Development of Performance Task Assessment Tools for Grade 10 Science

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Abstract - *This study focused on the description and development of performance task assessment tools for Grade 10 Science. This study covered the extent of utilization of performance tasks in Grade 10 science in the different learning areas: Earth Science, Physics, Biology and Chemistry. At the end, different performance task assessment tools for the four components were developed as the output of the study. The research design used the descriptive method with questionnaire as main research tool supplemented by documentary analysis and interviews to gather important data. A total of 52 Grade 10 Science teachers from the private schools in the Division of Batangas City served as respondents of the study.*

The findings revealed that more than half of the Grade 10 students performed well in Science. The performance of the students was measured using the new grading system set by the Department of Education. Moreover, the findings also showed that performance tasks in all learning areas including Earth Science, Physics, Biology and Chemistry were utilized by teachers to a moderate extent.

Among all the learning areas, performance tasks in Earth Science are the most utilized while those tasks in Biology are the least utilized by Grade 10 Science teachers. Also, the study revealed that the problems in utilizing performance tasks were sometimes met by Grade 10 Science teachers. Different performance task assessment tools were developed to provide for the corresponding needs of teaching and learning process where students are expected to perform different activities in the four learning areas of Science.

Keywords: *Performance Task, Assessment Tools*

INTRODUCTION

Assessment is an integral part of any instructional process. Whatever the teacher plans and delivers, assessment of the student learning outcomes follows. Educators view assessment as a comparison of student's performance from given criteria. Students, on the other hand, perceive assessment as a room for enhancement and an avenue for additional learning. Once assessment is done, feedback on performance should be provided to identify strengths and weakness, thus tracking students' learning [1].

Assessment is done for the purpose of making decisions. These may be concerned with the decisions related with analysis, implementation, and usefulness of the program, student feedback, and research. Unlike a traditional standardized test in which students select one of the responses provided, a performance assessment requires students to perform a task or generate their own responses. Performance assessment is authentic when it mimics the kind of work that is done in real-world contexts [2].

Assessment is most effective when it reflects an understanding of learning as multidimensional, integrated and revealed in performance over time. Likewise, it should reflect these understanding by employing a variety of methods, including those that call for actual performance. However, the assessment of students' performance does not specify such factors as quizzes, participation, projects, periodical tests and homework, but considers these as tools or measures for the different levels of learning outcomes [3].

The purpose of meaningful assessment is to improve the mode of instruction by providing information about the students' learning outcomes. This should occur in authentic contexts that allow students to demonstrate learning by performing meaningful tasks. Meaningful content and contexts for assessment help students by engaging their attention and encouraging them to share their work and talk about their progress. Students need to take an active part in assessment. When students understand assessment criteria and procedure, take ownership for assessing the quality, quantity, and processes of their own work, they develop self-assessment skills. Thus, the ultimate goal of assessment which is to help develop independent, life-long learners who regularly monitor and assess their own progress is achieved [4].

Mueller [5] defined a rubric as a scoring scale used to assess student performance along a task-specific set of criteria. Normally, authentic assessments are

criterion-referenced measures. That is, a student's ability to perform a task is determined by matching the student's performance against a set of criteria to find out the degree to which the student's performance meets the criteria for the task. Typically, a rubric which consists of the essential the task and appropriate levels of performance for each criterion is designed to measure student performance. A rubric is composed of two components: criteria and level of performance. Each rubric has at least two criteria and at least two level of performance. For each criterion, the evaluator applying the rubrics determines to what degree the student has met the criterion. Finally, the rubric contains a mechanism for assigning a score to each project.

Rubrics appeal to teachers and students for many different reasons. These are powerful tools for both teaching and assessment. Rubrics can also improve student's performance as well as it can serve as a guide to monitor their own achievements on a certain task. Rubrics are also useful because they help students become more objective evaluators of the quality of their own work and others. Rubrics also reduce the amount of time teachers spend evaluating students' work [6].

In this day and age, the unstoppable global demands when it comes to education are very evident. These demands require skills and competence that will showcase that students are able to perform well when they are sent to the real world. Students are educated to meet the needs of the dynamic society. With this, educators who are the main agents of transferring the competencies and skills should also update and equip themselves to be able to cope up with those changes. It is also a great challenge for the educators on how they can assure excellent quality education despite the changes in the curriculum.

The present age is the age of science and technology. The progress and development of the society is now closely linked with the progress and development in the field of sciences which in turn depends upon the quality of science education imparted to the youngsters in schools. The formal classroom teaching or laboratory work alone can neither help in providing wider opportunities for the inculcation and development of such interests and attitudes nor it cater to the development and realization of the scientific skill. Therefore, to achieve the desired purpose, there is a need for some other platforms or means which may be helpful not only in supplementing the task of formal classroom science teaching but also prove a source of constant inspiration.

Science became part of the school curriculum during the 19th century. The humanities were firmly entrenched as these subjects that were thought to lead to the most noble and worth educational outcomes. Scientists had to be careful when arguing the utility of Science, not to present Science as too crassly materialistic and without higher virtue. So in addition to discussing the practical importance of Science in a world that was becoming denominated by Science and technology, they also said that Science provided intellectual training at the highest level-not the deductive logic that characterized most of formal education, but the inductive process of observing the natural world and drawing conclusions from it. Students would learn this way of thinking by carrying out independent inquiries and investigations in the laboratory [7].

Even without the pressure of standards, benchmarks, and high-stakes testing, the facts and principles of Science will continue to form the basis of the Science curriculum because this content provides an organizational structure that is understandable and recognizable. Teachers should be free to balance and integrate the content of Science that they select with the other goals that they choose to pursue. Teachers have to provide comprehensive summaries of the fields of chemistry, biology, physics and earth science to high school students. They should also be free to organize their Science courses as many of the goals of Science education as they feel comfortable with, selecting the content that makes the most sense to them. There is nothing wrong with teachers teaching as much scientific content as they wish to, as long as that content is meaningful and important to them and the lesson is taught in a way that students are able to comprehend and appropriate, not as lifeless abstractions [8].

The K-12 science curriculum consists of decongested topics for the students to have mastery of the basic competency needed. Different approaches are being used for the effective implementation of the curriculum. Concepts and skills in Earth Science, Life Science, Chemistry, and Physics are presented in spiral progression, thus requiring Science teachers to have knowledge in all those fields of Science. They should also know different performance-based strategies that can be used in teaching.

As a whole, the K to 12 Science curriculum is learner-centered, and inquiry and performance-based, emphasizing the use of evidence in constructing explanations, concepts, and skills in Life Sciences, Physics, Chemistry, and Earth Sciences. Lessons are presented with increasing levels of complexity from

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one grade level to another (spiral progression), thus paving the way to deeper understanding of a few concepts. These concepts and skills are integrated rather than discipline-based, stressing the connections across Science topics and other disciplines as well as applications of concepts and thinking skills to real life.

The shift from teacher-centered method of teaching science to student-centered activity based method encourages and develops in the child analytical skills. It is an attempt to make students become fully aware as well as understand the way scientist works, and also equips and prepares students for their possible career in science and technology which lead to the development of process skills [9].

According to Falk [10], as standard based reform sweeps the country, concerned educators grapple with how to help an increasingly diverse student population realize its academic and social potential. Likewise, concerned teacher educators struggle with how best to prepare teachers to meet this extraordinary challenge. Both tasks are especially complex because there are such vast differences in the initiatives being carried out in the name of standards-based reform. What marches under that banner varies significantly in content, in the types of assessment used, and in the kinds of accountability systems. Standards-based reform is defined largely as making sure children do better on tougher and more extensive standardized paper-and-pencil tests. In the name of ambitious-sounding reforms, such standards-based initiatives are exacerbating inequalities between students from different backgrounds and placing constraints on educators that undermine effective teaching. Yet there are standards initiatives that are of considerable use to teaching and learning. In many instances, working with standards and standards-based assessments has stimulated teachers and their students to get clear about their purposes, to develop coherent goals for learning, and to make use of a range of instructional strategies that support students' varying approaches to learning. Examining and assessing students' work in relation to standards has helped teachers, students, and students' families to understand what students know and can do as well as how to support students' further learning. As a result of standards-based work, many educators and students have had opportunities for reflection and collaboration that they have never experienced before.

Different activities that will require students to perform are very essential in Science because they provide opportunity for learning by doing and satisfy the constructive and creative instinct of students. They allow opportunity for self-expression, independent research and doing projects that lead to better understanding of scientific concepts. With the help of these activities, learning of science becomes exciting and provides a productive use of leisure time. When the students participate in various activities, their talents in making charts, illustrations, models, improvising equipment and experimentation are developed considerably [11].

Gere [12] stressed that experiences of students is also an effective way to learn Science. Using experiential approach, the students discover, create, and figure out things. In this approach, the teacher schedules variety of learning activities through lecture and audio-visual materials and techniques, assign students for readings from textbooks, reference work and other reading materials.

Laboratory is at the center of scientific studies so long as science remains both a product and process. The availability of laboratory equipment, facilities and materials play a vital role in determining the extent of best laboratory practices that will ensure acquisition of science process skills and competence in science concepts by the learners. One major aspect of Science education that is of great concern is in the area of availability and effectiveness of use of specialized and relevant science equipment, facilities and instructional materials. The school laboratories that are well designed, stocked and safe for teaching and learning of science ensure active practical exercises [13].

In the study of Atienza [14] she found out different factors that contribute to the teaching of science. These were the availability of instructional, administrators' support, classroom management, interest of teachers, students' interest, instructional skills, in-service training, personal qualities and emotional disability. On the other hand, she also cited some problems encountered in teaching science. The lack of facilities and their inadequacy were moderately serious problems for teachers. She also considered slightly serious problem the lack of knowledge of different methods, lack of knowledge in constructing assessment tools and untrained teachers. She further recommended that adequate facilities and other instructional materials be provided to improve the quality of science teaching and learning.

According to Orstein [15], the success of students' performances depends on how well students understood what is expected from them. It is essential that those involved in teaching, training and human resources development understand the ways in which traditional education and training approaches must be capitalized on and enriched to effect performance-

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based learning. He also emphasized that traditional approaches should not be thrown away, but should be used as a means toward implementing performance tasks. To implement performance tasks successfully, educators should change or improve their way of instructing and assessing learner's work. In addition, there should be a paradigm shift towards the curriculum process and then how learning should empower the learner through attainment of outcomes.

Performance tasks offer several benefits beyond selected- and constructed-response items. It places student demonstration of ability at the center of assessment. Performance tasks approximate real-world application of complex skills. These tasks also allow students to actively demonstrate their learning and skills. These can measure abilities beyond academic knowledge and skills. Performance tasks are typically more engaging for students. On the other hand, Performance tasks also come with challenges. Performance tasks can be time-consuming to design and score in a consistent and unbiased manner [16].

Department of Education Oder No.73 [17] cited that assessment shall be used primarily as a quality assurance tool to track student progress in the attainment of standards, promote self-reflection and personal accountability for one's learning and provide a basis for the profiling of student performance. Regards of nature and purpose of assessment, it shall be holistic, with emphasis on the formative or developmental purpose of quality assuring student learning. It is also standards-based as it seeks to ensure that teachers will teach within the standards and students will aim to meet or even exceed the standards. The students' attainment of standards in terms of content and performance is, therefore, a critical evidence of learning.

Moreover, the highest level of assessment focuses on the products or performances which students are expected to produce through authentic performance tasks. Performances should be reflective of what teachers want students to be able to do with their learning. They are evidence of what teachers want students to tell them or demonstrate in real life that they can make of what they have learned in different subjects.

Today, there are numerous strategies that are being used to assess learners' achievement. Educators can determine whether learners have achieved the learning expectations by assessing them. This implies that when planning for classroom activities, educators should carefully think about the methods of assessing the students. Thus, assessment should not be thought of at the end of the learning activity.

Performance tasks is one of the most used strategies since this addresses the need to have students who are globally competitive. Performance tasks ask students to create products or perform tasks to show their mastery of particular skills. Various performance tasks are now designed to assess not just the knowledge and mastery of learners regarding concepts but also to gauge how those concepts can be used in real life setting.

The researcher sees the need and importance of determining the extent of utilization of performance tasks given by the Science teachers to their students. The findings are intended to be used as a springboard to develop assessment tools for the given performance tasks in Science Grade 10.

OBJECTIVES OF THE STUDY

This study was undertaken to develop performance task assessment tools for Grade 10 Science. The points considered are the performance tasks given by the teachers in Grade 10 Science and the evaluation and assessment techniques used for the performance tasks given together with the difficulties met by teachers in the utilization of performance tasks. At the end of the study, a set of assessment tools for the performance tasks in Grade 10 Science was developed for effective assessment of learning of students.

MATERIALS AND METHOD

The quantitative-descriptive method of research was used in this study. Moreover, this study used the researcher-made questionnaire and interviews as data gathering instruments. Data gathered were analyzed descriptively. Discussion was substantiated with information gathered through questionnaires. The findings of the study were used as basis in the development of assessment tools for the performance tasks used in Science Grade 10.

The subjects of the study are the Grade 10 students and Science teachers from the 19 private secondary schools in the division of Batangas City. No sampling was used. The Grade 10 student academic records were gathered to measure their performance in Science with the permission from the school head and school records officer. There are 52 Science teachers that served as the respondents of the study. They were purposively chosen because they are teaching Science subjects in Grade 10.

The initial preparation of the questionnaire involved reading of various related literatures, observations and incorporating the proponents teaching experiences which served as a springboard for framing the

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questionnaire items. The prepared questionnaire was validated through the help of some practitioners/experts in the field. Consultation with the Science Coordinator from other private schools was also done to validate the questionnaire. The validation procedure was systematically undertaken until the instrument became valid and ready for administration. It was pilot tested to 15 teachers not involved in the study and the reliability was established through Cronbach Alpha and its reliability index of 0.88 made the instrument reliable. Prior to the distribution of the questionnaire to the intended respondents, the researcher wrote a letter of request seeking approval of the concerned authorities. For the documents needed, after the approval of the school head/registrar, the researcher requested the assistance of the personnel from the registrar's office of each school under study to gain access to the quarterly grade and final grade of Grade 10 students.

The respondents' responses were tallied, scored and tabulated for statistical treatment. The scoring of responses will be based on the Likert scale positioning wherein respondents will choose what option is most true to them. The value ranges from 1-4 with 1 expressing the lowest value and 4 equivalent to highest value. Equivalent verbal descriptions will be used for each of the numerical values.

Table 1. Scale and Range Used to Describe Verbal Description

Scale	Range	Verbal Interpretation
4	3.50 – 4.49	Great Extent/ Very Often
3	2.50 – 3.49	Moderate Extent/ Often Met
2	1.50 – 2.49	Least Extent/ Sometimes Met
1	1.00 – 1.49	Not at All/ Never Met

Documentary analysis was also used to gather necessary information to support discussion and findings of the study. The data were gathered from the student's academic record with the permission from the school head and school records officer. Moreover, to supplement the discussion and analysis of data, unstructured interview was also conducted. An interview with the Science private high school Grade 10 Science teachers about the performance tasks given to their students was a great help for the researcher in the enhancement of the analysis of data.

For the scoring of Grade 10 student's performance in Science, equivalent grade and verbal descriptions for each numerical values were used.

Table 2. Scale Used in Converting Equivalent Grade to Describe Student's Performance

Scale	Verbal Description
90-100	Outstanding
85-89	Very Satisfactory
80-84	Satisfactory
75-79	Fairly Satisfactory
74 and below	Did Not Meet Expectations

To quantify the data gathered, the statistical tools used in the study were weighted mean, f-test and Scheffe method.

RESULTS AND DISCUSSION

Performance of Grade 10 Students in Science

The rapid advancement of science and technology poses a significant challenge to the entire humanity to keep up with the fast societal development rhythmically, most especially in the third world and developing countries like the Philippines. Being in rhythmic motion does not merely imply acquiring advance facilities and technologies but rather, the acquisition and enhancement of knowledge and skills essential in meeting the demands of the highly competitive and scientifically-inclined society must be given with more attention. The secret to which lies primarily on the quality of science education is one of the fundamental concerns.

The 2010-2011 Global Competitiveness Report of the World Economic Forum showed that the Philippines only fared better than Cambodia, among the eight Southeast Asian countries that were surveyed in the fields of education, science and technology and innovation.

The main factors that account for the low performance in science of the Filipino students include the lack of support for a scientific culture reflected in the deficiencies regarding the school curriculum, the inadequate teaching learning process, insufficient instructional materials and lack of teacher training. For instance, the lack of good and engaging textbooks and lack of science equipment have hindered the conduct of scientific investigations and hands-on activities among Filipino students.

Table 3 shows the performance in Science of Grade 10 students from the private schools in Batangas City. Based from the table, it can be inferred that out of 540 Grade 10 students, 30% got an outstanding performance in Science while 35.11 % got a very satisfactory performance in Science. The result is in contrary to the data presented on the 2010-2011 Global

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Competitiveness Report of the World Economic Forum which shows that Filipino students have poor performance in Science. It can be inferred from the table that more than half of the Grade 10 students performed well in Science. Only 6.30 % accounts for the students who have fairly satisfactory performance in Science.

Table 3. Performance of Students in Grade 10 Science

Level of Performance	Frequency	Percentage
Outstanding (90 – 100)	162	30.00
Very Satisfactory (85 – 89)	195	36.11
Satisfactory (80 – 84)	149	27.59
Fairly Satisfactory (75 – 79)	34	6.30
Total	540	100
Mean = 87.09	sd = 4.70	

The results could be due to the new grading system implemented under the K-12 curriculum. Compared to the old grading system, the new grading system that was implemented since 2015, is described to be as a standard and competency-based grading system. Grades are based on the weighted raw score of the learners' summative assessments. The major components are divided into three: written works, performance tasks and quarterly assessments. Unlike the previous grading system which gives greater weight to examinations, the new grading system focuses on the performance of students.

Extent of Teachers' Utilization of Performance Tasks per Learning Area

The utilization of performance tasks on science is essential because it will help both teachers and students to create a global-wide community of 21st century learners. In order to create a productive classroom, teachers see the need that students come to their own perception of the importance of their performance in class. Furthermore, in order for teachers to gauge learning, they must be able to perform tasks given by the teachers. In performing the said task, students must have the prior knowledge to build upon.

The assessment of the teachers in the extent of utilization of performance tasks in the four learning areas of Grade 10 Science are presented in Tables 4-7.

Earth Science. The relationship between science, our environment, and our everyday world is crucial to each student's success and should be emphasized. The performance tasks given by the teacher should drive instruction. Hands-on, student-centered, and performance-based approaches should be the emphases of instruction. Table 4 presents assessment of Grade 10 science teachers in the extent of their utilization of performance tasks in earth science.

As manifested in the table, the teachers utilized to a great extent is the activity about plate boundaries through an illustration which ranked first among the 12 items with a weighted mean of 3.78. It implies that teachers usually used illustration such as posters, cartoon, and drawings as a performance assessment when tackling about different plate boundaries.

Table 4. Teachers' Utilization of Performance Tasks in Earth Science

Earth Science	Weighted Mean	Verbal Interpretation
1. Describe the different types of plate boundaries through illustration	3.78	Great Extent
2. Describe the distribution of active volcanoes, earthquake epicenters, and major mountain belts through group reporting	3.61	Great Extent
3. Explain the different processes that occur along the plate boundaries through small group discussion	3.59	Great Extent
4. Describe the internal structure of the Earth through a model	3.57	Great Extent
5. Describe the possible causes of plate movements in a class discussion	3.57	Great Extent
6. Locate the trenches, active faults and fault system using the Philippine map	3.55	Great Extent
7. Describe the location between the location of the Philippine trenches and fault systems	3.55	Great Extent
8. Demonstrate ways to ensure disaster preparedness during earthquakes, tsunamis, volcanic eruptions and other natural disasters through role play/skit	3.53	Great Extent
9. Develop an emergency response system adapted to locale in case of the occurrence of natural disasters	3.45	Moderate
10. Suggest ways by which students can help the government in reducing damages due to natural disasters through an essay	3.39	Moderate
11. Make a sea-floor spreading model	3.14	Moderate
12. Enumerate the lines of evidence that support plate movement through an essay	3.10	Moderate
Composite Mean	3.49	Moderate

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It conforms to the idea of Killen that learning of science becomes more exciting and provides a productive use of leisure time. When the students participate in various activities, such as making charts, illustrations, and models. , thus leading to the enhancement of students' creativity and better understanding of scientific concept in an artistic way.

Having weighted means of 3.61 and 3.59 , ranked second and third in the distribution were performance tasks done in group such as reporting and group discussion which were both utilized by teachers to a great extent. Seemingly, teachers are fond of giving tasks to the students that will develop other skills that can be acquired only through group activities such as planning, teamwork, and leadership skills. This is qualified to the idea of Kegan that science, to be effective must inculcate participation or involvement of students to interact with other students, thus leading to increased cooperative learning.

Similarly, teachers were assessed to have great extent in the utilization of performance tasks that focuses on describing and demonstration skills of students. This was shown in the weighted means ranging from 3.53 to 3.59 which ranked fourth to eighth among the twelve tasks. These indicate that describing and demonstrating skills among students were developed by teachers through tasks that will challenge the students to explore earth science topics in depth. Also such activities like role play/skit helps students recognize the relevance of various science topics to real life.

On the other hand, the weighted means of 3.45 and 3.39 shows performance tasks in earth science that were utilized by teachers to a moderate extent and focuses on the planning and analytical skills that may be developed among the students. As seen in the table, activities such as developing an emergency response system and suggesting ways on reducing damages during natural disasters require the students to think and plan first before they can come up with the expected output.

Similarly, teachers were assessed to utilize performance task such making of models to a moderate extent having a weighted mean of 3.14. This implies that for teachers, science teaching and learning are didactic and theoretical therefore students seldom engage in hands-on/practical activity. In addition, it can be attributed to the availability of materials to be used for the model that will be made since those are personal expenses of the students. As affirmed by Atienza, lack of materials and inadequacy of facility were moderately serious problems for both teacher and students to be able to perform the required task for a certain topic.

Lowest rated by teachers among the performance tasks given in Earth science was the enumeration of evidences through an essay with a weighted mean of 3.10. The teachers have moderate extent of utilization of this task. It denotes that teachers may other tasks that can be given to students aside from writing an essay for the students to be able to present evidences regarding certain science phenomena. This is relative to the idea of Fraser which suggested that educators must provide more than one opportunities to students if they are not successful in inculcating important science concepts.

As a whole, the composite mean of 3.49 is an indication that performance task in earth science were utilized to a moderate extent as assessed by the Grade 10 science teachers. The concepts learned by students in this component of science will prepare them to tackle more abstract concepts in Earth science in their higher grade levels.

Physics. In learning Physics concepts, teaching should be based on the principle of learning by doing in order to provide maximum involvement among the students to explore the field through first hand experiences. The assessment of teachers on the extent of utilization of performance tasks in physics is presented in Table 5.

As presented in the table, the teachers utilized to a great extent the activity on the comparison or wavelengths through an illustration having a weighted mean of 3.57 and ranked first in the distribution. This is a clear indication that teachers are fond of giving task that will showcase students' creativity while learning the concept. This conforms to the idea of Reid that the more students enjoy the tasks, the more they can showcase their skills towards greater freedom and individual discovery.

Having a weighted mean of 3.55 was the activity about locating and labelling parts of a mirror in which teachers also utilized the said activity to a great extent. This indicates that teachers used such activity for the students to enhance the retention of concepts through locating and labelling activity. The students in this activity can specifically point out the exact parts of a certain object given together with the function of each part. This result is in line with the study of Feldsine which indicated that students had clear picture of concepts and had a unified understanding of each concept if they able to pinpoint / locate what is asked from them.

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Table 5. Teachers' Utilization of Performance Tasks in Physics

Physics	WM	VI
1. Compare the relative wavelengths of different forms of electromagnetic waves through illustration	3.57	Great Extent
2. Locate and label the parts of a mirror	3.55	Great Extent
3. Apply ray diagramming techniques in describing the characteristics and positions of images	3.47	Moderate
4. Describe the image formed by curved mirrors at different positions through simple laboratory activity	3.43	Moderate
5. Prepare a presentation that will include the difference between a plane mirror and a convex mirror	3.37	Moderate
6. Cite examples of practical applications of different regions of electromagnetic waves in a class discussion	3.33	Moderate
7. Explain the operation of a simple electric motor and generator	3.29	Moderate
8. Devise a simple telescope applying the properties of mirrors and lenses	3.24	Moderate
9. Identify electrical devices that make use of motors	3.22	Moderate
10. Demonstrate the generation of electricity by movement of a magnet through a coil	3.12	Moderate
11. Prepare a brochure on how the concept of balance, stability and equilibrium help to have safety in performing activities	3.08	Moderate
12. Prepare a pamphlet/brochure containing tips on how to handle/ use electrical devices	3.02	Moderate
13. Design and construct a simple mobile using the concept of balance, stability and equilibrium	2.82	Moderate
Composite Mean	**3.27**	**Moderate**

Having weighted means of 3.47 and 3.43, ranked third and fourth in the distribution were performance tasks that require application of the concept learned such as creating a diagramming techniques and conducting a simple laboratory activity which were both utilized by teachers to a moderate extent. Seemingly, students elicit more interest in practical work application rather than simple class discussion.

Similarly, activities such as preparing a presentation, devising a simple equipment, coming up with a brochure are the tasks that teachers utilize to a moderate extent. The obtained weighted means ranging from 3.08 -. 3.37 ranked fifth to eleventh in the rank order distribution. This is an indication that science teachers may use different tasks that require a tangible output from the students and at the same time facilitate better understanding of physics concepts.

In addition, with a weighted mean of 3.02, another performance task which teachers utilize to a moderate extent is for the students to prepare a pamphlet. This task also requires the student to produce concrete output. Yet, before they can come up with a quality product, they should have the scientific knowledge needed in the said task. The result could be because there is other task which can be given to students without requiring so much time and resources in the part of the students since preparing a pamphlet needs materials and more time performing the task compared to other. As revealed by those who have been interviewed at Sovereign Shepherd School of Values and Learning, performance tasks which requires students to bring the materials are sometimes difficult to utilize since these are personal expense of students. Likewise, this type of task requires much time that sometimes of the teacher gives insufficient time to do the task, the expected output will not be met and the use materials were not maximized because of time pressure for the students to submit on the allotted time.

Likewise, the task which requires the student to design and construct a simple mobile has a weighted mean of 2.82 and was ranked lowest. This implies that this kind task was moderately utilized by teachers also due to materials and time needed to complete the task. Another constraint in utilizing this kind task is the competence of both teacher and students to design a mobile. This is in consonance with Olivier's observation that the success of performance-based learning depends on how well it is understood. It is necessary that educators must be involved in trainings to understand the ways and approaches on how the set tasks will be performed by the students and also how those will be assessed. It will be very difficult in the part of the learner to perform a task if the teacher himself/herself does not how the task will be done.

The composite mean of 3. 27 justifies that teachers utilize the performance tasks in Physics to a moderate extent. It indicates that the students were given wide opportunities to learn physics through varied performance tasks.

Biology. Concepts in biology is designed to continue student investigations of the life sciences and provide students the necessary skills to be proficient in biology. The content standards include more abstract concepts such as the interdependence of organisms, the relationship of matter, energy, and organization in living systems and the behavior of organisms. Students

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investigate biological concepts through experience in laboratories and field work using the processes of inquiry. Table 6 reflects the extent of teachers' utilization of performance tasks in biology.

As seen in Table 6, the tasks on transcribing and translating DNA ranked first with a weighted mean of 3.43. This shows that teachers utilize the said task to a moderate extent. The results revealed that mastery on translation and transcription is an essential skill that students should learn. Such task is also given to students for them to fully understand the way scientist works. This affirms the concept of Akinbobola that the shift from teacher-centered method of teaching science to student-centered activity based method encourages and develops in the child the spirit of analysis and inquiry.

Two performance tasks got a weighted mean of 3. 37. Both imply that teachers utilize these tasks to a moderate extent. The given tasks of enumerating examples through a group discussion and identifying organisms through outside classroom observation help the students develop their curiosity, honesty, openness and other scientific attitudes that they are encouraged to have. They are expected to exhibit the said traits through group and outside activities. This conforms to the idea of Gere that outside the classroom experience is also an effective way to learn science. Using experiential approach, the students discover, create and figure out things. As revealed by the Grade 10 Science teacher of McKinley Hill School, performance tasks which requires students to go outside the classroom heighten students' interest and engagement on the required task. Thus, high level of participation in the given task can be seen.

Having a weighted mean of 3.25 and ranked fourth in the distribution is the task of completing a concept map. The teachers utilized this task to a moderate extent. Concept mapping was useful in enhancing meaningful learning and students' conceptual understanding. It can also serve as a guide for students for new concepts to be learned.

Likewise, teachers utilize to a moderate extent the performance tasks such as illustrating, constructing a graphic organizer writing an essay, preparing a wet mount, making a scrapbook and observing as affirmed in weighted means ranging from 2.98 – 3.16 and ranked fifth to tenth, respectively. The mentioned performance tasks require the students to think and ask questions, understand and explain science ideas.

In addition, with a weighted mean of 2.96, another performance task which teachers utilize to a moderate extent is for the students to observe cases of variation through an experiment. This affirms the concept of Howell that Science provided intellectual training at the highest level-not the deductive logic, but the inductive process of observing the natural world and drawing conclusions from it. Students would learn this way of thinking by carrying out independent inquiries and investigations.

Ranked lowest is the performance task which requires the student to conduct an interview with females regarding their menstrual pattern. With a weighted mean of 2.45, it shows that teachers utilize the given task to a least extent. The result could be due to alternative ways on understanding the menstrual pattern without having to conduct an interview with them.

Table 6. Teachers' Utilization of Performance Tasks in Biology

	Biology	WM	VI
1.	Transcribe and translate DNA sequences	3.43	Moderate
2.	Give examples of hormones and their effects through group activity	3.37	Moderate
3.	Identify the producers, consumers, and decomposers in a particular biotic community through outside the classroom observation	3.37	Moderate
4.	Complete a concept map on human reproduction	3.25	Moderate
5.	Trace the direction of a nerve impulse through illustration	3.16	Moderate
6.	Construct a graphic organizer to show the relation between the endocrine system and human reproductive function	3.12	Moderate
7.	Write an essay on the importance of adaptation as a mechanism for the survival of a species	3.10	Moderate
8.	Prepare a wet mount of the DNA	3.04	Moderate
9.	Make a scrapbook that illustrates how human activities negatively affect the stability of an ecosystem	3.00	Moderate
10.	Observing a wet mounted DNA under the microscope	2.98	Moderate
11.	Observe cases of variation in plants, animals, and humans through experiment	2.96	Moderate
12.	Conduct an interview with females regarding their menstrual pattern	2.45	Least
Composite Mean		**3.10**	**Moderate**

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As revealed by the Science teacher of Christ the Lord Institute Inc., conducting an interview regarding a topic which is nearly awkward especially for males, makes it hard for her to utilize the given performance task though certain skills such as communication and interpersonal skills could be developed when this type of tasks will be utilized.

As a whole, the composite mean of 3.10 is an indication that teachers utilize the performance tasks in biology to a moderate extent. The respondents believe that students are taught to enable them to understand science principles and facts and to develop skills and processes of science investigation. This affirms Deboer's statement that scientific content should be meaningful and is taught in a way that students are able to comprehend, appreciate and relate it to real life especially lessons in biology which is a life science.

Chemistry. The Chemistry curriculum is designed to continue student investigations of the physical sciences. This includes concepts such as the structure of atoms, structure and properties of matter, and the conservation and interaction of energy and matter. Students investigate chemistry concepts through experience and activities inside and outside the classroom.

As manifested in the table, the teachers utilized to a great extent are the activities on solving problem about gas laws, mole concept and proportion of elements. All the three performance tasks have a weighted mean of 3.88 which shows that teachers utilize problem solving activities to a great extent. This kind task helps the students analyze scientific data via calculations. This performance task is usually utilized by teachers hoping that students will be able demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations. These findings conform to the idea of Killen that it is vital to equip students with the skills they need to solve different scientific problems. Solving problem can engage and motivate students to develop deeper understanding through applying ideas to real-world situations. It also actively engages learners and helps teachers to gain a better understanding of the abilities of the students.

Having a weighted mean that ranges from 3.51 to 3.71 are performance tasks that requires creativity and analytical skills. These tasks were also utilized by teachers to a great extent and ranked fourth, and fifth, respectively. Models play a crucial role in science practice. One justification for their inclusion in science teaching is that they contribute to an 'authentic' science education, where teaching reflects the nature of science as much as possible.

Likewise, another performance tasks which requires analytical and computation skills were ranked sixth and seventh, respectively. Having a weighted mean of 3.20 and 3. 39, both were utilized by teachers to a moderate extent. Seemingly, teachers consider these tasks to enable students visualize, articulate, conceptualize or solve both complex and uncomplicated problems by making decisions that are sensible given the available information.

Table 7. Teachers' Utilization of Performance Tasks in Chemistry

Chemistry	WM	VI
1. Solve problem sets on gas laws	3.88	Great Extent
2. Solve problems involving mole concepts	3.88	Great Extent
3. Determine the proportion of elements when they combine to form different compounds, given their masses through problem sets	3.88	Great Extent
4. Make a model of DNA and RNA using recyclable materials	3.71	Great Extent
5. Analyze the food pyramid by enumerating the molecules that make the different food group	3.51	Great Extent
6. Analyze nutrition labels through calorie computation of biomolecules	3.39	Moderate
7. Prepare a sample one-day meal plan considering the different biomolecules	3.20	Moderate
8. Identify the gas produced in the given reaction through simple laboratory experiment	3.18	Moderate
9. Investigate Boyle's Law through a laboratory set-up	3.10	Moderate
10. Measure the speed and reaction between a metal and a dilute acid through a laboratory experiment	2.78	Moderate
11. Present chemical reactions involved in biological and industrial processes affecting life and the environment through a powerpoint presentation	2.78	Moderate
12. Test solutions for their ability to conduct electricity through a laboratory experiment	2.71	Moderate
13. Demonstrate how chemical reactions can produce electricity by making a voltaic cell	2.51	Moderate
14. Demonstrate how electricity can produce chemical reactions through an electrolysis setup	2.49	Least
Composite Mean	3.21	Moderate

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On the other hand, having a weighted that ranges from 2.51 - 3.18 are performance tasks that focuses on conducting laboratory experiment. The result shows that teachers also utilize these tasks to a moderate extent. With these, teachers see the need for the student to engage in tasks that are inquiry-based, where students can design and conduct a scientific investigation and will enable students to use appropriate tools and techniques.

However, lowest in the rank is another performance task that is done in the laboratory and also requires analytical skill. Having a weighted mean of 2.49, this shows that teachers utilized this task to a least extent. The result may be due to a number of factors. First is the availability of materials in the laboratory to execute the given task. Another factor is the allotted time to perform the said task. Teachers used other ways for students to see that electricity can really produce chemical reactions without having to perform an experiment that will require much time and materials. This conforms to the study of Katcha that one major aspect of Science education that is of great concern is in the area of availability and effectiveness of use of specialized and relevant science equipment, facilities and instructional materials. The school laboratories that are well designed, stocked and safe for teaching and learning of science ensure active practical exercises.

To sum up, the composite mean of 3.21 is an indication that performance task in chemistry were utilized to a moderate extent as assessed by the Grade 10 science teachers.

Table 8 shows the difference on the extent of utilization of performance tasks in learning areas of Grade 10 Science.

Table 8. Difference on the Utilization of Performance Tasks by Areas

Learning Area	Earth Science	Physics	Biology
Earth Science	–		
Physics	–0.215*	–	
Biology	–0.382*	–0.167*	–
Chemistry	–0.272*	–0.057	0.110

**The mean difference is significant at 0.05 level of significance*

$F_c = 15.153$ p-value = 0.000

The table above shows that at 0.05 level of significance, the mean difference of -0.215 shows a significant difference between the utilization of performance task in Earth Science and Physics. Likewise, the mean difference of -0.382 and - 0.272 also implies that there is a significant difference on the utilization of performance task between Earth Science and Biology and Chemistry, respectively. We can also infer from the table that performance tasks in Earth Science are the most utilized among all the learning areas.

Comparing the extent of utilization of performance tasks in Physics to other learning areas, we can infer from the table that the mean difference of 0.167 is significant at 0.05 level of significance between Physics and Biology. The negative sign also indicates that performance tasks in Physics were utilized more than those tasks in Biology. Lastly, the mean difference of – 0.057 indicates that there is no significant difference between the utilization of performance tasks in Physics and Chemistry. Also the negative sign reveals that performance tasks in Physics were utilized more rather than those in Chemistry.

It can also be inferred from the table that a mean difference of 0.110 means that there is a significant difference between the utilization of performance tasks in Chemistry and Biology. It also shows that performance tasks in Chemistry are utilized more than those in Biology.

To sum up, among all the learning areas, performance tasks in Earth Science are the most utilized while those tasks in Biology are the least utilized by Grade 10 Science teachers.

Problems met by Teachers in the Utilization of Performance Tasks

Science teachers also rated the problems they met in the utilization of performance tasks in Grade 10 science. Table 9 shows the assessment of teachers of the given problems.

As presented in the table, having a weighted mean of 3.25 and 2.98, it can be inferred that the teachers often met the problem on the unambiguity of the performance standard set in the curriculum guide and the misalignment of the content standards with the performance standards. This conforms to the idea of Falk that performance standards can support more ambitious teaching and greater levels of success for all students but due to its ambiguity, it can also constrain teaching and professional decision making while creating higher rates of failure for students because the standards lack clarity,.

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Table 9. Problems Met by Teachers in Utilizing the Performance Tasks

Items	WM	VI
1. Unambiguity of performance standard set in the curriculum guide	3.25	Often Met
2. Misalignment of content standards with performance standards	2.98	Often Met
3. Too much time required in assessing the performance task	2.88	Often Met
4. Too much time required in devising performance tasks that are localized	2.86	Often Met
5. Insufficiency of available assessment tool for the given task	2.82	Often Met
6. Vagueness of available assessment tools	2.78	Often Met
7. Inadequacy of time allotted to do the activity	2.43	Sometimes Met
8. Unavailability of materials to be used for the required task	2.31	Sometimes Met
9. Lack of school facilities and/or materials to be used for the activity	2.18	Sometimes Met
10. Lack of interest among the students to do the required task.	2.18	Sometimes Met
11. Difficulty in executing the performance task	2.04	Sometimes Met
12. Lack of clear instruction to do a certain task	1.94	Sometimes Met
13. Lack of knowledge and skills among teachers in assessing performance tasks	1.51	Sometimes Met
Composite Mean	2.47	Sometimes Met

Having a weighted mean ranging from 2. 86-2. 88, third and fourth on the rank are the problems on the time required for teachers to assess the performance tasks utilized and also the time required in devising localized performance tasks or those activities that will only require materials that are available within the locality of the students. Also, another problem that teachers often met is the time required to assess the performance tasks given to students. As revealed by the Grade 10 Science teachers in Sovereign Shepherd School of Values and Learning, they find it hard to utilize some of the performance tasks set in the curriculum guide because the materials needed to perform the said tasks are difficult for the students to bring. Thus, they need to devise their own localized tasks yet the problem is the time required in devising those performance tasks. Moreover, another problem that they also encounter is too much time required to assess a certain performance task before they can come up with an objective assessment.

Similarly, problems such as insufficiency and vagueness of the available performance task assessment tools are also often met by Grade 10 Science teachers. The obtained weighted means ranging from 2.78 -. 2.82 ranked fifth and six in the rank order distribution. This is an indication that science teachers had difficulty in coming up with an assessment tool that is suitable for the performance tasks they have given to their students.

Having a weighted mean of 2.43 and seventh on the rank is the problem of inadequacy of time allotted to students to do the given task. This problem is sometimes met by the teacher. Some performance tasks set in the curriculum guide require so much time to accomplish. Thus, the quality of output of students are sometimes affected since they tend to rush finishing their task just to comply with the deadline set by the teacher.

Likewise, having weighted means of 2.81 and 2.31 are problems regarding unavailability of materials and school facilities needed to perform a certain task. These problems which are eighth and ninth on the rank are also sometimes met by the teachers. It is very difficult both for teachers and students to complete a task if materials and facilities are lacking. In science, hands-on activities are necessary to supplement teachers' instruction inside the classroom and for better students' learning outcomes. These activities require materials that students need to bring. Sometimes, especially if the materials needed are difficult to find or the schools doesn't have the facilities where the students can perform the task, teachers need to find an alternative material or even think of another performance task which can be given to students.

On the other hand, having weighted means of 2.18 and 2.08 are the problems on lack of interest among students in executing performance tasks and difficulty in executing the said task. These problems are also sometimes met by the teachers and tenth and eleventh on the rank. If the students find difficulty in executing a certain task, the quality of their output will be affected and even their interest in performing the task will also decline.

Moreover, having a weighted mean of 1. 94 and twelfth on the rank is problem on lack of instruction from the teacher on how a student will perform a task. It can be inferred from the table that this problem is sometimes met by the teachers.

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Ranked lowest is the problem on lack of knowledge and skills among teachers in assessing performance tasks. Having a weighted mean of 1.51, it can be inferred that this problem is sometimes met by the teachers. The result conforms to the study of Bowles that before the teacher move to develop assessment tools, they must take time to consider whether the assessment methods selected are able to meet the principles of assessment: valid; reliable; flexible; and fair.

The composite mean of 2.47 means that the problems listed above were sometimes met by Grade 10 science teachers.

Developed Performance Task Assessment Tools for Grade 10 Science

The developed performance tasks assessment tools provide the congruent needs of teaching and learning process where students are expected to engage in different performance tasks that could arouse students' active involvement with the new curriculum that is relevant, performance-based and learner-centered in the four learning areas of Grade 10 Science: Earth Science, Physics, Biology, and Chemistry. These included assessment tools that would enhance the performance of students in Science.

Assessment tools contain both the instrument in the form of rubrics and the instructions needed in gathering and evaluating the evidences in an assessment processes. Teachers need to understand the ability of the tool which includes its capacity and limitations to be able to adapt those tools to meet the particular requirements of the task at hand. These measure students' competencies based on the set of criteria.

To ensure that the assessment tools are consistent, these must be reviewed by other teachers prior to usage. Positive feedback is a confirmation that the tool is effective and appropriate. On the other hand, differences of opinions provide an opportunity to discuss and resolve any ambiguities and vagueness before the assessment tools are used. With this, it will enable to evaluate the suitability of the time allowed for assessment tasks and the tools' overall effectiveness.

Covered tasks on the prepared tools were creating a model, writing an essay, designing a brochure/pamphlet, constructing a simple mobile equipment, performing a laboratory activity on different topics, demonstrating and preparing a laboratory set-up, and conducting an interview.

CONCLUSION AND RECOMMENDATION

Performance tasks is one of the most used strategies since this addresses the need to have students who are globally competitive. Performance tasks help students to create products or perform tasks to show their mastery of particular skills. Various performance tasks are designed to assess not just the knowledge and mastery of learners regarding concepts but also to gauge how those concepts can be used in real life setting.

Moreover, the highest level of assessment focuses on the products or performances which students are expected to produce through authentic performance tasks. Performances should be reflective of what teachers want students to be able to do with their learning. They are evidence of what teachers want students to tell them or demonstrate in real life that they can make of what they have learned in different subjects.

The findings are intended to be used as a springboard to develop assessment tools for the given performance tasks in Grade 10 Science. Different performance task assessment tools were developed to provide for the corresponding needs of teaching and learning process where students are expected to perform different activities in the four learning areas of Science. In addition, the study will serve as a baseline for the improvement of the current strategies and evaluation tools used to assess the performance of students.

This would also serve as venue for evaluation in terms of assessment used in class and will also serve as a leeway for empowering teachers through involvement in continuous professional enhancement seminars and activities that focus on assessing the performance of students. A further study may be conducted focusing on the assessment tool that may be developed for performance tasks given to other grade level or even for other subjects.

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