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Unit Assessment Plan

EDCI 54900 – Assessment in STEM

11/19/2023

Unit Background

The STEM unit I picked was the 9-12: Air Quality InQuiry. The goal of the unit is for students to understand what kinds of things pollute the air. This is done through a lecture lesson and then 5 activities designed for students to be actively taking various measurements about the air. There are several different types of assessments throughout all the lessons. Some of them are worksheets designed to help reinforce the vocabulary and concepts being discussed. The first lesson included a quiz. “No one approach to assessment can evaluate everything that is important in achieving integrated STEM competence” (Douglas et al, 2020, p. 250)

As far as authentic assessment, each lesson had some aspect of authentic assessments. For example, there was an activity in the first lesson where students would safely burn various materials in a controlled environment then record the results. The questions asked at the end went from recalling facts they just observed to contemplating these effects by larger environmental factors (cars driving, factories working, etc.). It is important to make these connections because “...any STEM competency construct must go beyond the recall of isolated, factual knowledge or procedures” (Douglas et al, 2020, p. 235)

This is a thorough and complete unit. There are some performance-based assessments in a quiz at the beginning and a presentation at the end. There are some experiential learning activities that allow students to demonstrate not just knowledge but application of their knowledge. There are also options built into the lesson plans themselves where teachers can choose which assessment they would like to use, thus providing assessment variety based on the needs of the students. As McTighe and Farrara (1994) explain, “[classroom] assessment should (1) promote learning, (2) use multiple sources of information, and (3) provide fair, valid, and reliable information” (p. 5). There is such a wide variety and number of assessments that I do not think this lesson would need improvement or additional assessments.

Assessment

The rubric I’ve created goes along with the Activity 2 Lesson plan, specifically the “Current Event” activity (https://www.teachengineering.org/activities/view/cub_airquality_lesson01_activity2). In this activity, students will read an article from BBC News regarding a policy Paris created stating on specific days, only certain cars can be on the road or be ticketed due to carbon emissions. The assignment is to write a paragraph answering three questions that are listed in the activity.

The type of rubric I chose was an Analytic Rubric (<https://resources.depaul.edu/teaching-commons/teaching-guides/feedback-grading/rubrics/Pages/types-of-rubrics.aspx>). With this rubric, students will be given feedback for each question as well as an overall assessment of their writing. This way the students are also encouraged to practice their writing skills, something that is important with science, especially since this is a discussion about drawing conclusions from facts.

Item	Not observed	It's a Start	Getting There	Understood
Question 1	Question not answered	Response contained no facts or logical reasoning	Fair response with some facts and/or logical reasoning	Well written response supported by facts and logical reasoning
Question 2	Question not answered	One or two references included but from non-academic or non-reputable sources with limited relevance	One or two references included, somewhat relevant	Several references included, all are from academic and/or reputable sources and relevant to the topic
Question 3	Question not answered	Response limited in facts or explanation	Response fairly written, some facts or explanation	Response is relevant and includes reasons supported with explanations and facts
Writing level, grammar, and references	Questions not answered	Incompletely written, needs help with grammar, references not included	Fairly written, few grammar errors, references included but not properly cited	Well written, free of grammar errors, references cited properly
Overall Feedback:				

Purpose and Justification

The rubric will be evaluating the student's ability to articulate a response to a supplied article as well as offering them an opportunity to conduct research of their own. "[Central activities] that are the most successful are those rich tasks that provide students with an opportunity either to extend their understanding of a concept within the text or to 'scaffold' their ideas before writing" (Black et al, 2004, p. 17).

Since this was not explicitly stated that this would be a graded assignment, the rubric does not include a point system, just a gauge of how well they are crafting responses. Plus, as Boaler (2015) comments, "[study] after study shows that grading reduces the achievement of students" (p. 143). The assessment level labels are designed to be positive reinforcements, celebrating the work they did do while also including a category for if the question is not answered. This is because a student may skip a particular question, or think they've answered it but really didn't, and this way they can be shown clearly what was missing. It is then up to the teacher if they would allow for a resubmission.

Feedback

The feedback provided would be a guide for how to craft a well-reasoned argument. This includes grammar and resource quality plus how well they supported their responses. One adjustment that would be made to the initial activity would be to expand the student responses beyond just one paragraph as implied with the instructions. The rubric should be included with the directions so the student have a clear understanding of what is expected. Feedback is important at all levels, including high school, although high school often does not receive feedback. Boaler (2016) describes this from an article by Deevers (2006) who noted that they “found that as students got older teachers gave less constructive feedback and more fixed grading” (Boaler, 2016, p. 147)

References:

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