USING AUTHENTIC ASSESSMENT IN INCREASING GRADE NINE SPECIAL SCIENCE CLASS (SCC) ACHIEVEMENT AND ENGAGEMENT IN PROJECTILE MOTION

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Using Authentic Assessment in Increasing Grade Nine Special Science Class (SCC) Achievement and Engagement in Projectile Motion

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Abstract

The COVID-19 pandemic has a sweeping effect on the education system. Teachers will have to reinvent teaching strategies to meet the standard of meaningful and authentic learning. Thus, this study explored the effects of using Authentic Assessment in Increasing Grade 9 Students' Understanding of Projectile Motion through online learning. This mixed-method sequential exploratory research quantitatively employed a quasi-experimental pretest-posttest two-group design and qualitatively utilized a content analysis of students' engagement in the learning process. Statistical tools such as mean, standard deviation, ANCOVA, and t-test were used. The research indicated that students' achievement was somewhat low as it posited an average mastery level, as revealed during the pretest. The level of students' achievement in the experimental group was to be closely approximating mastery, while the control group indicated moving towards mastery during the posttest. Using One-Way Analysis of Covariance (ANCOVA), the study showed a significant difference in students' achievement when taught using Authentic Assessment. Moreover, the Test of Significant Difference amplified that the students in the experimental group had a significantly higher level of engagement than the control group. This outcome is strengthened by the thematic analysis of this study capsuled in four themes with their coded clusters describing students' engagement in learning Science using Authentic Assessments (1) *Affective: Liking for Learning,* (2) *Behavioral: Learning Processes, Effort, Persistence, Determination*, (3) *Cognitive: Learning Processes*, (4) *Behavioral: Preparation, Involvement, Intervention, and Interaction.* The use of Authentic Assessments significantly enhanced and increased students' achievement and engagement in the learning process.

Keywords: *authentic assessment; 7E learning cycle model; students' achievement; students' engagement; projectile motion*

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Context and Rationale

The COVID-19 pandemic has inflicted educational frameworks worldwide, prompting the physical closure of schools and shifting to digital spaces. This unprecedented crisis creates a hole in the education system's adjustment from re-articulating competencies to crafting modules for distance learning. However, it becomes more challenging for the students to be engaged in discussions. However, education must continue despite certain limitations, and the quality of learning should not be compromised. This matter triggers the researcher to prepare online interactive, meaningful, and digital safe-space classes through various platforms, including Google Classroom, Google Meet, Nearpod, and Quizizz.

The science curriculum framework in the Enhanced K to 12 Basic Education Program aims to develop scientific and technological literacy among students toward applying scientific knowledge. The curriculum strongly advocates the philosophy of constructivism and the discovery-based approach in the teaching-learning process, allowing the students to construct their knowledge and understanding of their world. This new science curriculum framework would empower the students with knowledge, skills, values, and attitudes required by the 21st-century citizens by learning to ask and answer questions and allowing the students to engage actively and critically in solving problems (K to 12 Toolkit, 2012).

The call to acquire quality and globally competitive science education that is learner-centered and inquiry-based has been the compelling reason for implementing the Enhanced K to 12 Curriculum. The Republic Act No. 10533, also known as "The Enhanced Basic Education Act of 2013," highlighted the urgency and critical need to improve the quality of primary education.

With matters mentioned, the researcher submits that one concept that calls for a thorough discussion to foster quality and solid understanding through actual and authentic assessments is the teaching of Physics (Projectile Motion). Projectile motion is one of the physics concepts yet to be mastered by Kabasalan Science and Technology High School Grade 9 Special Science Class and regular students, as observed in their MPS (61%). Even if this learning material is used in daily life, students still often need help understanding this concept.

The absence of face-to-face interaction and the adoption of modular distance learning compromised students' authentic learning. It has been said that with far-reaching distance learning activities, the evaluation and assessment measure in distance education is getting easy. However, Shuey (2002) manifested that even though activities in distance education are viewed as a continuation of conventional education, there have been a few issues, particularly in the assessment and evaluation process, that students' performance cannot be evaluated well enough in the process. Compared to traditional classroom teaching, some educational problems cannot be controlled, for instance, the absence of an internet connection, low data connection, the place of residence being out of signal coverage, etc.

Authentic Assessment vs. Traditional Assessment. There are some fundamental differences between authentic assessment when compared to traditional assessment. The most widely used conventional assessment tools are multiple-choice tests, true/false tests, short answers, and essays. However, there are many shortcomings, the most crucial of which is not ascertaining a student's ability with certainty, whether the student was guessing or using his abilities. Assessment tools that are considered more

authentic are portfolios and independent projects journals/scientific papers. That way, students express their knowledge of the material using their abilities.

Authentic Assessment. The term' authentic assessment' has recently gained widespread use in education. An authentic assessment takes discernment to practical tasks where students apply their existing knowledge and abilities to a test they may experience in a real-life setting. As Yong (2018) indicated, authentic assessments are performance tasks set in a natural setting. Procedurally, it involves students "doing" the subject, requiring criticality in judgment and innovation, examining learners' capacities to apply their abilities and knowledge in solving problems, creating plans, or negotiating complex matters. Additionally, it allows students to receive feedback to correct their knowledge and performance and perfect their skills. Clearly, authentic assessment underlines the immediate assessment of students' performance. It expects students to be more dynamic and active with the knowledge acquired.

Koh (2017) states that because of the item format, it is widely acknowledged that traditional standardized testing limits the measurement of higher-order thinking skills and other critical 21st-century competencies. Higher-level and rigorous learning outcomes (e.g., critical thinking, simple problem solving, teamwork, and extended communication) are too subjective to be examined from an objective measuring or psychometric standpoint. The examination of discrete bits of facts and procedures has resulted from an overemphasis on accurate measurement and closed-ended item forms. As a result, many desired learning outcomes are measured as atomized fragments of information and abilities, resulting in a fragmented and dumbed-down curriculum. She also emphasized that students' authentic performance or work and dispositions, such as tenacity in addressing messy and complicated problems, positive habits of mind, growth mindset, resilience and grit, and self-directed learning, are all assessed through authentic tasks. Because scoring rubrics are a vital part of accurate assessment, they allow for descriptive feedback and self-and peer evaluations based on criteria and standards in holistic or analytic rubrics.

Sutadji et al. (2021) say that in order to aid in developing standards for defining authentic assessment, the qualities of authentic assessment are separated into three groups. To begin, assessments must be realistic, performance-based, and intellectually tricky to be authentic. Second, students must defend their answers and products and learn to work collaboratively. Third, the evaluation must be formative. Finally, students should be aware of the grading criteria, which comprise many assessment markers. The ideal outcome is mastery. Although not every assessment will include all these components, teachers must consider these developed definitions. With these factors at hand, the researcher's goal is to put authentic learning even in times of crisis. The researcher submits that for any teaching and learning to be meaningful, the assessment of students' education must be practical.

The study by Rosaroso, R. and Rosaroso, N. (2021) entitled "Performance-based assessment in selected higher education institutions in Cebu City, Philippines," clearly states that the use of performance-based assessment in selected Philippine classrooms brought significant effects on assessing students' learning. Results revealed that students were highly motivated to learn in classroom engagements, specifically when lessons are integrated with performance-based tasks. Students became self-regulated as they worked individually and in groups. Their willingness to work in a group was highly observed since most were goal oriented. Their sensitivity to the needs of others was one of the best manifestations they exhibited.

Slowly, schools in the Philippines are adapting to information technologies to

develop units and courses of study. Among these technologies, multimedia promises to provide knowledge in an easily accessible form that is efficient and economically beneficial. The adoption of interactive multimedia in the classroom has been lauded as a significant breakthrough in the quality of education in the Philippines. The researcher considers adopting Nearpod, Quizizz, Google Classroom, and Google Meet as online learning tools while using the 7E learning cycle model.

Assessment in Online Learning. Physics has become one of the most challenging disciplines for students to grasp. Many factors contribute to students' perceptions of physics as difficult, one of which is a difficult test. Students believe there need to be more formulas to follow to solve the problem. However, students will not be bored learning physics with the benefits of authentic assessments in online classes.

Online courses are unendingly contrasted with traditional face-to-face methods and are unmistakably unique. Online courses eliminate dependence on actual participation, offer consistent and nonstop availability of course materials, give freedom to the investigation, energize intelligent reasoning and reactions, and establish a student-centered learning environment. Since the course content is delivered online, assessments should take advantage of the unique characteristics associated with technology. Online instruction and assessment "must balance the requirements of technology, delivery, pedagogy, learning styles, and learning outcomes" (Gaytan and McEwen 2007).

To adequately prepare students for authentic assessments, instructors should modify their teaching methods to incorporate innovative approaches into their teaching pedagogy (Gaytan and McEwen 2007). Technological tools are available, such as Nearpod, which is very friendly and interactive, Google Classroom, and Google Meet to discuss course content, clarify conflicting points, and many more. Technological tools are needed everywhere. However, it would consume so much time to prepare, especially for technology-amateur teachers. As technology expands, so will assessment capabilities. Strictly, online educational platforms must be designed to encourage the exchange of important and relevant information. Also, interaction through online media promotes the bond between students and improves the quality of learning.

Sutadji et al. (2021) elucidated that online teaching and learning, in principle, can be delivered either asynchronously or synchronously. He added that assignments and portfolios could assess knowledge and skills in the asynchronous assessment method, which is not done in real time. Meanwhile, the synchronous assessment method can be used to reproduce traditional assessment methods and authentic assessment. For example, the teachers might use Google Classroom, Google Suite Applications, Nearpod, and Quizzizz. For multimedia presentations, the teacher might use platforms that allow infographics and interactive exhibits- these can contribute significantly to meaningful learning. In learning Physics concepts, among others, PhET interactive simulation and National Geographic Kids are of great help.

Online teaching and learning must be fun, engaging, and meaningful. Suppose teachers will use the culture of online learning to meet demands for authentic assessment. In that case, Filipino students may soon become critical thinkers and constructors of their knowledge. This submission can create a space for purposive education and developmental learning. This mixed-methods sequential exploratory research was delimited primarily to assess the utilization of Authentic Assessment and Conventional Method in learning Science concepts using the two intact groups of Grade 9 SSC Dalton and Grade 9 SSC Thomson during the school year 2020-2021. Qualitatively, the thematic analysis was used to explore the students' experiences and how they perceive their science engagement in class through authentic assessment. The

topic centered on Physics - Projectile Motion.

Innovation, Intervention, and Strategy

This paper aims to authentically see authentic assessments and create various interpretations in light of the new normal in education-modular online learning. This research goal is for students to use Bloom's Taxonomy levels as they relate to developing digital literacy. Along these lines, students created their google classroom, among others. They actively participated in collaborative classes such as Phet, Nearpod, Quizizz, Google Meet, and Google Classroom) in which they will demonstrate the following skills: presenting, discussing, researching, writing, solving, collaborating, and interpreting, among other 21st-century technology skills. The researcher also prepared to teach guides utilizing the 7E Learning Cycle model, instructions, and assessments through Nearpod, Quizizz, and Google Classroom. On the other hand, the conventional way of teaching strictly followed the giving and retrieving of ADM modules and practiced traditional assessments – multiple-choice tests, true/false, and short response answers for both offline and online.

To realize this project, the researcher took the following proceedings. For authentic assessments to happen, using the 7E Learning Cycle, the Kabasalan Science and Technology High School (KSTHS) allowed students to take "open-book" exams or access sources to help them. Still, at the same time, this created authenticity issues. However, the researcher used Nearpod and Quizizz applications. Nearpod is an excellent interactive online application built for distance learning, hybrid, and school-based settings.

On the other hand, Quizizz allows teacher-adviser and students to engage in a gamified assessment creatively. It will enable students and teachers to be online at the same time. Likewise, an authentic assessment could require students to do more teamwork or deliver more presentations through these applications. These can be stressful and difficult for some students, if not most, but technology can help overcome such problems by providing video presentations, structured and comprehensive learning tasks, and various charts. Doing this will also improve access – if students have a disability or mental health issues, even temporarily, staff can explore technology to adapt feedback or run assessments more inclusively. With the implementation of these matters, teachers ought to have the option to use online resources that permit students to practice skills, consult resources, and accumulate input that can advise and assist them with improving their performances and products.

The teaching process commenced through Online Learning. However, online learning entails problems such as the authenticity of students' answers and plagiarism. With the advent of applications (Nearpod, Quizizz, Google Classroom, and Google Meet), the researcher can ensure that assessment integrity and authenticity continue to be an issue even if teaching and learning are virtual. Implementing authentic assessments through a structured 7E learning approach allows students to explore and engage in actual and practical science situations. The researcher believed that practical problems could help students become critical by asking questions and developing their investigations.

Action Research Questions

This research paper aimed to determine the effectiveness of authentic assessments through the 7E Learning Cycle model in a modular online distance learning approach in teaching Projectile Motion among Grade 9 students of Kabasalan Science and Technology High School, the School Year 2020-2021.

Specifically, this study sought answers to the following questions:

1. What is the level of students' achievement using authentic assessment (experimental) and conventional assessment (control) in teaching projectile motion as revealed in the pretest and posttest results?
2. Is there a significant difference in students' achievement using authentic assessment (experimental) and conventional assessment (control) in teaching projectile motion, as revealed in the posttest?
3. How do the students perceive their level of engagement in their Physics class through the implementation of Authentic Assessments utilizing the 7E Learning Cycle Model Approach?
4. What enhancement program can be developed to improve the level of students' achievement?

Action Research Methods

Research Design

This study utilized the mixed-methods sequential explanatory research in gathering necessary data wherein the researcher would focus on the effect of using performance-based tools on students' achievement in learning Science and then the analysis of students' engagement. The mixed-methods sequential exploratory design consists of two discrete phases: quantitative followed by qualitative (Creswell et al. 2003). The researcher first collects and analyzes the quantitative (numeric) data in this design.

Participants and or/Other Sources of Data Information

The study was conducted in Kabasalan Science and Technology High School, Kabasalan, Zamboanga Sibugay, during the fourth grading period of the school year 2020-2021, utilizing Grade 9-SSC Dalton and Grade 9-SSC Thomson sections which were divided into two intact groups. Using purposive sampling techniques, the research participants were divided and matched against their science performance or average grade during the previous year's first, second, and third grading periods. Comprising twenty (25) students each, the experimental group was taught using authentic practices and activities through the employment of the 7E Learning Cycle Model. The control group was led using the Conventional Method of teaching Science as suggested by the Grade 9 Teacher's Guide and Learner's Guide. Before the treatments of the two groups with the two varied methods, they were given a pretest to establish their level of achievement or mean percentage score (MPS) in the subject matter. A posttest was conducted after the administration of the two methods to determine if there was a justifiable increase or difference in students' performance from the pretest to posttest.

Research Instrument

The researcher used the Alternative Delivery Mode Learning Materials in teaching Science 9 – Projectile Motion. The questionnaire (focusing on the content) was also used, which was subjected to validity and reliability tests. A panel of experts did the validity test to establish the questionnaire's content, criterion, and face validity. In contrast, the test and retest methods were administered to a different group of respondents as chosen by the researcher to test their reliability. To measure the internal consistency reliability of each factor, Cronbach's Alpha coefficients were computed. Items with Cronbach's Alpha value of 0.70 and above (high reliability) were retained, and items with Cronbach's Alpha value of less than 0.70 were discarded.

The second set of the questionnaire from the study of Rimm-Kaufman (2010) with modifications was utilized to measure the level of students' engagement. This instrument comprising 16 items is set at a 4-point scale (1-Not at all true, 2-A little true, 3-Often true, and 4-Always true). An online interview has been conducted to fully understand and determine students' level of engagement with authentic assessments.

Data Gathering Procedure

Before applying the treatments, a pretest was given to the experimental and control groups. The administration of the strategy was evaluated by posttests to know the learning of the two groups after the pretests.

To ensure the integrity of the conduct of the research, the researcher asked permission from the Office of the School Principal for her consent allowing the researcher to conduct the study in the area. Preliminarily, the researcher reminded the research participants about the purpose and significance of the study, discussion of risks and benefits, involved commitment, and protection of confidentiality, especially the privacy of their answers and scores. To uphold the rule of law, informed consent was secured from the research participants. All the participants were requested to participate in their own will. It was voluntary participation on their part, and no coercion was made to make them participate.

After the orientation of the study, the researcher-made pretest was administered to the experimental and control groups. The two groups were then subjected to the teaching process through Nearpod, Google Classroom, Google Meet, and Quizizz application. The posttest was administered to both conventional and experimental groups to evaluate students' level of achievement. Also, the participants answered the questionnaire on students' engagement. Six (6) students from the experimental group also underwent individual interviews to generate data for the qualitative exploration of this action research.

Data Analysis

The data gathered were analyzed using descriptive statistics to carefully describe students' learning responses toward authentic and conventional assessment. Inferential statistics such as One-Way Analysis of Covariance (ANCOVA) was employed to test the effects of Authentic Assessments versus the conventional assessment in teaching projectile motion in students' achievement. Moreover, the transcripts of students' responses to learning with Science through authentic assessment were clustered,

themed, and analyzed using thematic analysis. Similarly, to describe students' level of engagement in the learning process, the following mean range was utilized: 1.00 – 1.75 = Very Low; 1.76 – 2.50 = Low; 2.51 – 3.25 = High; 3.26 – 4.00 = Very High. Moreover, to determine the level of students' achievement, the Mean Percentage Score (MPS) and its descriptive equivalent below are taken from DepEd Memo No. 160, s. 2012 was used.

MASTERY/ACHIEVEMENT LEVEL

MPS	Descriptive Equivalent
96 – 100%	Mastered
86 – 95%	Closely Approximating Mastery
66 – 85%	Moving Towards Mastery
35 – 65%	Average
15 – 34%	Low
5 -14%	Very Low
0 – 4%	Absolutely No Mastery

Discussion of Results and Reflection

This section presents the study's significant findings, interpretation, and analysis of the data gathered to discuss the efficacy of using authentic assessments in increasing the achievement level of Grade 9 SSC students in learning science-projectile motion. The presentation of the results is organized and reflected in the order of problems posted in Chapter One. The presentation of data comes with tables for a clear showing of analysis and to ensure understanding.

Table 1: Level of Students' Science-Projectile Motion Achievement in terms of MPS in the Pretest for Experimental and Control groups

Mean Percentage Score (MPS)				
Trial Run	Experimental Group	Interpretation	Control Group	Interpretation
Pretest	56.27	Average	55.47	Average

Table 1 displays the Science Achievement of the Grade 9 Special Science Class of Kabasalan Science and Technology High School in terms of Mean Percentage Score (MPS) for both experimental and control groups. The pretest results were based on the 30-item teacher-made test about Projectile Motion. In reference herewith, both experimental and control groups revealed an average level of achievement. The researcher submits that there was no significant difference in the achievement of the Grade 9 SSC students in the pretest.

Shivaraju et al. (2017) manifested that administering a pretest before the lecture

was to examine the students' prior knowledge concerning the topic and prepare and make the students more focused on the course. Simkins and Allen (2020) on *"Pretesting Students to Improve Teaching and Learning"* pointed out that pretest results should provide helpful information about the knowledge that students bring into the subject. Hence, a tool for knowing the appropriate learning designs that students need.

Table 2: Level of Students' Science-Projectile Motion Achievement in terms of MPS in the posttest for experimental and control groups

Mean Percentage Score (MPS)				
Trial Run	Experimental Group	Interpretation	Control Group	Interpretation
Posttest	89.33	Closely Approximating Mastery	77.47	Moving Towards Mastery

Table 2 pictures the level of Science-Projectile Motion Achievement of Grade 9 SSC students of Kabasalan Science and Technology High School in terms of MPS in the posttest for experimental and control groups. The posttest results showed that authentic assessment is far more effective than the Conventional Method of teaching in teaching Science-Projectile Motion. It garnered a Mean Percentage Score (MPS) of 89.33, which is interpreted as Closely Approximating Mastery, a level higher than the conventional method, with a Mean Percentage Score (MPS) of 77.47, interpreted as Moving Towards Mastery. The researcher submits that there was a significant difference in the achievement of the Grade 9 SSC students, as revealed in the posttest.

Table 3: Level of Students' MPS Increase in Science-Projectile Motion from pretest to posttest Using Authentic Assessment and Conventional Method

Test	Authentic Assessment (Experimental Group)		Conventional Assessment (Control Group)	
	MPS	Descriptive Equivalent	MPS	Descriptive Equivalent
Pretest	56%	Average	55%	Average
Posttest	89%	Closely Approximating Mastery	77%	Moving Towards Mastery
MPS Increase	**33%**		**19%**	

Scale: 96 – 100% = Mastered; 86 – 95% = Closely Approximating Mastery; 66 – 85% = Moving Towards Mastery; 35 – 65% = Average; 15 – 34% = Low; 5 – 14% = Very Low; 0 – 4% = Absolutely No Mastery

Table 3 shows the Level of Students' MPS increase in Science-Projectile Motion from the pretest to posttest using authentic assessment and conventional method. Accordingly, the results showed that the level of students' achievement in the experimental group was revealed to be closely approximating mastery *(MPS = 89)*. In contrast, the control group indicated moving towards mastery *(MPS = 77%)*. Finally, the use of Authentic Assessments in teaching projectile motion is somewhat better. It posted a net increase of 33% compared to the use of the Conventional Method in teaching

projectile motion which indicated a net effect of only 19%. According to Dikli (2003), authentic assessment, branded thereafter as a form of alternative assessment, is way more beneficial compared to the conventional form of teaching, especially education assessment at a distance.

Table 4: Test of Significant Difference Using One-Way ANCOVA to Test Differences in Students' Achievement in the Experimental and Control Groups

Source of Variation	Type III Sum of Squares	Df	Mean Square	F-ratio	p-value
Corrected Model	160.070[a]	3	54.023	24.148	.000
Intercept	490.391	1	490.391	219.202	.000
Covariates	.391	1	.391	.175	.678
Main Effects	11.745	1	11.745	5.250	.027
Error	102.910	46	2.237		
Total	31565.000	50			
Corrected Total	264.980	49			

** Significant at the 0.05 level*

Using One-Way Analysis of Covariance (ANCOVA), the Group (Main effects) in Table 3 confirms that there is a significant difference in students' achievement when they are taught using Authentic Assessments with an *(f-ratio = 5.250; p-value (0.27) < 0.05)*. Thus, using authentic assessments solidly increased students' achievement in Science-Projectile Motion compared to using the Conventional Method. Brawley (2009), *"Authentic Assessment versus Traditional Assessment: A Comparative Study"* elucidated that authentic assessment, when appropriately designed, is a better way to determine the higher-order thinking skills required to complete a task rather than the conventional method of assessment. Similarly, the interpretation holds true to the theory of Hussain, Azeem, and Azra Shakoor (2011). They manifested that there is a significant impact of unguided, guided, and combination scientific inquiry on students' achievement than traditional physics teaching. This concept has been primarily captured in crafting structured performance tasks and activities using the 7E Cycle format. Moreover, Brawley (2009) added that while both traditional and authentic assessments provide information about student knowledge, the skills required for completion are very distinct. Finally, with the empirical findings herewith, and to foster better, real, and meaningful learning, the researcher submits that authentic assessment should be used in teaching Science-Physics.

Table 5: Level of Students' Engagement in the Experimental and Control Groups

Indicators	Authentic Assessment (Experimental Group)			Conventional Method (Control Group)		
	M	SD	Remarks	M	SD	Remarks
1. I show utmost interest in learning Projectile Motion.	3.58	0.57	Very High	3.46	0.63	Very High
2. I like learning Projectile Motion and relate its concepts to real-life situations.	3.42	0.49	Very High	3.38	0.56	Very High
3. I maximize my learning experiences and thinks that learning Projectile Motion is fun and exciting.	3.23	0.42	High	3.15	0.60	High
4. I share ideas and participate during discussions.	3.23	0.42	High	3.19	0.39	High
5. I try hard to do well during class.	3.15	0.46	High	3.19	0.39	High
6. I pay attention in science class.	3.38	0.56	Very High	3.42	0.57	Very High
7. I feel encouraged to work on something that relates to projectile motion.	3.46	0.63	Very High	3.35	0.55	Very High
8. I enjoy wandering about how Projectile Motion works.	3.38	0.49	Very High	3.38	0.49	Very High
9. I enjoy working various tasks in Science class.	3.31	0.49	Very High	3.38	0.49	Very High
10. If I have trouble understanding a problem, I go over it again until I understand it.	3.15	0.60	High	3.19	0.48	High
11. If I run into a difficult problem, I keep working at it until I've solved it.	3.31	0.49	Very High	3.35	0.55	Very High
12. I ask questions in class.	3.27	0.52	Very High	3.31	0.49	Very High
13. I read a lot in advance.	3.15	0.60	High	3.19	0.62	High
14. When I study, I try to understand the concept best by relating it to things I already know.	3.23	0.42	High	3.38	0.49	Very High
15. I try to match what I already know with things I am trying to learn from school.	3.38	0.49	Very High	3.46	0.63	Very High
16. I try to think through topics and decide what I'm supposed to learn from them.	3.58	0.57	Very High	3.38	0.49	Very High
Overall	**3.33**	**0.52**	**Very High**	**3.32**	**0.53**	**Very High**

Scale: 1.00 – 1.75 = Very Low; 1.76 – 2.50 = Low; 2.51 – 3.25 = High; 3.26 – 4.00 = Very High

Table 6 reflects that students in the experimental group have a very high level of engagement *(M = 3.33; SD = 0.52)*. Similarly, the students in the control group exhibited a very high level of engagement *(M = 3.32; SD = 0.53)*. Interestingly, indicators 3 (I maximize my learning experiences and think that learning Projectile Motion is fun and exciting), 4 (I share my ideas and participate during discussions), 5 (I try hard to do well during class), 10 (If I have trouble understanding a problem, I go over it again until I understand it), 13 (I read a lot in advance), and 14 (When I study, I try to understand the concept best by relating it to things I already know) in the experimental method (Grade 9 SSC Dalton) registered "High" level of engagement. On the other hand, indicators 3 (I maximize my learning experiences and think that learning Projectile Motion is fun and exciting), 4 (I share my ideas and participate during discussions), 5 (I try hard to do well during class), 10 (If I have trouble understanding a problem, I go over it again until I understand it), 13 (I read a lot in advance) in the control group (Grade 9 SSC Thomson) registered "High" level of engagement.

Strikingly, the Grade 9 SSC Thomson only differs in the level of engagement from that of SSC Dalton on indicator 14 (When I study, I try to understand the concept best by relating it to things I already know), which the former registered a "Very High" level of engagement. The overall standard deviation for both experimental (0.52) and control (0.53) groups appeared low. These values show that students' ratings on engagement are not seemingly dispersed and appear to be homogeneous.

Thematic Analysis on Students' Engagement Using Authentic Assessment anchored in the 7E Learning Cycle Model

The qualitative agendum of this study aimed to assess students' responses to their level of engagement. Table 7 exhibits the responses classified by themes describing students' engagement using Authentic Assessment anchored in the 7E Learning Cycle Model.

As shown in the table, four themes with their corresponding clusters depicting students' engagement in learning Science-Physics using authentic assessment are induced, namely: (1) Affective: Liking for Learning which captures that Science is interesting, realistic, fun, exciting, and challenging; (2) Behavioral: Learning Processes, Effort, Persistence, Determination which captures discovery approach and that students' curiosity will be satisfied through learning by doing research; (3) Cognitive: Learning Processes which captures thinking through topics, match learned concepts to the present concepts, understanding theories by relating to realistic and contextualized situations; and (4) Behavioral: Preparation, Involvement, Intervention, and Interaction which speaks of reading in advance, engaging in various group works, independent earning practices, and asking questions during discussions.

Table 6. Themes and Frequency of Occurrence

Themes and Coded Cluster	Research Participants (RP) RP1	RP2	RP3	RP4	RP5	RP6	Total
Affective: Liking for Learning Science is interesting, realistic, fun, exciting, and challenging	3	3	3	3	3	3	18
Behavioral: Learning Processes, Effort, Persistence, Determination Discovery Approach, Satisfying Curiosity through Learning by doing research	3	4	3	3	3	3	19
Cognitive: Learning Processes Think through topics, match learned concepts to the present concepts, understand theories by relating to realistic and contextualized situations	3	3	3	3	3	3	18
Behavioral: Preparation, Involvement, Intervention, and Interaction Reading in advance, engaging in various group works, Independent Learning Practices, Asking Questions during discussions	3	3	3	2	3	2	16
Total	12	13	12	11	12	11	**71**

Theme 1: Affective: Liking for Learning

The research participants articulated that Science is interesting, realistic, fun, exciting, and challenging when taught and assessed using authentic assessments. The reflected theme above, with a registered score of 17, centered on the viewpoint that authentic assessment triggers their interest in learning Science.

Research Participant one (1) said, “Science helps me explain and elaborate various occurrences and phenomena as it enables critical thinking. It is a method of discovering new knowledge and applying it to achieve desired ends. Also, I acquire knowledge about the natural world as they help us study nature in the broadest sense.” Research Participant two (2) said, “Science learning is exciting with authentic assessment because we can get a better understanding and comprehension about a certain real problem that confronts us, which is exciting for students like us. Also, it triggers a conversation to translate ideas into practical application and provides an idea for us to develop our critical thinking ability.”

According to Svinicki (2004), authentic assessment “is based on student activities that replicate real-world performances as closely as possible.” Adjacent to this theory, it is a must that students will be exposed to realistic learning experiences, learn

how to argue with a particular point rather than simply concurring, know how to practically connect one concept with the other, and learn to innovate and solve unstructured problems. Authentic assessments promote solid learning and make students as constructors, problem-solvers, communicators, and critical thinkers.

Theme 2: Behavioral: Learning Processes, Effort, Persistence, Determination

The second theme pictures behavioral: learning processes, effort, persistence, and determination, including the discovery approach, satisfying curiosity through learning by doing and doing research. This theme emphasizes that learning Science takes effort, persistence, and determination for both students and teachers. Teachers will be injecting various alternative activities that promote critical thinking and allow them to revisit the basics.

Research Participants 1, 2, 5, and 6 consistently agreed that Learning Science is exciting and takes effort, especially in accomplishing various technical tasks. Research Participant 6 cited, "Learning through research encourages us to establish the concept of understanding, meaningful learning experience and knowledge of the world by experiencing things and commenting on them and by actively working the information gathered." Research Participant 4 commented, "From open-ended questions to crafting a solution of a specific problem aided in the implementation of assessments during class session enable me to gain, strive, develop attitudes and skills and becomes understanding of what is truly meant by solid learning."

Meanwhile, Wiggins described authentic assessment as a direct examination of student performance. It requires students to be more active and effective with the knowledge gained. The students will be given various tasks. The teacher will note whether students can make performances, open-ended answers, and comprehensive crafts. The authentic assessment will help the teachers achieve validity and reliability by emphasizing and standardizing assessment criteria based on the products. The validity test' must simulate the real world. It involves unstructured challenges that help students practice seeing complicated things.

Theme 3: Cognitive: Learning Processes

The research participants stressed that thinking through topics, matching learned concepts to the present concepts, and understanding theories by relating to realistic and contextualized situations enable them to understand the topic efficiently. Research Participant 3 said, "Authentic assessments clearly provide us an avenue for better learning. When we discussed Projectile Motion, I revisited my learnings in velocity, speed, and displacement or distance because I think connection and learned concepts are substantial in dealing with new concepts. It will help you track down the key points during the discussion, which I always feel directed." Research Participant 4 commented, "It is important that we apply the things that we have learned to our lives. Alongside, we can use theories as a basis in our studies and understanding situations we are in."

This principle of active learning is rooted in the idea of Constructivism. Constructivism is 'an approach to learning that allows learners to construct their knowledge and that meaning-making and reality are determined by their experiences' (Elliott et al. 2000, 256). Arends (1998) states that Constructivism highlights the personal construction of meaning by the learner through his personal experience, which is affected by the interaction of prior knowledge and new events. Pointedly, knowledge is constructed, not innate, and not passively absorbed. Learning is a process in almost

all cases, and learners build new knowledge anchoring on previous learning. Prior knowledge influences and take cognizance as to what knowledge a learner will construct from the present learning experiences.

Similarly, when teachers effectively design an engaging, authentic task that is appropriately aligned with a learning competency, students will discover multiple entries to the material, encouraging them to connect prior knowledge and experience to the new material in meaningful ways.

Theme 4: Behavioral: Preparation, Involvement, Intervention, and Interaction

The fourth theme of engagement highlighted preparation, involvement, and interaction, including Reading in advance, engaging in various group works, independent learning practices, and asking questions during discussions. Involvement and intervention of students in the learning process are a must. However, with the current situation (global pandemic), it becomes harder for the students to be engaged in discussions and eventually participate and argue. Nevertheless, education must continue despite certain limitations, and the quality of learning should not be compromised. This matter triggers the researcher to prepare online interactive, meaningful, and digital safe-space classes through various platforms, including Google Classroom, Google Meet, Nearpod, and Quizizz.

Research Participant 3 commented, "I enjoyed drawing on the Nearpod since only the teacher can see my work." Research Participant 5 toned, "I read in advance most of the time for me to participate and share my ideas during class discussions, also participating in the class develops my speaking ability." "I also ask questions, especially when the idea is not clear, and ensures that when I practice solving another problem, I can do it on my own already," she added. Alternative assessment-authentic assessments encourage students to practice independent learning and problem-solving. It gives students a seabed of opportunities to ask questions, do research, craft solutions and look for answers in investigating real-world phenomena.

Convincingly, Authentic Assessment captured in a 7E Learning Cycle Model would allow the students to become engaged and active constructors of meaning. Thus, teaching approaches in Science should involve exploring the natural or material world, leading to asking questions and making discoveries through collaborative learning activities. In education, assessment is crucial, both online and face-to-face, even before the SARS COV-2 pandemic reaches our shores. To make assessments effective, they must be active and authentic. Teachers must exert extra effort in modifying their teaching methods by combining innovative practices into their teaching pedagogy. Thus, it is necessary to have an authentic assessment design adapted from the current implementation to better meet the desired skills and learning targets stipulated in the DepEd's Bible-Curriculum Guide.

Conclusions and Recommendations

This study has concluded that the application and implementation of Authentic Assessments in learning Science significantly increased students' achievement and engagement compared to using the Conventional Method. The level of students' achievement in the experimental group was revealed to be closely approximating mastery, while the control group indicated moving towards mastery during the posttest. The study shows a significant difference in students' achievement when they are taught using Authentic Activities and Conventional Methods in learning Science and

established that students in the experimental group have a significantly higher level of engagement than the control group. This outcome is supported by the thematic analysis of this study that induced four themes with their coded clusters describing students' engagement in learning Science using Authentic Assessments: (1) *Affective: Liking for Learning* proposing that Science is interesting, realistic, fun, exciting, and challenging; (2) *Behavioral: Learning Process, Effort, Persistence, and Determination* that pictures discovery approach, satisfying curiosity through learning by doing activities, learning by doing research; (3) Cognitive: Learning Process which captures thinking through topics, matching learned concepts to the present ones and understanding theories by relating to realistic and contextualized situations; and (4) *Behavioral: Preparation, Involvement, Intervention, and Interaction* that includes reading in advance, engaging in various group works, independent learning practices, and asking questions during discussions.

Performance-oriented culture did not circle only to pen and paper examinations. Evidently, authentic assessments support learner-centered education through various online and offline activities. To be effective, the teacher must break down big ideas into small practices, practice the skill, and use contextualized tasks, which enable students to create a meaningful and beneficial learning experience. The findings of this research signifying that the use of Authentic Assessments significantly enhanced and increased students' achievement and engagement in the learning process challenge educators to reinforce the utilization of the said approach in teaching Science in the Enhanced K to 12 Curriculum. As part of the recommendation of this study, the integration and implementation of authentic assessments should be strengthened, institutionalized, and practiced at the school level and division level through the conduct of seminar workshops for all Science teachers.

ACTION PLAN

Republic of the Philippines
Department of Education
Region IX, Zamboanga Peninsula
Division of Zamboanga Sibugay
KABASALAN SCIENCE AND TECHNOLOGY HIGH SCHOOL
F.L. Pena, Kabasalan, Zamboanga Sibugay

ACTION PLAN ON THE USE OF AUTHENTIC ASSESSMENTS IN INCREASING SCIENCE-PHYSICS UNDERSTANDING
School Year 2020-2021

Subject Focus	Program Description	Objectives	Strategies/ Activities	Time Frame	Persons Involved	Sources of Fund	Expected Outcome
Science - Physics	Implement Authentic Assessments in Online Learning through various educational platforms	Enhance the teaching-learning process for students to become active constructors of learning and meet the expected skill set for the graduates and students under the K-12 Curriculum Program.	Construct and implement lesson plans or teaching guides using the 7E Model with inquiry-based learning activities.	Whole Year	SH, Proponent/ Teachers/ Students	Personal	Higher MPS in Science Summative Assessments At least 85% Mastery Level in NAT and science subject; at least 85% (Very Satisfactory) GPA in Science
Science - Physics	School-Level Seminar – Workshop on the use of authentic assessments	Enhance teachers' pedagogical strategies and proficiency in teaching Science in	Conduct orientation on the Unpacking of MELCs and craft after those SMART objectives, learning	Dec 2020	SH, Proponent/ KSTHS Science Teachers/ Students	Personal	SMART Lesson Plans and Teaching Guides, Competent science teachers

	in science teaching	the K to 12 Curriculum. Strengthened the use of authentic assessments and maximized the advantage of the 7E Learning Cycle model in crafting lesson plans for online educational media platforms	targets, and localized learning tasks Intensive In-service Training on writing lesson plans with proper referencing styles and citation reflecting authentic assessments using the 7E Learning Cycle Model and conducting online teaching demonstrations for critiquing & polishing.	Dec 2020	SH, Proponent/ KSTHS Science Teachers/ Students	Personal	SMART Lesson Plans and Teaching Guides, Competent science teachers
Science - Physics	Division-Level Seminar – Workshop on the use of authentic assessment in Science teaching online	Enhance teachers' pedagogical strategies and proficiency in teaching Science in the K to 12 Curriculum.	Conduct orientation on the Unpacking of MELCs and craft thereafter SMART objectives, learning targets, and localized learning tasks	Septe mber 2021	Proponent/ Supervisor/ Principal/ Head Teachers/ Science Teachers/ Students	SEF/ MOOE/ Division Fund	SMART Lesson Plans and Teaching Guides, Competent ZS Science teachers

		Strengthened the use of authentic assessments and maximized the advantage of the 7E Learning Cycle model in crafting lesson plans for online educational media platforms	Intensive In-service Training on writing lesson plans with proper referencing styles and citations reflecting authentic assessments using the 7E Learning Cycle Model and conducting online teaching demonstrations for critiquing & polishing.	Septe mber 2021	Proponent/ Supervisor/ Principal/ Head Teachers/ Science Teachers/ Students	SEF/ MOOE/ Division Fund	SMART Lesson Plans and Teaching Guides, Competent ZS Science teachers

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Financial Report

The table below shows the cost estimates expended before, during, and after conducting this action research.

General Descriptions	Quantity	Unit	Unit Price	Total Estimated Costs
Short Bond paper sub. 20	3	Reams	275	825
Ink for printer	4	Bottles	271.25	1,085
Printing and Binding	5	Copies	200	1, 000
Ballpen	2	Pcs	20	40
Snacks (50 participants)			35	1,750
Total				4,700.00