

LEARNING & CREATIVITY PLAN (L&C PLAN): THE CHANGE OF A RIVER

THE CHANGE OF A RIVER

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1. Overview

Title	THE CHANGE OF A RIVER		
Driving Question or Topic	How has the Missouri River changed over the past 200 years? What transformations have taken place in this area’s atmosphere, biosphere, hydrosphere and lithosphere?		
Ages, Grades, ...	AGES: 14 - 18	9th – 12th grade	
Duration, Timeline, Activities	5 LEARNING HOURS	Five 45-60 minute class periods	5 SESSIONS OF ACTIVITIES
Curriculum Alignment	Social Studies Language Arts Technology		
Contributors, Partners			
Abstract - Synopsis	Students will describe the changes that have affected the Missouri River over the past 200 years by identifying transformations in this area's atmosphere, biosphere, hydrosphere, and lithosphere.		
References, Acknowledgements	https://www.usmint.gov/learn/educators/lessons-by-grade		

2. STEAME Framework*

Teachers’ Cooperation	1 st Teacher: Social Studies Classroom 2 nd Teacher: Language Arts Classroom 3 rd Teacher: Technology Computer lab (The three teachers can work together during the whole project)
STEAME in Life (SiL) Organization	Provide students with the opportunity to contact local, state, or federal policymakers regarding environmental issues.
Action Plan Formulation	STAGE I: Preparation by one or more teachers [STEPS 1-3], and

STAGE II: Action Plan Formulation [Preparation STEPS 1-3]...
Refers to the creation of this Learning Plan, by teachers in collaboration.

STAGE II: Action Plan Formulation [Development STEPS 4-15]...
Refers to the realization by the students of the activities of the Learning Plan.

STAGE II: Action Plan Formulation [STEPS 16, 18]...
Refers to the realization by the students of the activities of the Learning Plan.
The support, feedback and evaluation by the teachers is accompanying throughout the implementation of the activities and not only the final result.

** under development the final elements of the framework*

3. Objectives and Methodologies

Learning Goals and Objectives	By the end of the L&C Plan, students will know what changes have affected the Missouri River over the past 200 years by identifying transformations in this area’s atmosphere, biosphere, hydrosphere, and lithosphere.
Learning Outcomes and expected Results	<p>The expected results are:</p> <ul style="list-style-type: none"> • allow students to work in pairs to conduct their initial sphere research. • assign research team roles according to learning styles. For example, someone who excels at writing could be the research team recorder; someone who is artistic could design the group coin.
Prior Knowledge and Prerequisites	<p>Students should have a basic knowledge of:</p> <ul style="list-style-type: none"> •The Corps of Discovery •Waterways •Computer presentation program functionality <p>They should also know the meaning of following Terms and Concepts:</p> <ul style="list-style-type: none"> •Obverse (heads) •Reverse (tails) •Reservoir •Lewis and Clark •Corps of Discovery <ul style="list-style-type: none"> •Sandbar •Keelboat •Peace medal •Ecosystem •Atmosphere <ul style="list-style-type: none"> •Biosphere •Hydrosphere •Lithosphere •Pro •Con
Motivation, Methodology, Strategies, Scaffolds	The main methodology of this project is based on enquiry-based learning, an active learning that starts posing questions, problems and scenarios. Students will identify and research issues to develop knowledge and solutions. Inquiry-based learning prioritizes problems that require critical and creative thinking so students can develop abilities to ask questions, design investigations, interpret evidence, form explanations and arguments and communicate findings. Students are invited to reflect on natural changes and to identify transformations in the atmosphere. From these observations they can learn how to impact on today environment.

4. Preparation and Means

Preparation, Space
Setting, *Troubleshooting*
Tips

Preparations:

- Make an overhead transparency of each of the following:
 - Peace Medal Nickel reverse from the Resource Guide.
 - Keelboat Nickel reverse from the Resource Guide.
- Locate copies of journal entries in which Lewis and Clark describe the river's state in the early 1800s (see examples under "Materials").
- Make copies of each of the following:
 - "Changes in Our Environment" assignment sheet (1 per student).
 - "Individual Research Journal Rubric" (1 per student).
 - "Presentation Rubric" (1 per student).
 - "Atmosphere Team Guide" (1 per atmosphere team).
 - "Biosphere Team Guide" (1 per biosphere team).
 - "Hydrosphere Team Guide" (1 per hydrosphere team).
 - "Lithosphere Team Guide" (1 per lithosphere team).
- Make one copy of "Research Teams" and cut it along the dotted lines.
- Arrange to use the school computer lab for four class sessions.
- Arrange to use the school library for three class sessions (optional).
- Bookmark appropriate Internet sites.

GROUPINGS

- Whole group
- Pairs
- Small groups
- Independent work

Worksheets and rubrics are available at following website:

<https://www.usmint.gov/learn/educators/lesson-plans/the-change-of-a-river>

Resources, Tools,
Material, Attachments,
Equipment

Materials

- 1 overhead projector
- 1 overhead transparency of each of the following:
 - Peace Medal Nickel reverse from the Resource Guide
 - Keelboat Nickel reverse from the Resource Guide
- Copies of each of the following:
 - Multiple journal entries in which Lewis and Clark describe the river's state in the early 1800s, such as those written on June 14, 1804, and May 11, 1805
 - "Changes in Our Environment" assignment sheet
 - "Individual Research Journal Rubric"
 - "Presentation Rubric"
 - "Research Teams" sheet
 - "Atmosphere Team Guide"
 - "Biosphere Team Guide"
 - "Hydrosphere Team Guide"
 - "Lithosphere Team Guide"
- Small notebooks or journals (1 per student)
- 1 copy of the "Research Teams" sheet
- A reserved computer lab with Internet access and a computer presentation program
- A reserved section of the school library (optional)

- Web sites that include basic information on the Corps of Discovery's impression of the Missouri River structure and ecosystem, such as:
 - www.pbs.org/lewisandclark/archive/idx_jou.html
 - www.conservation.state.mo.us/conmag/2004/01/20.htm
 - www.lewisandclarkeducationcenter.com/
- Web sites that include basic information on the current Missouri River structure and ecosystem, such as:
 - nd.water.usgs.gov/lewisandclark/dams.html
 - www.nwd.usace.army.mil/pa/missouri2003aop.asp
 - www.epa.gov/msbasin/missouri.htm
 - www.conservation.state.mo.us/conmag/2004/01/20.htm
 - news-info.wustl.edu/tips/page/normal/840.html
 - www.northern.edu/natsource/HABITATS/Missio1.htm
 - www.wildmontana.org/missouririverbreaks.html
 - mdc.mo.gov/kids/out-in/2003/01/2.htm
 - wrc.iewatershed.com/watershed-national-10.php
- Poster board or butcher paper (1 sheet per group)
- Markers and/or colored pencils
- 1 computer projector
- 1 projection screen

Safety and Health

5. Implementation

Instructional Activities,
Procedures, Reflections

This L&C plan can be implemented in 5 learning hours.

Session 1

1. Display the overhead transparencies of the Peace Medal Nickel reverse and the Keelboat Nickel reverse. Direct the students to inspect the images on the transparencies. Ask the students what they know about these two images and what they represent.
2. Explain that, starting in 2004 and continuing through 2005, our nation is changing its nickels to tell the story of the Louisiana Purchase and Lewis and Clark's exploration of the American West 200 years ago. Inform students that these are the reverse designs that appear on the 2004 nickels.
3. Ask students to recall some basic historical information about the Louisiana Purchase and the Corps of Discovery's expedition. They should remember that Captains Meriwether Lewis and William Clark led the Corps of Discovery up the Missouri River in an effort to find a Northwest Passage to the Pacific Ocean, which would eventually assist with the nation's abilities to conduct trade. Along their journey, they developed relations with many groups of American Indians and conducted scientific studies of the animals, plants, land, and water in this region.
4. Make connections between these missions and the new nickels by noting that the Corps of Discovery members rowed, poled, and pulled a keelboat like the one pictured on the Keelboat Nickel. Also explain that the explorers gave peace medals that had an image on them like the image on the Peace Medal Nickel reverse to the American Indians as a sign of good will.
5. Conduct a Think-Pair-Share activity in which the students, first individually and then with a partner, brainstorm ideas about the important role that the Missouri River played in the journey of the Corps of Discovery. Once the students have discussed their ideas with their partners, conduct a class discussion in which these ideas are shared.

6. Explain to the students that the Corps, including the captains, kept journals of their experiences during the trip. The journals were full of descriptions of the wild, winding, turbulent, unrestricted Missouri River. Provide students with a sample of one or two journal entries that describe the river's state in the early 1800s.
7. Explain that they are going to conduct their own exploration of the Missouri River and its role in modern society as a class. Distribute a "Changes in Our Environment" assignment sheet to each student. Direct a student to read it aloud to the class.
8. Distribute one small notebook or journal to each student. Inform them that, during this investigation, each student must maintain a journal, which will be assessed at the end of the lesson.
9. Distribute a copy of the "Individual Research Journal Rubric" to each student. Review the rubric with the students and inform them that these are charts of what they have to accomplish in their individual research journals for various degrees of achievement (in other words, this is how they'll be graded).
10. Direct the students to take a moment at this time and write a journal entry in which they describe what they currently know about the state of the Missouri River in 1803. They should also hypothesize about what changes they believe may have occurred on the river since that time, and the possible causes for the changes.
11. Re-read the "Changes in Our Environment" assignment sheet and introduce the students to the core of their "jigsaw" research project. Explain that the students will be divided into groups that will explore the impact of changes that have been made to the Missouri River.
12. Direct the students to assemble themselves into four groups. Place the cut-outs from the "Research Teams" page into a hat and have a member of each group draw one team research assignment. This will inform the group of their duties for the first part of this project. Distribute the appropriate "Team Guide" to each group based on the team description they selected from the hat.
13. Ask the students to share their earlier journal entries with their research team, noting in their journals their peers' ideas as they are discussed. They should discuss what effects the changes they noted would have on their research area as well as on society.
14. Tell the students to discuss within their research teams what they need to know about the river and their sphere of expertise for this project. These questions and issues will guide their research. They should list these in their journals.
15. Direct the students to develop a plan for finding what they need to know. This plan should include an outline of individual investigative responsibilities. Each student must write their individual research plan (i.e. questions to answer and resources to use) in their journal.
16. Direct the students to complete their individual research plans for homework if they did not finish them during this class session.

Session 2

1. Explain that the students must now implement the independent research plans they described in their journals. They should record their findings, sources, and any new questions in their journals. Explain that they may use the Internet or library resources to investigate the Missouri River's structure and ecosystem two hundred years ago through the eyes of the Corps of Discovery. They should investigate the river's structure and ecosystem today by reviewing current research and information on the Internet. If appropriate, guide your students to the Web sites suggested in the Materials section of this lesson plan.
2. Accompany your students to either a school computer lab or the school library and allow them about fifteen minutes to begin their investigation. Observe what the students are researching. If necessary, step in with guiding questions such as

the ones on the sphere team guides to keep students on the right investigatory path.

3. When the majority of the students are finished with their initial investigation plan, ask them to reassemble in their research teams to discuss their findings. In their teams, the students should develop new questions based on the information the team gathered, and they should note these questions in their journals.

4. Direct the students to adjust their individual research plans based on their group discussion. Any adjustments or new questions should be recorded in their research journal.

5. Allow the students to research any new questions that have arisen.

6. Repeat steps 4 through 6 as many times as necessary until students have at least touched on the learning issues listed in the sphere team guides.

7. Now that students are "experts" on their area of research, direct them to assemble into new teams that contain representatives from each of the spheres. In these groups, the students should discuss their findings and begin to formulate their group's presentation.

8. Based on the group's discussion, direct the students to independently write a journal entry in which they hypothesize about the future of the Missouri River. They should focus primarily on their sphere of expertise, but should also touch upon each of the other spheres.

9. Once more, display the overhead transparencies of the Peace Medal Nickel reverse and the Keelboat Nickel reverse. Based on their research, for homework, require each student to design a new nickel reverse that commemorates the role of the Missouri River over the past 200 years. This drawing and an explanation of their design should be added to each student's journal.

Sessions 3 and 4

1. Allow the students to complete any individual research that may remain from the previous sessions.

2. Direct the students to reassemble into their groups from the previous session.

3. Distribute a copy of the "Presentation Rubric" to each student. Review the rubric with the students and explain that the presentations should include information on the river's past and present structure and ecosystem with emphasis on how changes in the structure over the past 200 years have affected the land, air, water, and living things in the Missouri River ecosystem. Through the inclusion of scientific facts, the presentations should explain the positive and negative effects of these changes on society. Explain that, in groups, each individual will take on a research role. Explain, too, that all of the research will be combined to form the group presentation.

4. Direct the students to design and create their group presentations, which are to be 15 minutes in length. The students should develop a plan for the actual creation of this presentation, so that all students can participate. The students should also share and discuss their last journal entries and individual thoughts on the future of the Missouri River, as this will be incorporated into the group presentation.

5. Distribute a piece of poster board or butcher paper to each group. Direct the students to share their individual nickel designs and combine ideas in order to develop a group nickel design. This design should be included in their presentation.

6. Explain that the groups will share their presentations during the next session, so any incomplete work must be completed as homework.

7. Ten minutes before the end of the session, have the students take a moment to write a journal entry describing how they feel about the changes that have taken place on the Missouri River over the past 200 years, based on the research they've conducted and their group discussions.

Session 5

1. Direct each group to give their 15-minute presentations.
2. After each presentation, allow five minutes for your questions as well as those from other students.
3. Ten minutes before the end of the session, direct the students to write a journal entry describing how they feel about the changes that have taken place on the Missouri River over the past 200 years now that they've heard from the other groups. Has their view changed since their last journal entry? Why or why not?
4. Collect the individual research journals.

Worksheets and rubrics are available at following website:

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Assessment - Evaluation

The assessment will be the result of following actions:

- Take anecdotal notes about the students' ability to work as a team, to complete independent research, and to meet all the other project objectives.
- During the presentations, note the students' performance in each of the categories outlined in the "Presentation Rubric." Assess their work accordingly.
- Read the individual research journals and assess them using the "Individual Research Journal Rubric."

A continuous monitoring and evaluation is done throughout the learning plan with a special focus on the students' ability to cooperate, share proposals, solve problems and debating.

Presentation - Reporting
- Sharing

As described in detail in the above sessions, there are different moments during the L&C plan where students are asked to share ideas, make presentations and to report about their work.

- *Extensions - Other Information*

- Direct the students to investigate and present research relating to local environmental changes.
- Provide students with the opportunity to contact local, state, or federal policymakers regarding environmental issues.

STEAME Prototype/Guide for Learning & Creativity Approach
Action Plan Formulation

THE CHANGE OF A RIVER

Major steps in the STEAME learning approach:

STAGE I: Preparation by one or more teachers

1. Formulating initial thoughts on the thematic sectors/areas to be covered
2. Engaging the world of the wider environment / work / business / parents / society / environment/ ethics
3. Target Age Group of Students - Associating with the Official Curriculum - Setting Goals and Objectives
4. Organization of the tasks of the parties involved - Designation of Coordinator - Workplaces etc.

STAGE II: Action Plan Formulation (Steps 1-18)

Preparation (by teachers)

1. Relation to the Real World – Reflection
2. Incentive – Motivation
3. Formulation of a problem (possibly in stages or phases) resulting from the above

Development (by students) – Guidance & Evaluation (in 9-11, by teachers)

4. Background Creation - Search / Gather Information
5. Simplify the issue - Configure the problem with a limited number of requirements
6. Case Making - Designing - identifying materials for building / development / creation
7. Construction - Workflow - Implementation of projects
8. Observation-Experimentation - Initial Conclusions
9. Documentation - Searching Thematic Areas (STEAME fields) related to the subject under study – Explanation based on Existing Theories and / or Empirical Results
10. Gathering of results / information based on points 7, 8, 9
11. First group presentation by students

Configuration & Results (by students) – Guidance & Evaluation (by teachers)

12. Configure mathematics or other STEAME models to describe / represent / illustrate the results
13. Studying the results in 9 and drawing conclusions, using 12
14. Applications in Everyday Life - Suggestions for Developing 9 (Entrepreneurship - SIL Days)

Review (by teachers)

15. Review the problem and review it under more demanding conditions

Project Completion (by students) – Guidance & Evaluation (by teachers)

16. Repeat steps 5 through 11 with additional or new requirements as formulated in 15
17. Investigation - Case Studies - Expansion - New Theories - Testing New Conclusions

18. Presentation of Conclusions - Communication Tactics.

STAGE III: STEAME Actions and Cooperation in Creative Projects for school students

Title of STEAME Project : _____

Brief Description/Outline of Organizational Arrangements / Responsibilities for Action

STAGE	Activities/Steps Teacher 1(T1) Cooperation with T2 and student guidance	Activities /Steps By Students Age Group: ____	Activities /Steps Teacher 3 (T3) Cooperation with T1 and T2 and student guidance
A	Preparation of steps 1,2	1,2	
B	Teaching - Guidance in step 3,4	3,4	
C	Teaching – Guidance 5	5	Teaching – Guidance 5
D	Guidance – Evaluation 6,7	6,7	Support 6,7
E	Guidance	8,9,10,11,12,13	Teaching – Guidance - Support
F	Organization (SIL) STEAME in Life	14 Meeting with local, state, federal policymakers	Organization (SIL) STEAME in Life
G	Preparation of step 15	A	Cooperation in step 15
H	Guidance	16 (repetition 5-11)	Support Guidance
I	Guidance	17	Support Guidance
K	Creative Evaluation	18	Creative Evaluation