Assessment Tools used in Teaching

Prepared for
The Mother's Service Society

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Learner Map

Grade Level – 7th Grade Life Science
Unit - Evolution
Big Idea – Adaptations are traits that help an organism survive and reproduce in a

particular environment, and the inability to adapt can lead to extinction.

Levels of Student Understanding	Instructional activities/plans	Assessment Activities
Level – 7 Sub idea - The causes of extinction hinge on loss of habitat, lack of genetic diversity, and the inability to adapt. TSWBAT design an organism that can adapt and survive. Students will justify their rationale by providing evidence.	**Group activity** – Design an organism and its adaptations based on the habitat, change of environment **Direct instruction** – Debriefing the main ideas – adaptation, extinction, types of adaptation	Performance based assessment using a rubric – Students will demonstrate their knowledge by presenting their design to the whole class. Students will complete their graphic organizer to summarize all the important ideas.
Level – 6 Sub idea - Organisms that cannot adapt may become extinct. TSWBAT identify the factors responsible for extinction.	**Group activity** – Students investigate the factors responsible for extinction through a simulation activity. **Class discussion** – What are the factors that are responsible for extinction?	Students arrive at conclusions and answer the guiding questions after completing the activity. Students share their ideas about factors that are responsible for extinction.
Level - 5 Sub idea -Adaptations can also be behavioral – example - floating nests TSWBAT analyze the different types of adaptations. Students will also be able to explain behavioral and structural adaptations.	**Video clips** – to show the behavioral adaptation in organisms **Class discussion** – How is behavioral adaptation different from structural adaptation?	Students work in pairs and make posters about the types of adaptations. Students also provide illustrations and examples. Students respond to the prompt and write the distinctions between behavioral and structural adaptation.
Level -4 Sub idea - Adaptations can be structural – Camouflage,	**Brain storming** – students share their prior knowledge about camouflage and mimicry **Visuals** – Students examine the pictures and predict the	Test – Students will check their pre-reading test and write the correct responses. Students will create foldables to include all the new vocabulary words and

mimicry TSWBAT explain structural adaptation and provide examples.	adaptation. **Direct instruction** – Teacher correct if there are any misconceptions and explain the adaptations	definitions.
Level-3 Sub idea - Adaptations start out as changes in the DNA that create some advantage to	**Adaptive advantages – Virtual Lab** – Students investigate the effects of mutations that give some organisms adaptive	Students complete their lab worksheets and write their conclusions about adaptive advantages.

the organism in the environment. TSWBAT analyze the effects of mutations and adaptive advantages. Students will describe the effects of mutation on adaptation.	advantages. Students also examine the environmental changes for several generations. **Class discussion** – How does mutation help in creating adaptive advantages for some organisms?	Students write their response to the prompt about mutation and share their answers.
Level - 2 Sub idea - Traits that help an organism within a species to survive are adaptations. TSWBAT identify the reasons for adaptation among organisms. Students will also make conclusions after watching the demonstration.	**Demonstration** – Adaptations of aquatic and desert organisms **Brainstorming** – Why do organisms adapt? Refer to the conclusions from the demonstration	Students write their conclusions about the two organisms and their adaptations. Students complete a quick write to main idea and add the details.
Level –1 Students use their prior knowledge to answer the pre-reading questions about adaptation.	**Pair share** – Students answer the pre reading questions about adaptation Class discussion – Students share their answers for the pre-reading questions.	Warm–up question about Natural Selection – to elicit students' prior knowledge Diagnostic Assessment – Pre-reading questions about adaptation to identify misconceptions

DESIGN AN ANIMAL Exhibition

Grade level – 7th Grade life Science

Objectives & Levels of Student Understanding targeted in this Performance Task

Levels of Student Understanding

Learner Map - Level – 7. Students who can design an organism that can adapt and survive. Students will justify their rationale by providing evidence. They understand the idea that - The causes of extinction hinge on loss of habitat, lack of genetic diversity, and the inability to adapt.

Objectives

TSWBAT

- Design an animal and explain their rationale in regards to the adaptations of their animal.
- Demonstrate their knowledge about the concept of adaptation by presenting their model to the whole class.

Science Standards

1. Students know that extinction of a species occurs when the environment changes and the

1. Students know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.
2. Construct models, maps and appropriately labeled diagrams to communicate scientific knowledge.
3. Communicate the steps and results from an investigation in written reports and oral presentations.

Purpose

The main purpose of the assignment is to provide an opportunity to the students to apply the content knowledge to a new scenario. (Nitko ,pg # 251 , 4th Edition) In addition, the tasks involved require the students to make cross-curricular connections (art – creating a model, language arts- providing a rationale in written format as well as presentation)

Time allotted

The students are expected to turn in the project in one week.

Accommodations

The language learners have a template with sentence starters to answer the guiding questions. Also, the EL students and RSP students have a choice to present their model in pairs or individually. In addition, language learners also receive guidance in listing the choice of animals, materials needed for the project etc. The gifted students have the option of creating an environment for their animal, instead of choosing of one of the options given.

(*) Not for student use.

Description of item tasks

Background Information: It is the future, the year 3000, and it is now possible for humans to build planets, and genetically engineer or create plants and animals to live on that planet. You are one of the scientists working on the animals, and it is your job to design and create an animal, which will be perfectly suited to its environment on this new planet.

Task (Complex thinking and information processing learning targets): You need to pick one of the following environments of already created planets and create an animal, which is going to be strong and resilient enough to survive in that environment. You need to consider the following guiding questions, while writing your rationale.

- how this animal is going to stay warm or cool,
- what it is going to eat,
- how it is going to get its food and water, and
- how it is going to care for its young to make sure they survive.
- Your animal must FIT INTO the existing food chain - it cannot be the ultimate predator (the one which can eat everything else and nothing can eat it).

Content Learning Target

Vocabulary that needs to be included – Adaptation, survival, specifications regarding the type of adaptation – structural (camouflage and mimicry), behavioral (nesting, herding etc) , environment, habitat

You may select one of the following environments or create your own.

1: This planet is dark and cold most of the time. It is very mountainous. It rains almost all day. Because of the wet, dark conditions, the only plants that grow well are small mosses and funguses. Animals on this planet include a type of mouse, a nocturnal hunting large cat, fish, and a variety of insects.

2: This planet is dry and hot. Most of the planet is flat. Water is found in underground streams but there is little water on the surface of the planet. Most of the planet's surface is covered in sand, although there are patches of dry grass. When plants can get their roots down into the water table, they grow into tall trees with leaves at the top but not along the trunk. Plants, which are not connected to the water table, are small and dry, but they are edible. Animals on this planet include insects, a species of birds, which roost in the high trees, a sand-colored lizard and a type of rat.

3. This planet is tropical: wet and hot. Most of the planet is covered by rainforest. The planet is very flat. Water collects in large pools and lakes, which have water in them all year 'round. A species of poisonous plant grows thickly on the ground. The spines of this plant are poisonous, and any animal, which steps on one, is sure to die. The vegetation is plentiful, and includes leaves, fruits and nuts. Animals include carnivorous snakes, varieties of insects, monkeys, fish and birds.

4. This planet has a moderate climate. It never gets very hot or very cold, but stays mild all year 'round. It rains for part of the year and the water forms pools and lakes, which dry up towards the end of the year and then the planet is very dry. The planet is partly mountainous and partly flat. Vegetation includes tall trees with high leaves and fruit, and

a smaller plant, which bears nuts. However, these nuts are inside hard shells, which need to be removed before the nut can be eaten. Animals include rats and mice which live underground, insects, birds that nest in the tall trees, slow moving mammals which also live in the trees and a species of carnivorous nocturnal wolf.

Effective Communication Learning Targets

You will present your model individually or in pairs and explain your rationale to the rest of the class.

Habits of Mind Learning Target

Your ability to elaborate the plans involved in creating the model and communicate your conclusions.

Exit interview questions

Q. What was the most interesting aspect of the project? Why?

Q. Were there any challenges (problems) while you were working on the project? How did you resolve it?

Q. Did you think you had enough time? Did you need more time or less time to complete the model?

Q. How do you think you did on the project?

(Circle only one box)

Below average	Average	Good	Excellent

Rubric used for assessing student work

Criteria	1	2	3	4
Content Demonstration of Content knowledge	Needs to demonstrate understanding, improve accuracy	Demonstration of understanding is partial and inaccurate	Demonstration of understanding is substantial and generally accurate	Demonstration of understanding is accurate and thorough
Rationale Ef**fectiveness of the rationale used in the design**	Logic needs to be error free and relevant	Logic needs revision but satisfactory	Logic used is evident and appropriate	Logic used is flawless and justified
Presentation	Needs to use the model to communicate ideas. needs to use supporting details	Limited use of model to communicate ideas Limited use of supporting details.	Uses the model as a tool to communicate ideas. Speaks in generalizations or has few supporting details.	Uses the model as a tool to skillfully communicate his or her ideas to others. Refers to specific science concepts and details.
Product	Ineffective organization strategies; relevant details missing	Somewhat organized; missing information	Neat and effective design; generally organized to include all the details	Well –crafted and creative design; all the details skillfully organized

Rationale for Rubric

Defining the purpose and context of assessment

The purpose of the assessment tool is to assess student learning and also to provide feedback to the students about their work. The rubric will be used to evaluate the content mastery, oral presentation, quality of the design, and the rationale. This will be a summative assessment of learning. The scoring strategy is to use the performance indicators mentioned above and evaluate student work. The task is a performance-based assignment (design an animal) that has a paper and pencil component as well. The students respond to the guiding questions and use the key vocabulary words pertaining to the lesson. The students are expected to extend their knowledge of adaptation and create an organism, explain the adaptations and justify their designs. The rubric is used not only to provide feedback to students and parents but also as a guide that might help students to improve their performance. A well-designed rubric will provide specific information about the performance expectations at the proficient level (at grade level).

Identifying the targets of scoring

The assessment addresses the science standards as well as the learning targets specified in the learner map. In addition, the assessment addresses literacy standards (listening, oral communication, content vocabulary development) as well. The students will be able to design an animal based on their knowledge about the concept of adaptation. Students will justify their model by explaining the adaptation of the animal they have created. The task addresses higher order thinking skills in

Bloom's taxonomy such as analysis and synthesis. Students analyze the concept of adaptation and synthesize to create their own design. The

assessment tool also takes into account the procedural skills such as oral presentation in front of the whole class.

Describing the Scoring tool format

The rubric is used to score constructed responses, which includes the rationale, presentation and the design itself. It is an analytic rubric, where more than one criterion will be evaluated (Nitko, pg# 264, 4th edition). In this rubric, there are four criteria and each component will be evaluated separately. This rubric is different from holistic rubrics, where the product is evaluated as a whole and the various components or aspects are not taken into consideration. Analytic rubric also gives the students and the teacher an opportunity to identify students' strengths and areas that need improvement. (Nitko, pg# 264, 4th Edition)

The task involves an open-ended response section in addition to creating an organism. There will be no answer key. However, in the response section, students are expected to use the key vocabulary. The answers will be different since it is based on the organism they have created. The rubric will also assess the oral presentation and the quality of the model. The oral presentation should include the rationale that will justify the design. The students are also expected to include relevant terms such as structural or behavioral adaptation – specify the types, environment they have chosen etc. The students can choose the environment based on the task guidelines or create an imaginary environment.

Describing the system for categorizing responses and awarding credit

The student responses will be evaluated and categorized into four levels. The levels vary from exemplary, proficient, developing, and yet to develop. Student work will be evaluated based on the content mastery, rationale, presentation, and the quality of the model. This will give an

opportunity for the students to analyze their strengths and areas of improvement. If there is a category that all students performed well/ did not perform well, it might be useful information to the teacher.

The items will be scored based on the four performance evaluators described in the rubric. Also, partial credit will be awarded to responses that are not quite accurate, yet have followed some of the guidelines and addressed the task. For instance, some students have not fully explained their rationale by including all the relevant vocabulary words. Nonetheless, they have attempted to include theory to justify their rationale. While presenting their design, some students missed the information regarding the environment or did not use the content vocabulary etc. The students were still awarded credit for the information that have included.

Applying criteria for what makes a good scoring tool

The rubric has four criteria that is used for assessing student performance. The rubric shows a degree of variation between the four levels (yet to develop – exemplary). This might make the expectations more transparent to the students . I have used the topdown approach, where a 'conceptual framework describes the performance and content' that will be assessed. (Nitko, pg # 266, 4th Edition). Based on the readings and discussions, I learned about the criteria for designing a good quality rubric. Too specific or narrow categorization, vague language, negative language descriptors are some of the elements that I have avoided. On the contrary, use of positive language descriptors, clarity in describing the criteria are some of the elements I have included in the rubric.

Understanding Quality Control: Validity and/or reliability evidence

The scoring tools are designed based on the content that was taught in class. Hence it accounts for content relevance. Content relevance is in turn a measure of validity. I am using a learner map and I have tried to design my rubric in alignment with the learner map. This accounts for the validity. The interpretations about student learning and thinking will be meaningful since the instructional practices are in alignment with the assessment practices.

Dr. D's Law of Reliability suggests that "all else being equal, the more observation items we gather

in the classroom, the more consistent a picture we get of true student understanding." In this case, I have tried to collect information addressing content mastery, extension of knowledge (of the topic), rationale that supports the design etc. This will provide sufficient information about student understanding.

Conclusion/Reflection

Creating a rubric after considering all the requirements of a quality rubric is easier said than done. I had to ensure that I use positive language descriptors, use appropriate criteria that can actually assess student performance. I wanted to ensure that the rubric would be a guide for the students and give the students an opportunity to evaluate their own work.

The assessment provides an insight into student thinking in regards to the topic adaptation. The task demands the use of higher order thinking and constructing new schemes based on the prior knowledge. The assessment will be helpful in understanding the students' mastery of the concepts. The exit survey can be used for further validation study and might be used to improve the task guidelines and the rubric.

Exhibition - Performance Based Assessment

Exhibition – Performance Based Assessment

Introduction

* **The performance-based assessment is a summative assessment to determine student learning and understanding of the concept of adaptation.**
* **The evaluation is based on a rubric, which will assess the content mastery, logic involved in the design, presentation, and the model animal created.**
* **The assessment focuses on the ability of students to extend and apply their knowledge about adaptation and extinction.**

Definition

* **Validity refers to the meaningfulness of the assessment practices and it depends on the purpose for which the assessment results are used.**
* **Validity of an assessment tool can be determined by analyzing the categories of validity evidence. (Nitko, pg # 56, 4th edition)**

Categories of Validity Evidence

* **Content representative ness and relevance – This can be obtained from the learner map that was designed for this particular unit.**
* **Types of thinking and processing skills required (substantive evidence) – This assessment demands the use of higher order thinking skills. The quality of the product and performance are assessed.**
* **Practicality evidence- The assessment procedure was easy to administer and the theoretical concepts in the assessment procedure reflect student understanding. The rubric gives evidence to explain the individual differences meaningfully.**
* **Internal structure evidence – The task is broken down into four components and each component is assessed using a set of well defined criteria.**

Evidence

* **How can it be demonstrated?**
* **Validity evidence can be obtained from learner map, since a learner map provides information about levels of understanding and information about instructional practices.**
* **What is my evidence for it?**
* **The learner map designed for this unit on adaptation has performance assessment task as summative assessment. The assessment practices are aligned with the instructional practices.**

Validity Evidence

* **Why does it matter to my assessment practice?**
* **The summative assessment gives a chance to understand student learning and mastery of the concepts.**
* **The assessment is valid since it allows students to show their concept**

mastery in multiple ways. For instance, the students respond to the guiding questions, create a model and present their design to the class.

Quality of the Assessment Tool

* **The assessment tool used is of high quality since it fulfills the requirements of a high quality assessment tool.**
* **The assessment tool involves a rubric based on a set of well-defined criteria. It also involves open-ended, hands-on task that involves higher order thinking skills.**
* **The assessment also allows the students to use multiple skills such as writing, presenting, designing a model etc.**

Conclusion

* **Based on the evidence gathered to assess the validity, the assessment tool can be considered valid.**
* **Nonetheless, there are some components that can be further improved to enhance the clarity, especially for language learners. Including graphics as part of the prompt would have reduced the cognitive load for visual learners and EL students.**

Reflection

* **One thing I enjoyed/did well – using the learner map and theory to justify the validity of the assessment tool.**
* **One thing that I wish I had done better – I have not included any graphics in my power point.**
* **Other – The scaffolds (notes, text book references, class discussions) were extremely useful.**