THOMPSON RIVERS UNIVERSITY | Education & Social Work

Bachelor of Education (Secondary) STEM

Lesson Plan

Lesson Title: A Fish in Motion Lesson # 3 Date: Wednesday, December 17th 2020

Name: Julia Subject: Physics Grade(s): 11

Rationale:

This lesson is introducing the big idea involving an objects motion. Learning how to predict and analyze an objects motion in connecting is valuable to students as it will give them a well-rounded perspective of the physical limits that exist in our world. This lesson will be done using indigenous story telling for the purpose of teaching students a lesson in physics, giving them a new cultural experience and making the lesson more entertaining.

Core Competencies:

Communication	Thinking	Personal & Social
Connecting and engaging with others Working collectively	Students apply critical and reflective thinking to acquire and interpret information.	Students communicate to build and sustain positive relationships with diverse people, including people from different generations and cultures.

Big Ideas (Understand)

Physics - An object's motion can be predicted, analyzed, and described.

Learning Standards

(DO) (KNOW)

Learning Standards - Curricular Competencies	Learning Standards - Content
• Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information • Formulate multiple hypotheses and predict multiple outcomes • Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods • Consider the changes in knowledge over time as tools and technologies have developed	Projectile motion 1D and 2D, including: • vertical launch • horizontal launch • angled launch

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Instructional Objectives & Assessment

Instructional Objectives (students will be able to…)	Assessment
• Differentiate between 1D and 2D projectiles • Acknowledge other ways of knowing • Grasp their own physical limits • Predict the physical outcomes of a simple projectile	• Worksheet • Observational Checklist

Prerequisite Concepts and Skills:

Students will already have a grasp of horizontal, uniform and accelerated motion and vector and scalar quantities.

Indigenous Connections/ First Peoples Principles of Learning:

FPPL

Learning recognizes the role of Indigenous knowledge – The knowledge of first people has not always been acknowledged and is still often put aside to focus on post-industrial Euro-centric cultures. Through story telling indigenous people have passing on wisdom relating to many scientific ideas and principles in STEM. In this lesson plan focuses on the the Secwepemc story Fish Lips to demonstrate indigenous knowledge of physics and projectiles. Ultimately this FPPL provides students with a sense of the world based on their experiences in it.

Learning is embedded in memory, history, and story – For generations indigenous people have passed down wisdom through stories, songs and even dances. This is a highly precise process learned only through listening closely and remembering. Both historical and cultural knowledge is primarily locally-based. Incorporating this FPPL helps provide learners with opportunities to listen to and connect with the stories of others. After completing this lesson, students will have gained a well-rounded and culturally significant perspective of physics.

The Secwepemc story Fish Lips will be used to demonstrate indigenous knowledge of physics and projectiles. (15:25 – 23:30) http://www.cbc.ca/radio/ideas/legends-of-the-shuswap-1.2913217

Fish Lips:

In the story, the most beautiful fish ever created tries to show off by attempting to jump over the moon, but he jumps to high. He misses the moon and even misses landing in the water. Stuck on land and broken, he asks his brothers, the other animals for help. Many of his brothers offered him gifts to help him, but he remained broken. Finally, mother nature came along and told him she thought he had been too proud. So she gave him gooses rectum as a mouth. The moral of the story is never think about your looks and always think about what's in your heart.

Stories are a cultural way of making sense of the world. In this Secwepemc story the fish both physically and metaphorically jumps to high. If he had realized that there are limits to his ability, then he probably would have remained beautiful. I also thought this story was a good way of bringing whimsy and magic into the very math and law based world of physics. Even though the moral of the story is a good for students to hear I will be cautious of wording it in a delicate way that does not devalue the self-esteem of any students. (example female student that values her looks)

Universal Design for Learning (UDL):

Students will be given both individual and group work
This lesson plan supports learners with multiple intelligences:
Interpersonal – Reflecting on their own knowledge
Existential – Students will be able to explore the big questions concerning human limits
Bodily-Kinetic – Students will perform and activity outside exploring the limits of physics
Visual Spatial – Students will be asked to visualize a projectile and be given the option of drawing while listening to the indigenous story
Interpersonal – Students will be provided with indigenous cultural views and believes. They will also be asked to participate in some group activates
Verbal-Linguistic – Students will be given a short lecture on some key terms and concepts
Logical Mathematical – Students will be provided with mathematical formulas exemplifying physical principals

Differentiate Instruction (DI):

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Materials and Resources

Pen, Paper, computer and speaker to play fish lips story, Projector to display PowerPoint, fish related work sheet, small ball.

Lesson Activities:

Teacher Activities	Student Activities	Time
Introduction (anticipatory set – "HOOK"): The class begins with a review of horizontal, uniform and accelerated motion and vector and scalar quantities. The review will take place as a brain dump. In a brain dump I will start with a term terms (ex. accelerated motion and vector quantities) Students will have 5 minutes to write out on a scrap piece of paper all the information on. As a class we will complete the same activity on the board.	Students will write out all the information they can remember about accelerated motion and vector quantities. After 5 minutes they will be asked to stop. Students will volunteer the information they came up with. Independently students will fill in the gaps of their knowledge.	15 min
Body: As a class we will listen to the story of Fish Lips. Students will be split into small groups (2 or 3) an asked to discuss: 1) What is the moral of the story? (how much emphasis we put on look in society) 2) How does the story relate it to physics? 3) Fist nations story telling the purpose of this story Lesson (give them the three things before the story) I will talk to groups individually and summarize the conclusions to the whole class. I will then lecture using power point and talk about Projectile motion. Defining a 1D and 2D, projectile from a vertical launch, horizontal launch and angled launch. Take a break by getting students to go outside. There we will have a basketball or a "fish". Students will be asked to throw the fish over the clouds or the sun. We will go over all the mathematical variables on an equation sheet. I will relate all the variables to the beautiful fish. Example: Initial velocity – how fast the fish was going initially. This can be broken down further into the x and y direction. A projectile simulator will be used to show how mass and initial velocity can be used to determine the qualities of a projectile. (next day) https://phet.colorado.edu/sims/html/projectile-motion/latest/projectile-motion_en.html	While listening to the story of fish lips students will be given the option to take notes, draw or simply just listen. Students will discuss the story and answer the questions in small groups. Groups will summarize their understanding to me. Do whip around Listen to the story again As a class we will go outside. Students will be asked to throw a ball "fish" over the clouds or the sun. Students should notice they have limits to their physical abilities just as the fish did. Students will be given a formula sheet and asked to take notes. They will also be given the website for the projectile simulator if they want to investigate further.	45 min
Closure: Students will be given fish related worksheets. Each sheet will have different numerical values. Students will be asked to determine whether the fish will end up in the water or on land. During the 15 minutes I will walk around the class informally checking in with students and answering any questions.	Students will spend the rest of class working on a fish lips related worksheet. If they do not finish it in class. It will be due on Friday (At the end of the week) Finnish outside	15 min

Organizational Strategies:

Teacher prior to class will

-place students into groups (A.L. with M.A.) place strong students with those that need assistance - Frequent check ins and observational check list -worksheets printed -proper software on Chromebook for UDL/DI situations

Proactive, Positive Classroom Learning Environment Strategies:

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Reflections (if necessary, continue on separate sheet):

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References

https://phet.colorado.edu/sims/html/projectile-motion/latest/projectile-motion_en.html
https://phys.libretexts.org/Bookshelves/University_Physics/Book%3A_Physics_(Boundless)/3%3A_Two-Dimensional_Kinematics/3.3%3A_Projectile_Motion#:~:text=Projectile%20Motion-,Projectile%20motion%20is%20a%20form%20of%20motion%20where%20an%20object,only%20interference%20is%20from%20gravity.
https://www.cbc.ca/radio/ideas/legends-of-the-shuswap-1.2913217