shared experience allows them to refine their listening and communication skills, ultimately leading to successfully integrating diverse ideas and team success (Straus, 2002).

This study hopes to help students build the strong collaboration skills that can be acquired from teamwork, which is needed for their future endeavors. Teachers often express confidence in fostering 21st-century skills like collaboration in their classrooms. This is often seen in group projects where students must work together on a specific task. However, the assessment of these projects often needs to be revised, focusing solely on the final output and neglecting the actual process of collaboration and its sub-skills. Students are graded on their product, not their teamwork.

Collaboration is more than just a result. Teachers must pay attention to a complex dance of sub-skills if they want students to develop collaborative proficiency. Consider a group of five students with an assertive member who dominates discussions with their brilliant ideas, ultimately leading to a successful project. However, this student consistently needs to acknowledge their teammates' contributions. The teacher, fixated on the final product, misses this crucial aspect of collaboration - the give and take, the active listening, the drawing out of others' ideas. Given the rising focus on collaborative learning's potential to empower students, this study explores a collaborative assessment task in technology education. This paper aims to evaluate this approach within Empowerment Technology by leveraging existing rubrics that assess collaboration and sub-skills alongside output quality. Specifically, we investigate its effectiveness in fostering ICT proficiency, creativity, and critical thinking, focusing on applying "Principles of Visual Message Design Using Infographics." The study involved Grade 11 Senior High School students from a Science and Technology High School in Cebu, Philippines.

2. Background

This study rests firmly on the twin pillars of Lev Vygotsky's Social Development Theory and Albert Bandura's Social Learning Theory. The ZPD (Zone of Proximal Development) concept by Vygotsky, where learners thrive with scaffolded support from others, perfectly complements Bandura's focus on observation and modeling in shaping behavior and attitudes. Together, these social learning theories unlock a deeper understanding of how individuals learn in collaborative environments, informing our inquiry into how teachers can cultivate vibrant, active learning communities.

Russian psychologist and teacher Lev Vygotsky initially proposed that learning occurs through relationships and communication in 1962. He also looked at how our social circumstances affect how we learn. According to his theory, learning occurs when students engage with teachers, other experts, and their peers. Thus, through dialogue, teamwork, and feedback, educators can design a learning environment that optimizes students' capacity for interaction. Furthermore, according to Vygotsky (1962), culture is the main element that influences how knowledge is constructed. We acquire knowledge via this cultural lens through social interaction and adherence to the norms, competencies, and skills created by our culture.

An effective education lies in the development of lively learning communities. A shared commitment to learning, collaboration, and mutual support characterizes these communities. Here, diverse perspectives are valued, and individuals are encouraged to learn from and contribute to the collective knowledge base (Bielaczyc & Collins, 2013). In such environments, students can engage in meaningful dialogue, share their experiences and ideas, and develop critical thinking and problem-solving skills (Tang et al., 2020). The classroom becomes a microcosm of a learning community, where the physical and social environment fosters active engagement and interaction (Watkins, 2005). This environment might include flexible furniture arrangements promoting collaboration, interactive technology facilitating information sharing, and culturally responsive resources reflecting the students' diverse backgrounds.

Collaboration is essential for building strong learning communities. Students can work together on projects, solve problems, and learn from each other's perspectives (Nelson, 2013). Through collaborative learning activities, students develop essential skills like communication, teamwork, and conflict resolution. Additionally, they learn to appreciate

different viewpoints and respect diverse approaches to learning (Felder & Brent, 2005). Engaging in facilitated discussions using Socratic questioning techniques can further enhance the learning community (Hew & Cheung, 2008). Through open-ended questions, critical reflection exercises, and persuasive reasoning exercises, educators can establish a dynamic learning environment where students actively create what they understand (Sasson et al., 2018).

As Vygotsky (1978) stated, language is the fundamental tool propelling human thought, reasoning, and cultural engagement through activities like reading and writing. Recognizing this, instructional strategies that promote literacy across all subjects are crucial for knowledge construction. This requires whole-class leadership, individual and group coaching, and independent learning opportunities. Effective learning environments also prioritize student-led discussions. These discussions should be purposeful, with substantive comments building upon each other and facilitating a meaningful exchange of ideas (Bielaczyc & Collins, 2013). Questions that foster deeper understanding should naturally emerge from this dialogue. A discussion-based classroom utilizing Socratic dialogue, expertly managed by the instructor, promotes a sense of valued contribution in each student, leading to increased motivation.

In this context, the teacher is a facilitator, composing directed and guided interactions. Vygotsky's social process ideas have inspired numerous educational theorists, who proposed strategies that promote more bottomless knowledge construction, facilitate Socratic student discussions, and build active learning communities through small-group instruction. Vygotsky emphasized the inseparable link between learning and social context. Instructional strategies that encourage the "distribution of expert knowledge" are essential. This involves students collaborating on research, sharing their findings, and culminating in a joint project or presentation (Chu et al., 2011). Such activities foster a collaborative community of learners where knowledge construction thrives.

Vygotsky (1962) described this social learning context as one where student-student and expert-student collaboration tackles real-world problems or tasks. These tasks leverage each individual's language, skills, and experiences, shaped by their unique cultural backgrounds. This collaborative approach paves the way for more bottomless knowledge construction and a more comprehensive understanding of complex concepts. Educators can cultivate a dynamic and engaging learning

environment where students actively construct their knowledge by prioritizing rich language interactions, collaborative projects, and student-led discussions (Meyer et al., 2018). This approach, aligned with Vygotsky's emphasis on the social context of learning, fosters critical thinking, communication, and problem-solving skills. Equipping students with these essential tools empowers them to navigate academic challenges and thrive in their endeavors.

3. Methods

To understand how student work demonstrates collaboration skills, this study employed a mixed-methods approach by integrating qualitative analysis of multichannel video data with quantitative evaluation using a rubric based on 21st-century learning design. Observational data was collected through multichannel video recording (Milne et al., 2016), while a qualitative analysis examined how instructing principles of visual message design influenced collaboration skills using infographics (Safarini, 2019) and using test instruments to measure potential student performance improvements after an instructional intervention. During the intervention, a unique assessment task doubles as a group activity, gauging collaborative skills and knowledge acquisition. Students create infographics advocating for their chosen causes and present their ideas collaboratively. A multifaceted approach was employed to evaluate the effectiveness of the intervention. An evaluative rubric assessed student collaboration throughout the process, while a post-test measured comprehension gains. Additionally, a questionnaire was used to gather student feedback, providing valuable insights. In order to enhance the credibility of the results, the quantitative data were used to cross-validate results through interviews, employing a triangulation method.

3.1. Assessment Task Design

The assessment task will be a project whose main objective is to create Infographics in their chosen advocacy. This is a significant task that will involve some sub-activities. The topic of Principles of Visual Message Design Using Infographics was selected for this project, and the task is to promote their chosen advocacy through Infographics. The objective of the task was to foster collaboration and teamwork, ignite creativity and imagination, and cultivate critical thinking and problem-solving skills among students. It was also designed to foster the development of information, media, and technology skills. The task was

spread over five sessions where students worked in groups. Student collaboration skills were evaluated using two established tools: the 21CLD Learning Activity Rubric and the Student Work Rubric, both focusing on the collaboration dimension (Shear et al., 2010; Makaramani, 2015).

3.2. Objectives

This study examines the effectiveness of integrating a collaborative assessment task to enhance students' ICT skills while promoting collaboration, teamwork, creativity, imagination, critical thinking, and problem-solving proficiencies. The research centers on developing Information, Media, and Technology Skills, explicitly focusing on Empowerment Technology's "Principles of Visual Message Design Using Infographics" among Grade 11 Senior High School students at Compostela Science and Technology High School. The primary objectives include evaluating students' collaborative levels, assessing the impact of the teaching intervention on performance, assessing students' acceptance of the assessment task and associated rubrics, and exploring the potential relationship between collaboration skills and group performance. Through these objectives, the study aims to contribute valuable insights into the efficacy of collaborative methods in advancing students' ICT skills and related competencies.

3.3. Participants and Sampling

The study employed a convenient sampling method to select its participants, consisting of 35 Senior High School Grade 11 students (16 males and 19 females, aged between 16 and 17 years old) from the Academic Track, specifically the STEM Strand, at a Science and Technology High School Cebu Province, Philippines. One Senior High School Empowerment Technology (ICT) teacher was also included.

3.4. Ethical Considerations

Ethical considerations were paramount throughout the study, ensuring the welfare and rights of all participants. Before commencement, necessary permissions were sought from relevant authorities to conduct research involving students and teachers. Informed consent outlining the study's purpose, procedures, potential risks, and confidentiality measures was secured. Anonymity and confidentiality were maintained in data collection, storage, and reporting, with all information used exclusively for research purposes.

3.5. Research Instruments

This study adapted two established tools from ITL Research to determine students' level of collaboration: first is the 21CLD Learning Activity Rubrics for the collaboration dimension, and second is the 21CLD Student Work Rubrics for the collaboration dimension (Shear et al., 2010; Makaramani, 2015). These rubrics assess the learning activity, evaluating its potential to foster collaboration. They consider factors such as shared responsibility, group decision-making, and interdependence of work products. Pre-test and Post-Test Questionnaires, which were pilot-tested, analyzed, revised, or validated by experts, were used to gauge students' learning before and after the experiment. A total of 8 CCTV cameras with 2 DVR boxes, each containing 1 TB of Hard Disk Drive, were installed inside the classroom, which recorded students' activities during the entire experiment. Survey Questionnaires for the acceptability of the assessment task and students' perception of collaboration were given to the students on the last day of the intervention period. These were supplemented with personal interviews with the subject teacher and the students and actual observations of the respondents.

Figure 1. The 21st Century Learning Design (21 CLD) Learning Activity Rubrics for Collaboration

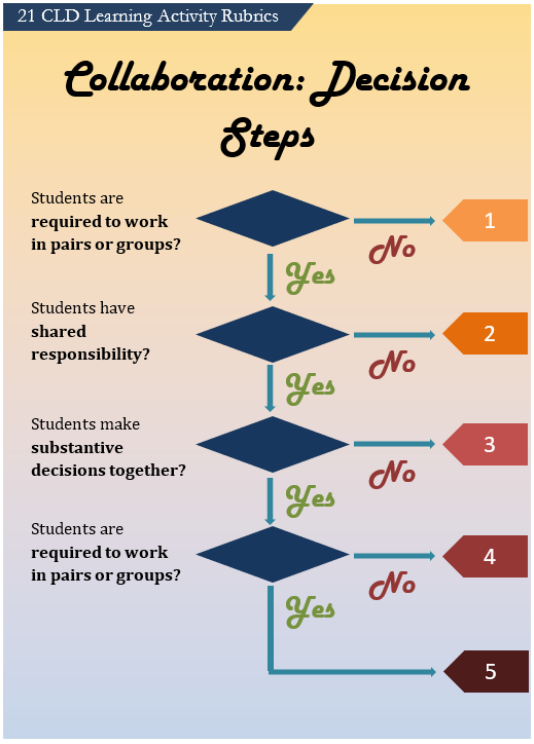

Figure 2. The CLD Learning Activity Rubrics Collaboration Decision Steps

The 21st Century Learning Design (21CLD) framework gives teachers valuable tools like the Student Work Rubrics for Collaboration to evaluate how well students work together. These rubrics focus on critical areas such as teamwork, organization, feedback, and technology use. They help educators understand and improve students' collaborative skills. Students who collaborate solve problems at higher levels than students who work individually because students respond to feedback and questions to create solutions that better fit the problem (Care et al., 2016). The Collaboration Decision Steps in 21CLD are like a roadmap for teachers (Makaramani, 2015). They guide educators through planning, organizing, implementing, and reflecting on collaborative tasks in the classroom. Teachers can use these steps to

ensure that group activities align with learning goals and provide valuable learning experiences. Together, these rubrics and decision steps empower educators to enhance students' collaboration abilities, preparing them for success in the 21st century.

3.6. Analysis

The degree of collaboration was analyzed based on video recordings capturing most classroom activities throughout the lessons. The video data collected during the lesson intervention was thoroughly reviewed and assessed using the '21 CLD Student Work rubrics' (ITL Research, 2012), enabling the identification of students' collaboration levels and providing insights to address the research questions. Additionally, descriptive statistics were employed to determine the percentage distribution for each collaboration code. Data collected from the students' questionnaires were analyzed using Pearson's correlation, revealing potential relationships between average in-group collaboration skills and average group performance. The t-test for paired sample for mean was utilized to determine the pre-post mean gain.

4. Results and Discussion

This section discusses the results on the impact of collaborative assessment tasks in enhancing ICT skills from the pre-test and post-test design to the survey responses on the various assessment tasks.

4.1. Pre-test Results

The first aspect of the analysis deals with the primary data on the respondents' pre-test results in each infographic competency. It was essential to conduct the pre-test and find out the respondents' scores as these served as a barometer of whether there was an improvement in student performance because of the teaching intervention through the collaborative assessment task.

Table 1. Pre-Test Scores of Respondents per Competency

Competencies	Pre-Test Scores' Mean
1. Manipulating Text	1.18
2. Manipulating Graphics	4.09
3. Design or Layout	3.41

Table 1 presents the mean of the respondents' pre-test scores. In all three competencies, the students fell far behind the perfect score of 4 for manipulating text, 12 for manipulating graphics, and 9 for design or layout. This is because the topic of Infographics is new to students. The respondents had yet to learn about it.

4.2. Performance of Learners

This part discusses how the learners are distributed to the different codes or levels of collaboration based on the rubrics used. The students were coded individually and as a group.

4.2.1. Performance of Learners

Based on the results given in Table 2 below, it shows that 3 out of 22 students (13.64%) are classified under Code 1, another 3 out of 22 students (13.64%) are classified under Code 2, 1 student (4.55%) is classified under Code 3, and 2 (9.09%) students are classified under Code 4 in terms of how they collaborate while doing the assessment task. The majority of the students, 13 out of 22 (59.09%), are categorized under Code 5, which is the highest level of collaboration based on the criteria in the rubric.

Table 2. Frequency of the Code on Collaboration Achieved by Students Individually

Code Description	Frequency	Percentage
1 Students are NOT working together in pairs or groups	3	13.64%
2 Students ARE working together, BUT they are NOT sharing responsibility fairly.	3	13.64%
3 Students share responsibility reasonably, BUT they must make substantive decisions together.	1	4.55%
4 Students ARE sharing responsibility fairly AND making substantive decisions together, BUT their work product is separate.	2	9.09%
5 Students ARE sharing responsibility fairly, making substantive decisions together, AND their work product IS interdependent.	13	59.9%

For the groups of students classified as Code 1, the problem arose when the students needed to work with their groupmates. The problem for the students who belong to Code 2 was that they worked with their groupmates but needed to share their responsibilities equally. The Code 3 student was working with groupmates and sharing responsibility somewhat but needed to join groupmates in making substantive decisions. The students under Code 4 shared responsibility reasonably and substantively decided together, but their work product was separate. These claims were made based on the data collected using the video recording and personal accounts made by the subject teacher, who was present throughout the intervention. During the intervention session, some students hardly participated throughout the lesson. One student went to class late in one of the sessions. He played with the computer and acted in working with groupmates every time the teacher approached his group. One male student just kept on teasing one member from another group. This took place in almost every lesson. He also rarely talks and discusses with his group members. He just kept on bothering and playing fools with other groups. According to the subject teacher and his friends, he was always restless and did not take the task seriously. However, he did participate in the group presentation.

4.2.2. Group Code of Collaboration

The average code of students in each group was taken to generate the level of code of collaboration for every group. The teachers assigned code to the students based on the actual intervention experiences of the subject teacher and video recordings utilized by the researcher. Students used the 21CLD Collaboration: Student Work Rubrics and Collaboration: Decision Steps.

Table 3. Average Code of Collaboration per Group

Group	Code Decided by the Subject Teacher	Code Decided by the Researcher	Average Code	Description
1	4.00	3.67	3.83, ≅ 4	Students ARE sharing responsibility fairly, AND they ARE making substantive decisions together, BUT their work product is NOT interdependent
2	4.13	4.07	4.10≅ 4	Students ARE sharing

				responsibility fairly, AND they ARE making substantive decisions together, BUT their work product is NOT interdependent
3	3.25	3.17	3.21≅ 3	Students ARE sharing responsibility fairly, BUT they ARE NOT making substantive decisions together
4	3.29	3.79	3.54≅ 4	Students ARE sharing responsibility fairly, AND they ARE making substantive decisions together, BUT their work product is NOT interdependent
5	3.71	3.71	3.71≅ 4	Students ARE sharing responsibility fairly, AND they ARE making substantive decisions together, BUT their work product is NOT interdependent

Table 3 presents the average collaboration code per group, with scores determined by the subject teacher and the researcher. Group 1's average collaboration code is approximately 3.83, denoting that students share responsibility fairly and make substantive decisions together, although their work product is not entirely interdependent. Group 2 shows a similar pattern with an average code of approximately 4.10, indicating collaboration in sharing responsibility and decision-making but lacking complete interdependence in their work product. Group 3, with an average code of around 3.21, suggests that students share responsibility fairly but do not make practical decisions collectively. Groups 4 and 5, with an average code of around 3.54 and 3.71, respectively, showcase collaboration in responsibility-sharing and decision-making, yet their work products remain not entirely interdependent. These findings clearly understand collaboration dynamics within each group, highlighting strengths and areas for improvement. Notably, the data points to a general leaning among

groups to share responsibilities and make decisions together, signaling a positive collaborative atmosphere but also emphasizing the need for further development of interdependence in their work products; it is evident that success in collaboration hinges on effective implementation rather than a specific approach, it is essential to recognize the distinctions among various collaboration methods. Therefore, educators must carefully align the chosen collaborative approach with the task's specific learning requirements, as Bower (2006) highlighted.

Table 4. Students as a group achieved the frequency of the code on collaboration.

Description	Frequency	Percentage
1 Students are NOT working together in pairs or groups	0	0%
2 Students ARE working together, BUT they are NOT sharing responsibility fairly.	0	0%
3 Students ARE sharing responsibility fairly, BUT they ARE NOT making substantive decisions together.	1	20%
4 Students ARE sharing responsibility fairly AND making substantive decisions together, BUT their work product is separate.	4	80%
5 Students ARE sharing responsibility fairly, making substantive decisions together, AND their work product IS interdependent.	0	0%

Table 4 reveals a dominant collaboration pattern among students (Code 4, 80%). They shared responsibility fairly and made substantive decisions together but kept their work products separate. This preference for joint decision-making while maintaining individual contributions suggests a consistent collaboration mode. Mainly, students did not engage in independent work or exhibit patterns of unfair responsibility or entirely interdependent work products. While 20% of instances represented instances where responsibility was shared relatively but decisions were separate (Code 3), the overall distribution of codes emphasizes students' preference for collaborative approaches with defined individual contributions.

4.3. Relationship Between Collaboration and Performance

This discusses and answers the null hypothesis stated in the problem of whether there is a notable relationship between collaboration and group performance and whether or not good collaboration equates to good performance. The student's performance was evaluated using 1) Post-Test and 2) Output (Infographics) Score.

4.3.1. Level or Code of Collaboration and Post-Test Score

This presents the level or code of collaboration as the independent variable correlated to the post-test scores to determine if there is a significant relationship between these two variables.

Table 5. Correlation Between the Code of Collaboration and Post-Test Score

Measurement of Performance	N	r	Descriptive Interpretation	*p*-value
Post-Test Scores	22	0.27	Weak Correlation	0.23

Table 5 presents the correlation between the collaboration code and post-test scores, providing insights into the relationship between collaborative behavior and academic performance. The correlation coefficient (r) 0.27 suggests a weak positive correlation between the two variables. This indicates that as the code of collaboration increases, there is a slight tendency for post-test scores to increase, though the relationship is not particularly strong. The descriptive interpretation characterizes this correlation as weak, implying that collaborative behaviors measured by the collaboration code do not strongly predict post-test performance. The $p - value$ of 0.23 further strengthens this observation, suggesting that the correlation is not statistically significant. The table suggests that while a mild positive association exists between collaboration and post-test scores, other factors beyond collaborative behavior likely play a more considerable role in determining academic performance.

4.3.2. Level or Code of Collaboration and Output(Infographics) Score

This presents the level or code of collaboration as the independent variable correlated to the output (infographic) score to determine whether these two variables have a significant relationship. The subject

teacher utilized a scoring rubric in grading the students' outputs. Table 6 presents the results.

Table 6. Correlation Between the Code of Collaboration and Output (Infographics) Score

Measurement of Performance	N	r	Descriptive Interpretation	*p*-value
Output (Infographics) Scores	22	0.01	Very Weak Correlation	0.95

Table 6 explores the correlation between the code of collaboration and the output scores related to infographics. The correlation coefficient (r) 0.01 suggests an extremely weak positive correlation between the two variables. This indicates that there is almost no discernible relationship between collaborative behavior, as the collaboration code indicates, and the performance of creating infographics. The descriptive interpretation labels this correlation as "very weak," highlighting the lack of a meaningful connection. The high $p - value$ of 0.95 further supports this observation, signifying that the observed correlation is not statistically significant. In essence, the table suggests that collaborative behaviors, as measured by the collaboration code, do not significantly impact output quality in the infographic creation context. Other factors not considered in the collaboration code may play a more significant role in determining performance in this task.

4.4. Student Performance in the Assessment Task

This discusses whether there is an increase in the student's scores from the pre-test to the post-test. This will help determine the improvement of student performance.

Table 7. T-Test Analysis on the Difference between Pre-Test and Post-Test Scores of the Respondents

Group	Mean	*t*-value	*p*-value	Findings
Pre-Test Scores	8.68	-21.73	0.00	Significant
Post-Test Scores	21.95			

Table 7 presents the results of a $t - test$ analysis, explicitly examining the difference between the pre-test and post-test scores of

the respondents. The mean pre-test score is 8.68, while the mean post-test score is 21.95. The $t - value$ of -21.73 is exceptionally high, indicating a significant difference between the scores. The p minus v a. l u e = 0.00 is below the joint significance threshold of .05, signifying statistical significance. Therefore, the findings indicate a significant difference between the pre-test and post-test scores. This suggests that the intervention or learning experience, as reflected in the change from pre-test to post-test, has had a substantial and statistically significant impact on the respondents' performance. The positive change in mean scores from 8.68 to 21.95 implies improvement throughout the learning intervention. Overall, the table highlights the learning program's effectiveness in enhancing the participants' understanding or skills, as evidenced by the significant positive shift in test scores.

Table 8. T-Test Analysis on the Difference between Pre-Test and Post-Test Scores per Competency of the Respondents

Competencies	Mean		t-value	p-value	Findings
	Pre-Test Score	Post Test Score			
1. Manipulating Text	1.18	3.45	-9.90	0.00	Significant
2. Manipulating Graphics	4.09	10.45	-13.60	0.00	Significant
3. Design or Layout	3.41	8.05	-19.15	0.00	Significant

Table 8 provides a detailed analysis of the t-test results on the difference between pre-test and post-test scores for each competency of the respondents. The pre-test's mean scores for manipulating text, graphics, and design or layout were 1.18, 4.09, and 3.41, respectively. The t-values for manipulating text, graphics, and design or layout were 3.45, 10.45, and 8.05, respectively. The p-values for all three competencies were recorded as $p = < 0.05$.. These results indicate that the changes observed in the post-test scores for manipulating text, manipulating graphics, and design or layout are statistically significant. This demonstrates that the program effectively equipped respondents with essential skills across all assessed competencies. Post-test scores were significantly higher than pre-test scores for all areas, confirming the program's effectiveness.

4.5. Survey Results

The collaborative assessment task was measured through the respondents' perception of its effectiveness in promoting a positive attitude towards group work, developing 21st-century skills, especially in collaboration, inculcating independent learning, and integrating ICT into specifically designed tasks.

4.5.1. Survey Question Categories

The survey questions are divided into several categories that determine the students' perception of each category. Table 9 presents the results.

Table 9. Survey Question Categories, Mean, Standard Deviation and Description

Survey Question Categories	Mean	SD	Description
1. Group members display a pleasant attitude towards the assessment task.	2.98	0.23	Agree
2. Group members think that the assessment task improves 21st-century skills.	3.12	0.53	Agree
3. Group members consider the assessment task as self-motivation for further improvement.	3.29	0.77	Strongly Agree
4. Group members display a positive attitude towards collaboration or collaborative work.	2.86	0.29	Agree
5. Group members consider their learning during the assessment task a lifelong learning experience.	3.29	0.47	Strongly Agree
6. Group members appreciate assessment tasks as a tool for promoting independent learning.	3.24	0.47	Agree
7. Group members think that ICT can be a good tool for collaboration.	2.53	0.87	Agree
8. Group members display initiative while doing the accomplishment of tasks.	2.62	0.70	Agree

Table 9 shows the students' responses for responses categorized into some classifications. Overall, there was a clear indication that most

students agreed on the categories of collaboration and the assessment task. This implies that the students generally like the assessment task and enjoy collaborating. It can also be noted that in Category 3, students strongly agreed that the assessment task motivated them to improve their skills in infographics further. In category 5, the student-respondents strongly agreed that their learnings during assessment tasks are applicable and valuable in daily life.

Table 10. Students Responses for the Selected Questionnaire on Collaboration

No.	Item Description	Strongly Agree	Agree	Disagree	Strongly Disagree
		Frequency (%)			
9	Every group member shows responsibility for their work.	11.76	58.82	29.41	0.00
17	Every group member makes major decisions together during the activity.	23.53	76.47	0.00	0.00
23	Every group member depends on each other to do their task to complete the assessment.	5.88	70.59	17.65	5.88
18	All group members work together to produce the final product.	11.76	76.47	11.76	0.00
30	Every group member shows their responsibility to complete the task.	64.71	35.29	0.00	0.00

Table 10 shows the students' responses to the selected questionnaire items designed based on the criteria stated in the rubric for collaboration. Overall, there was a clear indication that most students agreed (an average of 63.53%) on the criteria for collaboration while doing the assessment task. In conclusion, the findings from the questionnaire proved that the designed assessment task did assist the students in attaining the essential collaborative skills.

Table 11. Students Responses for the Selected Questionnaire on the Assessment Task

No.	Item Description	Strongly Agree	Agree	Disagree	Strongly Disagree
		Frequency (%)			
1	Every member of the group enjoys the assessment task.	23.53	64.71	11.76	0.00
2	The assessment task improved my knowledge of layout and designing	41.18	47.06	11.76	0.00
4	The assessment task improves my critical thinking skills.	29.41	52.94	17.65	0.00
5	The assessment task improves my communication skills.	17.65	64.71	17.65	0.00
6	The assessment task motivates me to study more about layout and design.	41.18	52.94	0.00	5.88
7	The assessment task improved my confidence in layout and design.	29.41	64.71	5.88	0.00

Table 11 presents a comprehensive analysis of students' responses to the chosen questionnaire items about the assessment task. The findings indicate a remarkable degree of unanimity among the students, with an average agreement rate of 92.67% on the specified assessment task items. Moreover, 88.0% of the students acknowledged that the assessment task positively impacted their knowledge acquisition. Furthermore, 92.0% of the students agreed on enhancing their confidence levels in various infographic-designing competencies.

5. Conclusion

This study investigated the impact of a collaborative assessment task within the area of Empowerment Technology, specifically investigating its effectiveness in enhancing students' proficiencies in ICT, creativity, and critical thinking. The main context was directed towards the subject "Principles of Visual Message Design Using Infographics," focusing on Grade 11 Senior High School students at a Science and Technology High School in Cebu, Philippines. Quantitative methods and qualitative

triangulation of the results were applied. The following are notable findings of the study.

1. 21st Century Learning Design (21CLD) enhances students' collaboration skills, as evidenced by their performance in an infographic design project.
2. Students exhibit collaboration on the four foundational markers: cooperative teamwork, shared responsibilities, joint decision-making, and interdependent contributions.
3. On implementing intervention through the collaborative assessment task, significant pre-post gain in the competencies (e.g., manipulating text, manipulating graphics, and designing) was statistically significant.
4. Students exhibited typical collaboration by sharing responsibility fairly, making substantive decisions collaboratively, and producing an interdependent final output.
5. Teachers play a crucial role in designing and implementing engaging and structured learning activities that encourage students to hone their communication, negotiation, and problem-solving skills in a collaborative setting.

Effectual work-related output in the modern, interconnected world depends on collaborative proficiency. Whether working in a team, navigating complex social situations, or simply interacting effectively with others, strong collaboration skills enable individuals to solve complex problems. Beyond collaborative skills, the designed assessment task catalyzed diverse 21st-century proficiencies encompassing communication, critical thinking, creativity, information literacy, and media literacy. Additionally, students enhanced information and media literacy skills, navigating computer photo editing and social media in crafting and sharing their infographics.

Like other research papers, this study has limitations. It is essential to acknowledge that the findings of this study are specific to Grade 11 Senior High School students in the Philippines, focusing on visual message design using infographics. Therefore, the generalizability of the results to a broader demographic or educational setting may be limited. Future research could explore the applicability of collaborative assessment tasks in different educational contexts to assess their effectiveness across diverse student populations and subjects.

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