Developing a Binational Geography Curriculum in Sustainability

Alex Oberle, Fabian Araya, Ximena Cortés & Mollie Ullestad

Published online: 14 Jan 2015.

Submit your article to this journal 🖉

View related articles 🔍

View Crossmark data

Developing a Binational Geography Curriculum in Sustainability

Alex Oberle
Department of Geography, University of Northern Iowa
Cedar Falls, Iowa, USA

Fabian Araya and Ximena Cortés
Department of History and Geography, University of La Serena
La Serena, Chile

Mollie Ullestad
Geographic Alliance of Iowa, University of Northern Iowa
Cedar Falls, Iowa, USA

Introduction

In a world with an ever-increasing population, diminishing natural resources, and greater levels of consumption, sustainability has emerged as a critical concept and it encompasses everything from international policy to lifestyle changes to "green" technologies. According to the U.S. Environmental Protection Agency, "everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations" (EPA 2014). While various aspects of sustainability have been adopted by schools and universities, businesses, organizations, and governments, there is a need for more standards-based curricular material that connects directly with sustainability. Geography represents such a natural link, whether it is the three aspects of geo-literacy—interactions, interconnections, and implications—or the direct connection between sustainability and at least four of the National Geography Standards.

"… [T]here is a need for more standards-based curricular material that connects directly with sustainability."

This binational project between Chile and the United States links sustainability and geography to create 16 standards-based lesson plans that focus on sustainability. The international component is unique, highlighting the significance of sustainability across borders and geographic space, connecting local issues, events, and challenges with the broader global context and with similar occurrences elsewhere in the world. This collaborative project engages scholars in geography education and pre-service social science/geography students at two universities to develop the lesson plans with each lesson plan paired with one from the other country, specifically the state of Iowa in the United States and the region of Coquimbo in Chile. For example, on the topic of renewable energy, there is one lesson plan on challenges to renewable energy in Coquimbo and its counterpart focuses on wind energy resources in Iowa.

The Value of Curricular Materials on Sustainability

Sustainability is not only an increasingly critical topic, but is also crosscutting, linking geography and science. Within geography, sustainability concepts are grounded in both human-environmental interaction and spatial perspectives regarding real-world problem solving. In the National Geography Standards, sustainability is central to Standard 16, "Changes that occur in the meaning, use, distribution, and importance of resources," which also has Substandard 16.3, "Sustainable resource use and management" (National Geography Standards 2012). The concept is also evident in Standards 14, 15, and 18, which address human modifications on the environment, the impact of physical systems on human systems, and interpreting the present to plan for the future. In the science realm, sustainability is implicit in the Next Generation Science Standards, including such focus areas as the availability and management of natural resources and developing or refining scientific solutions to solve such issues (Next Generation Science Standards 2014).

While sustainability standards that promote "sustainability literacy" exist through the U.S. Partnership for Education in Sustainable Development (2009) in concert with the National Council for the Social Studies (NCSS), curricular standards for sustainability have not been widely adopted nor directly integrated with geography and science standards. These standards are represented as grade bands across the K–12 level and encompass a range of topics: ecological, economic, and social, and also encourage personal and collective action and responsibility. A common thread among these standards is the notion that they are all connected, which supports the direct link with geography. These connections are represented in terms of mutual issues and challenges that exist widely across regions and around the world.

"Within geography, sustainability concepts are grounded in both human-environmental interaction and spatial perspectives regarding real-world problem solving."

Project Development

The original idea for this project grew out of existing collaboration between geography education scholars at the University of La Serena (Chile) and the University of Northern Iowa (United States). The University of La Serena (ULS) secured federal funding from Chile's Fund for Scientific and Technological Development (FONDECYT) to develop geography curricular materials relating to sustainability, and then sought out collaboration with the University of Northern Iowa (UNI) to develop a binational and bilingual project that would serve secondary educators and students in both Chile and in the United States. The Geographic Alliance of Iowa (GAI), based at UNI, then earmarked a modest amount of National Geographic Educational Foundation funding to further support the project, chiefly to host the project and lesson plans on its web site and then to fund additional

"The original idea for this project grew out of existing collaboration between geography education scholars at the University of La Serena (Chile) and the University of Northern Iowa (United States)."

Table 1. Themes and Focus Areas for Lesson Plans

General Theme	Lesson Plan focus for Coquimbo, Chile	Lesson plan focus for Iowa, USA
Economic–Energy	Energy challenges in the region	Wind energy
Economic–Industrialization	Growth of the Pisco industry	"Green" Manufacturing
Environmental–Hazards	Tsunami hazards in Coquimbo Bay	Flood hazards in Iowa
Environmental–Pollution	Pollution in La Herradura Bay	Urban runoff in Cedar Falls
Social–Poverty	Rural Poverty in La Higuera	Rural poverty in Iowa
Social–Urbanization	Urban growth in La Serena-Coquimbo	Des Moines urban change in comparison to Iowa
Cultural–Immigration	Italian immigration to the region	Immigration in Iowa
Cultural–Agricultural	Water usage in rural Coquimbo	Alternative agriculture

"[T]he full version of these and all the other lesson plans and web quests can be found at: http://www.uni.edu/gai/sustainability-lesson-plans"

graphic design once the project was completed. The project team identified eight aspects of sustainability that are common to both the state of Iowa and the Chilean region of Coquimbo, as well as being widely transferable to other parts of the globe (Table 1).

Once identified, pre-service teacher education students in each university developed lesson plans for each of the eight broader aspects of sustainability. At ULS, this was part of a "Regional Geography of Chile" course where twenty-eight history and geography teacher education students gathered information, conducted research, and then developed educational resources that addressed local problems related to geographic aspects of sustainability. Students designed the lesson plans and classroom activities to connect with digital media and include a strong technology component. Similarly at UNI, two advanced pre-service geography/social science teachers worked independently to create lesson plans for the eight topics. Following the lead of their Chilean counterparts, the teacher education students created both a web quest and a lesson plan, with the web quest addressing the broader issue and the lesson plan presenting the larger sustainability issue in a statewide (Iowa) context. All lesson plans followed the framework established by the NSF Road Map Project and the National Council for Geographic Education, and directly addresses the recently updated National Geography Standards (National Geographic 2012). Geography education faculty at both universities reviewed all lesson plans and web quests. Two lesson plans are highlighted below, but the full version of these and all the other lesson plans and web quests can be found at: http://www.uni.edu/gai/sustainability-lesson-plans (last accessed September 4, 2015).

Lesson Plans

Lesson Plan 1

Title: Urbanization in Iowa
Author: Mollie Ullestad
Affiliation: University of Northern Iowa
Grade Band: 7th–8th grades

Geography for Life Standards

#3. How to analyze the spatial organization of people, places, and environments on Earth's surface.

#9. The characteristics, distribution, and migration of human populations on Earth's surface.

#12. The processes, patters, and functions of human settlement.

Duration: 2 to 3 50-minute class periods

Objectives

- The purpose of this lesson plan is to give students a better understanding of urbanization in Iowa and how it affects the state as a whole.
- At the beginning of the lesson, students will watch a YouTube video about urbanization and how it has affected the evolution of cities throughout history. A class discussion will follow. Students will then read sections of an online article about population growth in the Midwest and its urban and rural dimensions. Another class discussion will follow. Next, the teacher will assign each student an Iowa county to research how urbanization has affected that county. As an assignment, students will create a PowerPoint presentation about their research findings and present it to the class.
- This lesson gives students the opportunity to use deductive reasoning about the relationship between population, urbanization, and rural areas.
- This lesson gives students the opportunity to use deductive reasoning about the relationship between population, urbanization, and rural areas.

Specific Objectives

- Students will understand how urbanization varies across the globe and in Iowa.
- Students will understand which areas are experiencing population growth and urbanization and which are not.
- Students will understand how urbanization is affecting life in particular Iowa counties.

Spotlight on Urbanization in Iowa

Iowa's largest cities and suburbs are growing while its rural areas and towns are losing residents. Iowa's largest urban area is Omaha-Council Bluffs, with a population of 850,000 (2009), followed by Des Moines with 563,000 (2009). Des Moines, however, has been seeing a population growth rate of 17 percent, ranked third in the Midwest region of the United States. The population of the Midwest as a whole has been growing steadily, including Iowa with an increase of 2.8 percent. While this may seem like a promising statistic, this population increase is very unevenly distributed around the state, causing economic problems for rural areas. In fact, while Iowa's metropolitan areas saw increases in population by 9.1 percent, its micropolitan and rural areas saw a population loss of a combined 8.2 percent. As a traditionally rural state, Iowa is seeing vast changes as its cities and urban areas quickly grow and its small towns dwindle.

For a more general background of urbanization in the United States, explore this web quest: https://sites.google.com/a/uni.edu/urbanization-in-the-united-states/

> *"Des Moines, however, has been seeing a population growth rate of 17 percent, ranked third in the Midwest region of the United States."*

Teacher's Toolbox

When teaching this lesson, be sure to guide students in work, but have them practice their own leadership skills and ability to do independent work. Students should actively participate in class discussions, but conduct research and complete their assignment on their own. To enable this, give clear and precise directions before beginning another step in the lesson and eliminate outside distractions. This lesson works easiest if students have their own computer, laptop, or tablet, but if this is not an option students can also work in pairs when using the Internet.

National Geography Standards

#3. How to analyze the spatial organization of people, places, and environments on Earth's surface.

#9. The characteristics, distribution, and migration of human populations on Earth's surface.

#12. The processes, patters, and functions of human settlement.

Materials

- Other Materials
  PowerPoint
  1:1 laptops/tablets recommended

Developing the Language of Geography

- Urbanization: the increasing number of people that migrate from rural to urban areas
- Urbanization rate: the percentage of the total population living in urban areas, as defined by the country
- Rural: in, relating to, or characteristic of the countryside rather than the town

Assessing Student Learning

Formative Assessment: Class discussions of the YouTube video and online article.

Summative Assessment: Students will create a short PowerPoint presentation about how urbanization has affected their Iowa county and present it to the class. They will include in their presentation whether their county has experienced a population increase or decrease, why, and how urbanization has affect their county's economy. Students will also include visuals and statistics in their presentation.

Advance Preparation

- Have YouTube and online article URLs ready for students.
- Prepare a list of Iowa counties for student research and the assignment.

Lesson Procedure

Step-by-Step Instructions

1. Anticipatory set: In the past 100 years, the United States has seen a huge shift from a rural population majority to an urban population majority. How do you think this has affected Iowa? Optional: If you would like to focus more on urbanization throughout the United States before zoning in specifically on Iowa, have students participate in this web quest: https://sites.google.com/a/uni.edu/urbanization-in-the-united-states/

2. Students will watch the YouTube video, "Urbanization and the Evolution of Cities Across 10,000 Years" (video: http://www.youtube.com/watch?v=fKnAJCSGSdk).

3. Class discussion: What did students think of the video? What surprised them? How do they think Iowa fits into the global urbanization picture?

4. Students will read sections of the online article, "2000-2009 Population Growth in the Midwest: Urban and Rural Dimensions" and look at the figures (article: http://www.econ.iastate.edu/sites/default/files/publications/papers/p11427-2010-04-28.pdf).

5. Class discussion: What did the article and its figures tell you about urbanization in Iowa? What stood out to you? Which areas in Iowa are growing in population and which are declining?

"What did the article and its figures tell you about urbanization in Iowa? What stood out to you? Which areas in Iowa are growing in population and which are declining?"

6. Assign each student a county in Iowa. Select counties that have either experienced high population growth (urbanization) or high population loss (Examples: Growth = Story, Polk, Dallas, Warren, Dubuque, Linn, Johnson; Loss = Webster, Hamilton, Ida, Sac, Taylor, Ringgold, Allamakee).
7. Once assigned, students will research how urbanization has affected their specific county and how the population and economy have changed as a result. (As students are researching, help when needed, but allow students to do research entirely on their own.)
8. Students will work on their assignment.

Extending the Lesson

Possible follow-up activity:

- Have students assigned to a county with high population growth (urbanization) pair up with a student assigned to a country with low population growth. Have the two create a venn diagram that compares and contrasts their two counties in terms of urbanization.
- The U.S. urbanization web quest expands the scale of the lesson from Iowa to the United States as a whole.

References and Resources

- YouTube Video:
  http://www.youtube.com/watch?v=fKnAJCSGSdk
- Online Article:
  http://www.econ.iastate.edu/sites/default/files/publications/papers/p11427-2010-04-28.pdf
- Urbanization in the U.S. web quest:
  https://sites.google.com/a/uni.edu/urbanization-in-the-united-states/

Lesson Plan 2

Title: The Growth of the La Serena-Coquimbo Metropolitan Area
Author: Felipe Morales Barrera
Affiliation: Universidad de La Serena, Chile
Grade Band: 7th grade

Geography for Life Standards

#11. The patterns and networks of economic dependence on the Earth's surface
#12. The processes, patterns, and functions of human settlement

Duration: 3 days, 3 classes of 90 minutes daily

Lesson Purpose and Description: To engage students in utilizing various geographic tools and techniques to understand different facets of urbanization

Learning Objectives:

- Students will understand how to use fieldwork and geographic tools to locate and explain geographic problems.

- Student will understand how different factors impact the morphology and change in urban areas.
- Students will understand how economic processes affect the development of human settlement.

Spotlight on Urbanization: Chile is a majority urban nation and the La Serena-Coquimbo metropolitan area is one of the largest in the country and includes two joined cities, one with a tradition of industry and trade and the other that is centered on the service sector. Existing in a highly arid region, urbanization here is greatly influenced by access to water and as with any expanding urban area in a desert region, sustainability issues are paramount.

Teacher's Toolbox: When teaching this lesson, be sure to adequately prepare students for fieldwork including both the trip logistics as well as the collaborative component. Frequent spot checks on student progress will ensure that they are effectively moving forward on the project, to include both landscape observations and survey data collection.

National Geography Standards

#11. The patterns and networks of economic dependence on the Earth's surface
#12. The processes, patterns, and functions of human settlement

Five Themes of Geography: Location, Place, Human-Environmental Interaction

Materials

- Data presentation
- Computer lab to work online
- Web quest (http://webquest.carm.es/majwq/wq/ver/53825)
- Transportation to fieldwork
- Method of recording video

Developing the Language of Geography

- Conurbation: an extended urban area, typically consisting of two or more cities
- Urban: a location characterized by higher population density
- Spatial distribution: renewable or nonrenewable resources used for obtaining an energy source
- Sustainable development: development that meets the needs of the present without compromising the ability of future generations to meet their own needs

Assessing Student Learning

- Formative Assessment
  This will occur throughout the lesson.
  The instructor will gauge participation in the activities and fieldtrip.
  The instructor will use the established rubric to evaluate the completion of the web quest.
- Summative Assessment: This will be evaluated at the end of the lesson by the quality of their narrative/essay and video-based report.

Advance Preparation

Organize fieldtrip to the surrounding urban area

Lesson Procedure

Step-by-Step Instructions

DAY 1:
1. Anticipatory Set: The teacher will ask: how has the metropolitan area changed over the past five years?
2. The teacher will provide an overview of concept of rural and urban settlement as well as economic development and population change as it applies to settlement patterns.
3. The teacher will discuss urbanization in the larger Chilean context, specifically Santiago and then the Coquimbo part of the metropolitan area.
4. The teacher will elicit questions from the class to ensure comprehension, and provide details about the fieldtrip that will happen the next day.

DAY 2:
1. The class will embark on a fieldtrip to the La Serena-Coquimbo area, all the while discussing connections between observations and the previous day's presentation.
2. The teacher will engage in a discussion about the urban landscape, asking students about the clues in the landscape that suggest different phases of growth in the cities.
3. The teacher will provide a demographic questionnaire and each student must talk to at least one resident to get a response to the questionnaire. Questions include details about residents' housing, such as where they moved from and why.
4. The teacher will rejoin the students to discuss, as a group, the results of the surveys.

DAY 3:
1. The students return to the classroom to complete the web quest which engages students in a step-by-step collaborative research project that includes conceptual ideas presented in the lecture, observations from fieldwork, and the results of the questionnaires.
2. Work on creating an essay/narrative and video report on this project ("Geography and History of the La Serena-Coqumibo Metropolitan Area": http://webquest.carm.es/majwq/wq/ver/53825).

> *"The teacher will engage in a discussion about the urban landscape, asking students about the clues in the landscape that suggest different phases of growth in the cities."*

Extending the Lesson

Other Possible Activities

- Before the lesson, students could create a KWL (Know, Want to Learn, Learned) about the La Serena-Coquimbo area, starting with what they already know, what they want to learn, and then what they learned after the lesson was completed.
- During the fieldtrip and/or at the end of the lesson students could specifically discuss various aspects of sustainability, especially in regards to water, as it relates to the growth of this urban area.

References and Resources

Web quest: http://webquest.carm.es/majwq/wq/ver/53825

Acknowledgments

Holt (now social science teacher at R.B. Stall High School in North Charleston, South Carolina). Thanks to UNI Social Science Education student Chelsea Kies for assistance in formatting the final version of this article.

References

Environmental Protection Agency. 2014. *Sustainability*. http://www.epa.gov/sustainability/basicinfo.htm (last accessed June 25, 2014).

National Geographic Society. 2013. *A road map for 21st century geography education*. Washington, DC: National Geographic Society.

National Geography Standards. 2012. *Geography for Life*. Washington, DC: National Geographic Society.

Next Generation Science Standards. 2014. *Next Generation Science Standards*. Washington DC: Achieve.

U.S. Partnership for Education for Sustainable Development. 2009. *National Education for Sustainability K–12 Student Learning Standards*. Washington, DC: US Partnership.

Alex Oberle is an Associate Professor in the Department of Geography at the University of Northern Iowa, Cedar Falls, Iowa, USA, and Coordinator of the Geographic Alliance of Iowa. His research interests include applications of geospatial technologies for enhancing geography education and spatial thinking, as well as ethnic/urban geography, particularly the dynamics of Latino and Asian urban settlement.

Fabián Araya is an Associate Professor in the Department of Social Science at the University of La Serena, La Serena, Chile, and director of the geography program. He earned his doctorate in geography from the University of Cuyo (Argentina). His research interests include geography education with focus areas in both sustainability and spatial thinking.

Ximena Cortés is an Associate Professor in the Department of Social Science at the University of La Serena, La Serena, Chile. Her research interests include geography education and the geography of Chile. She teaches courses on physical geography, geography of Chile, and the regional geography of Chile.

Mollie Ullestad is an undergraduate student studying Social Science Education with an emphasis in Geography at the University of Northern Iowa, Cedar Falls, Iowa, USA, and the Undergraduate Research Assistant at the Geographic Alliance of Iowa. Her areas of interest include geography education, human geography, and international education.