Students Make Natural Connections through the Integration of Social Studies and Science

Susan Pass
Assistant Professor
University of Texas at San Antonio
Department of Interdisciplinary Learning and Teaching
One UTSA Circle
San Antonio, TX 78249
(210) 458-4524
susan.pass@utsa.edu

Christine Moseley
Associate Professor
University of Texas at San Antonio
Department of Interdisciplinary Learning and Teaching
San Antonio, TX 78249
Ph: 210.458.5992
Fax: 210.458.7281
Christine.Moseley@utsa.edu

Brief Bios:

Susan Pass is assistant professor of social studies education at the University of Texas at San Antonio. She received her doctorate from the University of Houston and currently teaches secondary social studies methods.

Christine Moseley is associate professor of science education at the University of Texas at San Antonio. She received a PhD in Environmental Science from Oklahoma State University and currently teaches environmental education courses.

Abstract: This article describes a curriculum and two activities that integrate both social studies and science while inviting students to make connections between civics and science to learn significant concepts in a meaningful way. Students work within the real-world context of wildlife population scenarios, to make predictions, test their hypotheses, and determine and construct graphs that best represent their data, while learning the importance of animal habitats and the factors that impact wildlife populations in continually changing ecosystems. Discussion and experiences with charting how an environmental concern becomes a law and documenting the state legislative process with the two lessons cited ensure that students understand ideas about democracy, civic leadership, and citizen responsibility.

Key Words: Interdisciplinary, government, science, graphing, habitat

Integration provides an opportunity for students to make natural and meaningful connections between and among multiple content areas. Both the *National Council of Social Studies* (NCSS 1994) and the *National Science Teachers Association* (NRC 1996) have long supported the integration of social studies and science with other content areas in order for students to make meaningful connections and to develop significant understandings of important concepts. Further, both NCSS and NRC agree that it is important for students to be engaged in tasks that provide them multiple opportunities to observe, make conjectures, hypothesize, and be encouraged to collect, organize, and describe data. Additionally, activities and lessons involving social studies and science should involve students in constructing appropriate graphs and charts to represent their data, making predictions and conclusions based on that data, testing their predictions and conclusions, and discovering what good citizenship and a democratic government can do to improve environmentalism (NCSS 1994).

When we have discussed the importance and necessity of integration with pre-service and in-service teachers, we are often asked the following questions: Can our students learn significant ecology while learning social studies? We believe the answer to this question is an emphatic "yes" if the tasks we engage students in are chosen wisely. In this article we will

describe two lessons that integrate both civics and science while inviting students to make connections between social studies and ecology in order to learn significant concepts in a meaningful way. These lessons also integrate mathematics. Both have been used successfully at the high school and middle school levels. We believe that they are also adaptable for elementary school students.

Project WILD, an international conservation and environmental education (K-12) curriculum program developed both lessons. Both lessons incorporate the principles of wildlife management in their conceptual frameworks. Project WILD lessons are interdisciplinary and emphasize the importance of choice (Project Wild 2007). Since 1983, more than 940,000 teachers have participated in Project WILD workshops, which have provided ecological and civics education to more than 48 million students globally (Project WILD 2007). Many of the Project WILD lesson plans and information can be found on its website: http://www.projectwild.org/. "Project WILD addresses the need for human beings to develop as responsible citizens of our planet" (Project WILD 2007).

The National Council for the Social Studies (NCSS) has stated that its main goals for students (besides subject mastery) are to be lifelong learners, capable of solving problems and contributing to the common good who are both critical thinkers and good citizens (National Council for the Social Studies 1994). Participation in the workshops and lesson plans of Project WILD fosters all of the above – plus it educates students on the NCSS Strands of VI (Power, Authority and Governance), VIII (Science and Technology), and X (Civic Ideals and Practices).

Background Information for these Lessons

The two lessons chosen for this article are adapted from two activities in the *Project WILD: Science and Civics, Sustaining Wildlife Curriculum and Activity Guide* (Project WILD

2002). Activities in the *Science and Civics Guide*, using both science and social studies, involve students in an environmental action project that will benefit the local wildlife community. The curriculum uses a two strand core of activities: Habitat Exploration and Participatory Democracy that prepare students to investigate a local site. The two lessons chosen for this article are representative of both strands and allow students to work within the real-world context of wildlife population scenarios, while learning the importance of animal habitats and the factors that impact wildlife populations in continually changing ecosystems. In addition, students learn how personal and societal choices made today can impact the environment in the future. They also learn to track legislation through the state's legislative process and discover how democratic representatives can promote ecology. Discussion and experiences with students prior to this activity should ensure they understand ideas about carrying capacity, components of habitat and limiting factors. Thus, it is advisable for teachers to invite an environmentalist in to talk to the class or take a "nature walk" around the school grounds to explore animal habitats prior to engaging the students in the following two lessons.

First Lesson: Habitat Exploration - Limits to Living Here

The major purpose of this lesson is to teach students to recognize the interdependence of ecosystem elements and the complexity of limiting factors. The law of limiting factors states that when some process, such as growth or reproduction depends on several different factors, the speed of the process is determined by the slowest factor (Project WILD 2002). The slowest factor might be present in limited or overabundant amounts, such as too little light in the morning or too high a temperature in the afternoon, which could impede growth or food sources. Limiting factors in nature could include temperature, light, water, salts, soil nutrients, fire, and predator and/or prey populations.

Introduction

Explain to students the law of limiting factors. Give the students the following background information regarding nesting prairie falcons found in the Birds of Prey Natural Area in southwestern Idaho. The prairie falcons in that area, which is the largest concentration of nesting prairie falcons in the world, nest in the late spring and early summer along the cliffs above the Snake River. For food, the prairie falcon relies mainly on an existing large population of Townsend ground squirrels, which lives on the flat land above the canyon. Availability of this prey is crucial for survival of the nesting falcons. As the summer progresses, daytime temperatures increase. Eventually, the ground squirrels go underground and hibernate (called aestivation) as a way to avoid the heat. The falcons then move to higher elevations where the ground squirrels remain active (thus, obtainable) because the temperatures are cooler.

Activity

- First, show students Graph A and then ask them to explain what happened and what caused the change in population numbers.
- Show the students Graph B. Ask them to speculate on a solution to the prairie falcon population change.
- Ask students to suggest other physical factors that might influence wildlife activity and populations (e.g., amount of rainfall, wind speed, hours of sunlight).
- Have students propose some ways that physical factors influence or limit human activity or population growth.
- Investigate the competitive uses for land occupied by the prairie falcons. What happens when humans decide to create farmland or extend the city into areas

where falcons or other birds of prey live? Do human choices impact the limiting factors of existing wildlife populations?

Assessment

Students will write a paragraph discussing the relationships between organisms in ecosystems and the role of limiting factors in those relationships. Students will include in this essay what they could do as concerned citizens to protect local habitats and animals.

Second Lesson: Participatory Democracy – Wild Bill's Fate

The major purpose of this lesson is for students to learn their state legislature's process for enacting a law that affects wildlife. At the same time, all states have state agencies that are responsible for overseeing issues involving the state's environment and natural resources. In this activity, students will learn where to go for sources of information on the current status of issues within the state concerning wildlife. They will also learn how to track the status of a state bill at any given time in its process through the state legislature.

Introduction

Explain to students that state governments make legislative decisions that affect wildlife populations within the state. In addition, the responsibility for protecting and managing wildlife in any state is the responsibility of a designated state agency, governed by state laws. Explain that there are also other state agencies concerned with other aspects of the state's environment, such as water, land use, and air quality. The students' state senators or representatives have offices whose staff can provide the information regarding laws governing wildlife issues and the responsible agencies. This lesson will investigate the relationships between the state environmental agencies and any legislation that is being proposed as a result of these relationships.

Activity

- Appoint a team of two or three students to contact their state representatives or state senators to find out what bills have been introduced that would affect wildlife and/or the environment.
- Have another team of students contact the state agencies responsible for the management of wildlife and the environment, regarding any concerns that the state agencies have.
- Each team is to report back to the class with their findings.
- List the proposed legislation on the chalkboard by bill numbers, titles, amendments, and who introduced each bill.
- Students then list the concerns of the state agencies by state agencies on the chalkboard and explain these concerns to the class.
- Students should then prepare a list of questions on the proposed legislation the concerns of the state agencies.
- After hearing all questions, students will discuss which bill and which concern are most worthy of consideration.
- Based on the concern selected, students will select a bill to investigate.
- Students will track the process of the bill as it proceeds through the state legislative process. Every week, the teacher will have a student report to the class where the bill currently is in the state legislative process.

Assessment

Students will write a letter to their state representatives or senators either opposing or supporting that bill. The essay must contain:

1. A concise description of the major purpose of the bill
2. A discussion of the major viewpoints supporting (or opposing) the bill
3. An explanation of possible unanticipatory consequences from the passage of the bill.
4. A description of actions that citizens might take at appropriate stages to affect the bill's passage or defeat.
5. A personal statement of whether the writer believes that the bill should be passed.

Conclusion

Project WILD's educational materials are provided to teachers through practical, interactive workshops conducted by representatives of sponsoring state wildlife, natural resources, and educational agencies. Workshop participants are encouraged to discover the benefits of melding both science and social studies into useful lessons that might improve the environment and certainly lead to enhanced learning among high school students. Doing interdisciplinary lessons that blend science with social studies have many useful learning goals:

- Such lessons establish educational goals that require the applications of concepts, content and skills to involve students in the construction of their own knowledge.
- These lessons engage students in tasks that challenge them cognitively and developmentally.
- Such lessons can engage students in service tasks that have clear goals and meet genuine needs.

- These lessons can maximize student voice in selecting, designing, implementing, and evaluating their learning product.
- Such lessons promote communication and interaction with the community/state and teaches the higher thinking skills

Environmental issues are complex and we need to begin sensitizing students as early as possible to the influence human behavior has on the natural world. Understanding this delicate balance between humans and their environment begins with developing environmental literacy. Howard Gardner's theory of Multiple Intelligences (Gardner 1999) states that individuals strong in the area of Naturalistic Intelligence observe, understand and organize elements and patterns that are part of the natural world. Gardner (1991) also believes that natural settings provide children the opportunity to develop the understanding that education is part of, not separate from life. Students who have teachers who are knowledgeable about environmental issues, who are prepared to teach about the natural world in their classroom, and are excited to utilize the surrounding natural areas have a strong education because their teachers not only create a generation of valuable citizens but they also foster the development of the Naturalistic Intelligence in those students. The way we educate students today about the environment will have a great impact on the future quality of life for generations to come. To educate students about ecology and the democratic process is fulfilling the goals set forth by both the National Council for the Social Studies (NCSS 1994) and the National Science Teachers Association (NRC 1996). Such interdisciplinary teaching should be encouraged.

References

Gardner, H. "The Tensions Between Education and Development." *Journal of Moral Development,* (1991): 0 (2): 113-115.

Gardner, H. *Intelligences reframed: Multiple intelligences for the 21st century*. (New York: Basic Books, 1999).

Hudson, S. J. "Challenges for Environmental Education: Issues and Ideas for the 21st Century." *BioScience.* (2001): 51 (4): 283-288.

Project WILD. *Science and Civics: Sustaining Wildlife.* (Houston, TX: Council for Environmental Education, 2007).

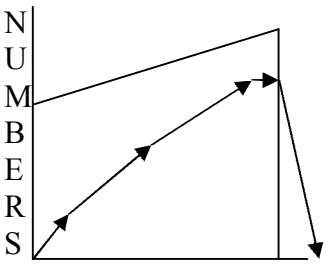
Project WILD. *Welcome to Project WILD.* http://www.project wild.org/ (accessed September 10, 2007).

The National Council for the Social Studies. *Expectations of Excellence.* (Washington, D.C., 1994).

National Research Council. *National Science Education Standards*. (Washington, D. C., 1996).

Graphs

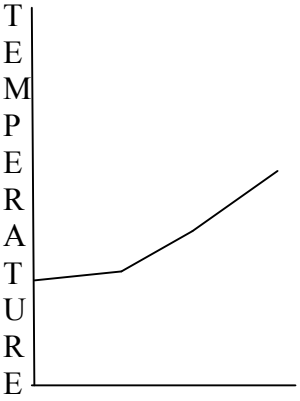
A:

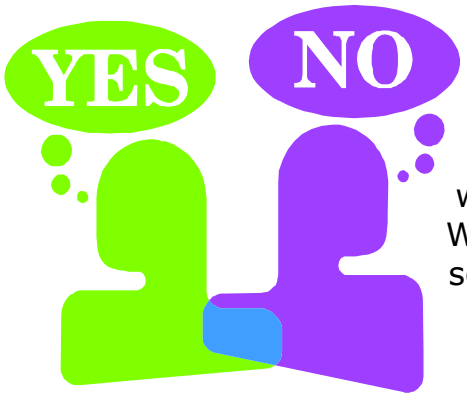


Number of ground squirrels

Number of prairie falcons

B: Average Temperature





Survey Says.....

An informal online survey of past Project WILD workshop participants who specifically took Project WILD in their college courses, either as part of pre-service, or as part of other courses, was completed in Ohio in December of 2006 and showed the following:

- 147 respondents
- 86% took WILD within the last 5 years*
- 67% took WILD as part of their methods course, 10% as part of an elective course and 18% as part of an optional offering outside of their classes.
- 100% said they felt it was an appropriate part of their courses
- 75% used WILD in their field experiences
- 76% highlighted their WILD training in their resumes or portfolios
- 49% are currently teaching, of which 53% said they currently use WILD in their classrooms in the following subjects**:
  --93% in Science
  --27% in Social Studies
  --25% in English/Language Arts
  --20% in Math
  --13% in Art
  --9% in Physical Education
- 63% said they use activities that were not part of their original training, meaning that they explored and utilized the guides beyond what they learned in their workshop.
- 72% said they shared WILD with other teachers
- 99% said they would recommend WILD to another teacher

- When asked how important they thought it was for colleges and universities to include WILD in their teacher education courses, they responded:
    --18% said it was critical
    --45% said it was very important
    --31% said it was important
    --4% said it was only somewhat important
    --1% said it was not important at all

Status of Project WILD in Ohio's 51 teacher education programs:
29 (57%) have never had WILD facilitators on staff.
22 (43%) have or have had at one time a WILD facilitator on staff or affiliated with their programs.

** This was to be expected as it is very difficult to track down individuals after they leave college.*

*** Most respondents indicated that they used the materials in a cross-disciplinary manner.*

While you may be wondering how this applies to Project Learning Tree, both programs are distributed very similarly and are utilized very similarly in Ohio. So it could be fair to say that this data could be extrapolated to include PLT as well.

If you'd like to read about more of the research that's been done on Project WILD and Project Learning Tree, both Projects have past research posted on their national websites at

Project WILD—http://www.projectwild.org/evaluation.htm

Project Learning Tree—http://www.plt.org/cms/pages/21_19_4.html