Cultural Relevancy Assignment #3
STEM Lesson & Assessment

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Lesson Rationale:

I decided to revise this lesson, Mission to Mars, to accommodate the cultural needs of my students due to the rational of past experiences that have proven that not all students are able to grasp content and application as easily as lessons that are tangible because students cannot witness the phenomena first hand, nor can they learn from their mistakes. This lesson forces students to think outside the box, or even outside the Earth in this case, with a difficult viewpoint that requires imagination. With this lesson, the possible mistakes students make cannot be tested, the reasoning is based on outside research, and the situations are all scenario based and cannot be easily related to student's prior experiences. It is also a lesson that students have attested in the past that travelling to Mars is not something they would ever consider doing and it does not relate to their everyday life now, so why should they be required to learn about it? I have experienced that this is a great teachable moment that has allowed me to open my student's eyes and be able to cross-content connect previous knowledge in history and social studies to make connections of the challenges that pioneers have faced in the past, motives for exploration, and possible reasons that may impact human survival on this planet in the future because of detrimental effects of snowballing from direct and indirect human environmental degradation. These scientifically proven detrimental results on Earth that may someday force civilization to evacuate and can also be connected through student's personal experiences and prior knowledge.

Other reasoning for this lesson is the culture of middle schoolers that I have taught in the past possess a mindset that is very much live in this moment. They cannot imagine what life would be like without internet, cell phones, social media, or technology that was not even conceivable twenty-years ago. It is my goal for this lesson to have students try to envision what might be possible in the next twenty-years that we can only dream about today. This leads to my overall essential question of: what are the criteria and constraints that would allow or impede the possibility for humans to establish civilization in outer space. Again, invoking the envision of not what we have available today, but how will technology advance in the future.

Student Background Information:

I will be teaching at a new school next year. The demographics and backgrounds of my students will be assumptions based upon my gathered knowledge and information extracted from Washington State Office of Superintendent of Public Instruction School Report Card. According to OSPI, 49% of students are Caucasian, 20% Hispanic/Latino, 12% Asian, 11% two or more races, 4% African American, 3% Native Hawaiian/Pacific Islander, and 1% Native American. 52% of students are male and 48% of students are female. 43% of students are on free/reduced lunch plans, 9% are enrolled in special education classes, 7% are transitional bilingual, and .1% are migratory families. Additionally, in my district of only four middle schools, in 2017-18 there were over 50 sixth-grade students district wide that were homeless.

Based on those statistics, I will have great diversity and cultural backgrounds in my classroom. There is a likelihood that there will be on average, 5 of 125 of my students will be homeless next year. It will be imperative that that my classroom is a place where students feel safe and have equitable access to technology, information, resources, and extra support when needed academically or personally. I am assuming that many of my students will not have been born and raised in the Olympia, WA region since it is one of the largest growing cities in the nation. I will most likely have students that were born in another country and may need additional assistance understanding science literacy and I need to be on heightened alert to not assume that students all have the same prior knowledge and experiences. I am excited to be able to integrate student's unique attributes into my classroom community.

Multicultural Components: Highlighted Yellow in Lesson Plan

I have revised several components of this lesson to address the cultural needs of my students. I have included three individual components: An Independent Exploration Project, a Reflective Writing Artifact, and a Summative Assessment. One partner STEAM Engineering Project, and one small group project consisting of four students that are assigned roles and will integrate and collaborate ideas formulated from individual student's Independent Exploration Project and incorporate the groups ideas into a Mars Colony Design Project. Finally, I have included two class activities, one is a Class Debate on morality and feasibility of colonizing Mars and the other is a large-scale timeline depicting historic and projected future events of Mars.

Reflecting to our readings and discussions, there are several ideologies that I will be incorporating into this lesson to facilitate equitable learning opportunity for my students. More specifically ensuring non-mainstream learners that may not have had the same upbringing or opportunities as mainstream learners have had, are provided with the background knowledge and resources to make learning equitable. I will incorporate the information I acquired through (Lee, ND) to offer resources through additional support through one-on-one interventions, at lunch or after school availability, or just a list of additional credible culturally available resources to facilitate sense-making practices for my students. Through the array of individual, partnered, small group, and class projects previously mentioned, it is my goal to facilitate a safe, judgment free learning environment that will engage students with rigorous learning, make science personally meaningful, and relevant to their personal and future lives. Through this lesson, students will be encouraged to relate to challenges they have personally faced first hand in their home life, within their community, or third hand through others experiences or media.

Another factor I will be addressing is non-school barriers that I am hoping the trusting relationship that I will be striving to develop with my students will allow us to overcome these challenges together. As discussed in Gonzalez and Kuenzie (2012), this lesson allows approaches to close the gap of non-school factors and learning by allowing students to address some to these challenges they have faced in a non-judgmental fashion and relate them to challenges that may be faced by pioneers on Mars. These non-school factors may include hardships such as lack of food, clothing, comforts, luxury items, self-dependency, isolation, conflict, and family struggles. Lessons such as Mission to Mars, allows students to make a meaningful connection between their everyday lives and science, make correlations to situations they face daily, and become invested, engaged, and create personal identities connected to science that allows them to escape into another world of imagination where the opportunities are endless.

I have experienced that sixth graders especially, developmentally possess an amazing adaptability to learn complex subject matter. This especially holds true when lessons instill a sense of self-efficacy and removes barriers of stereotypical scientists being white males (even though I fall into that stereotype), but words of encouragement especially to female scientists,

students of other nationalities, struggling learners, or students from low-income families helps assist students in finding success. The projects I have incorporated into this lesson allow students choices in method of communication and delivery of investigation, allows for creativity and collaboration, and for differentiation of learning styles. This allows the means of formative assessments does not inhibit students from demonstrating what they have learned in a way best suited for their abilities. The projects that will especially help deliver this strategy are the Individual Exploration Project partner STEAM Engineering Project. This is especially beneficial to my students that are English language learners to ensure assessments are not strictly content based. This also incorporates another criterion for colonization of Mars, since Mars belongs to no specific nation, what will be the language spoke on Mars. Will eventually its own dialect be constructed? This could also be another STEAM project elective, to develop a different language for your Mars colony.

Other factors that impact learning that will be addressed in this lesson is gatekeeping and border-crossing. Gatekeeping is the idea of weeding out students that don't make the educational cut in science. I believe that all students have strengths they need to be able to identify and tap into, especially in group settings, but also be able to have opportunities to test other roles outside of their comfort zone to allow for personal exploration and mindset growth in a non-judgmental and teamwork scenario. This lesson has a group project called the Mars Colony Design Project. Students will either be assigned according to their strengths or possibly in areas in need of developing skills if already attained mastery in other roles from previous projects. The last factor the lesson addresses is border-crossing. This can be a very strong experiential strategy for confidence building in students or detrimental to confidence if not set for success or proper constraints defined by teacher prior to activity. The two activities that will embrace border-crossing and support students unique thinking is the class collaboration projects: Class Debate and Mars Timeline. In the class debate, the students will be assigned a viewpoint on morality of colonizing Mars and they must support that assigned viewpoint through evidence and reason. This allows students to voice their opinion based on their assigned positions and constraints will be enforced to allow individual opinions without the ability to criticize. I have found this is a great option to give students that are not confident in their opinions an avenue to express their voice that leads to further skill building and ability to speak in front of the class

easier in the future. The class Mars Timeline allows more freedom to collaborate but also needs to be done so in an organized matter that allows all students their opportunity to add to the overall finished product and add their own style and not allow students to be passive and not participate or become over controlled by stronger personality types. This exercise facilitated properly will lead to an equitable experience for all class members.

To summarize, the activities I have supplemented this lesson with, I believe will provide my students with a positive and equitable learning experience that is designed to allow for personal interest and experiences of all students regardless of background. Through these engaging activities, students will be assessed on understanding and not strictly facts. This topic will also hopefully spark an interest in STEM, NASA, and the future of space exploration that could lead to a more in-depth sense of wonder and life-long learning for my students.

Technology Components Incorporated:

I try to incorporate technology into every opportunity possible for every lesson. If there were no time restraints to this project, it could be incorporated into an entire STEM project-based learning unit. The technology that was mentioned in this lesson includes several opportunities for students to implement a variety of uses. The interactive whiteboard helps to engage, help incorporate professionals and media into the lesson, and allows opportunities for students to demonstrate understanding in a kinesthetic style. This year my school has integrated a 1:1 Chromebook initiative, which will allow all students equal access to research and investigate when needed, in addition to learning the life skills required to safely and responsibly managing their own personal laptops. I will also be utilizing a variety of websites to supplement educational richness and to increase engagement. These websites will include Poll Everywhere, Scratch Coding, and NASA resources. Last, students will have the opportunity to integrate technology through their partner STEAM Project if they elect to engineer a project that requires technology. The additional technology may include Arduino Circuit Boards or a 3-D Printer. The access to a choice of technological educational tools and students having immediate access to Chromebooks will facilitate learning and will allow the opportunity for all students to achieve the goals set forth by myself and themselves.