

Lighting Up the Night Sky: An Innovative Learning Experience Plan

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Additions made after peer and instructor review/comments have been made in green. This is to demonstrate the iterative process of learning design and collaborative efforts of educators.

Overview

Students will use Circuit Stickers to create a constellation seen in their town during a specific season. They will also explain why that constellation can be seen in that location at that time of year.

Rationale & Standards

I teach fourth grade science in Texas, using the Texas Essential Knowledge and Skills (TEKS) standards. I chose this standard as the lesson fit creatively and meaningfully with the creative technology I have been exploring.

- **4.8C** - Collect and analyze data to identify sequences and predict patterns of change in shadows, seasons, and the observable appearance of the Moon over time. *Supporting Standard*

Learning Goal & Success Criteria

Today I am collecting and analyzing data about seasons so I can identify sequences and predict patterns of change.

I'll know I've got it when:

- I can collect data related to seasonal change over time (temperature, plant and animal behavior, constellations, hours of daylight)
- I can predict patterns of change in a location based on seasons
- I can model why our seasons change due to Earth's orbit

Innovative Technology

My innovative technology is Circuit Stickers. This technology is used to connect art to the science of circuits, and allow for creations to be lit up. Constellations felt relevant as an art form and are specified under a science standard where students learn about seasonal patterns and change. Circuit Stickers will allow students to create a piece of art and explain their scientific thinking, enriching the lesson with whole-brain teaching and cross-curricular connections.

Learning Plan

- **BACKGROUND KNOWLEDGE:** In previous lessons, students will have developed an understanding that seasons change due to Earth's position in its orbit around the sun. They will understand that the constellations we see at our location on Earth change seasonally due to the portion of space we face when seeing the night sky. Earth is moving, not the stars. This Mystery Science lesson on ["Why do the stars change with the seasons?"](#) will have been taught to give students a deeper understanding of why this occurs. *Using Circuit Stickers will also have been previously taught and explored so students should be familiar with the innovative*

technology. Students are familiar with basic web exploration skills and the Schoology platform for hosting course content and links.

- ***Note for Universal Design for Learning (UDL):** Mystery Science uses audio, visual, on screen text to provide multiple means of representation.
- EXPLORE: Students will visit a variety of websites to explore constellations seen at certain locations during certain times of year. They will also explore artwork that has been inspired by the night sky.

Websites for constellation exploration

- <https://www.ducksters.com/science/physics/constellations.php>
- <http://www.astro.umass.edu/~arny/constel/oct.html>
- http://www.kidscosmos.org/cosmos/cosmos_star_maps.php#sep

Videos for constellation exploration

- <https://www.youtube.com/watch?v=BbzCA0Lqf3Y>
- <https://www.youtube.com/watch?v=tLPNawTZOSQ>
- <https://www.youtube.com/watch?v=bzZxC58Y688>

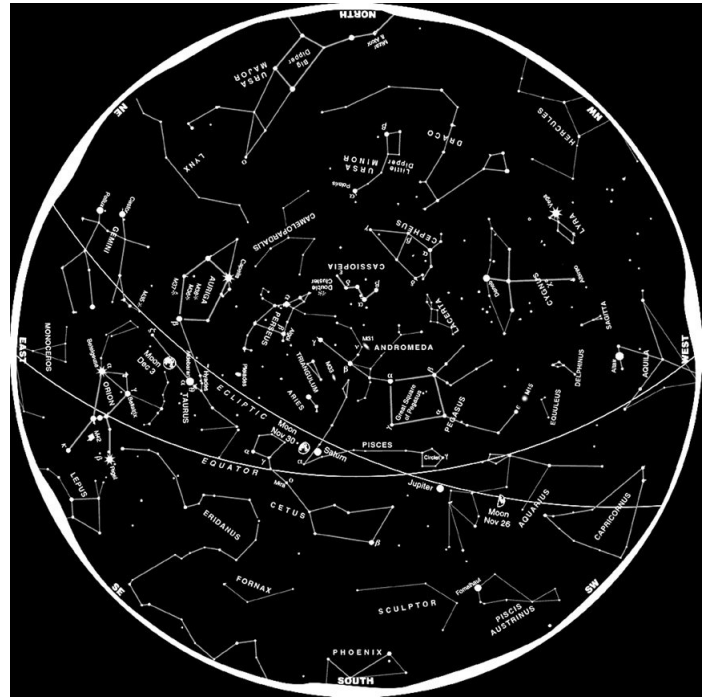
Artwork inspired by night sky



[Starry Night by Vincent Van Gogh](#)



[Aurora borealis by tpsdave](#)



[The Zodiac Constellation Names by Nola Taylor Redd at Space.com](#)

***Note for UDL:** Students have been intentionally provided with multiple means of representation to explore concepts - visual art, audio/visual, and text.

- **CREATE:** Allow students “tinker time” to sketch out constellation ideas and how the circuits will be wired beneath them. During “tinker time,” students are encouraged to have on topic discussions about ideas, successes, and challenges. It will be expected that students are able to explore and make mistakes, but are mindful of using the Circuit Stickers supplies wisely. Sketches and plans should be complete before assembling circuits. Teacher will formatively monitor student progress and check in. Students will need to have their sketch “stamped” by the teacher before obtaining Circuit Stickers supplies. During this quick conference, student and teacher will have a self-reflective discussion on if the plan is ready for a final product. Students will then use Circuit Stickers to create a constellation that can be seen during their birthday month. They will draw the representation of the constellation on a sheet of paper to overlay the stickers and illuminate the constellation. Students will also have the choice to either write an explanation of why we can see that particular constellation only during that month/season or to video their explanation on Flipgrid and create a QR code (with teacher assistance) to display with their constellation. The written or verbal explanation should directly address the science standard by describing why we can “observe patterns of change in constellations during the seasons.”
 - ***Note for UDL:** Students have the choice between written and verbal expression to address multiple means of expression and allow for differentiation of product while still meeting the same standards.
- **SHARE:** Students will have an opportunity to walk through a class gallery in a dark room for the constellations to appear. Afterwards, the work will be displayed in the hallway for other students to see and enjoy. Beneath each constellation will be either the writing piece explaining

the seasonal changes causing the constellation or a QR code to a Flipgrid video the with the student explanation. Students will also visit their classmates' works and leave feedback on sticky notes about what they learned/noticed in the artwork and explanation (either Flipgrid or written, whichever explanation format was chosen).

- ***Note for UDL:** Using birthday months and a science/art/writing/speaking cross-curricular creation addresses multiple means of engagement to provide students with a strong “why” they are doing the assignment (deeper than “it’s a fourth grade standard”). Additionally, work is shared with peers and others outside the classroom for a more authentic audience.

Rubric for Assessment

Points	Success Criteria
/1	Circuit is complete to light up all LEDs in constellation
/2	Constellation overlay sheet is neatly drawn to represent constellation image
/3	Explanation of seasonal change in constellations is accurate and thorough (students may choose to do this in written format or orally on a Flipgrid video and share the QR code) <ul style="list-style-type: none"> ● Earth moves, not the stars ● Position of Earth around the sun ● Only see part of night sky
/2	Work is displayed as a polished piece of art, writing is neat and free of grammatical errors OR speaking is clear and eloquent
/2	Used “tinker time” with Circuit Stickers creatively and constructively <ul style="list-style-type: none"> ● Student worked or discussed on topic ideas during class time ● Drafted and sketched writing/speaking and artwork prior to final copy ● Used Circuit Stickers properly without waste (a previously taught and explored skill)
Total: ___/10	

Justification & Research Base

This lesson was developed as part of Michigan State University’s Master of Arts in Educational Technology course CEP 811. The course title is “Adapting Innovative Technologies in Education” and focuses on creativity, making, and iterating. This learning experience plan fits into this course as we are exploring how we, as educators, can be makers and learn from “failure” (or iteration, as we prefer to call it), and how we can support our students in the creative process, as well. In fact, research shows that younger students score higher on a creativity scale than older (Conradty & Bogner, 2018). As teachers and leaders in innovative education, our goal should be to help our students cultivate and grow in their creative potential, not stifle it. This cross-curricular “STEAM*” focused lesson aims to do just that. It allows students to see themselves as makers and innovators, find connections across disciplines, and to undergo exploration of their own creative processes.

Further, Barbara Chow (2010) in her article, “The Quest for Deeper Learning,” posits that included in a “set of skills and knowledge that reinforce each other and together promote rigorous and deeper learning” are mastery of core academic content, critical thinking and problem-solving, and communicating clearly and effectively. This lesson asks students to do each of these skills in a variety of ways as they explore seasonal changes (content), Circuit Stickers (critical thinking), and Flipgrid or their own writing (communication). These are by no means the only important skills for our twenty first century students to learn, but they are some of the overarching, most important.

*STEAM = Studying disciplines of Science, Technology, Engineering, Arts, & Mathematics.

References

Cathérine Conradty & Franz X. Bogner (2018) From STEM to STEAM: How to Monitor Creativity, *Creativity Research Journal*, 30:3, 233-240, DOI: [10.1080/10400419.2018.1488195](https://doi.org/10.1080/10400419.2018.1488195)

Chow, B. (2010). The quest for ‘deeper learning’: commentary: Rigorous and deeper learning.

Education Week, 30(6), 22–24. Retrieved from

http://www.edweek.org.proxy2.cl.msu.edu/ew/articles/2010/10/06/06chow_ep.h30.html?qs=the+quest+for+deeper+learning [Google Scholar]

Inspiration & Resources

- [TEKS Resource System](#)
- [MysteryScience.org](#)
- [Flipgrid](#)
- [Chibitronics](#) (maker of Circuit Stickers)
- Schoology (school course material platform)