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Enhancing the Learning of Body Systems through ClassPoint - Assisted Interactive Instruction

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ABSTRACT

This study, which assessed the effectiveness of ClassPoint-assisted interactive learning in improving students' performance and engagement level, has significant practical implications. The study utilized the ClassPoint application to teach learning body systems to Grade 10 students at Toledo City Science High School during the 2024-2025 school year. A quasi-experimental research design was employed, involving 40 respondents. An adapted questionnaire from Abellera (2020), Calma (2020), and Tamayo (2020) was utilized for the pretest and posttest to evaluate students' knowledge of the specified learning competencies in Science 10. Additionally, a survey questionnaire measuring students' engagement levels was adapted from Bong and Chatterjee (2021). The findings indicate that the control and experimental groups performed poorly on the pretest, showing a significant difference in two of the three assessed learning competencies. With the experimental group scoring better, this study found a significant difference in posttest performance between the two respondent groups. These results underline how well ClassPoint-assisted interactive learning increases student knowledge and involvement in science education.

The findings showed that students had a reasonable opinion of Classpoint, which helped them to be very engaged. More interactive teaching tools should be included in the educational process to promote even more interesting learning opportunities.

Keywords: *ClassPoint, interactive learning, student engagement, academic performance, body systems, Science 10, quasi-experimental design, digital tools in education, Toledo City Science High School, Toledo City Division.*

1. INTRODUCTION

Rationale of the Study

Science education is pivotal in developing functionally scientifically literate learners (Härtig et al., 2020; Karisan & Zeidler, 2016; Picardal & Sanchez, 2022) who can be future nation-builders. Rapid technological advances today have resulted from Science education reforms that focus on improving content delivery to learners. For instance, the importance of science (The Importance of Science Education - FasterCapital, n.d.) goes beyond its essential contents. Science provides a reliable process of learning about the natural environment and satisfies our human nature of curiosity, steering us toward scientific breakthroughs for an advanced society (Barnes & Lewis, 2019).

Despite innovation in teaching, the current education trends have presented significant challenges to educators, especially in effectively delivering the Science curriculum to learners. Bumagat et al. (2023) found that while science teachers occasionally face difficulties with digital infrastructure, instructional resources, digital competence, assessment, and supervision, they most commonly face difficulties with academic workload, laboratory experimentation, and physical infrastructures. These various challenges significantly impacted the delivery of the science (Science in a Suitcase | STEM, n.d.) curriculum to learners.

For instance, the Philippines dismal performance in the Programme for International Student Assessment (PISA), especially in science, has been recorded, with the Philippines being at the bottom rank with total points of 356 points, compared to an average of 485 points in Organization for Economic Cooperation and Development (OECD) countries (PISA, 2022). PISA assessment stresses that students from the Philippines are still among the world's least proficient in math, reading, and Science (Acido & Caballes, 2024). The assessment calls for reforms among science educators to innovate strategies to effectively teach students essential science concepts to augment the nation's performance in international assessments.

Such results have been apparent in Toledo City Science High School, where students have low scores during quizzes, signifying a low comprehension level of science topics. Despite employing varied strategies, students still got below passing scores on the exams employed in Science 10. Such data necessitates a teacher to look for teaching strategies to augment

students' motivation to learn, thereby increasing student engagement in the classroom. Employing various strategies in teaching, integrating ICT in teaching, and tailored professional development training for teachers are potential solutions to improve the delivery of science curricula at all levels of education (Bumagat et al., 2023).

ClassPoint, when used in multimedia lectures, shows great promise to develop new teaching methods that will significantly improve students' academic performance (Zhang & Li, 2021b). This Microsoft PowerPoint add-on combines a classroom quiz tool and an interactive (Studocu, n.d.) whiteboard into one handy package. It can rapidly convert PowerPoint presentations into interactive tests, administer tests in class, collect real-time student responses, score tests, and save results (Mazlan et al., 2023). Adding this technology to Microsoft PowerPoint allows a simple show to be more interactive and engaging, making students more interested in learning. This idea could help students understand new ideas better, especially in science, and it gives teachers a promising direction to explore. Especially in the science curriculum delivery, this invention could help pupils grasp new ideas and provide a hopeful road for teachers to investigate.

Various studies have been conducted that explored the effectiveness of ClassPoint-based interactive media in students' learning outcomes across multiple learning areas (Sujatmiko Dyah, 2023; Hidayat et al., 2023; Mazlan et al., 2023), but none have explored its influence on students' learning outcomes in science at the secondary level. In this premise, the researcher delved into the impact of ClassPoint-assisted interactive learning in teaching biology in improving the students' scores in Biology 10. This research undertaking aims to improve students' scores in Biology 10 using the data from the pretest and posttest scores from the tested Essential Learning Competencies.

Theoretical Background

This research assumed that ClassPoint-assisted interactive learning in teaching biology can improve students' scores in Biology 10. It is underpinned by significant theories and legal bases that laid down the foundations of integrating the ClassPoint application in teaching for students' interactive learning. Significant theories include experiential learning theory, engagement theory, and the technological pedagogical content knowledge (TPACK) model of teaching and learning.

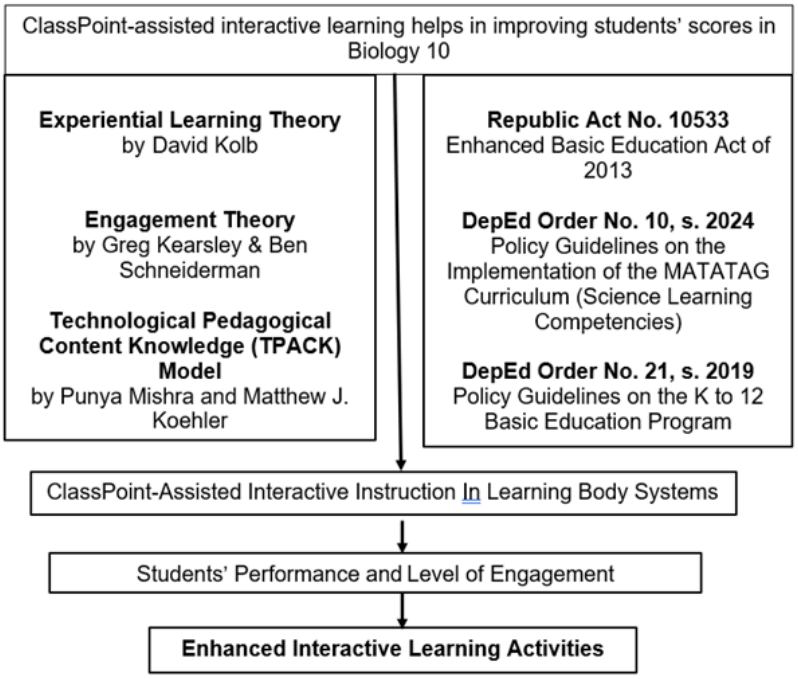


Figure 1 Theoretical Framework of the Study

Technological advancements have posed significant challenges to the teaching and learning process, highlighting the importance of enhancing students' skills in education instead of mere knowledge acquisition in school. The experiential learning theory created by David Kolb is one important idea that clarifies how experiences influence the learning process. Unlike a casual knowledge of material, this theory stresses skills development as a key component in attaining workplace success. (Jonathan & Laik, 2020). The experiential learning theory approach has effectively developed suitable learning viewpoints and habits to assist the students in the new VUCA environment. Emphasizing the need for experiential learning in student development, this idea empowers teachers with the knowledge to include students in the learning process actively.

Abumosa (2024) underlined a notable trend among students using ClassPoint to build an interactive learning environment under remote education. Results showed more student involvement and interest after using ClassPoint in teaching and

learning. The benefits of technology use emphasize how vital it is to enhance educational opportunities and act as a major predictor of students' higher academic performance. For students, this technology integration has changed education from a conventional approach to an interactive learning environment.

According to Pherson-Geyser (2020), experiential learning activities helped students retain more information by fostering the idea that they should be psychologically prepared and engaged. Educators should enable their students to engage in experiential learning for effective learning. Keeping students interested can be done by including fun tasks in the teaching and learning process and making the lessons more relevant by linking them to the students' real-life experiences. The primary objective of experiential learning is to transform knowledge, making it more relevant for learners. This knowledge fosters meaningful experiences for learners by instituting innovation in the teaching-learning process (Pherson-Geyser, 2020).

Moreover, Rasmitadila et al. (2019) discovered that the experiential learning model (ELM) could enhance student learning outcomes, as most students obtained mastery scores, especially in the context of science courses. The experiential learning model's favorable influence on students' academic achievement has dramatically changed how teaching is given, stressing the importance of experiences in students' learning results. The current educational challenge is the lack of interactive learning media that incorporates ICT. Consequently, educators or instructors must put in extra effort to acquire technology for producing and developing learning media (Yanti et al., 2023). Therefore, interactive tools have been employed to enhance the learning experience, and one such tool is integrating the ClassPoint application into the teaching-learning process.

According to Yanti et al. (2023), students provided responses that exceeded 60% to 100%, suggesting that they firmly agree that ClassPoint learning media is user-friendly, interactive, and enjoyable as it is integrated into the teaching-learning process.

The engagement hypothesis, put forth by Greg Kearsley and Ben Schneiderman, is another important concept that lays the basis for this study. As this theory recognizes, for lessons to stick, students must actively participate in what they are taught. Paudel (2023) claims that an engagement learning approach enhances student groups' interest and confidence, correlating with knowledge acquisition, skill development, and the cultivation of competent human resources in mathematics. Students exhibit intrinsic motivation for diverse learning activities when interaction is prioritized in the educational process. He also notes that a collaborative method and ICT technologies must be used in classrooms to render instructional practice effective, proficient, and significant.

Engagement theory emphasizes student engagement and technology integration. According to this perspective, students learn best when their teachers use technology to get them involved and use their interests. Educational engagement denotes all stakeholders' active involvement and dedication in the learning process, encompassing students, educators, and academic organizations (Rachmad, 2022). This engagement extends beyond mere physical presence in educational settings; it also includes all participants' cognitive, emotional, and behavioral interactions in the teaching-learning process.

Integrating digital technology plays a significant role in fostering student engagement within educational settings. For technology to effectively encourage participation, Bond and Bedenlier (2019) state that teachers In order for technology to effectively encourage participation, Bond and Bedenlier (2019) state that teachers must be present and provide students with ongoing feedback. The modern educational environment has changed the way that instruction is delivered, and teachers now need to include ICT in their lesson plans to boost student engagement. Support for educators and learners must be continuous. This idea emphasizes how important digital technology is for raising student interest in learning environments. Integrating educational technology boosts engagement when learners view it as significant, applicable to real-world contexts, and feel encouraged to participate without fear. In this regard, encouraging positive student engagement in the classroom can be achieved by giving students opportunities to participate in the educational process through the use of engaging activities and the integration of ICT into teaching and learning.

Kim et al. (2019) conducted a significant investigation examining the mediating roles of digital readiness and academic engagement in e-learning on academic achievement. The study showed that these factors are important for understanding the role of students' academic engagement and digital readiness as mediators in shaping their perceptions of e-learning, which are influenced by academic achievement. In order to increase student engagement in the classroom, educators must incorporate ICT into the teaching and learning process because the current educational environment has changed how instruction is delivered, which is an essential element for effective instruction. Interactive learning tools, for instance, enable teachers to improve their lessons so that they can involve and interest students, where fundamental skills are essential for success in the digital environment.

Technological advancements have introduced considerable obstacles to the educational process. Serrano et al. (2019) emphasized the importance of including digital technologies in educational systems that are in line with innovation. Therefore, conventional courses must be reexamined to increase student involvement and strengthen educational experiences. Maintaining student involvement in the learning process depends on a change in teaching delivery, which emphasizes its important role in improving academic performance. For example, educational technology increases student involvement; behavioral engagement is the primary driver of higher degrees of involvement (Bedenlier et al., 2020).

The Technological Pedagogical Content Knowledge (TPACK) Model in education is another essential foundation for this

research. The TPACK model is a way to think about teaching knowledge and the various information a teacher possesses regarding the material they teach, the methods they use to teach it, and the resources they utilize to support their methods. To improve subject learning outcomes, educators should focus on developing students' abilities to use educational applications and digital information effectively, as well as helping them understand how to combine pedagogical, content, and technological knowledge in ways that support the integration of digital resources into teaching (Handayani et al., 2023).). This model highlights the importance of technology integration in the teaching-learning process in improving the delivery of instruction.

Teachers frequently face difficulties in efficiently enhancing students' 21st-century skills due to the substantial impact of technological improvements in education. With a focus on three interconnected components—subject knowledge, pedagogical knowledge, and technical knowledge—technological pedagogical content knowledge (TPACK) has given educators a theoretical framework to help them understand the complexities of technology integration (Redmond & Lock, 2019). In order to emphasize the positive use of ICT in the educational process and transform the way the curriculum is taught, these three areas are essential. Nonetheless, a significant difference was investigated between the degree of technological integration and teachers' educational attainment. Li et al. (2022) observed that teachers with higher education levels are better able to incorporate technology into the teaching process. In contrast, those with lower education levels had a worse understanding of the subject. The influence of ongoing professional education in integrating developing technology into the teaching and learning process is implied by such data.

The use of ICT in pedagogy is influenced by technological pedagogical content understanding, according to a similar study by Andyani et al. (2020). By increasing curricular efficacy and efficiency as well as learning accountability and transparency, positive usage of ICT in the classroom seeks to revolutionize education. Teachers need to be acquainted with the emerging technologies that have the potential to transform the delivery of instruction. Similarly, Pedagogical Knowledge (PK) refers to a thorough understanding of the process, practice, learning techniques, and learning environment, and how these topics relate to the goals, values, and learning objectives. According to research by Absari et al. (2020), PK improves Technology Pedagogy and Content Knowledge (TPACK), emphasizing the critical impact that teachers' in-depth understanding of instructional techniques plays.

Aside from the significant educational theories such as experiential learning theory, engagement theory, and technological pedagogical content knowledge (TPACK) model, another legal basis also provides a comprehensive foundation to this research undertaking- the Republic Act No. 10533, otherwise known as the "Enhanced Basic Education Act of 2013". This legislation aims to elevate the country's basic education system by adding two years to senior high school to produce globally competent students who can thrive in a competitive world. This law required the state to provide every student with an opportunity to obtain a globally competitive, high-quality education based on a pedagogically sound curriculum that meets international standards. It shall use pedagogical approaches that are constructivist, inquiry-based, reflective, collaborative, and integrative.

Beyond making infrastructural investments, high-quality education emphasizes instructors' pedagogical abilities in using captivating teaching techniques to enhance students' learning results. Such abilities include teachers' adaptation to emerging technologies with the potential to transform the delivery of instruction to improve students' learning outcomes. This law required the implementation of specialized professional development programs for educators and school administrators, such as capacity-building initiatives for regional education officials, leadership training for school principals, and workshops on creative teaching techniques (Violon & Violon, 2024). There is a need for creative ways to improve students' academic achievement because today's learners have a variety of learning needs that standard teaching approaches cannot adequately satisfy.

A crucial legal basis for this study is DepEd Order No. 10 series of 2024, referred to as the "Policy Guidelines on the Implementation of the MATATAG Curriculum (Science Learning Competencies)." Setting out to address the issues in the educational field, this legal paper describes the curricular change known as the MATATAG curriculum. This order provides teachers and instructional leaders a framework to implement the MATATAG Curriculum. Addressing the selection of subject matter, implementation of teaching strategies, use of learning resources, and use of assessment tools, this paper will serve as a primary tool for teachers in their instructional planning. (DepEd Order No. 10, 2024). This will assist instructional leaders in developing supervisory and management strategies to oversee instructional delivery, track learning progress effectively, and offer suitable technical support to educators and school administrators.

Along with the sections, this legal paper emphasizes how important it is for educators to develop innovative ways to teach, particularly in the science curriculum, to ensure that the curriculum is delivered effectively. By its implementation, this policy improves students' performance in scientific subjects and emphasizes the critical need for creativity in education and learning. This legal order permits school leaders to implement flexible options for instructional time, allowing for 45 minutes per day dedicated to all learning areas, including science. With a more flexible and practical approach to science education, teachers can now better meet the diverse needs of their students and emphasize the importance of innovative teaching methods in providing high-quality instruction.

With the curriculum reforms of the MATATAG curriculum, teachers are mandated to be more adaptive and innovative in delivering instruction. To effectively reinforce the provisions found in RA No. 10533, DepEd Order No. 21, s. 2019 saw the implementation of the K–12 Basic Education Program Policy Guidelines. This policy offers a thorough overview of Basic Education for grades K–12, including all important educational phases under the Emphasizing its key qualities in transforming how instruction is delivered to make learning more relevant and high-quality for students, the K-12 Program's adoption offers a clear improvement given functional literacy in reading, writing, and numeracy (Cerezo et al., 2023).

The necessary abilities for learners to flourish in a globalized society were underlined in the policy guidelines for effectively implementing the K–12 curriculum. Communication, information, media, technology skills, learning and innovation skills, and life and career skills are some of these abilities. These abilities, coupled with strong curriculum support, are meticulously crafted to equip students to become stewards of nation-building holistically.

The theories of education that focus on engagement, experiential learning, and the technology pedagogical content knowledge (TPACK) model, as well as the legislative foundations such as DepEd Order No. 42, s. 2017 and Section 21 of DepEd Order No. 2019 established a thorough knowledge of how this study project should be conducted. This study thoroughly investigates the factors being investigated to enhance students' academic performance using the ideas presented in each theoretical and legal context.

2. THE PROBLEM

Statement of the Problem

This study assessed the effectiveness of ClassPoint-assisted interactive learning in improving students' performance and engagement using the ClassPoint application in learning body systems among Grade 10 students at Toledo City Science High School for the School Year 2024-2025 as a basis for a proposed enhanced interactive learning activity.

Specifically, it answered the following sub-problems:

1. What is the pretest performance of the control and experimental groups in the following learning competencies in body systems:

1.1. explain the role of hormones involved in the female and male reproductive systems;

1.2. describe the feedback mechanisms involved in regulating processes in the female reproductive system (e.g., menstrual cycle);

1.3. describe how the nervous system coordinates and regulates these feedback mechanisms to maintain homeostasis.

2. What is the posttest performance of the control and experimental groups of the abovementioned learning competencies?
3. Is there a significant difference between the control and experimental groups' pretest performance?
4. Is there a significant difference between the control and experimental groups' posttest performance?
5. What is the experimental group's student engagement level after employing the ClassPoint-assisted interactive instruction?
6. What enhanced interactive teaching material can be proposed based on the study?

Null Hypothesis:

This research presented this null hypothesis, which was tested at a significant level of 0.05:

H_{01}: There is no significant difference in the respondent-group pretest performance on the assessed learning competencies.

H_{02}: There is no significant difference in the respondent group's posttest performance on the assessed learning competencies.

Significance of the Study

The results of the study are of great help to the following:

Science Teachers. The study's results will guide them in preparing interactive learning activities to help students retain the lesson or the course. This study will help them deliver the lesson well and create mastery of the subject matter.

Students. This study will help the students improve their academic performance through interactive learning activities designed by the teacher.

School. The findings of this study will aid the school in planning appropriate programs and training workshops to guide the teachers in designing interactive learning activities using ClassPoint to improve learners' knowledge of the content of Science lessons.

Department of Education. The study will help the Department to focus on transforming education practices by prioritizing teachers' training programs on designing interactive learning activities for students.

Future Researchers. The findings will supplement the researcher's work on related studies to improve instruction or suggest modifications to the usual strategy for delivering the competency needed in a particular grade level.

3. RESEARCH METHODOLOGY

This part presents the methodology used in conducting the study. It includes the design, flow of the study, environment, respondents, instrument, data gathering procedure, scoring procedure, and statistical treatment.

Design

This study utilized a quasi-experimental research design since the respondents were grouped into controlled and experimental groups. It also explored the students' engagement level after exposure to ClassPoint-assisted learning material. After 3 to 4 weeks of intervention, this research assessed the effectiveness of the proposed intervention by determining the students' academic performance before and after employing the ClassPoint-assisted interactive learning activities among the two groups of respondents.

According to Rogers and Révész (2019), experimental research involves changing one or more variables and then investigating how this affects another variable. This study used ClassPoint-assisted interactive learning activities as the independent variable, and student scores were the dependent variable. This study evaluates how well the suggested intervention raises students' Science 10 scores in the fourth quarter in learning about body systems.

Flow of the Study

This research utilized the input-process-output (IPO) approach to handle information for the duration of the study.

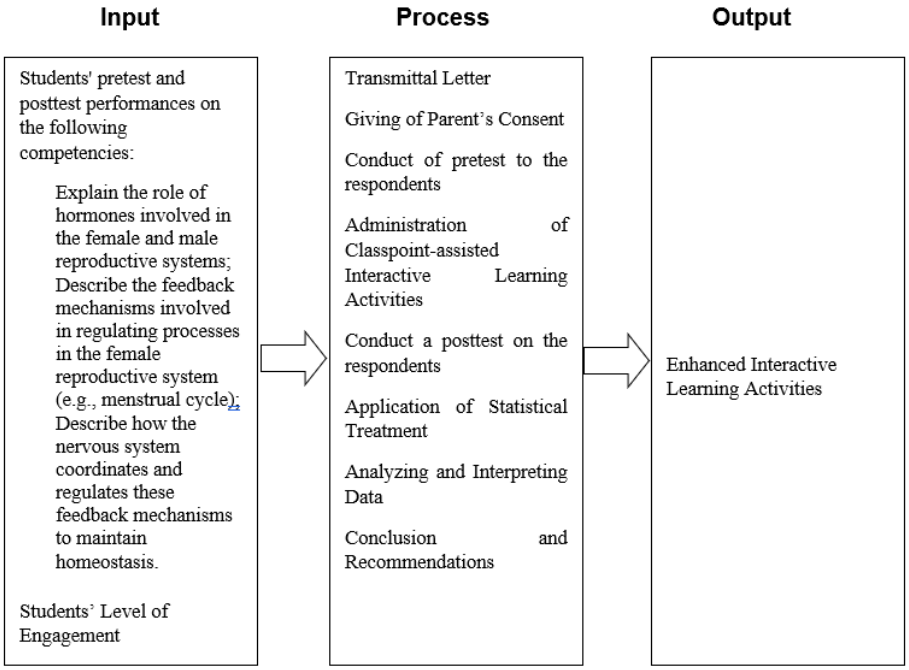


Figure 2. Flow of the Research Study

Input. The input included the respondents' pretest and posttest scores on the tested Most Essential Learning Competencies in Biology 10 from the controlled and experimental groups. This study also explored students' engagement in learning body systems using the ClassPoint application.

Process. A transmittal letter asking permission from the School Principal to conduct the study started this phase. The first step was to obtain parental consent for the respondents' survey participation. Upon obtaining parental consent, an orientation for the participants followed. A pretest assessed students' previous understanding of the designated learning abilities in Biology 10. Subsequently, ClassPoint-assisted interactive learning activities were administered to evaluate their impact on learners' scores. A posttest was conducted to see if there was an improvement in the students' test results. A substantial correlation was established between the controlled and experimental groups regarding the students' gain scores on the specified learning abilities.

The data was evaluated to interpret and validate the hypotheses and ascertain the correlations among the study's variables. Ultimately, conclusions and suggestions were derived from the results.

Output. The output consisted of enhanced interactive learning activities that educators can implement to improve student performance in the subject. Identifying areas of concern facilitated addressing gaps. Finally, it is essential to outline the anticipated outcomes and observations to facilitate the evaluation of its application in the teaching-learning process.

Environment

The study was conducted at Toledo City Science High School (TCSHS), a public science high school in Ilihan Heights, Toledo, Cebu, Philippines. It is a recognized science high school by the Department of Education (DepEd). It was founded in 1996 in response to the Department's call to focus on Math and Science education. It started with 25 first-year students and was annexed to Bato National High School, the Division of Toledo City's lead school.

The school consists of one (1) School Principal, two (2) Administrative Assistants, and nineteen (28) teachers, both from Junior and Senior High Schools. The Junior High School and Senior High School follow the Science and Math curriculum. Senior High offers only Science, Technology, Engineering, and Mathematics (STEM), humanities and Social Sciences (HUMSS), and Accountancy and Business Management (ABM) under the Academic Track.

The school provides a Special Program in Foreign Language (French), a Department of Education project meant to give students chances to improve their competitiveness both locally and globally.

Figure 3. Locale of the Study

Respondents

The study's respondents were determined through random sampling as a requirement for the intended study. It included two sections in Grade 10 – one with 20 students as the control group and one with 20 students as the experimental group. The experimental and control groups were determined by tossing a coin to ensure fairness and impartiality in the study. The experimental group was given the intervention through the ClassPoint-assisted interactive learning activities to determine the effects of the learning material on the students' scores. The control group was exposed to the conventional strategy in the teaching-learning process. The distribution of the respondents is presented below.

Table 1 Frequency Distribution of Respondents

n=40

Grade 10	Respondents		% Male	% Female	Total
	Male	Female			
Controlled Group	6	14	30.00	70.00	20
Experimental Group	4	16	20.00	80.00	20
Total					**40**

Instrument

The researcher utilized an adapted pretest and posttest from Abellera (2020), Calma (2020), and Tamayo (2020), designed to measure the students' prior knowledge of the specified learning competencies of learning competencies in body systems. The tests consist of 10-item multiple-choice questions for the three identified learning competencies in body systems. The students' scores on the cited competencies were determined from their pretest and posttest scores. This study further examined the students' engagement levels following their exposure to the ClassPoint-assisted interactive learning material, utilizing an adapted questionnaire from Bong and Chatterjee (2021).

Data Gathering Procedure

A formal request letter seeking authorization to conduct the research was sent to the Office of the Schools Division Superintendent. Following the endorsement from the Schools Division Superintendent, parental consent was sent to the respondents for permission to participate in the research endeavor. Once permitted, the participants were thoroughly oriented to clarify the research goals, and clear directions were given to avoid any confusion during the study. After administering the pretest questionnaire, participants were invited to ask about the study. The data collection occurred during the tenth-grade Biology class.

Statistical Treatment

The researcher used statistical analysis on all collected data; all necessary data acquired by the instrument were aggregated, organized, analyzed, and interpreted accurately. They are referred to as follows:

The **Simple percentage.** This statistical tool analyzed data from the students' obtained scores from the identified learning competencies.

The **Weighted Mean.** This tool assessed the scores obtained by respondents from the pretest and posttest, utilizing data from an adapted questionnaire.

The **Standard Deviation**. Learners' scores: Learners' scores from the pretest and posttest were analyzed using a standard deviation to measure how dispersed the data is around the mean. Standard deviation provided insights into the students' performance in the competencies being tested.

The **t-test**. The data collected from both respondent groups were subjected to a t-test analysis to see whether there was a significant difference in their scores after employing the ClassPoint-assisted interactive learning activities.

Scoring Procedure

This scoring procedure was utilized in the study to assess the effectiveness of ClassPoint-assisted interactive learning activities on students' academic performance in Biology 10.

Range of Score	Category	Verbal Description
8.21-10.00	Outstanding	Demonstrates outstanding performance in the cited learning competency.
6.41-8.20	Very Satisfactory	Demonstrates strong performance in the cited learning competency.
4.61-6.40	Satisfactory	Demonstrates adequate performance in the cited learning competency.
2.81-4.60	Fairly Satisfactory	Demonstrates basic performance in the cited learning competency.
1.00-2.80	Poor	Demonstrates poor performance in the cited learning competency.

To measure students' level of engagement after using the ClassPoint interactive tool in learning body systems in Biology 10, the following scoring procedure was used:

Range of Score	Category	Verbal Description
4.00-5.00	Strongly Agree	The respondent is very positive towards the statement.
3.00-3.99	Agree	The respondent is positive towards the statement.
2.00-2.99	Disagree	The respondent is negative positive towards the statement.
1.00-1.99	Strongly Disagree	The respondent is very negative towards the statement.

Ethical Considerations

The "ClassPoint-Assisted Interactive Learning in Teaching Biology 10" study included students, teachers, and technology. Therefore, numerous ethical considerations were addressed to guarantee integrity, privacy, and fairness.

First and foremost, informed consent was obtained from all participants, including students and teachers, before data collection began. Participants thoroughly understood the goals, techniques, possible hazards, and advantages of the research. Student participants also followed ethical standards, particularly those relating to minors, by obtaining parental or guardian permission. No personal information was disclosed in research publications or reports, keeping confidentiality and anonymity assured.

In addition, the research maintained equity and fairness to prevent prejudice or exclusion. ClassPoint-assisted learning's integration did not give any student group an unjust advantage or disadvantage. Every participant had the same level of access to the various teaching styles and technology utilized in the research. The researcher ensured PowerPoint did not disrupt the usual learning processes or unduly stress the teachers and students. Furthermore, possible technical problems and accessibility concerns were rigorously handled to guarantee equal involvement and favorable learning results.

Upholding the credibility of the study depended finally on data integrity and ethical reporting. The researcher guaranteed that data collection, analysis, and interpretation were done correctly and openly. Results were given honestly without distortion or misrepresentation, and any conflicts of interest were revealed. Ethical clearance from pertinent institutional review boards or ethics committees should be sought to confirm the study's compliance with research ethics. The study can provide significant insights into the function of ClassPoint in improving Biology 10 teaching by giving these ethical issues top priority and maintaining the best ethical standards.

4. DEFINITION OF TERMS

The following terms are defined operationally according to how they are used in this study:

ClassPoint is an interactive teaching tool integrated into Microsoft PowerPoint presentations that enables real-time student interaction, formative assessments, and instant feedback during instruction. In this study, ClassPoint is an instructional technology add-on that transforms conventional slideshow presentations into interactive learning sessions, facilitating live quizzes and polls, student annotations, immediate response collection, and real-time engagement metrics.

ClassPoint-Assisted Interactive Instruction. A teaching approach that integrates the ClassPoint interactive presentation tool into instructional delivery to enhance student engagement, participation, and formative assessment.

A controlled group is a crucial component in experimental research design. It acts as a standard for assessing the impact of an experimental intervention or treatment.

The experimental group comprises participants subjected to the variable or treatment being studied. The results from this group are contrasted with those from the control group to ascertain the treatment's impact.

Interactive learning is a type of learning where students are actively engaged in the teaching and learning process.

Organ system. Such learning includes the learning competencies centered on the subjects related to human reproductive systems evaluated in this study.

Students' performance is numerical data of students' performance garnered from qualitative assessments in various subjects.

5. PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

This chapter presents the data being gathered, its analysis, and interpretation of the respondents' scores based on the pre-test and posttest results of the Grade 10 students in Biology 10 using the ClassPoint-assisted interactive learning. Specifically, the study focused on assessing the effectiveness of the proposed intervention in improving students' scores in Biology 10 on the cited learning competencies.

Table 2: Respondents' Pretest Performance on the Cited Learning Competencies

Learning Competencies	Controlled Group				Experimental Group			
	Mean	SD	%	Description	Mean	SD	%	Description
explain the role of hormones involved in the female and male reproductive systems	2.10	0.93	21.00	**Poor**	3.60	0.88	36.00	**Fairly Satisfactory**
describe the feedback mechanisms involved in regulating processes …	1.95	0.51	19.50	**Poor**	2.20	0.89	22.00	**Poor**
describe how the nervous system coordinates and regulates these feedback mechanisms …	2.05	0.75	20.50	**Poor**	2.95	0.99	29.50	**Fairly Satisfactory**
Combined three competencies above	2.03	0.75	20.30	**Poor**	2.92	0.92	29.20	**Fairly Satisfactory**

Legend: 1.00-2.80-Poor/ 2.81-4.60-Fairly Satisfactory/ 4.61-6.40- Satisfactory/ 6.41-8.20- Very Satisfactory/ 8.21-10.00-Outstanding

Table 2 presents the pretest performances of the control and experimental groups, the mean per learning competency tested, and their corresponding descriptions. The table shows that in the first competency explaining the role of hormones in the female and male reproductive systems, the control group obtained a mean of 2.10 with a standard deviation of 0.93. In contrast, the experimental group obtained a mean of 3.60 with a standard deviation of 0.88, which implies that the control group has poor performance, while the experimental group is fairly satisfactory. Several factors rooted in recent educational theory and research can be attributed to the disparity in pretest performance between the control and experimental groups, even before the implementation of ClassPoint. According to Härtig et al. (2020), variations in students' prior knowledge, motivation, and engagement levels can significantly influence initial assessment outcomes. The experimental group's fairly satisfactory performance may reflect higher baseline engagement or prior exposure to active learning strategies, as supported by the Engagement Theory (Kearsley & Shneiderman, 2022), which emphasizes that students who are more engaged and involved in learning tasks tend to perform better.

Rasmitadila et al. (2019) also discovered that experiential learning strategies, even without technology, promote more profound understanding and improved retention of science ideas. Conversely, reliance on conventional, passive teaching strategies, which usually do not activate students' prior knowledge or inspire interest, may explain the control group's poor performance (Bumagat et al., 2023). These findings highlight the importance of learner-centered and engaging instructional approaches in achieving better initial competency in science education.

The control group, with a mean of 1.95 and a standard deviation of 0.51, and the experimental group, with a mean of 2.20 and a standard deviation of 0.89, demonstrated poor pretest performance on the competency of describing feedback mechanisms involved in regulating biological processes. This outcome can be attributed to the inherent complexity of feedback systems in biology, which require higher-order thinking and abstract reasoning skills that students often struggle

with when taught through conventional, passive methods (Bumagat et al., 2023; Härtig et al., 2020). According to the Engagement Theory (Kearsley & Shneiderman, 2022), meaningful engagement is essential for deep conceptual understanding. However, traditional classroom environments frequently lack the interactive and experiential elements to make such abstract concepts accessible.

Furthermore, Rasmitadila et al. (2019) emphasize that students' ability to internalize and articulate complex regulatory mechanisms is limited without hands-on or experiential learning opportunities. These findings highlight that, before any intervention, both groups were similarly disadvantaged by a lack of engaging, student-centered approaches necessary for mastering advanced scientific competencies.

The difference in pretest on the third competency-describe how the nervous system coordinates and regulates these feedback mechanisms-between the control group poor performance with mean of 2.05; standard deviation of 0.75 and the experimental group fairly satisfactory performance with mean of 2.95; standard deviation of 0.99 can be attributed to variations in students' prior knowledge, engagement, and cognitive readiness. According to Härtig et al. (2020), students' baseline scientific literacy and motivation significantly influence their initial mastery of complex biological concepts. The experimental group's better performance may reflect a higher level of prior engagement or exposure to active learning strategies, as suggested by the Engagement Theory (Kearsley & Shneiderman, 2022), which emphasizes that students who are more involved and motivated tend to perform better even before formal interventions.

Furthermore, Rasmitadila et al. (2019) found that experiential learning approaches-characterized by active participation and contextualized learning-improve students' conceptual understanding, which is crucial for grasping integrative processes like homeostasis. In contrast, the control group's poor performance likely stems from reliance on traditional, passive instruction that does not sufficiently activate prior knowledge or promote systems thinking (Bumagat et al., 2023). These findings indicate that even before the introduction of ClassPoint-assisted instruction, differences in engagement and learning approaches contributed to the observed performance gap.

The pretest results in Table 2 reveal that the control group had an average mean score of 2.03 (SD = 0.72), indicating poor performance across all three competencies namely explain the role of hormones involved in the female and male reproductive systems, describe the feedback mechanisms involved in regulating processes, and describe how the nervous system coordinates and regulates these feedback mechanisms. The experimental group achieved a higher mean of 2.92 (standard deviation = 0.92), reflecting a pretty adequate performance before implementing the ClassPoint intervention. This would imply that the experimental group already had a greater baseline comprehension of the subject matter or engagement with it prior to any instructional innovation being implemented.

In line with the findings of previous research that has highlighted the influence of prior knowledge, student participation, and the environment of the classroom on the outcomes of science learning, these findings are consistentHartig et al. (2020), for instance, draw attention to the fact that students' baseline scientific knowledge and motivation have a considerable impact on their capacity to comprehend intricate biological concepts. Similarly, Kearsley and Shneiderman (2022) note that students with prior exposure to interactive or engaging learning environments tend to perform better on initial assessments. Recent studies by Bumagat et al. (2023) and Rasmitadila et al. (2019) also confirm that experiential and student-centered learning approaches, even before technological interventions, are associated with higher achievement and readiness in science education. Furthermore, a study published by Abumosa in 2024 discovered that pupils' acquaintance with interactive learning tools and their active engagement in classroom activities are powerful predictors of their academic success before the implementation of the intervention.

By highlighting the existing dilemma in science education, which is that many students struggle to comprehend complicated biological ideas through standard teaching techniques, the initial disparity in baseline knowledge brings to light the problem. Findings of this nature highlight the critical need for novel instructional strategies that actively engage students and cater to various educational requirements. The pretest results provide evidence that the study is relevant since they highlight deficiencies in the students' basic understanding, which can impede their academic advancement if they are not addressed to address them. This fits with recent research (Härtig et al., 2020; Bumagat et al., 2023) that highlights the limitations of passive, conventional instruction in promoting deep comprehension and motivation in students learning science. Furthermore, the relatively acceptable baseline performance of the experimental group implies that previous exposure to more interesting or interactive learning environments can enhance students' preparedness, an idea supported by Engagement Theory (Kearsley & Shneiderman, 2022).

These differences are set up at the start of the study, which is very important for figuring out how dynamic training with ClassPoint affects students. The intervention aims to improve academic performance and enhance student engagement and motivation, addressing the challenges highlighted by the pretest. Recent evidence (Abumosa, 2024; Rasmitadila et al., 2019) supports the effectiveness of technology-enhanced, experiential learning in improving science outcomes, reinforcing the significance of my study in contributing to educational innovation.

Results of the pretest confirm the relevance and need for the study. They show that students could find it challenging to

acquire fundamental scientific skills without focused, interactive teaching aids such as ClassPoint. Therefore, the thesis is pertinent and an absolute need for the advancement of techniques in scientific education that cultivate learning experiences that are both meaningful and captivating. Students' science coursework has not been implemented effectively because of a lack of current lab tools, teaching materials, and access to digital technologies. This has often resulted in students' academic performance being worse than it might have been. For instance, Abareta and Prudente (2025) noted that science educators often do not have adequate access to modern laboratory equipment, teaching resources, and digital technologies supplied by their institutions, which usually affects the delivery of the science curriculum. In order to boost student engagement and improve their academic performance simultaneously, Guinumtad et al. (2024) stress the need to enhance teaching methodologies, particularly about scientific ideas. Educators must devise innovative teaching strategies to improve students' educational results.

The incorporation of digital technologies has significantly transformed the approaches to curriculum delivery in educational settings, with Microsoft PowerPoint exemplifying this change. According to Hadiyanti and Widya (2018), students showed little desire to attend lessons using PowerPoint presentations as they considered them boring and felt left out of classroom conversations. This highlights the need for an interactive tool to facilitate student engagement during teaching and learning.

Table 3: Respondents' Posttest Performance on the Cited Learning Competencies

Learning Competencies	Controlled Group				Experimental Group			
	Mean	SD	%	Description	Mean	SD	%	Description
explain the role of hormones involved in the female and male reproductive systems	3.95	0.60	39.50	**Fairly Satisfactory**	6.70	0.73	67.00	**Very Satisfactory**
describe the feedback mechanisms involved in regulating processes …	4.65	0.93	46.50	**Satisfactory**	7.15	1.38	71.50	**Very Satisfactory**
describe how the nervous system coordinates and regulates these feedback mechanisms …	4.25	0.63	42.50	**Fairly Satisfactory**	7.25	0.91	72.50	**Very Satisfactory**
Combined three competencies above	4.28	0.72	42.80	**Fairly Satisfactory**	7.03	1.01	70.30	**Very Satisfactory**

Legend: 1.00-2.80-Poor/ 2.81-4.60-Fairly Satisfactory/ 4.61-6.40- Satisfactory/ 6.41-8.20- Very Satisfactory/ 8.21-10.00-Outstanding

Table 3 shows the posttest performances of the control and experimental groups, their obtained mean, and their corresponding verbal descriptions. For the competency "Explain the role of hormones involved in the female and male reproductive systems," the control group had a posttest mean score of 3.95 (SD = 0.60), indicating a "Fairly Satisfactory" performance. The experimental group demonstrated a notably elevated mean of 6.70 (SD = 0.73), indicating a "Very Satisfactory" level of performance. This significant disparity highlights the efficacy of ClassPoint-assisted instruction in enhancing students' understanding of hormonal functions within reproductive biology. Studies indicate that interactive technologies improve conceptual understanding by facilitating visualization and providing real-time feedback, which are essential for comprehending intricate biological processes (Ramadhani & Raharjo, 2024). According to the Engagement Theory (Kearsley & Shneiderman, 2022), tools like ClassPoint foster deeper learning through active participation, making abstract endocrine concepts more accessible and memorable.

In the competency "Describe the feedback mechanisms involved in regulating processes in the female reproductive system," the control group mean was 4.65 (SD = 0.93). By comparison, the experimental group scored 7.15 (SD = 1.38), indicating a significant improvement to a "Very Satisfactory" level. ClassPoint's improvement of students' knowledge of homeostatic control—a notion usually considered challenging because of its abstract and cyclical character—suggestes that it was very effective. Research by Vizcayno (2024) highlights that interactive quizzes and immediate feedback mechanisms—features of ClassPoint—stimulate students' metacognitive skills, allowing for better comprehension of cause-and-effect relationships in physiological feedback loops. Moreover, Rasmitadila et al. (2019) support that experiential learning tools promote knowledge retention, especially in subjects that involve systemic regulation and logical progression.

For the competency "Describe how the nervous system coordinates and regulates these feedback mechanisms," the control group scored 4.25 (SD=0.63), classed as "Fairly Satisfactory." The experimental group, on the other hand, had a mean of

7.25 (SD = 0.91), hence ranking "Very Satisfactory." This suggests that ClassPoint-assisted learning substantially improved students' understanding of neural integration in maintaining homeostasis. Interactive visualizations and instant response formats significantly help neuroscience material, which calls for systems-level thinking. According to Md Ramli & Md Ramli (2025), such interactive strategies enable students to see and conceptually arrange how the nervous system operates as a control center, hence promoting real-time cognitive scaffolding. This aligns with Kolb's Experiential Learning Theory, which posits that active engagement and reflection significantly enhance understanding of integrative biological processes.

Finally, when examining the combined results of the three competencies namely explain the role of hormones involved in the female and male reproductive systems, describe the feedback mechanisms involved in regulating processes, and describe how the nervous system coordinates and regulates these feedback mechanisms, the control group mean is 4.28 (SD = 0.72). By comparison, the experimental group had a much higher mean of 7.03 (SD = 1.01), both read as "Fairly Satisfactory" and "Very Satisfactory" respectively. This composite result illustrates the overall effectiveness of ClassPoint-assisted instruction in boosting students' mastery of reproductive and regulatory biology topics. The statistically significant performance gap confirms the cumulative benefit of interactive, technology-based instruction across multiple content areas. As supported by Guinumtad et al. (2024), integrating digital tools like ClassPoint improves cognitive engagement and performance, particularly when applied consistently across several topics. This finding also echoes the TPACK model (Mishra & Koehler, 2006), affirming that pedagogically sound integration of technology, content, and teaching strategies.

The table's statistics show a wide variety of student performances; the experimental group scored best on average compared to the control group, who were not exposed to the ClassPoint-assisted learning tool throughout the teaching-learning process. This notable rise in student performance using ClassPoint presentations emphasizes the potential of educational technology to improve learning results. Guinumtad et al. (2024) further back this by observing that especially when used consistently across several subjects, using digital tools like ClassPoint may greatly enhance cognitive involvement and performance. In the same a direction, Ramadhani and Raharjo (2024) underlined that adding ClassPoint to PowerPoint presentations might greatly enhance the teaching-learning environment.

By incorporating interactive learning tools in the educational process, we can significantly enhance the delivery of instruction, inspiring us to adapt to emerging technologies in education. Bong and Chatterjee (2021) emphasized that ClassPoint was an effective platform for enhancing student engagement and participation in class, thereby contributing to improved student academic performance. Using the ClassPoint technology in the classroom also improves learning outcomes and student engagement (Vizcayno, 2024).

Table 4: Test of Difference of the Respondent-Groups' Pretest Performance

Learning Competencies	Controlled Group	Experimental Group	Mean Difference	Effect Size	p-value	Interpretation
	Mean	Mean				
explain the role of hormones involved in the female and male reproductive systems	2.10	3.60	1.50	-0.637	< .00001*	Significant
describe the feedback mechanisms involved in regulating processes …	1.95	2.20	0.25	-0.169	.142234*	Not Significant
describe how the nervous system coordinates and regulates these feedback mechanisms …	2.05	2.95	0.90	-0.456	.001355*	Significant
Combined three competencies above	2.03	2.92	0.89	-0.421	.000016*	Significant

*The p-values indicate the probability of obtaining the observed results if the null hypothesis were true. A p-value less than 0.05 is considered statistically significant, suggesting that the observed difference is unlikely to be due to chance. *significant when p-value <.05*

Table 4 reveals the differences in the pretest mean scores of the two groups of respondents based on the three assessed learning competencies. A t-test was used to determine if there was a significant difference in the mean scores of the two groups from the pretest performance. For the first learning competency, "Explain the role of hormones involved in the female and male reproductive systems," the control group had a mean score of 2.10. In contrast, the experimental group achieved a

mean of 3.60. This yields a mean difference of 1.50, with an effect size of -0.637 and a p-value of < .00001*, indicating a statistically significant difference. The moderate-to-large effect size implies that the experimental group had a considerably better understanding of hormonal functions before the ClassPoint intervention. According to the Engagement Theory by Kearsley and Shneiderman (2022), students who are more motivated and involved in learning tend to demonstrate higher baseline academic performance. This aligns with Härtig et al. (2020), who found that learners with prior exposure to interactive or participatory learning environments show greater conceptual readiness. Thus, the observed difference may be attributed to earlier experiences with engaging or inquiry-based instruction, which the experimental group may have encountered.

For the second learning competency, "Describe the feedback mechanisms involved in regulating processes in the female reproductive system," the control group had a mean of 1.95, and the experimental group scored 2.20. The difference is not statistically important, as shown by the p-value of 142234, the effect size of -0.169, and the mean difference of 0.25. As a result, neither group knew much about feedback systems before the intervention. The minimal effect size indicates only a slight performance edge for the experimental group, likely due to random variation. Students find feedback loops quite challenging since they call for systems-level thinking and abstraction, concepts not easy to grasp without adequate scaffolding (Bumagat et al., 2023). Students find feedback loops to be quite difficult to comprehend due to their advocacy for systems-level thinking and abstraction, which are difficult to comprehend without adequate scaffolding (Bumagat et al., 2023). The necessity of imparting inventive concepts is underscored by the absence of substantial distinctions. ClassPoint offers interactive elements and visual aids that help to make these intricate processes more accessible and memorable.

The third learning competency, "Describe how the nervous system coordinates and regulates these feedback mechanisms," revealed a mean of 2.05 for the control group and 2.95 for the experimental group. This results in a mean difference of 0.90, with a moderate effect size of -0.456 and a p-value of .001355*, indicating a statistically significant difference between the two groups. This suggests that students in the experimental group had a stronger foundational understanding of nervous system regulation before being exposed to the intervention. According to Kolb's Experiential Learning Theory, students benefit from engaging directly with content through active reflection and application, which may have been more prevalent in the prior experiences of the experimental group. Furthermore, Rasmitadila et al. (2019) noted that even before technological integration, experiential and student-centered teaching strategies enhance comprehension of complex biological systems, supporting the finding of better performance among students who may have been exposed to more dynamic or context-driven instruction.

For the combined performance across the three competencies, namely explain the role of hormones involved in the female and male reproductive systems, describe the feedback mechanisms involved in regulating processes, and describe how the nervous system coordinates and regulates these feedback mechanisms, the control group had a mean of 2.03. Contrary to this, the experimental group achieved a score of 2.92, which led to a mean difference of 0.89. The p-value of.000016*, which corresponds to a calculated effect size of -0.421, suggests statistical significance.This substantial difference in baseline knowledge reflects that the experimental group had a firmer grasp of the subject matter before the intervention. Such a large effect size suggests more than random variation and may indicate that the experimental group had been previously exposed to more innovative or interactive learning strategies. The Technological Pedagogical Content Knowledge (TPACK) paradigm underlines how the mix of pedagogical knowledge with material and technology helps to deliver better educational experiences (Mishra & Koehler, 2006). The overall result of this stress the need to ensure that all children have access to educational settings that are rewarding as the level of academic talent is highly influenced by the quality of teaching, motivation and prior student engagement.

Analysis of the table revealed that two in three of the cited competences for learning identified the statistically significant difference, by calculating the mean of the scores of the pretest performances. This notable variation suggests that the pretest results for the control and experimental groups varied. Both groups of respondents also showed very poor performance on the three specified learning characteristics requiring changes in the teaching-learning process. The responders' poor average scores have encouraged teachers to create creative ways of instruction meant to improve student academic performance. This poor performance calls for a change in how the curriculum is delivered, particularly in science.

For example, Guinumtad et al. (2024) showed that the scores of the group using ClassPoint and the group not using ClassPoint showed significant improvement after implementation, highlighting the efficacy of both approaches in improving learning results. Nevertheless, ClassPoint integrated learning has demonstrated greater efficacy in improving students' learning outcomes. Hadiyanti and Widya (2018) found that some students lacked the motivation to participate in classes that employed traditional PowerPoint presentations, as they perceived them as monotonous and felt excluded from classroom discussions. This highlights the idea that teachers need to use interactive learning tools to engage students more in the teaching-learning process and become active in the discovery of learning.

The significant difference between the experimental and control groups' pretest scores suggests that educators must create instructional techniques and resources that actively include students in the teaching-learning process and are flexible enough to meet their varied requirements. Students perform at a higher level when actively involved in the learning process. This

demonstrates the transformational power of creative teaching methods in raising students' conceptual learning outcomes, particularly within the framework of scientific curricula.

Table 5: Test of Difference of the Respondent-Groups' Posttest Performance

Learning Competencies	Controlled Group	Experimental Group	Mean Difference	Effect Size	p-value	Interpretation
	Mean	Mean				
explain the role of hormones involved in the female and male reproductive systems	3.95	6.70	2.75	-0.899	< .00001*	Significant
describe the feedback mechanisms involved in regulating processes …	4.65	7.15	2.50	-0.728	< .00001*	Significant
describe how the nervous system coordinates and regulates these feedback mechanisms …	4.25	7.25	3.00	-0.886	< .00001*	Significant
Combined three competencies above	4.28	7.03	2.75	-0.838	< .00001*	Significant

**significant when p-value <.05*

Table 5 reveals the differences in the posttest mean scores of the two groups of respondents based on the three assessed learning competencies. The analysis employed a t-test to determine whether a significant difference exists in the posttest performances between the controlled and experimental groups. For the first learning competency, "Explain the role of hormones involved in the female and male reproductive systems," the control group had a mean posttest score of 3.95, while the experimental group scored 6.70. This results in a mean difference of 2.75, an effect size of -0.899, and a p-value of < .00001, indicating a highly significant improvement in the experimental group. The large effect size suggests a substantial impact of ClassPoint-assisted instruction in improving student comprehension of hormonal regulation. Supported by the Engagement Theory (Kearsley & Shneiderman, 2022), ClassPoint's interactive quizzes and live annotations also likely helped students visualize hormone interactions and retain knowledge more accurately. These results highlight the effectiveness of the intervention, by emphasizing that interactive resources lead to greater participation and better understanding of content that the traditional lecture-based approach.

In the second learning competency, "Describe the feedback mechanisms involved in regulating processes in the female reproductive system," the experimental group received a mean of 7.15. In contrast, the control group received a mean of 4.65 which resulted to a mean difference of 2.50 and has effect size of -0.728 with corresponding p-value of <. 00001. The ClassPoint intervention's significant p-value and large impact size show that it can close knowledge gaps about complex regulatory mechanisms. Feedback loops, which are facilitated by dynamic and visual engagement like ClassPoint's, call for higher-order thinking and an understanding of systems. Students who actively participate in their education are better able to retain information, according to Kolb's experiential learning theory. The improvement in this competency shows that the intervention made a complex subject more approachable and interesting, confirming the value of interactive technologies as teaching tools in science classes.

For the third learning competency, "Describe how the nervous system coordinates and regulates these feedback mechanisms," the control group scored 4.25, while the experimental group scored 7.25. This produced a mean difference of 3.00, an effect size of 0.886, and a p-value of < .00001, confirming a highly significant improvement. With an effect size close to 0.9, this result shows that students exposed to ClassPoint developed a much firmer grasp of integrative biological systems. ClassPoint's real-time polling and annotation features facilitated students' ability to connect nervous system activity with physiological regulation. Literature by Md Ramli & Md Ramli (2025) supports that interactive environments allow learners to engage with complex systems thinking, particularly in physiology. These results confirm that the study's intervention improved factual recall and enhanced students' capacity for critical thinking and systems analysis.

For the combined performance across the three competencies, namely explain the role of hormones involved in the female and male reproductive systems, describe the feedback mechanisms involved in regulating processes, and describe how the nervous system coordinates and regulates these feedback mechanisms, the control group mean is 4.28. On the other hand, the experimental group had a mean difference of 2.75 and scored 7.03. The computed effect size of -0.836 is significant; the p-value of < .00001 shows strong statistical relevance. This outstanding outcome strongly supports the general efficacy of the ClassPoint-assisted interactive instruction. Rare in educational research, an effect size over three has a significant influence on student learning. This implies that the intervention produced significant, quantifiable changes across all evaluated learning outcomes rather than just small ones.. These findings are consistent with the Technological Pedagogical Content Knowledge (TPACK) framework, which asserts that technology can dramatically enhance student learning outcomes when effectively aligned with content and pedagogy (Mishra & Koehler, 2006). The study exemplifies this synergy and provides compelling evidence that interactive, technology-based strategies like ClassPoint should be integrated into science instruction for meaningful and lasting academic improvements.

The findings indicate a significant difference in the posttest performances of both respondents across the three evaluated learning competencies. This substantial score difference suggests that the respondents' scores improved after exposure to the interactive training aided by ClassPoint. This demonstrates how the aforementioned innovation in the teaching materials—the addition of the ClassPoint interactive tool—enhanced students' test outcomes in relation to those subjected to traditional PowerPoint presentations.

ClassPoint is a better teaching tool than the other learning modalities, according to Guinumtad et al. (2024), who also showed it has significantly improved student scores. This interactive learning tool has changed instructional delivery especially in science education, where challenging concepts require significant student engagement. Teachers have to enable significant interactions to guarantee a complete knowledge of the topics.

By allowing students to respond to questions, participate in quick polls, and receive real-time assessments, ClassPoint facilitates live interactions during instructional sessions (Md Ramli & Md Ramli, 2025). This strategy creates an inclusive educational atmosphere in which students may clarify conceptual doubts, close knowledge gaps, and keep engaged throughout learning interactions so ensuring improved academic performance, therefore promoting real learning results. Furthermore, using ClassPoint as an intervention technique improves students' academic performance in science and learning engagement (Vizcayno, 2024).

Table 6: Respondents' Perceived Level of Engagement in Using ClassPoint

Statements	Weighted Mean	Verbal Description	
a) I experienced greater interaction and engagement with my peers and instructors when ClassPoint was used as a quiz tool in the class.	3.45	SA	
b) The ClassPoint has motivated me to participate in questions and polls more often in the class.	2.74	A	
c) The interactive quiz questions in ClassPoint helped me to self-evaluate how well I was learning the course material during the lesson.	2.90	A	
d) The lessons are lively and engaging when instructors run the class using ClassPoint than a class without the use of ClassPoint.	3.01	A	
e) ClassPoint's display slide allows me to follow along and pay more attention to instructors' presentation, live annotations and respond promptly to the delivered questions easily using my own browser.	3.31	SA	

Legend: SA-Strongly Agree, A-Agree, D-Disagree, SD-Strongly Disagree

The table shows the students' perceived level of engagement after being exposed to ClassPoint-assisted interactive learning in learning body systems. Based on the table, "I experienced greater interaction and engagement with my peers and instructors when ClassPoint is used as a quiz tool in the class" obtained the highest weighted mean of 3.45, implying a positive perception of students' engagement, which is Strongly Agree in using ClassPoint. The statement then followed, "The ClassPoint has motivated me to participate in questions and polls more often in the class," which obtained a weighted mean of 2.75, yielding a verbal description of Agree. It was followed by the statement, "The interactive quiz questions in ClassPoint helped me to self-evaluate how well I was learning the course material during the lesson," which obtained a weighted mean of 2.90 and a verbal description of Agree. The statement "The lessons are lively and interesting when instructors run the class using ClassPoint rather than a class without the use of ClassPoint" obtained the third highest weighted mean of 3.01 with a verbal

description of Agree. For the last statement, "ClassPoint's display slide allows me to follow along and pay more attention to instructors' presentation, live, and respond promptly to the delivered questions easily using my browser," obtained a weighted mean of 3.31, yielding a verbal description of strongly agree.

The information provided indicates that students have a positive opinion of Classpoint, which helps them to be rather involved. Designed to promote active participation, this interactive learning tool helps to provide a supportive atmosphere where students can clarify ideas, challenge assumptions, and stay engaged with complex biochemistry topics (Md Ramli & Md Ramli, 2025). Likewise, the learning process is set to be more participatory as students answer using computers or mobile devices (Ramadhani & Raharjo, 2024). This highlights the value of innovation in education and the need to use instructional practices that actively engage students in the teaching-learning process, particularly when using cutting-edge tools like the interactive ClassPoint application. In a similar vein, Khozaei et al. (2022) observe that learning environments that are stimulating increase students' learning engagement.

6. SUMMARY, FINDINGS, CONCLUSION, AND RECOMMENDATIONS

This chapter outlines the summary, findings, conclusions, and recommendations derived from the study.

SUMMARY

This study assessed the effectiveness of ClassPoint-assisted interactive learning in improving students' performance and engagement level using the ClassPoint application in learning body systems among Grade 10 students at Toledo City Science High School for the School Year 2024-2025. This study intended to propose enhanced interactive learning activities that can be utilized in learning body systems, specifically Biology 10. This intended outcome aims to improve students' scores and make learning more engaging. The student's academic performance was measured by questionnaires focusing on three identified learning competencies in Biology 10. Pretest and posttest scores were gathered using the adaptive questionnaire from Abellera (2020), Calma (2020), and Tamayo (2020), designed to measure the students' prior knowledge of the specified learning competencies of learning competencies in body systems. This study further examined the students' engagement levels following their exposure to the ClassPoint-assisted interactive learning material, utilizing an adapted questionnaire from Bong & Chatterjee (2021). Different statistical tools including mean, simple percentage, and t-test were applied to the data collected. The notable difference in pretest and posttest performance between the two groups was also looked at. An adapted questionnaire was also used to gauge students' perceived degree of involvement in using ClassPoint.

FINDINGS

This section of the study presents the findings derived from the data collected from the participants.

The first sub-problem aimed to determine the pretest performance of the control and experimental groups in the three identified competencies in learning body systems. For the competency of explaining the role of hormones involved in the female and male reproductive systems, the control group had a mean score of 2.10, while the experimental group scored 3.60. These results fall under the descriptors of poor and fairly satisfactory, respectively. Regarding the second competency, which describes the feedback mechanisms that regulate processes in the female reproductive system, the control group obtained a mean of 1.95, and the experimental group scored 2.20, indicating poor performance. For the third competency, describing how the nervous system coordinates and regulates these feedback mechanisms to maintain homeostasis, the control group had a mean of 2.05, and the experimental group scored 2.95, again showing a discrepancy between poor and fairly satisfactory levels having the average of 2.03 – poor and 2.93 – fairly satisfactory levels. Though the experimental group showed a little better baseline knowledge, these findings imply that students in both groups had little prior knowledge of the material. These results support Härtig, Nagengast, and Wendt's (2020) research, which underlined how differences in students' pre-existing knowledge and involvement affect first assessment results. This suggests that the slight advantage of the experimental group may be attributed to prior exposure to more active or participatory learning environments.

The second sub-problem addressed the posttest performance of both groups. In the competency regarding the role of hormones in reproductive systems, the control group improved to a mean of 3.95. In contrast, the experimental group significantly rose to 6.70, improving from fairly satisfactory to very satisfactory performance. For the second competency concerning feedback mechanisms in the female reproductive system, the mean of the control group was 4.65 and the mean of the experimental group reached obviously higher value of 7.15 - jumping, similarly, to very satisfactory values. Thirdly, for the nervous system regulation of feedback mechanisms, the control group: 4.25, the experimental group: 7.25, the experimental group was significantly higher than the control group. These outcomes highlight the effectiveness of the ClassPoint-assisted instruction in significantly improving students' understanding of all three competencies. The study by Ramadhani and Raharjo (2024) supports this, which found that using ClassPoint to convert traditional PowerPoint presentations into interactive formats enhances conceptual comprehension and boosts student performance in science subjects.

The third sub-problem investigated whether pretest performance differed significantly between the control and experimental groups. With a mean difference of 1.50 and a large effect size, the ability to explain hormonal roles revealed a statistically

significant difference, suggesting the experimental group had a better baseline understanding. Similarly, the competency involving nervous system regulation also displayed a significant difference with a mean difference of 0.90. However, no significant difference was found in the competency of feedback mechanisms in the female reproductive system. When the three competencies were combined, the overall mean difference was 0.89 with a large calculated effect size of 1.06, pointing to a meaningful difference in prior knowledge between the two groups. This implies that the experimental group had previous exposure to more interesting teaching techniques. This is consistent with the results of Rasmitadila and colleagues (2019), who found that students exposed to experiential and student-centered teaching strategies show better retention and pre-intervention performance.

The fourth sub-problem explored whether there was a significant difference in the posttest performance between the control and experimental groups. For the first competency, the experimental group outperformed the control group by a mean difference of 2.75, supported by a large effect size and statistical significance. In the second competency, the mean difference was 2.50, also with a strong effect size and high significance level. With a large effect size, the third competency had the highest mean difference, measuring 3.00. Combining the three competencies yielded an exceptional effect size of 3.14 and a mean difference of 2.75, demonstrating the strong influence of the ClassPoint-assisted instruction. These findings demonstrate the effectiveness of the intervention in significantly enhancing student achievement across all competencies. This supports the findings of Guinumtad, Tolentino, and Dela Peña (2024), who reported that students exposed to ClassPoint showed substantial improvement in science learning outcomes compared to those taught using conventional methods.

The fifth sub-problem focused on student engagement in the experimental group after being exposed to ClassPoint-assisted interactive instruction. With a strongly agree rating, the statement about having more interaction and engagement with peers and teachers while using ClassPoint was the most highly rated engagement item. Students felt more engaged and attentive during classes that used ClassPoint, as evidenced by the positive responses given to other statements like the ability to follow along with lessons, interest in the class, and increased participation in quizzes and polls. These findings reflect those of Bong and Chatterjee (2021), who concluded that ClassPoint enhances academic performance, student motivation, and engagement, particularly in digital learning environments.

The fifth sub-problem focused on student engagement in the experimental group after being exposed to ClassPoint-assisted interactive instruction. With a strongly agree rating, the statement about having more interaction and engagement with peers and teachers while using ClassPoint was the most highly rated engagement item. Students felt more engaged and attentive during classes that used ClassPoint, as evidenced by the positive responses given to other statements like the ability to follow along with lessons, interest in the class, and increased participation in quizzes and polls. These findings reflect those of Bong and Chatterjee (2021), who concluded that ClassPoint enhances academic performance, student motivation, and engagement, particularly in digital learning environments.

CONCLUSIONS

This section outlines the conclusions derived from the findings of this study.

Based on the findings of this study, it is concluded that the use of ClassPoint-assisted interactive instruction significantly enhanced the academic performance and engagement of Grade 10 students in Biology, specifically in the competencies related to: (1) explaining the role of hormones involved in the male and female reproductive systems, (2) describing feedback mechanisms in the female reproductive system, and (3) illustrating how the nervous system regulates and coordinates these mechanisms to maintain homeostasis. The experimental group consistently did better on post-tests than the control group in all three competencies. These differences were statistically significant, and the effect sizes were big, which shows that the intervention worked very well.

These findings confirm the main theories guiding the research. Kearsley and Shneiderman's (2022) Engagement Theory stresses that active participation and group projects improve learning outcomes. Real-time quizzes and polls, aClassPoint'snteractive elements of ClassPoint, helped to enable these conditions. Moreover, the results support Kolb's Experiential Learning Theory (1984)Kolb'sh contends that direct involvement, application, and reflection help students learn more effectively. ClassPoint helped students remember and understand things better by letting them interact with scientific information in a way that was both interactive and visual. The results also fit with the Technological Pedagogical topic Knowledge (TPACK) framework that Mishra and Koehler (2006) suggested. This shows how important it is to combine technology with topic and teaching methods in order to provide effective instruction in the 21st-century classroom.

In terms of alignment with current Philippine educational laws and policies, this study strongly supports the goals of Republic Act No. 10533, also known as the Enhanced Basic Education Act of 2013, which mandates modern pedagogical approaches responsive to learners' needs and global standards. By leveraginglearners'gy to enrich instruction, this study fulfills the law's emphasis on innovation and learner-centerednelaw'soreover, the study adheres to the recent policy under DepEd Order No. 10, s. 2024, which sets the Policy Guidelines on implementing the MATATAG Curriculum, emphasizes mastery of foundational science competencies and using context-driven, interactive learning tools. The ClassPoint-assisted instruction aligns with this directive by enabling students to explore complex biological systems through engaging, multimedia-

supported activities.

Also, the study backs up DepEd Order No. 21, s. 2019, which spells out the Policy Guidelines for the K–12 Basic Education Program. This order emphasizes how important it is to use teaching methods that encourage students to think critically, work together, and understand science. ClassPoint helps with these skills by encouraging active involvement, encouraging metacognitive engagement, and giving students feedback-rich environments where they can build their understanding. In addition to demonstrating the intervention's efficacy intervention'sdagogy, these alignments also demonstrate the intervention's significance to policy. In study'sn, the findings of this study are corroborated by research that was conducted more recently. Ramadhani and Raharjo (2024) found that interactive tools like ClassPoint significantly improve student comprehension in biology by transforming static content into dynamic, learner-centered experiences. Similarly, Vizcayno (2024) highlighted that digital engagement tools foster motivation and attention in science classes. Guinumtad, Tolentino, and Dela Peña (2024) also concluded that students exposed to ClassPoint-based teaching outperformed traditional classrooms. These studies affirm that technology-enhanced instruction is timely and impactful, especially in light of post-pandemic educational recovery efforts.

All things considered, the ClassPoint-assisted teaching employeeducation'study successfully met the pedagogical and policy requirements of Philippine science education. It encouraged participation, raised academic results, and enabled students to grasp basic scientific skills in a way that fit national criteria. This finding emphasizes the need of including interactive technologies into classroom teaching to satisfy the changing requirements of Filipino students.

RECOMMENDATIONS

This part of the paper offers suggestions for this work.

First, the educational process should use enhanced ClassPoint-assisted interactive learning tools to generate more interesting learning experiences.

Second, it is advised that customized professional develoteachers'ining aimed at improving teachers' use of the ClassPoint interactive application guarantees its efficient use since it is an evolving learning tool.

Third, it is also recommended that the Department of Education prioritize teacher training centered on improving tteachers'skills in integrating technologies into the teaching-learning process.

Lastly, students in different grade levels and subject areas may be the subject of future research on ects of this interactive learning tool.

7. OUTPUT OF THE STUDY

Web-based Enhanced ClassPoint-Assisted Interactive Learning Material

This chapter discusses the research's findings from thoroughly reviewing respondent data. In Biology 10, body systems are studied. This resource might help students. This instructional application improves students' learning by making PowerPoint presentations more engaging.

Rationale

In today’s fast-paced school atmosphere, teachers need to use technology in their lessons to keep students interested and help them learn more. It has been shown that ClassPoint, a popular interactive teaching tool, can turn a standard classroom into a lively and interactive place to learn. When it comes to using new technology in the teaching-learning process, educators are supposed to be flexible. This educational resource comprises a few interactive exercises that have been thoughtfully created to raise students' level of engagement, which is one measure of successful learning. In contrast to conventional presentations, students are seen as active learners who participate in the teaching-learning process. One of the key objectives of this proposed learning resource on learning body systems is to change students' educational experiences.

Objective

The main objective of this suggested learning resource is to improve students' Biology 10 scores, particularly in the body systems section. It highlighted the revolutionary significance of developing technologies in the teaching-learning process by transforming the conventional presenting format into one that is more dynamic and captivating. The topics covered in this proposed learning material are Biology 10 in the fourth quarter, specifically those related to body systems.

Scheme of Implementation

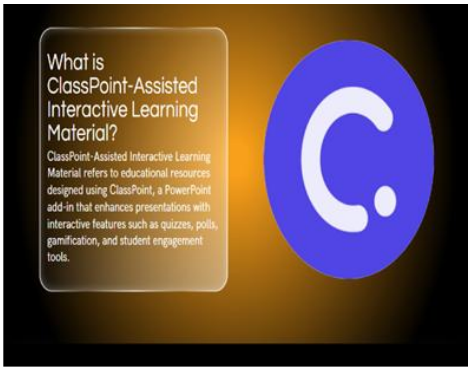
The researcher suggested this implementation plan to ensure this learning material is implemented effectively. The researcher will first ask the superintendent of the school'school'son for permission to use this learning resource in the field. The researcher will ask the school'school'spal for permission to conduct customized professional development training through Learning Action Cell sessions to equip teachers, particularly those teaching science, with the technical know-how of this interactive learning application after receiving approval from the superintendent of the Schools Division. An orientation will

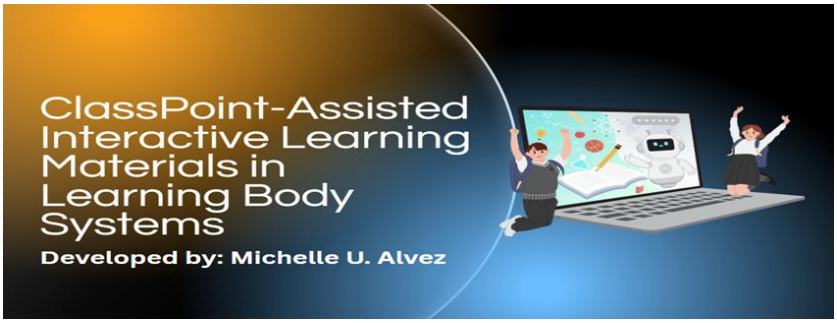
also be held to ensure the teachers are appropriately oriented on the sessions and how to use the learning materials. After that, this educational resource will be kept in an online repository where teachers may access it and utilize it to teach Biology 10, especially body systems. To guarantee that the content is accessible, this online repository will be shared with the teachers.

The researcher has included PowerPoint presentations integrated with ClassPoint, an interactive teaching tool to enhance learning and understanding. The primary output of this study is a web-based, enhanced ClassPoint-assisted interactive learning material, accessible via httpsdemonstratingstedlearning.my.canva.site/ or through the QR code provided below. This digital resource was developed in direct response to the study'sstudy'sgs, demonstrating that integrating ClassPoint into Biology 10 instruction significantly improved student performance and engagement in learning about body systems.

Teachers can use QR codes by opening their smartphsmartphone's or QR scanner apps. Then, point the camera at the QR code provided. Tap the notification or link that appears to open the shared folder containing the presentation files. Ensure that the device is connected to the internet for access.

Another option is to use the Direct Link. Teachers open a web browser (e.g., Chrome, Safari) and type or copy-paste the following link into the address bar: https://classpoint-assistedlearning.my.canva.site/ . Lastly, they press Enter to view and download the files.Upon accessing the link, users are welcomed by a visuallyengaging and user-friendly website designed through Canva.





The homepage introduces the resource to transform traditional PowerPoint presentations into dynamic, interactive lessons that foster active participation and a deeper understanding of complex biological concepts, specifically those related to body systems in Biology 10.

The site is a repository for downloadable PowerPoint presentations (.pptx files) enhanced with ClassPoint features. Each presentation is meticulously designed to have real-time feedback systems, interactive quizzes, polls, annotation and drawing tools, and interactive quizzes. These features let teachers give feedback tests and make it easier for students to participate in class. Students can use their own devices to answer quiz questions, participate in polls, and interact with lesson content, for example. This makes learning more interactive and real-time.

To ensure accessibility and ease of use, the site provides clear, step-by-step instructions for teachers. These include guidance on downloading the presentation files, installing Microsoft PowerPoint and the ClassPoint add-in (if not already installed), opening and running the presentations in slideshow mode to activate interactive features, and utilizing the embedded quizzes, polls, and annotation tools during actual class sessions.

The interactive learning material aims to fill the gaps found in the study—specifically, low student performance and involvement in science. The content seeks to improve studentstudents'tual grasp of bodily systems, ClassPoClassPoint'sctive tools can help teachers deliver more effective, student-centered science instruction and inspire increased classroom participation and motivation.

The website emphasizes the intervention's educational value. Compared to traditional methods, these resources resulted in improved posttest scores and student involvement. By incorporating digital resources into classroom practice, the notion enhances learning outcomes by providing teachers and students with a more dynamic and engaging learning environment.

Ultimately, the web-based enhanced ClassPoint-assisted interactive learning material is a whole, useful tool driven by technology that turns science classes into enjoyable experiences. It exemplifies how innovative instructional strategies, grounded in research, can address real classroom challenges and elevate both teaching and learning in science education.

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