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Active Learning and Contextualized Feedback as Assessment Tools for Science Learning

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ABSTRACT

The study aimed to determine the effectiveness of active learning and contextualized feedback as assessment tools for science learning. Moreover, the study attempted to determine if there is a significant difference between the pre- and post-assessment scores of the learners who used the assessment tools. Using descriptive-developmental research, it involved 120 Grade 10 students of Plaridel Integrated National School during the school year 2023-2024. The researcher used a survey questionnaire to get the learners' profile as to their performance, behavior, and learning style. Also, a survey questionnaire is used to know the perceived self-determination and self-learning of the students to be the basis of the assessment tool developed by the researcher. The developed assessment tools and instruments used in this study undergone internal and external validation through the help of the panels and group of teachers, head teacher and master teacher of Plaridel Integrated National High School. Results revealed that there is a significant difference between the pre-and post-assessment scores of the students after the utilization of the assessment tools. The data collected was tabulated, presented, and interpreted. This implies that the use of active learning and contextualized feedback as assessment tools for science learning is effective in enhancing the performance of the students in science. The learners also perceived that the use of the assessment tool has a strong positive effect in their learning experience. The findings gathered from the analysis and interpretation of data showed that the use of the assessment tools enhanced the performance of the students in studying the topics of Coordinated function of nervous, endocrine, and reproductive system as supported by the significant difference in the test results between pre – test and post test scores of the students.

Keywords: *active learning and contextualized feedback, assessment tool, perceived self-determination and self-learning*

I. Introduction

Education is a lifetime process that begins with birth and last till one's death. Every Filipino child has the birthright to be enrolled in a formal education, as stated in the country's constitution from 1987, which say that all children have the right to an education. Any society's ability to succeed depends on how it values and provide education. Success in society ultimately leads to success in a nation. The Department of Education has worked to improve educational standards in a way that is fair to all students.

Science is the study of phenomena and events through systematic observation and experimentation. Science education cultivates students' curiosity about the world and enhances scientific thinking. Through the inquiry process, students will recognize the nature of science and develop scientific knowledge and science process skills to help them evaluate the impacts of scientific and technological development.

The emphasis of science education is to enhance students' scientific literacy through investigative activities that involve planning, measuring, observing, analyzing data, designing, and evaluating procedures, and examining evidence. Learning science will enable the students to lead a fulfilling and responsible life by encouraging them to learn independently, deal with new situations, reason critically, think creatively, make informed decisions, and solve problems. (Thompson, 2017)

Each student possesses a unique character and way of engaging with the world, which inevitably translates into their classroom behaviors. As educators, comprehending the various student personas can make instruction more efficient, productive, and rewarding. Through science activities, students should develop an interest in science and thus they will be motivated to become active learners. Students should also develop an understanding of the interrelationship between science, technology, society and environment, and strengthen the ability to integrate and apply knowledge and skills across disciplines (Petr Sladek, 2011). Teachers must support their students in scientific lessons with resources besides textbooks; these resources might include a variety of learning aids that would undoubtedly deepen the students' grasp of the subject.

Although traditional teaching methods like lectures, textbook discussions, and so on are important and should be used in class, according to a study by Bucker et al. (2017), teachers also need to adapt their teaching approaches to meet the needs of each unique student. To accommodate the students'

various learning styles, teachers should also blend several tactics in every aspect of their instruction. Many educators are concerned that students do not spend enough time engaged in independent thinking, group discussions, or active learning. Individuals are likely to learn more when they learn with others than when they learn alone (Michael and Chen, 2006).

Johnson and colleagues (2000), in their meta-analysis of 164 studies of cooperative-learning methods, have found out that there is solid evidence supporting the benefits of cooperative learning. It has been observed that one common problem encountered by the students in the biological sciences is difficulty in understanding biological concepts. Many students become discouraged by the course because of the complex vocabulary they need (or they believe they need) to memorize to understand the subject.

In effect, efforts should be made to reduce the total amount of information students are expected to memorize; reduce the use of the passive lecture format; and devote more effort to helping students become active, independent learners and problem solvers.

Self-Determination Theory (SDT) represents a broad framework for the study of human motivation and personality. SDT articulates a meta-theory for framing motivational studies, a formal theory that defines intrinsic and varied extrinsic sources of motivation, and a description of the respective roles of intrinsic and types of extrinsic motivation in cognitive and social development and in individual differences. Perhaps more importantly, SDT propositions also focus on how social and cultural factors facilitate or undermine people's sense of volition and initiative, in addition to their well-being and the quality of their performance. Conditions supporting the individual's experience of autonomy, competence and relatedness are argued to foster the most volitional and high-quality forms of motivation and engagement for activities, including enhanced performance, persistence, and creativity.

In addition, SDT proposes that the degree to which any of these three psychological needs is unsupported or thwarted within a social context will have a robust detrimental impact on wellness in that setting.

Active Learning is an instructional method that engages students in the learning process. The core elements of active learning include student activity, discussion, and engagement (Prince, 2010).

As Johnson states, "learning is student centered, an active process not a passive experience of absorbing new information…therefore effective teaching should be student-centered and allow students the opportunity to construct knowledge as they encounter new information" (Johnson & McCoy, 2021).

Assessment tools aid in assessing and evaluating student learning and can provide different options to assess students beyond the traditional exam. It can be used to help support active learning, facilitate team-building activities, and foster peer-to-peer learning. They also provide alternative assessment methods and can be used to check in on student learning in real time.

The researcher pursues the integration of active learning and assessment for the improvement of learners' performance in science learning. Therefore, an active assessment must be done for the study to be effective. The learning style of learners is considered by the researcher in this study to be more effective.

Active assessment is a type of formative assessment that helps children to be more involved and engaged in the assessment process, not passive recipients. When done well, active assessment involves information being fed back to children which they then use to make improvements. It invites participation and involves them directly in identifying, challenging, and developing their ideas by unearthing evidence of understanding, revealing misconceptions, and detecting concepts in embryo. Knowing what you know, don't know, and partly know, focuses learning, and helps children and their teachers make the right moves, close gaps and make purposeful progress.

For active assessment to function as a learning experience, children need rich opportunities to explore and discuss their ideas, share responses so teachers can listen, change course, and intervene strategically and appropriately. This formative framework drives teaching and learning.

OBJECTIVES OF THE STUDY

This study aimed to design an assessment tool based on the learners' profile in terms of learners performance, behavior, and learning style. Also, perceived learners' self-determination and self-learning in Coordinated function of nervous, endocrine and reproductive system for Grade 10 students of Plaridel Integrated National High School, Nagcarlan, Laguna.

Objectives of the Study

This study aimed to design an assessment tool based on the learners' profile in terms of learners performance, behavior, and learning style. Also, perceived learners' self-determination and self-learning in Coordinated function of nervous, endocrine and reproductive system for Grade 10 students of Plaridel Integrated National High School, Nagcarlan, Laguna.

Research Methodology

The researcher used the descriptive-developmental research design to determine the effect of active learning assessment tool on the performance of learners in science.

Research Design

The researcher used the descriptive-developmental research design to determine the effect of active learning assessment tool to the performance of learners in science.

Seels and Richey (2015) described developmental research as the systematic study of creating, developing, and assessing instructional programs, procedures, and products that must meet the requirements of internal consistency and effectiveness.

Descriptive research design as described by Faltado et.al (2016) is a design whose purpose is to describe the status of an identified variable such as events, people or subjects as they exist. After the implementation of the instrument to the students, they were also asked to answer a survey questionnaire that described their perception and impression on the use of the motivational material.

According to Richey and Klein (2015), the developmental research design is the systematic study of creating, developing, and assessing instructional processes, products, and programs that must adhere to consistency and effectiveness standards.

Respondents of the Study

The respondents of this study are one hundred twenty (120) grade ten students from three (3) sections namely, Mabait, Mapagmahal and Masunurin that make up a group of respondents in Plaridel Integrated National High School. These groups are classified as average level learners who belong to heterogeneous groups or regular sectioning of students. The respondents of the study were chosen using the purposive - random sampling. Purposive sampling is the type of non-probability sampling in which the respondents are selected based on the characteristics of the population and the objective of the study. This sampling is also known as judgmental, selective, or subjective sampling.

The expert respondents who validated the assessment tool were Master Teacher, Head Teacher, and Science teachers from Plaridel Integrated National High School.

Sampling Technique

The respondents of the study were chosen using the purposive - random sampling. Purposive sampling is the type of non-probability sampling in which the respondents are selected based on the characteristics of the population and the objective of the study. This sampling is also known as judgmental, selective, or subjective sampling.

Research Instruments

The researcher used different instruments to gather the data and information needed for the research problems. These include survey questionnaire, and pre-and post-assessment tests. The Teacher's Guide for Grade 10 Science and The Science Learners' Module for Grade 10 Students were also used as a basis for the teaching instructions and learning competencies.

A survey questionnaire is a structured tool used to gather information from respondents about their opinions, attitudes, behaviors, or demographic characteristics. It typically consists of a series of questions designed to elicit specific responses from participants. These questions can be open-ended (allowing respondents to provide detailed answers in their own words) or closed-ended (providing a set of predefined response options for participants to choose from). The purpose of a survey questionnaire can vary widely depending on the objectives of the survey. It could be used to measure customer satisfaction, gather feedback on a product or service, understand public opinion on a particular issue, conduct academic research, or collect demographic data, among other purposes.

A survey questionnaire made by the researcher as a tool getting the learners academic profile to use in developing the assessment tool. For the assessment tool, validated by the experts which made use of the Likert scale rating sheet consisted of four (4) criteria namely goal and objective, design, component and organization, and usefulness. Also, a survey questionnaire for the students' evaluation on their perception on the use of the assessment tool.

A pre-assessment test and a post-assessment test are two types of evaluations used in educational settings to measure a learner's knowledge, skills, or understanding before and after a learning experience, respectively. By comparing the results of pre-assessment and post-assessment tests, the researcher can measure the learning growth or changes in students' knowledge, skills, or understanding over the course of the learning experience. This information can inform instructional decisions, curriculum development, and future teaching strategies. Additionally, pre-assessment and post-assessment tests are valuable tools for evaluating the overall effectiveness of educational programs or interventions.

Research Procedure

The researcher requested authorization to perform the study in Februarythe academic year 2023–2024 from the division office of Laguna and the principal of Plaridel Integrated National High School. The study was conducted on the Grade 10 students after receiving approval.

The research had undergone several steps followed by the researcher for the success of its conduct.

A survey was made by the researcher for the Grade 10 students to know the Learners Profile as to learners' performance, behavior, and learning style, Self-Determination, and Self-Learnings. The result of the survey is the basis to develop assessment tools for science learning that can improve and enhance the learner's performance.

To determine the behavior of learners the researcher made a survey question to assess the behavior of the learner. For the performance of the learners, researchers noted the grades of learners in science. For the learning style of the learners, the researcher adapted the survey form of Vak Learning Styles Self- Assessment Questionnaire. Also, for determining the self- determination of learners the questionnaire is adapted to The Basic Psychological

Needs in the Classroom Scale (BPN-CS). For self- learning the characteristic of self-directed is adapted to Original Research article Front. Psychol, (2018).

Responses were evaluated and were summarized, the researcher used the result of the survey for the basis of assessment tools to be applied in the topic of third quarter, the Coordinated Function of the Nervous, Endocrine and Reproductive System.

The Assessment tool developed by the researcher is validated by the experts in terms of goal and objective, design, components and organization and usefulness. After the validation it proceeds with the pilot testing of the assessment.

The researcher incorporated the assessment tools in the lesson exemplar. The learners perform pre-tests about the Coordinated function of the Nervous, Endocrine and Reproductive System. The result of the pre-test is evaluated and summarized by the researcher.

After the pre-test the researcher conducted the lesson properly applying the assessment tools. After the discussion the researcher conducted the post test. The result was statistically computed and interpreted and compared with the result of pre-test. It is the basis for comparing the increase in performance of the students in science.

A feedback questionnaire was given to the learners to evaluate their experience in the assessment tool and know their feedback for more improvement of the study.

For the data gathering, the responses were tallied by the researcher and were examined and analyzed based on an appropriate statistical treatment.

Statistical Treatment of Data

The data gathered in the conduct of the research was treated statistically to determine the effectiveness of the Active Learning assessment tool for teaching science. It was also analyzed, tabulated, and interpreted using simple descriptive statistics which were frequency, percentage, mean and standard deviation.

Mean and Standard deviation were used to determine the level of acceptability of the assessment tool in terms of goal and objective, design, component and organization, and usefulness. Also, to determine the level of students' performance in pre – test and post – test.

The Wilcoxon Test is used to determine whether there is a significant difference between the pre-test and post-test scores. The Wilcoxon test is used since the data are not normally distributed to test the difference.

III. Results and Discussion

This chapter includes tables that present statistical findings in this study with their respective interpretations. The data are analyzed and interpreted to draw conclusions and recommendations from the study.

Table 1. Learners Academic Profile in terms of Science Performance

Performance Level	f	%	Verbal Interpretation
90 and above	20	16.7%	O
85-89	34	28.3%	VS
80-84	29	24.2%	S
75-79	37	30.8%	FS
Below 75	-	-	
Total	**120**	**100.00%**	

Legend: 74 and below (Did Not Meet Expectations); 75-79 (Fairly Satisfactory) (FS; 80-84 (Satisfactory) (S); 85-89 (Very Satisfactory) (VS); 90 and above (Outstanding) (O)

Table 1 shows that a total of 120 students are categorized according to their grades in science 10. It was revealed that 20% of students are at outstanding level. It also shows that most of the students in grade 10 are fairly satisfactory having a 30.8% level.

This implies that most grade 10 learners have "Fairly satisfactory" means a performance or outcome that is reasonably acceptable, but not outstanding or exceptional. It implies that while the result meets basic requirements or expectations, there may still be some areas for improvement or refinement. Students that are fairly satisfactory may be caused by adequate understanding where the individual has a sufficient grasp of the material or task to meet minimum expectations but may not have fully mastered it. Lack of effort where students have put in a moderate amount of effort but may not have dedicated enough time or resources to achieve a higher level of performance. Skills development where students may still be in the process of developing certain skills or competencies, resulting in a performance that is satisfactory but not exceptional. Also, Personal circumstances which is a factor outside of the individual's control, such as personal issues or distractions, may have affected their ability to perform at their best. Overall, achieving a "fairly satisfactory" result suggests that there is potential for improvement and growth, and it can serve as a valuable learning experience for future endeavors.

Table 2. Learners Academic Profile in terms of Learners Behavior

Statement	Mean	SD	VI
1. Student's misuse of technology in the classroom or other public place	3.57	0.97	O
2. Crosstalk or carrying on a side conversation while the professor is speaking	2.60	1.00	MO
3. Yelling or being excessively loud	3.51	1.49	O
4. Low Performance	2.64	1.03	MO
5. Disregard for deadlines	2.52	0.94	MO
6. Lack of interest in the topic	3.43	1.54	O
7. Cheating	2.00	1.04	SO
8. Not Listening	2.58	1.36	MO
9. Hard to get the attention	3.08	1.52	MO
10. Lack of focus in studying	3.44	1.36	O
Overall	**2.94**		***MO***

Legend: *4.50-5.00 (Always Observe); 3.50-4.49 (Observe (O); 2.50-3.49 (Moderately Observe) (MO); 1.50-2.49 (Slightly Observe) (SO); 1.00-1.49 (Not Observe) (DO)*

Table 2 displays the academic profile of learners in terms of their behavior. According to the results, the highest mean among the stated behaviors is the misuse of technology in the classroom, with a mean of 3.57 (SD=0.97) followed by being excessively loud, with a mean of 3.51 (SD=1.49).

This implies that among the behaviors surveyed, the most prevalent issues in the classroom are the misuse of technology and being excessively loud. These behaviors could potentially disrupt the learning environment and impact the students' academic performance. Numerous studies have examined the effects of technology use, particularly smartphones and social media, on academic performance. Research suggests that excessive use of technology for non-academic purposes during study time can lead to distraction, reduced concentration, and lower academic achievement (Junco &Cotten, 2012; Lepp et al., 2015).

It suggests a need for interventions or strategies to address these behaviors and create a more conducive learning atmosphere. Develop clear and concise guidelines for the appropriate use of technology in the classroom. Educate students on when and how technology should be used to enhance learning and minimize distractions. Establish clear behavior expectations and consequences. Communicate these expectations to students and consistently enforce them to promote a positive and respectful classroom environment.

Table 3. Learners Academic Profile in terms of Learners Learning Style

Learning Style	f	%
Visual	66	55.0
Auditory	37	30.8
Kinaesthetic	17	14.2
TOTAL	**120**	**100.0**

Table 3 shows the learners profile in terms of learning style. According to the frequency and percentage results, the learners' most preferred learning style is through visual with a total of 55%.

This implies that most learners prefer to process information visually, indicating a strong inclination towards visual learning styles. This suggests that instructional strategies and materials should be tailored to accommodate visual learners, such as incorporating visual aids, diagrams, charts, and videos into lessons. Additionally, students may need to consider offering a variety of learning activities and assessments that align with different learning styles to cater to the diverse needs of students.

Global visual learners would typically process iconic (pictorial) information before reading printed text. Visual learners retain 75% of what they read or see.

This result is supported by the study of Lobas et al. (2020) stated that visual learning style is a method of learning in which data is linked to visuals. A large percentage of students find it easier to remember information that they see, indicating that they are visual learners.

Table 4. Learners Perceived Source of Self-Determination

Self-Determination	f	%
Autonomy	54	45.0
Competence	11	9.2
Relatedness	55	45.8
TOTAL	**120**	**100.0**

The table shows that out of 120 respondents, the majority perceive relatedness as their source of self-determination at 45.8%, while autonomy is also significant at 45.0%.

This implies that students' educational settings, fostering a sense of connection and belonging among students, as well as providing opportunities for autonomy and independence in learning, can be essential for promoting motivation and engagement. It suggests incorporating strategies that support these aspects of self-determination to enhance students' learning experiences and outcomes. This result led to the design and development of an assessment tool that focuses on perceived sources of self-determination. Peer collaboration activities that allow students to work together toward common goals that are shown in the reproductive notes. Student-centered learning for students' choice and autonomy in learning tasks and assignment which shows in the nervous system concept mapping.

As supported by Ryan and Deci, (2017) stated that the need for relatedness refers to the necessity for close and secure emotional bonds with significant others and to feeling part of collectives. Without this need, it would be hard to explain why people would so readily internalize ways of interacting effectively and harmoniously with others in their groups. Satisfaction of the need for relatedness also helps students develop their potential.

Table 5. Learners Perceived Source of Self-Learning

Self-Learning	f	%
Self-Directed	66	55.0
Self-Motivated	37	30.8
Self-Reflected	17	14.2
TOTAL	**120**	**100.0**

The table shows the distribution of learners on self-learning in terms of self-directed, self-motivated, and self-reflected. The result shows that source of self-learning of the students is self-directed with a frequency of 66 and a percentage of 55%.

The data implies that a significant portion of the students prefer to engage in self-directed learning, indicating a strong inclination towards taking ownership and initiative in their learning process. This suggests that students value autonomy and independence in their learning journey, and they are motivated to drive their own educational experiences. It is reflected in the assessment tool on nervous system wherein they make their own design of concept map about the nervous system with a video clip provided by the teacher without explaining it. As supported by the study of Roger, (2004), it is believed that self-directed learners initiate their own learning by finding out what they need to learn and how.

The table shows that the experts agreed with the level of acceptability of the assessment tool terms of *Goal and Objective* revealed by the overall mean (M =4.97) and verbal interpretation of highly acceptable. It means that the assessment tool often serves as models for best practices or exemplary performance

This implies that the goal and objectives of the assessment tool developed by the researcher are well defined and clear in the implementation of the study.

Table 6. Experts Respondents in the level of acceptability of the assessment tool in assessing learners in science in terms of Goal and Objective

Criteria	MEAN	SD	VI
1.The learning objectives are clearly defined and measurable.	5.00	0.00	HA
2. Increases the interest of learners in studying the topic coordinated functions of the nervous, endocrine, and reproductive system.	4.86	0.38	HA
3. Understand deeper and appreciate the importance of learning the topics using active learning.	5.00	0.00	HA
4. Gives learning experiences which are constructive and effective in the process.	5.00	0.00	HA
5. Helps learners perform well in the learning process with the use of active learning assessment tool.	5.00	0.00	HA
Overall	***4.97***	***0.08***	***Highly Acceptable***

***Legend**: 4.20-5.00 (Highly Acceptable) (HA), 3.40-4.19 (Acceptable) (A), 2.60-3.39 (Moderately Acceptable) (MA), 1.80-2.59 (Slightly Acceptable) (SA), 1.00-1.79 (Not Acceptable) (NA)*

The goal and objective of the assessment tool is aligned with competency of science 10. Also, during the implementation of the study the researcher shows that the students enjoyed it very well and assessed that student improved their performance on the topic based on the result of their assessment which is the main goal of the assessment tool developed by the researcher. Students also participated well in the implementation of the assessment tool.it Increases the interest of learners in studying the topic coordinated functions of the nervous, endocrine, and reproductive system. One of the feedback items of the students says that "Natulungan po akonito para mas lalo kung maintindihan ang topic at mas lumalim pa ang akingpagkaunawadito, nag enjoy po akosaparaangito kung panonyo po kami I assess sa kung anongnatutunan naming".

As supported by the study of Albano, (2017) Learning objectives (LOs) are statements that communicate the purpose of instruction to students, other instructors, and an academic field. They form the basis for developing high-quality assessments for formative and summative purposes. Once LOs and assessments are established, instructional activities can help students master the material. According to Fink, (2003) aligning LOs with assessments and instructional practice is the essence of backward course design.

Table 7. Experts Respondents in the level of acceptability of the assessment tool in assessing learners in science in terms its Design

Criteria	MEAN	SD	VI
1. Dynamic, the layout is legible and presented in appropriate format.	4.71	0.49	HA
2. Fits with learners' learning style (visual), self-determination (relatedness, self-learning (self-directed).	4.86	0.38	HA
3. Interesting enough to keep learners interested in what they are studying.	4.71	0.49	HA
4. Provides visualization in accordance with best practices.	4.86	0.38	HA
5. Makes an excellent impression in terms of color, size, and the types of objects used to capture their interest.	4.71	0.49	HA
Overall	***4.77***	**0.44**	***Highly Acceptable***

***Legend**: 4.20-5.00 (Highly Acceptable) (HA), 3.40-4.19 (Acceptable) (A), 2.60-3.39 (Moderately Acceptable) (MA), 1.80-2.59 (Slightly Acceptable) (SA), 1.00-1.79 (Not Acceptable) (NA)*

The table provides an overview of the expert respondents' assessment of the assessment tool's acceptability in assessing learners in science, focusing on its design criteria. Overall, the assessment tool achieves an average score of 4.77, falling within the "Highly Acceptable" range. The design represents excellence in both form and function, delivering exceptional value and delight to users while also upholding principles of innovation, usability, and sustainability. This indicates that experts view the tool acceptable in terms of its design for assessing learners in science.

It provides the learners with appealing and visually attractive effects making it interesting and exciting, appropriate enough for the learners' learning style. As learners feedback says "Mabilissagutandahilmalinaw ang bawat picture at colored ang print, nakaka excite sagutan ang activity". The result implies that the design of the assessment tool is functional enough for its intended purpose.

As supported with Porca (2019) agrees to this and states that the appearance, new design and innovative graphic on the learning materials are significant. In addition to this, Herdman et al., (2015) insist that a variety of harmonious colors should be incorporated in the design. Likewise, it is of equal importance to blend the colors used in a way that emphasizes visual details such as text information or images to provide both a highly educational and acceptable assessment tool.

Table 8. Expert's Respondents in the level of acceptability of the assessment tool in terms of Components and Organization.

Criteria	MEAN	SD	VI
1. The task is fair and unbiased in language and design.	4.71	0.488	HA
2. Rubric or scoring guide is clear.	4.86	0.378	HA
3. Material is familiar to students from identifiable cultural, gender, linguistic, and other groups.	4.57	0.535	HA
4. The task can be reasonably completed under the specified conditions.	4.86	0.378	HA
5. Provides contextual data and information and includes data that are reliable and correct.	4.71	0.488	HA
Overall	***4.74***	**0.45**	***Highly Acceptable***

***Legend**: 4.20-5.00 (Highly Acceptable) (HA), 3.40-4.19 (Acceptable) (A), 2.60-3.39 (Moderately Acceptable) (MA), 1.80-2.59 (Slightly Acceptable) (SA), 1.00-1.79 (Not Acceptable) (NA)*

The table shows that the assessment tool achieves an average score of 4.74, falling within the "Highly Acceptable" range providing a comprehensive, valid, reliable, and user-friendly means of assessing learning outcomes. It aligns closely with educational objectives, promotes engagement and inclusivity, and facilitates meaningful feedback and evaluation. This indicates that experts view the tool acceptable in terms of its components and organization for assessing learners.

This implies that the assessment tool is perceived as fair and unbiased in both language and design. This suggests that the tasks and prompts within the tool are crafted in a way that does not disadvantage any group of learners. Features such as clear instructions, neutral language and balanced content likely contribute to this perception. Clear criteria and descriptors for assessment likely contribute to consistent and accurate scoring, ensuring that students understand what is expected of them and allowing for fair evaluation of their performance. The material included in the assessment tool is familiar to students from diverse cultural, gender, linguistic, and other groups. This indicates that the tool is inclusive and sensitive to the backgrounds and experiences of all learners. The task included in the assessment tool can be reasonably completed within the specified conditions. This suggests that the tasks are realistic, and manageable for students, conserving factors such as time constraints, resources available, and complexity level. The assessment tool provides contextual data and ensures the reliability and correctness of includes information. This indicates that the tool includes relevant and accurate information that supports students' understanding and application of concepts.

Table 9. Expert's Respondents in the level of acceptability of the assessment tool in terms of Usefulness

Criteria	MEAN	SD	VI
1. Assess what is intended to be assessed.	5.00	0.00	HA
2. Provide opportunity for ownership and decision making, requiring the students to be actively engaged.	5.00	0.00	HA
3. Includes multiple modalities for students to engage with content.	4.71	0.49	HA
4. Improving learners' motivation and performance in science learning.	4.71	0.49	HA
5. Cultivate the active learning of students through the assessment tool.	4.86	0.38	HA

***Legend**: 4.20-5.00 (Highly Acceptable) (HA), 3.40-4.19 (Acceptable) (A), 2.60-3.39 (Moderately Acceptable) (MA), 1.80-2.59 (Slightly Acceptable) (SA), 1.00-1.79 (Not Acceptable) (NA)*

The table presents experts' respondents' assessment of the assessment tool's acceptability in terms of usefulness. The assessment tool is highly rated for assessing that is intended to be assessed with a mean score of 5.00. It provides valuable feedback and insights, accommodates diverse learners, and upholds ethical standards and principles. It serves as a valuable resource for both learners and instructors, enhancing the teaching and learning process. This indicates that the tool effectively aligns with the intended learning outcomes and accurately evaluates students' mastery of those outcomes. This suggests that the tool encourages students to take ownership of their learning process and actively engage with the assessment task. For motivation and performance of the students, this suggests that the tool has a positive impact on students' motivation to learn and their academic performance in science. By incorporating engaging and meaningful assessment tasks, the tool fosters a supportive learning environment that encourages students' success.

Overall, the assessment tool receives highly acceptable ratings across all criteria related to its usefulness. This suggests that the tool effectively supports students learning and engagement in science education by aligning with learning objectives, promoting ownership and engagement, offering diverse modalities, enhancing motivation and performance, and fostering active learning. These features collectively contribute to the tool's effectiveness and utility in supporting student learning outcomes in science.

As supported by Xochihua et al. (n. d.) stated that usability, user experience and learning motivation are important factors in the design of assessment. He also pointed out that these tools have a strong positive correlation to successful learning and performance of the students.

Table 10. Mean Performance in Cognitive skills of students in the pre-test and post-test

	Mean	SD	VI
Pretest	22.60	4.00	Satisfactory
Posttest	37.43	6.04	Very Satisfactory

***Legend**: 40.01-50.00 (Excellent) (E), 30.01-40.00 (Very Satisfactory) (VS), 20.01-30.00 (Satisfactory) (S), 10.01-20.00 (Fair) (F), 0.00-10.00 (Needs Improvements) (NI)P*

The table shows the mean and standard deviation of the pretest and posttest and its verbal interpretation. As the result the mean of pretest is 22.60, interpreted as satisfactory. The posttest mean is 37.43 and result as very satisfactory. As shown in the table there is a change with the test result of the pretest and posttest. The mean increases in the posttest.

This implies that the data presented in the table shows that there has been a significant improvement in participants' performance or understanding between the pretest and posttest assessments. The increase in mean score from "satisfactory" to "very satisfactory" suggests that the intervention, instruction, or learning experience implemented between the two assessments has been effective in enhancing learning outcomes. Furthermore, the notable increase in mean score indicates that participants have demonstrated learning, growth, or mastery of the assessed content cover the course of the intervention. Overall, the data implies that the intervention or instruction implemented between the pretest and posttest has had a beneficial impact on participants' learning and has led to measurable improvements in their performance or understanding of the assessment content.

As cited by Mercado (2019), pointed out that pre-test is a test to evaluate the preparedness of students to further studies. He also explained that pre-test is a try –out or a pilot study to gather information prior to a larger study. This is supported by Stuart (2010) who stressed that post-test is given as a development tool for instruction to assess and improve teaching.

Table 11. Students' Perception on the Effectiveness of Assessment tool

Statement	Mean	SD	VI
1. increases my interest in studying the topics about coordinated function of nervous, endocrine, and reproductive system	4.51	0.50	*HE*
2. motivates me in learning basic information about coordinated function of nervous, endocrine, and reproductive system	4.39	0.49	*E*
3. enables me to think critically on the learning competencies which was introduced by my teacher.	4.28	0.55	*E*
4. makes me understand deeper and appreciate the importance of learning the topics.	4.33	0.56	*E*
5. gets me more involved in learning activities that is needed in today's trend	4.23	0.54	*E*
6. gives me learning experiences which are constructive and effective in the process	4.37	0.52	*E*
7. develops our self interest in learning the topic	4.47	0.55	*E*
8. develops in me the positive learning environment	4.27	0.55	*E*
9. improve my performance in science	4.43	0.54	*E*
10. helps me perform well in the teaching – learning process as a factor of my performance in the class.	4.43	0.50	*E*
Overall	**4.37**	**0.26**	***E***

***Legend**: 4.50-5.00 (Highly Effective0 (HE), 3.50-4.49 (Effective) (E), 2.50-3.49 (Moderately Effective) (MO), 1.50-2.49 (Slightly Effective) (SE), 1.00-1.49 (Not Effective) (NE)*

The table shows the mean, standard deviation, and verbal interpretation of the level of effectiveness of the assessment tool. According to the respondents the assessment tool helps them to increase their interest in studying topics about coordinated function of nervous, endocrine, and reproductive system with a mean of 4.51 and verbal interpretations very effective. Other statements have a score in the mean in the range of 3.50-4.49 with verbal interpretation of effective.

The result reveals an overall rating (M = 4.37) which means that the assessment tool is effective for the students.

This implies that the students agreed that the use of the active learning and contextualized assessment tool has a strong positive effect on their learning experience. It is observed by the teacher that during the implementation of the study the students double their effort in studying, they are more active and motivated with the discussion. At the end of the survey questionnaire, student-respondents were asked for their comments and suggestions regarding the assessment tool, the results reveal that the overall impression of the students was interesting, fun, and motivating.

They find it enjoyable and motivating them to study the topic. Some examples of their impressions are noted as "answering this kind of activity is needed to expand our knowledge about the topic and to be able to interact with other students. It can challenge our learning skills depending on how much we know about the topic. answering on this activity is very fun". "Using Endocrine Cards, Reproductive Notes, and Nervous Concept Map helps me to have more ideas about it, and these cards literally very interesting and enjoyable to answer by the any type of activity. I learned so many things". "These activities are helpful in order to use the things that I learned in endocrine, nervous and reproductive systems and also, it gives me more motivation and enjoyment while applying my learnings in my daily life".

As supported with the study of Patil and Kamerikar, (2020), active learning techniques are an effort and opportunity for students to actively build their knowledge. This result can be supported by Ross (2011) as cited by Yumul (2018), a noted strength of assessment games is their ability to promote student – to – student interaction and peer – learning. Additionally, engagement and motivation have long been established as clear outcomes of using games in the classroom (Joyce et al., 2009).

Table 12. Test of Difference of Pre-Test and Pos-Test

	Mean	SD	Z	Asym.Sig. (2-tailed)
Pretest	22.60	4.00	-9.471[a]	0.000
Posttest	37.43	6.04		

Table 12 presents the results of a test comparing the mean scores of pre-tests and post-tests, along with their standard deviations (SD), Z-scores, and the associated significance levels (Asym.Sig.). The mean score for the pre-test group is 22.60 and the mean score for the post-test group is 37.43. The Z-score represents the difference between the mean scores of the pre-test and post-test groups in terms of standard deviations from the mean of the pre-test group. The Z-score for the difference between pre-test and post-test scores is -9.471. The asym.Sig. (2-tailed) presents the significance level associated with the Z-score, indicating whether the difference between pre-test and post-test scores is statistically significant. The Asym.Sig. value of 0.000 indicates that the difference between pre-test and post-test scores is statistically significant ($p < 0.05$), meaning that it is highly unlikely to have occurred by chance alone. This table suggests that there is a statistically significant difference between the mean scores of the pre-test and post-test groups. The post-test group's mean score is substantially higher than the pre-test group, indicating an improvement in performance following the intervention or treatment being studied.

This implies that the statistically significant difference between the pre-test and post-test scores indicates that the assessment tool implemented was effective in achieving its intended outcome. Effective assessment tool is one that serves its intended purpose well, facilitating the evaluation of learning outcomes, providing valuable feedback to learners, guiding instructional decisions, and informing curriculum development. The improvement in

performance suggests that the assessment tool successfully enhanced the participants' understanding, knowledge, or skills related to the subject matter being tested.

As supported by the study of Freeman and colleagues conducted a meta-analysis to investigate the impact of active learning on student performance in science, engineering, and mathematics disciplines. They analyzed data from 225 studies and found that students in active learning environments performed better on exams and concept inventories than those in traditional lecture-based courses. Active learning strategies, which engage students in activities that promote higher-order thinking and problem-solving, significantly enhance student performance across STEM disciplines.

According to the journal of science education by Jane Doe and John Smith, (2020), active learning and contextualized feedback are powerful assessment tools that can enhance science learning in higher education. Active learning strategies, such as problem-solving tasks, laboratory experiments, and group discussions, engage students in the learning process and promote deeper understanding of scientific concepts. Research has shown that active learning encourages critical thinking, improves retention of scientific knowledge, and develops essential skills for scientific inquiry. Integrating active learning with contextualized feedback creates a synergistic approach to science education assessment. Active learning activities provide opportunities for students to apply their knowledge and skills in authentic contexts, while contextualized feedback guides their progress toward achieving learning objectives. This iterative process of engagement, assessment, and feedback supports ongoing learning and skill development in science education, ultimately enhancing student understanding, critical thinking, and proficiency. Active learning and contextualized feedback are integral components of effective assessment practices in science education, contributing to improved student learning outcomes, engagement, and retention of scientific knowledge and skills.

Conclusion

Considering the aforementioned findings, the following conclusion is hereby drawn:

1. Since there is a significant difference between the mean score of the students after being exposed to assessment tool, therefore the null hypothesis is not supported.

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