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Designing a Tool and Cooperative Learning: A MACOS Inspired Activity

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Introduction

"This was a fun activity. I got to design and build a tool and even use it in class," described Chase, a sixth-grade student who participated in the Designing a Tool activity from the 1960s Anthropology-based curriculum project called Man: A Course of Study (MACOS). In an effort for students to better comprehend the many challenges in making tools, Chase and many of his classmates were tasked to design a tool used for peeling an orange. Students used creativity, ingenuity, problem-solving, and cooperative learning to create an instrument designed to peel the skin from an orange as they learned about implementing tools to aid in daily tasks related to Great Plains settlement.

Man: A Courses of Study and other social science education programs resulted from events in the 1950s. With the creation of the National Science Foundation (NSF) in 1950, the United States government-funded millions of dollars to increase the nation's mathematics and science programs to compete with the Soviet Union. With the launching of Sputnik in 1957 by the Soviets, the need for technological superiority and patriotism was a national priority. While mathematics and science began to flourish with new innovative school projects like the Biological Sciences Curriculum Study or the Physical Science Study, social studies lagged in content and pedagogical innovation. In 1959, leading social studies curricular experts gathered in Woods Hole, Massachusetts, to consider and problem-solve how to implement the teaching of science and social science could be implemented into the nation's public schools. Project social studies were funded by the United States Office of Education and private foundations to create disciplined-based project materials for grades K-12, which focused on inductive inquiry, the structure of the curriculum, and alternative and new forms of pedagogy. In the end, over 50 projects were designed and funded. Of such projects, MACOS was considered one of the most advanced and controversial.

As Barnes, Stallings, and Rivner (1981) described, Man: A Course of Study ran counter to American values during the program's nearly ten-year run. While MACOS provided students with countless opportunities and activities to foster inquiry through discovery, simulations, and examination of artifacts and characteristics of animals and the Inuit culture, critics charged MACOS as perpetuating cruelty to animals, divorce, evolution, cannibalism, murder, and infanticide. Such criticism centered on the curriculum found in the Netsilik Inuit units. According to Fitchett and Russell (2012), through inquiry, discussion, role-playing, and film, students were exposed to cultures foreign to their own. Scenes of hunting and killing seals and caribou, coupled with stories of senilicide and infanticide, caused many conservative politicians to attack the moral transience associated with the project. As Man: A Course of Study content entered the national spotlight, so to did its popularity among school districts throughout the nation, eventually leading to its demise in 1975.

Aim and Purpose for Simulation Activity

Despite MACOS's misfortunes and controversy, the project provided a new and innovative curriculum for elementary social studies teachers. Aspects of the cooperative curriculum found in MACOS still are applicable today. Michael Yell (2021) suggests that cooperative learning principles align with the National Council for the Social Studies C3 initiative. While cooperative learning models often vary, principles promote 1) positive interdependence, 2) individual accountability, 3) face-to-face interaction, and 4) the teaching of interpersonal, discussion, and small group skills. For this activity, students incorporated a modified tool-making activity found in Man: A Course of Study that required students to determine the usefulness and effectiveness of group constructed tools (Dow, 1971). In this activity, Man: A Course of Study's tool-making activity was selected to encourage the attributes noted and the ability of students, in small groups, to become actively involved in the properties of materials used in tool design and solve the problem of designing a tool.

Man: A Course of Study Overview

Developed in the 1960s by a collaborative group of social scientists and classroom teachers and headed by Dr. Jerome Bruner, Man: A Course of Study (MACOS) received funding from the National Science Foundation to develop and implement an anthropology-based curriculum in upper elementary and middle school environments. Peter Dow (1971) indicated that the goals of the program "were threefold: to give the students a set of models for thinking about the world, to provide students with intellectual tools for investigating human behavior, and to evoke in children the appreciation of the common humanity that all human beings share" (p.389). According to Fitchett and Russell (2012), Bruner believed students could learn complex concepts early and be challenged through a cross-disciplinary and cross-cultural analysis of the biological and social sciences. As students explored and participated in project materials, students were encouraged to explore three central questions: 1)What is human about human beings? 2) How did they get that way? and 3)How can they become more so?

Students examined behavior within a cross-disciplinary and cross-cultural analysis framework to better understand human nature and culture. Jerome Bruner (1960) indicated that the student's role was to "acquire new information, to transform or manipulate it so that it can be applied to new tasks and evaluate the extent to which manipulation is adequate and appropriate" (p.48). By selecting such roles, students developed a view of their history and culture through multiple lenses. Several assumptions guided the design and development of MACOS. First, as students increase their awareness of their own culture, they experience increased self-confidence and comprehension of their operating assumptions about life. Second, learning is primarily a social process where children and teachers articulate and share ideas. Third, the world can be observed, conjectured about, ordered, and understood using the modes of inquiry of the biological and social sciences. Lastly, an individual life can be viewed as part of the more significant flow of human existence within a given environment.

John Herlihy (1974) suggested that the MACOS classroom follows the characteristics of constructivism. He described the typical learning environment as intuitive, where both students and the teacher were actively involved in approaching topics. Learning was often associated with group work, problem-based sheets, movies, simulations, and hands-on activities, which encouraged trial and error to solve a problem. In the vision of Jerome Bruner, students were responsible for their learning, as the teacher was viewed as a non-authoritarian figure during the learning process.

Man: A Course of Study had two significant sections. The first contained a series of animal studies of salmon, herring gulls, and baboons; the second studied the lives of Netsilik Inuit in the Pelly Bay region of Canada. Students address fundamental questions about human nature by comparing and contrasting several animal species and other human cultures. The Netsilik material emphasizes the uniqueness of human beings and the fundamental similarities that unite all races, ethnic groups, and cultures. Man: A Course of Study emphasized collecting facts via primary and secondary data sources. Primary sources comprise students' experiences at school, playing, and daily experiences. Secondary sources fall into three categories: film and visual aids, written materials, and interactive devices, such as games. The film, the primary data source in the course, was used to simulate field observations. Thirty booklets of differing styles and purposes replace the usual textbooks. Field notes, journals, poems, songs and stories, games, construction exercises, and observation projects allow children to learn in varied ways (Dow, 1965).

While anthropology elective courses are often limited in school offerings, the discipline of anthropology is regularly implemented in both United States and World History courses in today's academic setting. Colleen Popson and Ruth Selig (2012) contend that anthropology's presence is often limited to private or independent schools, charter schools, or elementary or middle schools in wealthy school districts. Nevertheless, the need to integrate and infuse anthropology and the study of humanity into more mainstream social studies courses has relevance. Furthermore, Street (2010) recommends that the need for students to engage in activities associated with Anthropology helps students engage in critical inquiry about their position in the world and society and recognize practical problems anthropologists encounter.

Designing an Orange Peeling Tool Simulation Activity

The orange peel tool activity was a modified version of the tool-making activity found within Man: A Course of Study. In its original conception, the tool-making activity was developed to simulate the importance of tools and other instruments used by Netsilik Inuit as they hunted for caribou and seals. This activity was used to correlate elements of anthropology as it relates to the Great Plains settlement. Such infusion, according to Morris (2006), the addition of anthropology in both elementary and middle-grade social studies classes provided students the ability to 1) examine cultural differences by defining the significance of their culture to that of the culture(s) studied; 2) experiencing cultures through experiential learning, and 3) experience culture through role-playing to provide alternative ways of thinking and experience perceived by a particular culture or event.

Pellegrino, Lee & d'Erizans (2012) suggest that classroom simulations illustrate historical realities and a student-centered model. The positive effects of incorporating simulations into the curriculum are two-fold: First, students are subjected to classroom involvement while learning abstract concepts. Second, the use of simulations, small group interaction, and cooperative learning allows for students to 1) have a deeper level of insight; 2) become more active in the learning process; 3) retain knowledge and information longer than traditional (direct instruction) methods of teaching; 4) develop and reinforce critical and analytical skills, and 5) increase speaking, presentation and interaction skills (Slavin 1994; VanSledright 2004; Lennon, Byford, & Cox, 2015).

Furthermore, Corey Wright-Maley (2015) indicates that teachers who incorporate simulation activities qualities were significantly more likely to include value and engage in critical inquiry with their students than content acquisition alone through role-playing. The activity role-

plays, and open-ended responses gave students historically accurate and realistic selections/actions. Such a dilemma encouraged students to become active participants whose actions or decisions directly influence the outcome and connection to both materials studied and potential outcomes. John Herlihy (1974) contends the teacher must be skilled in group work, inquiry, communication skills, and feedback techniques as students design, build and test their orange peeling instruments. In these student interactions, inquiry, creation, and testing occur, and the freedom of decision-making and group cooperation.

The objective of the exercise is not the final product itself but rather the solving of a problem with certain restrictions, group work, and inquiry. There are several steps involved in the tool-making process, any one of which presents students with several choices: the problem must be defined, a method of solution chosen, and appropriate materials selected and modified for a group's eventual use. The last step is to test the instrument's peeling ability.

Procedure and Preparation

For the Teacher

Teaching about cultures can be monotonous to students. This tool-making simulation activity allows the teacher to explore both the properties and characteristics of tool-making through simulation and cooperative learning. Students in small groups must design a tool using provided materials to design, construct and test by peeling an orange. This lesson is designed to expand and broaden students' collaborative skills and increase their decision-making level by incorporating four steps to designing and building a tool based on characteristics from Man: A Course of Study.

Step One: Introduction: Properties of Materials

Before students begin the activity, the teacher might ask the class what makes something a tool? What is the definition of a tool? Students should consider the properties of materials before making a tool. To promote inquiry, provide students with a popsicle stick, three toothpicks, three small paperclips, the fork end of a plastic fork, a four-inch piece of tape, and a four-inch string. Ask groups to explain the material, properties, and possible uses (see Table 1).

Step Two: Designing a Tool

In this lesson, students solve the problem of peeling an orange by designing a tool. The objective is to solve the problem of peeling an orange within certain restrictions (not peeling with fingers or bruising the fruit) and using a constructed tool to aid in advancement. After students focused on the properties of the materials used to construct a tool, students in small groups should approach the problem, select allocated materials, and assemble a tool to demonstrate in class.

Step Three: Testing a Tool

Students are given 15 minutes to design and build their tools with only the materials provided (a popsicle stick, three toothpicks, three small paperclips, the fork end of a plastic fork, a four-inch piece of tape, and a four-inch string). Groups are encouraged to use all of the materials. Each group must decide the tool's name, cost, and functionality. After students complete their tool, one representative from each group will peel an orange in front of the class using their tool. (see Figure 1).

Figure 1. Students Designing and Peeling an Orange

Step Four: The Importance of Tools

After students demonstrate their tools, the teacher can discuss the importance of tools. The teacher can describe various inventions and their various applications, implications, and impact on society and how the use of tools aided in the Great Plains settlement.

For the Student

Building a hand tool to peel an orange illustrates the advantage of daily tasks. As the group brainstorms various ways to make a tool, please consider the following:

1) After receiving instructions from the teacher, the group should elect a leader. The leader will demonstrate the group's finished tool to the class.
2) Each group will receive a bag with the following items: a popsicle stick, three toothpicks, three small paperclips, the fork end of a plastic fork, a four-inch piece of tape, and a four-inch string. The group is only allowed to use these items to develop a tool to peel an orange.
3) As a group, investigate the materials provided. What is it? What are the properties (hard, soft, sticky, long, short)? What are possible uses for each item? List the material, properties, and possible uses on the sheet provided.
4) As a group, try to brainstorm several designs and how each would benefit from the materials provided without damaging the fruit.
5) Each group has 15 minutes to design and construct their tool.
6) As a group, name the tool and cost if sold in stores.
7) The group leader will present the tool and peel the orange to the class. What worked well? What changes, if any, would the group make to improve the tool?

Evaluation

This activity required students, working in groups, to design and build a tool based on the tool-making activity found in Man: A Course of Study. Rather than assign students a score based on participation alone, a simple rubric was utilized in the effort so students and teachers alike may use it to render judgments concerning tool construction and participation. For this activity, the following criteria were selected and evaluated: 1) the use of materials; 2) creativity and design; 3) demonstration of tool to the class; and 4) participation and cooperation.

Conclusion

This Man: A Course of Study-inspired cooperative learning activity allows students and educators to confront complex ideas and develop inquiry-based critical thinking skills through Social Studies content. For students, the cooperation and discussion within this activity present the chance to include and celebrate personally and culturally relevant ideas, beliefs, and articles. This lesson would be a valuable resource for supervising teachers who have less first-hand exposure or experience with inquiry-based activities when planning or designing new lessons. This activity can be modified or altered to suit the age, ability level, and content addressed regardless of the classroom. This activity may serve as a model for higher education institutions to help pre-service teachers understand and implement inquiry-based approaches within future classrooms.

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Table 1. Materials and Their Properties

Materials	Properties	Possible Uses
1. Popsicle Stick		
2. Plastic fork		
3. Tape		
4. String		
5. Toothpick		
6. Paperclip		