UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

LESSON PLAN (PILOTED 2022)

Candidate's name: Kieron Vick

Grade/Class/Subject:	5/ADST/STEM Bridge Building Challenge	School:	Suwilaawks Community School
Date:	March 14, 2024	Allotted Time:	1 Hour
Topic/Title:	Applied Design, Skills and Technologies/Ultimate Rainbow Bridge Building Challenge		

1. LESSON ORIENTATION

Key resources: Instructional Design Map

Briefly, describe purpose of lesson, and anything else to note about the context of lesson, students, or class, e.g. emergent learning needs being met at this time, elements of focus or emphasis, special occasions or school events.
While this ADST lesson is engaging and fun, the ultimate purpose is to help students develop essential problem-solving, creativity, and teamwork skills, emphasizing the importance of communication and accepting different perspectives. When designing bridges collaboratively, students analyze problems, think critically, and explore multiple solutions as if they were engineers, ultimately learning skills that are relevant in day to day life.

2. CORE COMPETENCIES

Key resources: https://curriculum.gov.bc.ca/competencies

Core /Sub-Core Competencies *(check all that apply):*	*Describe briefly how you intend to embed Core Competencies in your lesson, or the role that they have in your lesson.*
☐ COMMUNICATION – Communicating ☐ COMMUNICATION – Collaborating ☐ THINKING – Creative Thinking ☐ THINKING – Critical Thinking ☐ THINKING – Reflective Thinking ☐ PERSONAL AND SOCIAL – Personal Awareness and Responsibility ☐ PERSONAL AND SOCIAL – Positive Personal and Cultural Identity ☐ PERSONAL AND SOCIAL – Social Awareness and Responsibility	Students engage in informal and structured conversations in which they listen, contribute, develop understanding and relationships, and learn to consider diverse perspectives. Students communicate with intention and purpose. They recognize the role the audience plays in constructing meaning, and they make strategic choices to help convey their messages and create their intended impact. Students combine their efforts with those of others to effectively accomplish learning and tasks. As members of a group, they appreciate interdependence and cooperation, commit to needed roles and responsibilities, and are conscientious about contributing. They also negotiate respectfully and follow through on plans, strategies, and actions as they share resources, time, and spaces for collaborative projects. Students engage with others in ways that build and sustain trusting relationships and contribute to collective approaches. They value diverse perspectives and integrate the ideas of others with their own to tackle tasks, issues, and problems. Students learn to analyze and make judgments about a work, a position, a process, a performance, or another product or act. They reflect to consider purpose and perspectives, pinpoint evidence, use explicit or implicit criteria, make defensible judgments or assessments, and draw conclusions. Students have opportunities for analysis and critique through

	engagement in formal tasks, informal tasks, and ongoing activities. Students think critically to develop ideas. Their ideas may lead to the designing of products or methods or the development of performances and representations in response to problems, events, issues, and needs. They explore possibilities, develop and reflect on processes, monitor progress, and adjust procedures considering criteria and feedback. Students reflect on their creative ideas to decide which ones to develop. They do this with a sense of place and taking into consideration unintended consequences for other living things and our planet. If they decide to develop an idea, they work collaboratively to refine it and work to realize it. Students may generate creative ideas through free play, engagement with other's ideas, or consideration of a problem or constraint, and/or because of their interests and passions. New ideas and inspirations can spontaneously arise from the unconscious mind, but students can also develop strategies to facilitate the generation of ideas – learning a lot about something, engaging in a period of reflection, providing time for incubation, and doing relaxing or automatic activities to quiet their conscious mind. Students who are personally aware and responsible have a sense of self-worth and a growing confidence in a variety of situations. They value themselves, their ideas, and their accomplishments. They can express their needs and seek help when needed, find purpose and motivation, act on decisions, and advocate for themselves. Students who are personally aware and responsible take ownership of their choices and actions. They set goals, monitor progress, and understand their emotions, using that understanding to regulate actions and reactions. They are aware that learning involves patience and time. They can persevere in difficult situations and understand how their actions affect themselves and others. Students build and maintain diverse, positive peer and intergenerational relationships. They are aware and respectful of others' needs and feelings and share their own in appropriate ways. They adjust their words and actions to care for their relationships. Students identify and develop an appreciation for different perspectives on issues. They show empathy, disagree respectfully, and create space for others to use their voices. They generate, use, and evaluate strategies to resolve problems.

3. INDIGENOUS WORLDVIEWS AND PERSPECTIVES

Key resources: First Peoples Principles of Learning (FPPL); Aboriginal Worldviews and Perspectives in the Classroom

FPPL to be included in this lesson *(check all that apply):*	*How will you embed Indigenous worldviews, perspectives, or FPPL in the lesson?*
☐ Learning ultimately supports the well-being of the self, the family, the community, the land, the spirits, and the ancestors. ☐ Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place). ☐ Learning involves recognizing the consequences of one's actions. ☐ Learning involves generational roles and responsibilities. ☐ Learning recognizes the role of Indigenous knowledge. ☐ Learning is embedded in memory, history, and story. ☐ Learning involves patience and time. ☐ Learning requires exploration of one's identity. ☐ Learning involves recognizing that some knowledge is sacred and only shared with permission and/or in certain situations.	This interactive and collaborative lesson will utilize the FPPL in a variety of ways. Firstly, because this ADST involves the student contributing to a group, learning will support the well-being of the self, promoting holistic learning. Because students are collaborating towards an objective, learning will be reflexive, reflective, experiential and relational as students consider their own and diverse perspectives together in working towards the objective, utilizing different methods of learning. Because this is a collaborative lesson, learning will involve the consequences of one's actions if the student is not following rules or is purposefully disrupting the progress of their teammates. This is a complex lesson that involves a variety of strategies and requires critical thinking from all participants, therefore learning involves patience and time and requires exploration of one's identity as every student has the responsibility to share their creative/critical thinking and contribute to their groups.

4. BIG IDEAS

Key resources: https://curriculum.gov.bc.ca/ (choose course under Curriculum, match lesson to one or more Big Ideas)

What are students expected to understand? How is this lesson connected to Big Idea/s or an essential question?
- Designs can be improved with prototyping and testing. - Skills are developed through practice, effort, and action. - The choice of technology and tools depends on the task.

5. LEARNING STANDARDS/INTENTIONS

Key resources: https://curriculum.gov.bc.ca/ (choose course under Curriculum)

Curricular Competencies: *What are students expected to do?*	**Content:** *What are students expected to learn?*
Understanding context: - Gather information about or from potential users. **Defining**: - Choose a design opportunity. - Identify key features or user requirements. - Identify the main objective for the design and any constraints. **Ideating** - Generate potential ideas and add to others' ideas. - Screen ideas against the objective and constraints. - Choose an idea to pursue. **Prototyping** - Outline a general plan, identifying tools and materials. - Construct a first version of the product, making changes to tools, materials, and procedures as needed. - Record iterations of prototyping. **Testing** - Test the product. - Gather peer feedback and inspiration. - Make changes and test again, repeating until satisfied with the product. **Making** - Construct the final product, incorporating planned changes. **Sharing** - Demonstrate their product and describe their process. - Reflect on their design thinking and processes, and their ability to work effectively both as individuals and collaboratively in a group, including their ability to share and maintain a co-operative workspace. - Identify new design issues. **Applied Skills** - Use materials, tools, and technologies in a safe manner, and with an awareness of the safety of others, in both physical and digital environments - Identify the skills required for a task and develop those skills as needed. **Applied Technologies**	Students are expected to use the learning standards for Curricular Competencies from Applied Design, Skills, and Technologies 4-5 in combination with grade-level content from other areas of learning in cross-curricular activities to develop foundational mindsets and skills in design thinking and making.

- Choose appropriate technologies to use for specific tasks. - Demonstrate a willingness to learn new technologies as needed.	

6. ASSESSMENT PLAN

Key resources: Instructional Design Map and https://curriculum.gov.bc.ca/classroom-assessment

*How will students demonstrate their learning or achieve the learning intentions? How will they know if they are proficient? How will the evidence be collected, documented and shared? Will you use **observation**s, have targeted **conversations**, or collect **products**? Mention any opportunities for feedback, self-assessment, peer assessment and teacher assessment. What tools, structures, or rubrics will you use to assess student learning (e.g. Performance Standard Quick Scale)? Will the assessments be **formative**, **summative**, or both?*

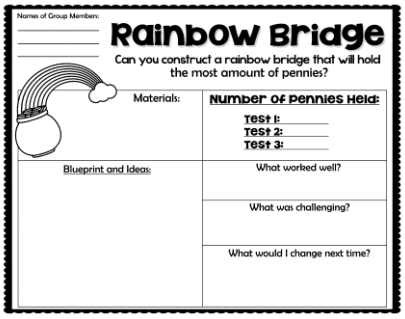
This ADST/STEM lesson will use both formative and summative assessments. For formative assessments, I will be observing students while they construct their bridges, focusing on their engagement as they collaborate in pairs or groups of three as they discuss approaches to bridge design, ideate solutions, test prototypes, and refine designs. These observations will also be focused on student creativity and teamwork. There will also be design plan submissions; before students partner up to build their bridges, students will individually sketch out their own bridge designs, and I will have targeted conversations with them about the thought processes behind their decisions. Feedback will be given based on their design considerations, and I will talk about things such as stability, bridge length, and balance to encourage students to think critically about their designs.

The summative assessments will be towards the bridge testing, where we test the final products to see how well the student bridges were constructed. After the competition of testing bridges concludes, students will then take time to complete an engineering report/ reflection about their bridge construction process, where they will respond to questions such as “What worked well”, “What challenges did you face”, “If you could rebuild, what would you change?” and so on, promoting critical and reflective thinking. Finally, all students will complete a self-assessment checklist on how well they contributed to developing the bridge and how well they were able to collaborate with their teammates.


Name: _____

Rainbow Bridge

Sketch out a possible design for when you group up and collaborate to design your final product. Use this original sketch to compare with other group members' designs when you plan the final design. Consider things such as bridge length, structure, stability, and balance.


Names of Group Members:

Rainbow Bridge

Can you construct a rainbow bridge that will hold the most amount of pennies?

Materials:

Number of Pennies Held:

Test 1: _____
Test 2: _____
Test 3: _____

Blueprint and Ideas:

What worked well?

What was challenging?

What would I change next time?

7. DESIGN CONSIDERATIONS

Key resources: Instructional Design Map

Make brief notes to indicate how the lesson will meet needs of your students for: differentiation, especially for known exceptionalities, learning differences or barriers, and language abilities; inclusion of diverse needs, interests, cultural safety and relevance; higher order thinking; motivations and specific adaptations or modifications for identified students or behavioural challenges. Mention any other design notes of importance, e.g. cross-curricular connections, organization or management strategies you plan to use, extensions for students that need or want a challenge.
Differentiation & Learning Needs: Provide visual examples and help model bridge designs with students who may need a visual example of how to form a bridge with pipe fitters. - Grouping students who may require extra support with peers who can provide that and encourage positive reinforcement. **Higher-Order Thinking:** Encouraging students to analyze and remodify their designs based on prior testing. Asking "What if?" questions to get students to think critically and consider new designs and approaches.
Required preparation: *Mention briefly the resources, material, or technology you need to have ready, or special tasks to do before the lesson starts, e.g. rearrange desks, book a room or equipment.*
Materials: - Pipe Cleaners - Playdough for anchoring bridge - Cups & Pennies - Sheets (Design Plan, Engineering Report, Self-Assessment) Tasks: - Sort out pipe cleaners to equal amounts per group.

8. LESSON OUTLINE

Instructional Steps	**Student Does/Teacher Does** *(learning activities to target learning intentions)*	**Pacing**
OPENING: *e.g. greeting students, sharing intentions, look back at what was learned, look ahead to what will be learning, use of a hook, motivator, or other introduction to engage students and activate thinking and prior knowledge*	The opening of this ADST bridge building lesson will have the teacher overview of the entire activity and expectations with it. To start, I will introduce the activity and its objectives, the materials, the rules, and the purposes behind this ADST challenge. **Introduction/Objective:** This will start with me talking about the activity, the rainbow bridge-building competition, with the end goal of effectively communicating and collaborating with a team to build the bridge that can withhold the most weight, sharing design ideas and perspectives to help make decisions in constructing a final bridge. **Materials:** The materials used will be various coloured pipe cleaners to represent a rainbow, and playdough to anchor the pipe cleaners and the ends of their bridges. **Rules/Expectations:** Every student must make an initial sketch of their bridge design, as they will use this for sharing ideas when they form a team. Once	10-15 Minutes

	this is finished, students will then form teams of 2 to 3 (I may decide on teams of 3 so the teams can utilize three different perspectives rather than only two, but this will depend on the attendance). Before I talk about the rules, I will go also mention that teams will be required to do an engineering report while they construct their bridge and that every student will be required to do a self-assessment on how well they contributed to their teams. For the rules when constructing the bridges: I will go over that teams cannot get more than 30 pipe cleaners but can reshape and cut them down to a length no less than 15cm, as this is the minimum length the bridge must be. Students are also allowed to test the weight of their bridges during construction, as this allows them to alter designs and think critically on what to change. I will not provide many examples as I want to encourage students and their teams to think for themselves. Students will be given a maximum time of 25 minutes to complete their bridges. When the time is up, teams will have to stop completely, then it will be time to test how much weight these bridges can withstand. The bridge that ends up holding the most weight, wins! **Purposes:** This ADST lesson serves a variety of purposes that I will go over to the class, so that these important concepts are recognize and reinforced by the students: **1. Encourages Problem-Solving & Critical Thinking** - Require you to design, test, and improve solutions. - Allows you to learn how to analyze problems, think logically, and develop multiple solutions—just like real engineers and designers! (Also a valuable skill in general). **2. Develops Creativity & Innovation** - Experimenting with different materials and approaches encouraging you to think outside the box. - Shows that creativity is key in engineering, design, and technology fields, and helps us become innovative thinkers. **3. Builds Collaboration & Communication Skills** - Team-based activities teach us to work together, share ideas, and listen to different perspectives. - These skills are essential in the workplace and daily life. After I clear all of this up with the students, they will then start their initial bridge sketches. I will give them approximately 5 minutes to do this.	

BODY: • *Best order of activities to maximize learning -- each task moves students towards learning intentions* • *Students are interacting with new ideas, actively constructing knowledge and understanding, and given opportunities to practice, apply, or share learning, ask questions and get feedback* • *Teacher uses learning resources and strategic opportunities for guided practice, direct instruction, and/or modelling* • *Can include: transitions, sample questions, student choices, assessment notes (formative or otherwise), and other applications of design considerations*	The body of this lesson will have students get into teams, share their design considerations, and then finally start building their bridges. I will give them a few minutes to gather into teams and communicate ideas. Once they are all settled in, I will then start the clock for students to compete and build their bridges within 25 minutes. I will keep the rules on the monitor so students are always aware of them, and I will remind them to think about their engineering report as they make their bridges.	30 Minutes
CLOSING: • *Closure tasks or plans to gather, solidify, deepen or reflect on the learning* • *review or summary if applicable* • *anticipate what's next in learning* • *"housekeeping" items (e.g. due dates, next day requirements*	The closing of this lesson will have each team present their bridge to test how many pennies it can hold. There will be different weighted cups to see the durability of the student's bridges. This will go on until we have a winner or multiple winners if more than one bridge reaches the maximum weight capacity (this depends on how much time is left to spare). After the test/ competition concludes, students will go back into their teams to fill out the rest of their engineering report and then fill out their self-assessments that outlines how well they contributed to their team and how well they collaborated with others. Once everything is wrapped up, I will congratulate the students on their hard work and remind them that this was intended to be a fun team-building activity.	15 Minutes

9. **REFLECTION** *(anticipate if possible)*

• *Did any reflection <u>in</u> learning occur, e.g. that shifted the lesson in progress?* • *What went well in the lesson (reflection <u>on</u> learning)?* • *What would you revise if you taught the lesson again?* • *How do the lesson and learners inform you about necessary next steps?* • *Comment on any ways you modelled and acted within the Professional Standards of BC Educators and BCTF Code of Ethics?* • *If this lesson is being observed, do you have a specific observation focus in mind?*