ED 342x Design Project:
A portable interactive
adventure in cultural geography

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Introduction

The world is shrinking. In order to succeed in the future, young Americans must develop an international perspective when it comes to understanding how they fit in the world. Children are growing up in a world with a global economy. Our communities are becoming more culturally diverse. Political and environmental issues and events at home influence the world and vice-versa. Human rights, racial, ethnic and religious issues are in the headlines every day. Geography and world culture play a very important role in understanding current events, global changes and creating possible solutions to problems.

The Learning Problem.

In November 2002, the National Geographic Society - Roper 2002 Global Geography Literacy Survey were published. The study revealed startling data about young Americans’ lack of basic geographic knowledge.

The survey assessed 3,250 young adults, ages 18-24 in nine countries: Sweden, Germany, France, Italy, Japan, Great Britain, Canada, Mexico and the United States. The survey tested basic map reading abilities and basic knowledge of other cultures. Most of the young adults were also interviewed about their attitudes concerning geography and their awareness of geography in the context of current events.

The young Americans interviewed deemed it necessary and important to have the ability to read a map (88%), and to know where countries in the news were located (75%).

However, the results of the survey revealed a lack of map reading skills and knowledge of geography as it relates to world events amongst the young Americans, of whom:

- 11% could not find the USA on a map of the world
- 29% could not find the Pacific Ocean
- 75% could not estimate the US population
- 87% could not locate Iraq on the map

Note: the USA sent troops to Iraq 3 months later, at which point we became a nation at war with a country that most of us could not locate on a map.

In the chart below, the overall results of the NGS-Roper 2002 Survey are presented by country. Note the obvious difference in the level of geographic literacy across the nine countries. American young adults ranked second to last and received an overall "D" grade. Thirty-nine percent of Americans surveyed failed the test completely.
Although the young Americans surveyed believe the geography skills are important and necessary, the results of the study reveal that those skills are not being learned. When the results of the study were published, there was international outcry over Americans’ “pervasive lack of knowledge” of the world at large. The National Association of International Educators (NAFSA) warns, “Americans’ lack of knowledge represents a ‘national liability’ in the war on terrorism” (NAFSA, November 18, 2003).

In the climate of No Child Left Behind, there are problems facing geography education in the classroom. The NCLB Act of 2001 includes geography in the list of core academic subjects, yet has failed to mention the subject any further. The other core academic subjects receive provisions, appropriations and detailed programs, and geography receives none of these supports (GENIP, 2003). In this sense, we believe geography education must be addressed beyond the classroom.

**Attitudes About Geography**

A case study in Texas investigating students’ attitudes toward geography in 1983 revealed that geography ranked lowest of six school subjects. The study was repeated in 1993 at the same school, to find a slightly more favorable view of the subject, but the subject was still classified as the students’ least favorite subject. While boys reported
more interest in the subject in 1983, the girls showed equal interest by 1993. The researchers found that the only contributing factor toward students’ increased enjoyment of the subject related to the teaching methods employed in the classroom. Teachers who engaged in more active and hands-on teaching methods were most successful in contributing to students’ more positive attitudes about geography. The researchers call for more of a concerted outreach effort to the elementary grades in teaching geography, in order to capture the interest in young learners (Sack and Petersen, 1997).

While this is just one case study, we believe it resonates with students around the country. Students find memorizing facts to be “an unpopular chore associated with learning geography” (Oldakowski, 2001). We believe the best way to engage students in learning geography is to de-emphasize the learning of facts, and allow students to connect with geography through problem-based learning, which uses “problems to foster student motivation, focus and learning” (Duch, 1996).

**Brief Overview of Our Solution**

We have developed a laptop-style, interactive toy that incorporates a travel adventure theme with a series of problem-based games. We have chosen ages 8 - 12 as our target user group, for two main reasons. First, we believe that early exposure to geography and world culture helps promote a lifetime of interest. Through our research, we have found that many educational researchers assert that “children’s literacy in a subject improves as their interest in that subject increases. Moreover, developing positive attitudes toward a subject early in life influences whether an individual chooses to learn more about that subject later” (Sack and Petersen, 1997). Second, children at those ages are able to comprehend that other people are different from them. They are also able to perform mental abstractions and use logic when they solve problems.

Since the toy is laptop style, kids can use it anywhere. We originally intended for it to be used in the backseat of the car, but user testing informed us that kids often get sick reading in the back of a car. We are not designing with the intent that the toy will be used in a classroom setting. Rather, it fosters personal exploration at the pace of the individual user.

The solution is appropriate for children at various levels of understanding and experience. Vygotsky described the zone of proximal development in reference to the level of complexity in a subject matter in which a child is ready to learn. This is based on the child’s current level of understanding and his prior experience with the specific
knowledge domain. Our solution will allow for increased complexity in the concepts presented. This is addressed by allowing the system to grow with the child. The toy targets specific levels of understanding as the user must choose his or her level, as well as a system that adjusts its own level of complexity based on the child’s performance.

In developing content for the solution, the focus was on material that is challenging and interesting for the child. Ideas involve topics which allow the child to investigate cultural, spatial, and physical domains. We focused on travel and adventure for the purposes of this prototype. The child is able to virtually interact with his location, as well as draw upon similarities and relationships with other locations and cultures around the world.

In order to support the child in developing educated and creative solutions, the games will include a variety of additional resources. Often there will be more resources than necessary for the specific problem, creating a situation more similar to the real world than to a structured classroom-based project. Resources include maps, photos, quotes, short stories, conversion rates, and other simulated travel-related activities.

**Design Rationale**

*Stages of Cognitive Development*

We created our toy with the guiding principle that in order for learning to be successful, the information must engage the child. An important part of this engagement is creating scenarios and providing information that is applicable to the child’s level of cognitive development. Since our target user is ages 8-12, our toy is aimed at kids who are in the early stages of the concrete operational phase to those in the early stages of the formal operational stage, according to Piaget’s theories. In the concrete operational phase, kids are able to perform some mental abstractions and they are also able to use inference and logic to solve problems. They are also moving away from the egocentrism of the preoperational phase and are able to understand that other people have different experiences from them. At the formal operational stage, kids are able to engage in abstract and complex thought (Zimbardo, 2000).

Since our toy is aimed at kids with a varying degree of cognitive abilities, we designed the games with multiple levels in mind. In the earlier levels, we want to make sure to add features and details to guide kids through their travel. For instance, if the user were to take a trip from Palo Alto to Nepal, we would include a detailed animation showing people entering a plane, flying over the ocean, and then departing the plane, so that the user understands that they’ve gone to a new place. In more advanced levels, we will not
need to include as much detail in making sure the players understand the spatial nature of the game.

**Making Geography Interesting**

Another facet of creating an engaging lesson is to make the information relevant to the child’s life. This idea of experience based learning was championed by John Dewey, who informed our design process. Dewey writes “Geography appeals to the imagination. It shares in the wonder and glory that attach to adventure, travel, and exploration” (Dewey, 1916). Children are naturally inclined to use their imagination, so encouraging learning geography as a “people-centered” subject allows children to use their own lives as a starting point for those imaginary travels. He also writes, “When not treated as a basis for getting at the large world beyond, the study of home geography becomes a deadly as do object lessons which simply summarize the properties of familiar objects. The reason is the same. The imagination is not fed, but is held down to recapitulating, cataloguing, and refining what is already known. But when familiar fences that mark the limits of the village proprietors are signs that introduce an understanding of the boundaries of great nations, even fences are lighted with meaning” (Dewey, 1916).

With this in mind, we shied away from the current model of geography toys on the market. These tend to be “quiz format” and only encourage the memorization of rote facts (a country’s name, location, the name of the capital, etc.) It has been our intent to design a toy that would have such information embedded in the storyline of the adventure, along with kid-friendly and easily accessible information that would help players relate to the people and places in the games. Cross-cultural references exist in simple things, such as daily schedule, type of school, favorite pets, and favorite foods; and we believe these are important aspects of kids’ lives, and will lend themselves well to providing easy entry points to further information about the people and cultures of the world.

**Anchored Instruction**

While memorizing the names of all the countries in Europe is a requirement for some geography classes, the information is useless if it is not applied in some real-life situation. Bransford states that anchored instruction is a situation that “begins with a focal event or problem situation that provides an anchor for students’ perceptions and comprehension” (Bransford et al., 1990). Bransford believes that traditional education does not encourage students to see their knowledge as applicable in real-life situations, because the information is just stored as rote facts. His intent, therefore, is to teach in a way that makes information valuable, rather than just facts to be memorized. His research showed that students who just learned the theories and facts from a textbook
were significantly less likely than students who had the theories anchored in a situation, to be able to apply those theories in a new situation.

We need to ensure that our toy poses a problem first, rather than immediately forcing information which may be meaningless on the child. Our toy will set up situations in which the child will be motivated to use the informational resources. For the purposes of learning about geography, we believe a poorly designed toy would have the child first look at maps, learn definitions, and read about specific countries, before giving the child a problem to solve and a context within which to solve it, with the assumption that the child has memorized the content.

This would completely miss the concept of anchored instruction, because there would be no central situation or problem with which the child might connect the provided information. The information the child was given would be, in effect, “inert knowledge,” rather than “useful knowledge.” As with case-based instruction, our toy should first introduce the child to a problem for him to solve, specifically one that is interesting to the child. As the child goes about solving the problem, appropriate informational resources will be introduced, so that the child will be able to see how he can use this information to solve the problem.

**Problem-Based Learning**

Similar to anchored instruction is the theory of problem-based learning. This concept suggests that students who experience problem-based learning simulations are more competent in real-world, project-based learning environments. This appears to be due to the fact that students become better able to flexibly apply the skills they learned to new environments (Barron et al., 1998). Problem-based learning is like anchored instruction in that the learning situation is structured around a specific problem to be solved, rather than a list of rote facts to be memorized. The results of the study have informed our design in the following ways:

1. **Students develop a need to know.** Barron et al. report that for geographic concepts which require scaffolding, such as scale and area, students are more interested once they have developed a need to know. This idea underpins our project in that children will develop a strong motivation to learn new concepts in order to solve problems – in fact they **need** to learn the concepts in order to make sense of the clues.

2. **Learning appropriate goals.** There is a concern that project-based learning often gets caught up in the action and misses the opportunity for deep learning. We saw examples of this during our prototyping sessions, in which children saw the purpose of getting through the material, but did not develop a connection
between the activities and the understanding it was intended to foster. We need to be clear about what concepts we want users to understand and how we can challenge them to reflect upon that.

3. **Focus on a problem at the start.** Rather than starting with disconnected information and date, a better place to start is with a defined problem. We intend for our game to start with a problem that provides structure so that the child has a defined environment in which to play.

Problems posed in the game will integrate a variety of geographical and cultural concepts, rather than simply focus on just one at a time. A major argument in support of problem-based learning is that it challenges children to think as they do when they come up against problems in the real world. Children do not live in a world in which concepts are neatly separated from each other, but rather in world full of interdependencies and relationships. The National Geography Standards (see Appendix #1) have been used as a guide in developing integrated content.

**Motivation.**

A key aspect of our approach is that children are inherently motivated in problem-solving situations. “Children are both problem solvers and problem generators; they not only attempt to solve problems presented to them, but they also seek and create novel challenges” (Bransford, 2000). In designing our solution, we leveraged and built upon children’s innate motivation to conquer problems, especially self-initiated and self-directed problems. This type of learning is no longer disconnected from the child, as are many school assignments forced upon the child, but is instead relevant to the child’s daily life. Children gather information not only from the additional resources provided, but also from their previous knowledge, in order to make educated decisions in the game.

**Gender Issues**

Pamela Wridt has found through her research that boys have a better spatial sense than girls, mainly because of the types of activities they engage in outside of the home. Boys are riding bicycles and skateboards around town, and developing more complex mental maps of where they live, and how their cities are spatially designed. Girls’ mental maps are not as complex as boys’, mainly because Wridt found girls’ activities outside the home entailed mainly traveling to the shopping mall or other friends’ homes for social activities.

In this sense, our toy must consider the differing ways in which boys and girls experience the world in their daily lives, and incorporate those findings into the design. We intend to design opportunities for learning about economic geography, such as learning about
where clothes are manufactured Social geography will also be addressed, as we will create within the game fun, social places to “hang out.” Capitalizing on boys’ sense of adventure and outdoor spatial awareness will be best seen through mapping and finding one’s way with direction and travel.

**Multiple points of entry for different levels of learners.**

Gardner (1999) cites the need for designers to consider that learners of all abilities have access to the material; that the material is constructed in ways that can reach the most variety of learners. Gardner believes that there are at least three ways in which the “multiple intelligences perspective” can enhance understanding:

1. **By Providing Powerful Points of Entry.** Because students can be engaged or turned off quickly, we will create scenarios that “hook” the players in quickly, through the use of compelling problems to be solved.

2. **By Offering Apt Analogies.** Entry into the problems and scenarios will begin with topics familiar to the child’s age group; this use of familiarity will continue throughout the game as the players move through unfamiliar cultural and geographic territory.

3. **By Providing Multiple Representations of the Central or Core Ideas of the Topic.** The themes of globalism, the environment, world peace, etc., can be presented in an infinite number of ways, and we intend to address these major themes in ways that allow for the player to draw upon previous understanding in order to apply that understanding to new situations. This will create deeper understanding without overt repetition of the material.

Our toy allows for the child to choose from five levels of play. As a new user, a child may want to start with the first level, and work his way up through more difficult content and lengthier challenges. A child may return to the game and pick up where he left off, and the game will build upon the child’s progress. For example, a child who quickly solves problems at the first level will encounter more challenging problems as he moves along.

**Expanding the Definition of Geographic Literacy**

The National Geography Standards defines a geographically informed person as one who knows and understands the world in spatial terms, places and regions, physical systems, human systems, the environment and society, and uses of geography. We argue, however, that these standards simply don’t generate an environment where kids can become excited about geography or relate geography lessens to their own world and life experiences. Instead, we plan to go beyond the traditional classroom oriented geography teaching and create a toy that fosters motivation and a deeper interest in learning about the world and its various peoples. Our design transcends the teaching of dry facts and place memorization and incorporates a more real world travel experience. Through the
toy, kids can begin to explore the world in a completely new way, as we begin to break
down ethnocentric thinking and instill cultural sensitivity. Crucial to our design
objective is helping kids connect geographic awareness with an understanding of culture,
and how people all over the world coexist and are interconnected. We believe the toy can
do much more than make kids geographically informed; it will also help kids become
more tolerant of cultural diversity. We draw from multiple sources that inform our
integration of culture and its many implications in our design process.

**Integrating Culture and Geography**

Before beginning our design process, it was necessary to first construct a broad outline
for incorporating culture, an often unclear and ambiguous topic, into the geography
learning experience. We began by defining culture, using the anthropological definition
presented by Kurt Barnada, who states “Culture emerges from all the effects of a people’s
relationship to the land on which it settles. Culture can thus manifest itself in as an
infinite number of ways as people can relate to the land” (Barnada, 1991). We decided to
use this broad anthropological definition to make culture a more manageable and
inclusive issue. At the same time, we want kids to grasp culture and become culturally
aware without oversimplifying or “dumbing” down information. Barnada's research also
provides evidence that culture and geography are more effectively learned when
combined, as they share a complementary relationship. Geography is a scaffold for
understanding culture, while culture is a tool for making geography exciting and real.
Our design process incorporated a careful balance to ensure that we utilized the
strengths of both culture and geography to supplement the other. For example, learning
about a distant and unseen country will become more real and tangible if cultural facts
are incorporated, while learning about a country’s culture also becomes clearer when
rooted in geographical concepts.

It was also important for our group to realize the limiting nature of culture. Most kids
using our toy will only have been exposed to American culture, leaving them with an
extremely limited perspective. Due to the prevalence of ethnocentrism, our design
process included care to avoid teaching or relying on any cultural assumptions or
stereotypes. We plan to combat ethnocentrism, not perpetuate it.

**Culture as Mediator**

Through our design process we focused on using culture as a strong tool for making
geography more fun for kids. An important dimension of culture was to serve as a
mediator between a foreign and unknown place and a child’s personal life experiences.
Our design process reflects (Oldakowski’s) argument that the importance of culture is to
help a child go beyond memorizing facts and make a more lasting and realistic
impression. Oldakowski argues that culture can help make connections that enforce spatial awareness (Oldakowski, 2001).

Research performed by Nichole Pinkard largely informed how we should use culture as a mediator in our design process. Pinkard argues for the importance of culture as a mediator in her analysis of the learning gap between African American children and European children (Pinkard, 1999). She claims that African American kids are lagging behind in literacy skills because they feel disconnected and unmotivated from the instructional methods and materials designed for mainstream education. Pinkard’s main argument is that this disconnect occurs because these mainstream methods “do not adequately reflect the lived experiences of African American children” (1). Following Pinkard’s research, our design process reflects a “culturally responsive” pedagogy, which suggests “learning is most efficient when students are able to draw upon knowledge of concepts, procedures, and strategies they know well” (1). Therefore, prior knowledge should be used as a scaffold or basis for learning geography. Pinkard defines the use of prior knowledge in learning as “instructional relevance.” Our design assumes that most kids do not have prior geographic awareness, but kids do have knowledge about their own culture, which we use as a foundation for relating to other cultures.

In support of our goals to teach geography and cultural awareness to American children, Pinkard argues, “if cultural responsiveness is uppermost in the mind of the designer of instructional materials, the outcome will be materials that are so engaging that learning cannot help but occur”(3). Therefore, it was important for us not to force obscure cultural facts into our design, but to fuse fun and informative facts about other cultures that are also relevant to American children. This is one area of our design process that was extremely complicated, as American children do not have homogeneous experiences within the culture. Therefore, it was important for us to choose educational facts carefully as to include the largest number of kids with relevant experiences and pre-existing knowledge of the information, while not marginalizing the uniqueness of the foreign culture.

**Globalism and Cross-Cultural Awareness**

Throughout our design process, we were constantly reminding ourselves of the importance of teaching more than geographic awareness, but also a more global perspective that would enable kids with skills to live in our ever shrinking world. Sandra Demovsky’s research on global education informed our design process by highlighting the importance of going beyond teaching simple facts and map skills to generate cross-cultural awareness. Demovsky defines cross-cultural awareness as showing “how different events are viewed by different nations, groups, and people” (35). She also argues that cross-cultural awareness is similar to “perspective consciousness,” or making
the “strangeness of their ways become less strange”(36). This definition of perspective
consciousness informed our design process greatly, as we focused more on teaching
aspects of other cultures that would foster understanding and appreciation, while at the
same time maintaining the uniqueness of the culture. We feel that traditional classroom
geography tends to focus only on the most unique and earliest aspects of cultures, which
causes disconnect. This disconnect is inevitable followed by misunderstandings and
intolerance of other cultures and customs. By focusing more on current events and
cultural issues that connect the past with today’s world, however, we can increase a
child’s ability to not only become more cross culturally aware and tolerant of other
cultures. By showing kids how Americans are interconnected and similar, as well as
uniquely different from people from all over the world, we are ultimately increasing
tolerance of cultural diversity.

It is widespread throughout America to hear citizens proclaim “We’re number one!”
While we are not protesting against patriotism, it is the notion that America is the
greatest country in the world, thus everyone else is lesser, that we feel keeps Americans
from truly accepting and understand other cultures. Gardner argues that the chief
obstacle to understanding and tolerating other cultures is adopting false theories, which
are learned very early in life. He believes that misconceptions about the world begin in
early childhood socialization, and are very difficult to unlearn. “In history, despite
numerous counterexamples, many students continue to believe that the world is divided
into good guys and bad guys, with the struggle between these Manichaean forces
constituting a staple of life” (Gardner, 1999). Our design process reflects this propensity
for children to mindlessly accept ethnocentric thinking, and takes an active approach
towards building cultural awareness and cultural diversity tolerance.

**Active Participation and Simulated Travel**

Research conducted by Denise Morlan further shaped our understanding of culture’s
role in our design process. Morlan argues that geography education should “provide the
students with opportunities to understand the world as a whole, rather than a part of a
system, and to see themselves as an active participant within that system”(15). In order
for children to gain a more global understanding of the world, it is first important that
they realize they are social participants in the world. Morlan argues that stressing
“social participation” is necessary for children to learn their impact as participating
citizens in the world. Too often, geography education is taught as a distant and detached
subject in which students have no control or influence over. However, by focusing on
active participation in our design we intend to stress to the child that their actions do
have real consequences in the world.
Based on Morlan’s research, we incorporated active participation into our design by having functions which would allow the child to calculate distances to countries, exchange money, estimate prices of plane tickets, and planning items to bring on a trip to different countries. This design feature allows kids to actively participate in the planning of a realistic trip, which ultimately conveys to children that the countries they are learning about really do exist and are actually possible travel destinations. This active participation also makes learning geography and culture a more exciting experience or adventure rather than a lesson. Realizing the realistic possibility of traveling to various foreign countries some day may also reinforce geographic awareness and make a more lasting impression in the child’s mind.

**Design Objectives and Goals.**

Rather than just having children memorize names and places, our primary aim is to develop a base of conceptual understanding and interest, upon which children can continue to learn. This challenges students “to achieve higher-level critical thinking” (Duch, 1996). Therefore our design is primarily focused on how we can create a toy that allows children to explore and develop their interest in learning more about this field. Thus, our design goals are as follows:

*Foster interest in and aptitude for learning more about the world.*

In order to create lifelong learners in geography and culture, we must first teach children how to solve problems in this context. Through problem-based learning, children learn how to solve problems – a skill which they can continue to use in real world situations. Although concepts are better retained by children if they are having fun, the fact that they are *learning how to learn* is an even more substantial achievement. Our goals are in line with the view that, “the most important attitude that can be formed is that of desire to go on learning” (Dewey, 1938).

*Develop literacy in cultural, economic and environmental interdependencies of the world.*

As the world “shrinks”, children are increasingly finding themselves as part of a global economy. Therefore, children need to understand and respect differences in culture in order to better participate in this type of environment. Rather than having children simply memorize names and locations of countries, which are often quickly forgotten, the goal is for children to better understand how and why people and places are interconnected, in order to create a platform of geographic and cultural literacy upon which children can continue to learn about themselves and their world.
**Create a toy that children find fun and engaging.**
We want to avoid designing down to children. Children, especially those approaching their teens, are concerned with appearance, and want to be cool. We are creating a toy for children that combines the look and feel of a real-world adult game with age-appropriate content and child-centered narratives and characters. If a toy looks like it is for young children or has an outdated style, the child may find that to be a turn-off. We feel that by embedding or disguising learning in fun and challenging game scenarios, we have taken away the stigma of a "learning toy" and we can reach the kids that steer clear of the average learning toy. We decided to develop a fun toy with a tremendous learning by-product.

**The Design Process.**
Our design process consisted of five phases:
- Understand
- Observe
- Visualize
- Evaluate
- Refine

**Phase 1: Understand**
*Become an expert. Immerse yourself in the problem you are trying to solve with your design.* The problem surrounding young Americans’ lack of geographic knowledge is complicated. There is not a lot of research about this problem; the National Geographic Survey is the main source of information surrounding the problem itself. We researched geography education in schools, and conducted a survey of the current market in interactive, geography-related learning toys.

In order to understand geography education in school, we visited a seventh grade social studies classroom at a middle school in the San Francisco bay area. This is an affluent, top ranked school, and the students are described by the teacher as one of the better classes. The students are currently learning world history as well as current geography, but we found it to be extremely didactic and disconnected. For example, at one point the teacher stated “we are going to learn the countries of Europe by shape.”

In order to get a sense of the marketplace, we researched online for prominent games and toys. We found these to include GeoSafari Laptop, Carmen Sandiego software, the LeapFrog Quantum Pad & Explorer Globe, and National Geographic Xpeditions online.
The Current Marketplace

Our market research focused on interactive toys which are intended to teach geography. With the exception of the Carmen Sandiego series, most of these toys teach geography in a very didactic fashion, through quizzes and matching and repetition of information. Some of the most popular items on the market include:

LeapFrog Toys: Quantum Pad (Social Studies Cartridge) and Explorer Globe

http://www.leapfrog.com/do/findproduct?ageGroupID=all_products&id=quantumpad
http://www.leapfrog.com/do/findproduct?ageGroupID=all_products&id=explorerglobe

Even with interactive qualities, the LeapFrog toys mainly function as quiz games, since the learner is primarily learning facts through a series of quizzes and games. This is also the case with the QuantumPad game. (From the Quantum Pad Geography game: Toy asks, "Where is Alaska?" Child clicks on Alaska. Toy says "Right!"). LeapFrog states the following about its new Explorer Globe on its website:

"The Explorer Globe teaches geography - including the name and locations of countries, capitals, continents, bodies of water, music, population, currency, highest point, time zone, distances between locations, and comparison of land area and population between locations."

Geosafari Laptop

http://www.amazingtoyystore.com/geoslap.html

Like the Leap Pad toy, the GeoSafari Laptop is another toy which addresses geography learning outside the classroom. It is a portable laptop for children ages 8+. It has limited interactivity – the toy comes with activity cards that can be changed when the learner wants to change subjects. The "screen" is a card that slides under a slot, and the interactivity works much like the LeapFrog toys, with clicking on an answer choice, and receiving feedback from the machine as to the correctness of the user's response.

Carmen Sandiego

http://www.carmensandiego.com

The Carmen Sandiego series of detective-style geography learning is extremely popular. Carmen Sandiego is a series of interactive computer games where the learner plays detective and goes on missions around the world to solve virtual mysteries.
We also visited Toys R Us to see what was available in the “Geography Education” toy space. We found that most toys were completely based on memorization and taught information that seemed completely disconnect with a child’s life.

The globe (top left photo, below), allows the child to select “music” as an option, click on a country, and hear the country’s national anthem.

**Phase 2: Observe**

*People can’t tell you what they need; you must watch and see for yourself.* For the observation phase, we wanted to see how kids in the target age range would interact with and make sense of a laptop-style, geography toy. We decided to use the LeapFrog Quantum Pad and focus only on the social studies content. We observed three children (9, 10, and 10 years old) at Boys and Girls Club of the Peninsula. Note we only have photos of two of the children.
One major finding was that the kids were excited to use the QuantumPad and saw it as a toy rather than work. Additional findings include that:

- The toy’s feedback had to be immediate and precise. The kids were moving fast and we saw the toy respond too slowly sometimes.
- Having both a stylus and a dry erase pen was awkward.
- The scaffolding provided was helpful, although probably not sufficient.

Our observation was preceded and followed with a few questions:

**Pre-interaction questions.**
Have you ever played with one of these before? If not, I’ll show you what to do. I will help you if you get stuck.

We’re not testing you; we’re testing these games and we want your opinion about them and to see how you like playing these games. We didn’t make these games, so you can be honest and it won’t hurt our feelings.

**Post-interaction questions.**
1. What did you think of these games? ... the way it looks? ...the sounds it makes?
2. How would you describe this to a friend?
3. What ages of kids would like these games?
4. Would you want to play these again?
5. Anything you would change? Other stuff?

**Phase 3: Visualize Form and Function**

*Experiment with many different ideas.* In order to better visualize of how we might address our findings, as well as our design goals, we created a potential user scenario of possible use, an interactive click-through, and 3 physical prototypes with different styles and materials.

The potential user scenario addressed our rationale and goals in the form of a cartoon storyboard. The scenario begins as the family packs the car for a vacation to visit Grandma. Max tells his sister Ally that he will explain the game to her, as he has already played it before.
Max chooses his name from the main screen. If it were his first time playing, he’d be able to watch a tutorial and learn how to play the game.

There are different games available to players, all surrounding a problem of some sort. For our example we have only depicted the “Treasure Hunter” game. Max and his sister have decided to hunt for the “Giant Red Ruby.” Once he’s decided on the game he wants to play, he enters the level he wishes to play; we designed the toy for multiple levels of play to account for differing skill levels of players.
The players must find the Ruby, which has been stolen and is being hidden. In order to find the Ruby, they must follow geographic clues and gather information in order to make educated choices about the direction they must follow in order to find the Ruby. Each clue they follow leads them closer to their destination.

The clues send them to meet other kids in real-world destinations. The kids they meet become part of their “Round the World Agents Network,” which they can refer back to if they think the agents can help them understand clues. The more places the players “travel to,” the more agents and friends they collect, and the more help they have in finding the Ruby at the final destination.

The players are presented with choices about where to travel to find the next clue, and they must make “travel plans.” If they select the wrong geographic choice, they will be sent back in order to select again.

After figuring out that they needed to fly to Kathmandu, Max and Ally go on a simulated flight to Nepal. They see a map of the route, and can get readings on altitude and distance. Max and Ally eventually “meet” Norbu, the Sherpa boy.
The players receive clues from the kids they meet, if they ask the right questions. For example, in the Ruby scenario, the Max and Ally asked about the foods that the Sherpa boy ate at home. By asking this question and listening to the answer, the players received their next clue, and were able to move on to the next destination.

Eventually, they reach their destination and find the Giant Red Ruby!
**Game Menus and Tools**
The screen has icons which allow the player to choose the type of interaction he or she wants: The 2 Way Communicator, the Round the World Agents Network, Information Central, and the GPS positioning device. Other functionality around the outer edges of the toy have been envisioned as well, with the incorporation of an altimeter, compass, odometer, notepad, binoculars, digital camera and clock/timer.

The 2-Way Communicator is the game's way of also helping the players along in their quest for the Ruby. They receive messages and can ask questions with the Communicator.

The players find more information about the places they visit by clicking on links in the body of messages received through the 2-Way Communicator. These links point to an Information Central Database, which contains real information, pictures and maps about countries and peoples. We believe this allows the players to get a real sense of the culture and geography of the places, in context. It is for this reason that the cartoon metaphor is partially suspended in the links.
There is a GPS functionality embedded in the game, which allows players to learn about geographic coordinates. There is a compass, altimeter and odometer as well, to foster concepts of space, direction and distance.

In the more advanced levels of play, the players must calculate the cost of their airline ticket, figure out the monetary exchange and decide how much money they have to spend. They can make money by volunteering to do community service in most places they visit.

The players finally arrive at their destination, having traveled around the world, while still safely seated in the back seat of the car. When they arrive, they can sync the toy with a PC computer, and can print a copy of their trip, for example as a world map with narrative bubbles, or as a story, or as a list of the friends they made along the treasure hunt, among other ideas.
**Prototypes**
The three user prototypes consisted of a variety of materials modes of use. We wanted to see how kids would respond to contrasting features. Furthermore, we felt that multiple forms would allow kids to make comparisons and better articulate their opinions.

*Prototype – Model 1*
Phase 4: Evaluate

*Just because you like the idea, doesn’t mean everyone else does!* In order to evaluate the prototypes, we carried out user testing with a few audiences. We had the click-through loaded on each of the prototypes and informed our users that it was not truly interactive yet.

First we met with Kelsey, age seven. Her response was entirely positive, although it may have been affected by her familiarity with the researcher. Our findings were that she loved the cartoons and was engrossed in completing the game. She wanted to know where the game would take her. She also commented that she wanted to be the first child to own the toy.

We then met with Ethan, also age seven. He understood the basics of the game, and liked the idea of traveling around the world to find treasures and make friends. His reading level was not quite sufficient for the text we’d chosen for the scenario. Again, we see that it is utterly important to design with multiple levels of play. Ethan also really liked the cartoons, and wanted to see more.

We met with eight children, ages six through thirteen, at the Boys and Girls Club of Menlo Park. They found the situation to be rather confusing, perhaps at least partially because some of the children misunderstood that the game was not actually functional. They seemed to have trouble following the story, which seemed to support the need for multiple levels of play. They wanted to click around and see where the story went, but they did not want to stop and read the text. We are not sure if this is because the atmosphere surrounding the tests was chaotic (a large room full of kids all plying for a turn with the toy).

Phase: Refine

*Incorporate feedback to create a more robust product.* We now intend to develop our games more fully in order to incorporate the user feedback and research we have gleaned up to this point. Furthermore, we plan to learn from additional user testing with new prototypes.
**Group Work**
Our group came together to continue working on a project that had already been started by Sandy and Hillary. Anita and Julie both came with strong interest in the project and solid ideas about further developmental and cultural research possibilities. We divided tasks according to our relative strengths; however, each of us did an equal amount of research and writing. The design of the toy, its interactive user scenario, and prototypes were done by Sandy and Hillary. We mainly worked separately, emailing each other our work, meeting every few days to discuss the progress and edit our work. Julie and Anita added great value to the project’s previous work; informing changes and helping visualize new directions, implications, and potential impacts.

The design process we used is sometimes referred to as the “Stanford-IDEO” design process, as taught to us by David Kelley of IDEO, as well as Mike Mills. Throughout the process of designing this toy, we have made mistakes and learned from them. Perhaps our most educative moments in creating this project were in the user testing phases. We found ourselves wanting for more preparation and more structured testing environments and tasks. In the next phase of the project, we will consider this heavily in our user tests.

**Potential Impact**
We emerged from this process with a few design principles which should guide designers in the creation of new geography toys.

- **Move beyond the current quiz-format toy.** Quiz-style toys foster the belief that geography is just an accumulation of boring facts that need to be memorized. Using the child’s natural inclination for exploration and imagination to make geography come to life through problem-based scenarios provides a more engaging experience for the learner.
- **Be mindful of the limiting nature of cultural assumptions, widespread ethnocentrism, and commonly used stereotypes** when creating scenarios that involve other cultures.
- **Use a child’s pre-existing knowledge of culture as a scaffold for relating to other cultures.** Use culture as a mediator between child’s experiences and the distant, unfamiliar world.
- **Strive to show the interconnectedness and similarities of all cultures.**
- **Use multiple levels of play and multiple entry points for different abilities.** This allows the information and learning to be most accessible to a large target audience.
• **Design a toy that children find fun and cool.** All kids want to be cool! It’s very important to not design a toy that screams “educational,” as that kind of toy is not usually associated cool.

• **User testing and feedback on the design is extremely important.** Test your product with the target audience, making sure you test in different areas to account for different demographics and SES.

• **Rapid prototyping and multiple iterations of prototypes are good for generating ideas and seeing if things work.** The less time you spend on early prototypes, the more likely you will be willing to make big changes. Once you invest too far, changes are hard to make. Testing along the way keeps your product from veering too far off course.

Our future plans for the toy include finding a way to incorporate a web-based community surrounding the toy. We envision a website that would have message boards of players’ virtual travels as well as real life travels. The players will have a chance to connect and make friends with other players around the world, and in this there is a possibility of having players represent themselves in the game as “Round the World Agents.” The addition of a web site could also be a way for the content designers to remain informed about what content needs to be changed or added. The website could also include downloadable content updates and new games. Other future plans include multi-player environments.

We believe this toy can change the way young people feel about geography and help them learn about other cultures. We believe that by targeting a young user group, we can instill a desire to become lifelong learners in the subject of geography, and that they will continue to be interested in and understanding of cultures and peoples around the world.
Annotated Bibliography


Barnada’s article explores methods for integrating the study of culture into the foreign language classroom to facilitate learning. Drawing from multiple studies, Barnada argues that culture should be integrated into the study of geography as to lessen the difficulties of teaching culture and increase interest in geography. As funding for geography courses begins to suffer, the need to integrate culture and geography increases. Barnada also argues that teachers are often afraid to implement cultural studies into their lesson plans because of a common misconception of what culture implies. Drawing from a broad anthropological definition of culture, Barnada argues “culture emerges from all the effects of a people’s relationship to the land on which it settles. Culture can thus manifest itself in as an infinite number of ways as people can relate to the land (9).” From this definition, Barnada suggests that the teaching of culture does not have to involve teaching multiple unusual or random facts, or strange customs that are outdated, but rather the patterns of a people’s everyday life and customs.

Barnada’s analysis of culture as a foundation for teaching geography and vice versa is crucial to our project. In order to increase geographic awareness, the teaching of culture is necessary. However, his article is also a valuable reminder that the inclusion of cultural facts must be chosen carefully, as to include the importance of daily living experiences and not just outdated traditions.


The major focus of the paper is to present and support a set of design principles for developing curricula that leads to greater understanding. These design principles are (1) learning appropriate goals, (2) scaffolds that support both student and teacher learning,
(3) frequent opportunities for formative self-assessment and revision, and (4) social organizations that promote participation and a sense of agency1 (Barron et al., 1998).

Within this context, the article discussed how these principles relate to problem- and project-based learning. The article articulates how problem-based learning can be a strong place to start, with “authentic by simulated problems that students and teachers can collaboratively explore.” This can lead into project-based learning, which may be “centered in everyday settings with a tangible outcome” (Barron et al., 1998).

The article presents a few studies, one of which is an instructional intervention called Special Multimedia Arenas for Refining Thinking (SMART) and the Blueprint for Success (Blueprint) video-based anchor. The goal was for students to learn the relationship between geometry and architecture through an anchored problem to project-based sequence.

There were three measure of student learning: (1) performance assessment, (2) standards-based mathematics test, and (3) collectively designed projects. For the performance assessment, students were divided into three levels based on prior mathematical achievement and evaluated on a variety of criteria. For the standards-based test, students received a “traditional” test, and again were compared to their prior mathematical achievement, divided into three levels. For the collectively designed projects, students worked in small groups to prepare projects which were evaluated for accuracy, safety, and consistency.

The results demonstrated that students who experience problem-based learning simulations are more competent in real-world project-based learning environments. This appears to be due to the fact that students become better able to flexibly apply the skills they learned to new environments. For all three of the assessment approaches listed about, students showed measurable gains.

Implications: We are working on a handheld technology, while this article specifically focuses on classroom based instruction. Still, there are applications for this research in our work.

**Students develop a need to know.** The article reports that for geographic concepts which required scaffolding, such as scale and area, students are more interested once they have developed a need to know. This idea underpins our project in that children will

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1 This reader interprets “agency” as referring to a cohesive group or organization of people.
develop a strong motivation to learn new concepts in order to solve problems – in fact they need to learn the concepts in order to make sense of the clues.

**Learning appropriate goals.** The article points out a concern that project-based learning often gets caught up in the action and misses the opportunity for deep learning. We saw examples of this during our prototyping sessions, in which children saw the purpose of getting through the material, but did not develop a connection between the activities and the understanding it was intended to foster. We need to be clear about what concepts we want users to understand and how we can challenge them to reflect upon that.

**Focus on a problem at the start.** Rather than starting with an open-ended project which could have a variety of outcomes, a better place to start is with a defined problem. We intend for our game to start with a problem that provides structure that the child has a defined environment in which to play. The projects coming out of it may just be situations that the child will continue to come up against in the real world. And what about using video to set up the problem? For the purposes of actually prototyping our project, this may be out of scope time-wise, but we are seriously considering how this might better anchor children’s understanding of the problem.

Relate to an outside audience with deadlines. This concept may be peripherally applicable to our project. We are not sure how we can incorporate this concept into our toy, although we feel it could increase motivation, as well as create an authentic environment. There has been some discussion around developing an online community to allow both for an audience-performance situation as well as for collaboration.

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This article focuses on anchored instruction and how it can be supported and enhanced with technology. The concept of “anchored instruction” is such that the situation “begins with a focal event or problem situation that provides an anchor for students’ perceptions and comprehension” (Bransford et al., 1990). The authors believe that anchored instruction can improve students’ ability to transfer what they learned in order to solve new problems.
The article states that traditional education does not help students see knowledge as a means to an end, but rather as an end in and of itself. The problem is that “information stored as facts often is not spontaneously used to solve problems.” The intent, therefore, is to teach in a way that makes information valuable, rather than just facts to be memorized.

The case for technology, namely videodisc, in this article, is based on the greater richness of information, as well as improved comprehension by students versus verbal instruction. As Bransford et al. suggest, “video-based anchors contain much richer sources of information... [with] gestures, affective states, scenes of towns, music, and so on” augmenting the discussion.2

The authors conducted various studies, as well as referred to studies conducted by other researchers. One of the most significant studies (1987) involved college students and focused on science. The researchers selected 13 passages about middle- or high-school level science concepts. The first group just read the 13 passages, while the second group got the same information, but it was anchored in a trip Indiana Jones took to the South American jungle and the hypothetical problems that might have occurred. The second group was first asked to think about how they would have solved these problems, and then given each of the scientifically-based passages to read.

The results of the study showed significant difference between the two groups in how well they were subsequently able to use the information they learned in new situations. The first group, who simple read the passages, rarely even mentioned information from the provided material. The second group, who were provided the information in the context of problems, used the information they had just learned “spontaneously” in new situations.

Implications: We need to ensure that our game/toy puts the problem out there first, rather than forcing information, which may be meaningless, on the child. This means that our toy needs to set up situations in which the child will be motivated to use the informational resources. For the purposes of learning about geography, a poorly designed toy would have the child first look at maps, learn definitions, and read about specific countries, before giving the child a problem to solve, with the assumption that the child has memorized the content.

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2 For example, our ED342X class recently used videos of the popular computer games Grand Theft Auto and Medal of Honor to encourage discussion around violence in video games. Although these games could have been explained verbally, they were more easily comprehended visually.
This would completely miss the concept of anchored instruction, because there would be no central situation or problem with which the child might connect the provided information. The information the child was given would be, in effect, “inert knowledge” rather than “useful knowledge.” As with case-based instruction, our toy should first introduce the child to a problem for him to solve, specifically one that is interesting to the child. As the child goes about solving the problem, appropriate informational resources will be introduced, so that the child will be able to see how he can use this information to solve the problem.


Demovsky conducted an experimental design including pretest and posttest analysis of implementing a global education program into two midwestern sixth grade and social studies high school classrooms. From teacher administered questionnaires, surveys, and tests, Demovsky found a heavy prevalence of ethnocentrism and lack of acceptance of cultural diversity among students and teachers. These findings were related to their lack of a global perspective of the world and cultural awareness. Demovsky’s global education program includes increased cooperative learning techniques, global understanding, and tolerance of other cultures. Students participating in the global education program showed significant increase in posttest understanding of global issues and acceptance of cultural differences, as well as improved cultural awareness.

Demovsky’s research findings are useful to our design process in many ways. First, she found that going beyond teaching simple facts and map skills were not enough, rather teaching tolerance and current events of different cultures around the world increased cultural awareness. Demovsky defines cross-cultural awareness as showing “how different events are viewed by different nations, groups, and people” (35). This “perspective consciousness” is ultimately what we would like children to learn from using our toy. However, in order to instill and teach cross cultural awareness, Demovsky also points out the importance of showing kids how Americans are interconnected to people from all over the world, which will ultimately increase tolerance of cultural diversity.

This book focuses on the tension between the school’s imposed curriculum and teaching methods and how the students are not engaged to learn in that style. Dewey’s take home message is that teachers need to be concerned with taking a subject and connecting it to a child’s relevant life experience. Teaching a subject by rote or “just because kids need to learn it” is not going to help kids understand and internalize the material.

Three unpleasant consequences arise from teaching a subject strictly as an accepted body of truth or something which needs to be known, but not understood. The first is that “the lack of any organic connection with what the child has seen and felt and loved makes the material purely formal and symbolic.” (p. 202) Without any connection to the material, kids have no way of taking it from the abstract of the teacher’s words to their own concrete mental scheme.

The second consequence is that without a connection, there is no internal motivation for the student to learn or to pursue that subject. The third consequence is that in the presentation of the subject, the teacher often needs to simplify the explanation to the student’s knowledge level; this often means that the higher level (and more difficult to explain) concepts which make the subject more interesting are cut away for the sake of logic. We lose the “really thought-provoking character” of the subject.

This book is related to our design in that Dewey believes that a successful lesson is one that is engaging. He urges teachers to take that extra step of connecting their subject material to the student’s life in order to motivate and excite students about learning. Our design must be based on a model that fosters engagement so that the user’s will be motivated to use their knowledge and to pursue other geographic/cultural learning opportunities.


In this chapter, Dewey makes the case for why geography and history are interrelated and should be taught in tandem. In other words, Dewey proposes a way to give “experience” to geography, through history. Dewey writes, “To ‘learn geography’ is to gain in power, to perceive the spatial, the natural, connections of an ordinary act; to ‘learn history’ is essentially to gain in power to recognize its human connections” (p. 210).
Dewey makes the analogy of life as a play. History is the story of the play. Geography is more than just the scenery of the play; rather, “it enters into the very make-ups of the social occurrences or history.” (p. 211) He believes that history taught without consideration of the effects of nature and the earth becomes “a listing of dates with an appended inventory of events ’labeled important’.” (p. 211)

This chapter was of special relevance to our toy because it made the case for the teaching of geography to move beyond rote facts and towards a more comprehensive world view that privileges the importance of culture in the context of geography.


In this book, Dewey concisely lays out his hugely influential philosophy – that education should strive to include all viewpoints and value the experiences of every person in the classroom. Rather than try to conform to some external standard, schools should strive to teach their students using methods that would best engage the students, namely, their own lives. Dewey believes that a study “must be derived from materials which at the outset fall within the scope of ordinary life-experience.” (p.73) Once again, the importance of relating the information of the subject to the student in some way is highlighted. Experiences lead to growth. The educator must realize that it is the experiences in the present that arouse the quest for new knowledge. Ultimately, experiences can be educative.

Our design must be one that engages students through connection between the learning material and their own lives. We plan on using experiences which are common to all children (school, pets, meals, families) as a first step in cultural learning. From this framework of similarities we will then be able to move to explore the differences in a culturally sensitive manner.


Problem-based learning (PBL) differs from other types of learning in that it uses problems to foster student motivation, focus and learning. Good problems must first engage the students’ interest, require them to make good judgments based on facts and
information, require cooperation from team members, and try to be open-ended, connected to previous learning, and/or controversial. Furthermore, the problem should be based upon the course’s objectives, while connecting previous and new knowledge.

Most importantly, good problems should aim for developing the student’s critical thinking at a higher level than just memorizing facts. The article demonstrates higher levels of learning with Bloom’s Taxonomy:

Evaluation – judgment based on pre-established criteria  
Synthesis – producing something from component parts  
Analysis – breaking something down to its component parts  
Application – solving problems by using concepts or principles  
Comprehension – explaining or interpreting the meaning  
Knowledge – remembering facts, terms, concepts, definitions, principles


The article includes an example that supports the requirements of a good PBL problem. The problem is for students to use physics concepts to determine information about an electrical circuit in a hypothetical kitchen. What struck me were these questions embedded within the problem:

“If you don't know the answer, where can you find the information you need? What questions should you ask Sharon and Stan in order to determine their wiring needs?”

This is exactly what we want children to be doing while they are using our toy. They should not just be using information that is fed to them, but also be thinking about the information they need to find. One way we have addressed this is with pop-up informational window that provided more information than the child needs. As this article suggests, student should be required to determine “what information is relevant,” which requires a deeper level of cognition than simply memorizing terminology.


Over an eight-week period Morlan initiated a geography program in a middle school classroom. Her ultimate goal was to increase knowledge, abilities, valuing, and social
participation in the area of social studies. Morlan’s program was intended to “provide the students with opportunities to understand the world as a whole, rather than a part of a system, and to see themselves as an active participant within that system” (15). Her goals also included increasing student motivation through increasing a concern and interest in geography, by making learning more meaningful, vivid, and exciting to the students. Morlan structured her geography program around simulated travel activities, where students were given the opportunity to truly experience “social participation.” An experimental design with pre/posttests and student/parent/teacher checklists was utilized. Morlan concludes that her program met her goal of increasing 85% of the target group’s geographic knowledge 40%.

Morlan’s use of simulated travel is extremely useful to our design process, as we plan to make learning geography more personally relevant to children. By using simulated travel activities, such as calculating travel miles and costs of airline tickets, kids will realize that they truly are social participants in a real world in which their actions have consequences.

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National Geographic-Roper 2002 Global Geographic Literacy Survey,
Prepared by Roper ASW for the National Geographic Education Foundation, © November 2002, Roper ASW.

The National Geographic-Roper 2002 Global Geographic Literacy Survey was conducted as a follow-up to a similar study in 1988, which found a considerable lack of geographic knowledge amongst adult Americans in general, with 18-24 year old Americans faring particularly poorly. This latest study focused on the 18-24 year old age group, with equal numbers of male and female participants from nine countries: Canada, France, Germany, Great Britain, Italy, Japan, Mexico, Sweden, and the United States. Most of the countries’ respondents were nationally represented, with the exceptions of Mexico and Japan, which selected from specific metropolitan areas.

The study methodology entailed in-home interviews of a randomly selected sample. In total, 2,916 interviews were conducted in the nine countries. Over 300 interviews were conducted in each country, with the exception of the US, where nearly 500 interviews were conducted, along with an additional sample of 334 25-34 year olds to use as comparison. The study was conducted from May 24 until July 2, 2002, with a small number of interviews in the US conducted until July 26, 2002. Survey materials included a questionnaire in the native language of the participant. This questionnaire was identical for all countries, and many of the questions were identical or nearly identical to
those in the 1988 study. The length of the questionnaire was between 15-25 minutes, followed by a 10-minute interview.

National Geographic Society regards “broad and integrated geographic knowledge is critical to becoming a global citizen – critical to understanding and succeeding in a world which has increasingly taken on an international perspective in key arenas such as business, cultural diversity, resource use, and environmental protection.” They describe that the survey was designed to illuminate the competence of the participants in basic geographic knowledge and skills.

The survey contained 56 questions. The participants were asked about their attitudes toward geography, geography concepts such as El Niño, navigation skills such as direction, and names of countries on the map of the world.

Young Americans ranked 8th out of nine in the overall results of the survey. Sweden, Germany and Italy topped the list as the most geographically literate, followed in order by France, Japan, Great Britain, Canada, the US and Mexico. Some highlights of the findings:

<table>
<thead>
<tr>
<th>Participants’ Average Responses as Grades:</th>
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<tbody>
<tr>
<td>Sweden:</td>
</tr>
<tr>
<td>“A” grade</td>
</tr>
<tr>
<td>45%</td>
</tr>
<tr>
<td>Sweden:</td>
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<tr>
<td>“F” grade</td>
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<tr>
<td>04%</td>
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<tr>
<td>USA:</td>
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<tr>
<td>“A” grade</td>
</tr>
<tr>
<td>09%</td>
</tr>
<tr>
<td>USA:</td>
</tr>
<tr>
<td>“F” grade</td>
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<tr>
<td>39%</td>
</tr>
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</table>

Surprisingly, more young adults in Mexico could identify the United States on the map of the world than could young Americans. The study revealed an especially pronounced lack of knowledge about the Middle East and Asia, with only 13% of American respondents able to identify Iraq or Iran. In contrast, 34% of young Americans were able to determine that the television show Survivor took place on an island in the South Pacific. Most young Americans dramatically overestimated the US population, with fully
30% believing the US population to be between 1 and 2 billion. Young adults from the other nine countries could more closely estimate the US population than young Americans.

Young adults worldwide had trouble answering questions about world events and showed a lack of world context. The study cited how much news is dedicated to Israel, Afghanistan and Iraq, yet how few respondents could locate those places.

The study cited several factors that influenced performance.

**Education**
Overall, young Americans who had completed more school and reported taking a geography course performed better on the quiz than those who had not. They were better able to identify states in the US as well as other countries. In almost all countries, higher education equaled higher scores on the test.

**Travel Experience and Language Skills**
Respondents who had travel experience and multilingual skills performed well on the quiz. This group included Europeans who travel more frequently and speak more languages than average.

**Internet and Media Usage**
Reports of Internet usage was seen as a factor in higher scores for all respondents, although the US respondents don’t report using the Internet for news gathering as much as the respondents from other countries. The more successful respondents monitor current events with television and other media, such as newspapers, radio, magazines and the Internet. 89% of young Americans relied mainly on television as their main source of news.

**Age (US only)**
The 18-24 year old Americans did not perform as well on the quiz as did the 25-34 year old Americans on some questions, such as US population, that the EU endorses the Euro, and which countries are fighting over Kashmir.

**Gender**
With the exception of France, men answered 3.4 more questions correctly than women, across the survey.
Implications: This study serves as a framework around which we have posed our learning problem; we believe it provides clear evidence of the lack of geographic knowledge amongst young Americans.

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The author gives background on NCLB and the recent history of geography and education reform. The NCLB Act of 2001 includes geography in the list of core academic subjects, yet has failed to mention the subject any further. The other subjects receive provisions, appropriations and detailed programs, and nothing is mentioned for geography. The act calls for “highly qualified teachers” by the year 2005-2006 for geography courses. The author names this as an opportunity for teachers to receive training with federal funding.

All but two states have established geography standards; however only 33 assess geography on any level in mandated exams. Provisions in NCLB call for more AP classes/exams, and the author believes this could potentially expand the AP Human Geography course, and by doing so, involve more students in geography classes. The author calls for working within projects that have previously proven effective which fall under within the guidelines of NCLB in order to procure grant money. The author also calls for aligning with other groups and subject areas in order to lend strength to proposals, as geography simply does not have as high a profile as English, math and science.

Implications: There is very little funding for geography in schools. We are interested in developing an alternative or supplement to learning in geography in schools, in the form of a toy.

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The author believes that getting students to think in spatial terms is one of the most difficult yet important factors in teaching geography. He also believes that it is essential for students to become familiar with a spatial perspective in their initial learning of
geography. Spatial concepts are “the building blocks upon which geographic understanding develops,” (p.243) and they are a means to comprehending more complex theories within the field.

This article contains activities for high school and college students to help them better conceptualize spatial variability. A quiz is detailed, with the intent of familiarizing students with the concept of spatial perspective.

An example of the quiz as one exercise in teaching about spatial perspective:

“In order to see an NBA basketball game, you should go to:
Chicago, IL
Boise, ID

Students probably know about the Chicago Bulls. But they should also understand that major sports teams would naturally be located in big cities, and larger metropolitan areas are more likely to have a sports team. This type of thinking minimizes the need for memorizing facts about places which the authors cite as an “unpopular chore associated with learning geography.” (p.245)

There are other examples given to illustrate the importance of a students’ learning to conceptualize spatial distribution, such as population studies, weather, and crime statistics. It is the author’s hope that by helping students understand spatial concepts, they will be better able to understand differing interpretations spatial data, they will be more apt to understand more complex geographic concepts later in their education, and they will become more interested in geography because of the critical and analytical skills developed through thinking with a spatial perspective.

Implications: It may be more important to learn spatial thinking skills than it is to memorize facts about geography. To develop a skill in being able to determine answers to questions through spatial deductive reasoning allows students to transfer that type of knowledge to other situations. In terms of our toy, a child might not know anything about China, but he does know that a whole lot of people live there, so he might be more apt to make a correct choice in the game if asked to pick a country where there are over a billion people.

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In her article, “Learning to Read in Culturally Responsive Computer Environments,” Nichole Pinkard addresses the learning gap in literacy skills between African American and European American children. Pinkard claims that African American kids are lagging behind in literacy skills because they feel disconnected and unmotivated from the instructional methods and materials designed for mainstream education. Her main argument is that this disconnect occurs because these mainstream methods “do not adequately reflect the lived experiences of African American children” (Pinkard 1). In other words, mainstream learning environments are not “culturally responsive,” or sensitive to the unique experiences of African American children. According to culturally responsive pedagogy, “learning is most efficient when students are able to draw upon knowledge of concepts, procedures, and strategies they know well” (Pinkard 1). Through this sociocultural lens, Pinkard argues that culture is a crucial mediator through which to understand their surrounding world as well as learning literacy skills.

In an attempt to test her cultural responsiveness theory, Pinkard devised a study to test the effectiveness of the Rappin’ Reader and Say Say Oh Playmate, which are two computer programs that plan to teach literacy to African American kids by utilizing the traditional cultural rap music and clap routines respectively. Through preinterview, postinterview, pretest, posttest data collection, Pinkard found that kids using these programs showed significant increase in beginning reading skills, such as phonemic awareness and sight vocabulary.

While the focus of Pinkard’s research, to improve African American children’s literacy, is not specific to our design focus, her overarching concepts of cultural responsiveness, motivation, and instructional relevance are extremely beneficial to our design process. Our goal is to teach geography and cultural awareness to American children, but to also increase excitement and motivation to learn about their surrounding world. In support of these goals, Pinkard argues, “that if cultural responsiveness is uppermost in the mind of the designer of instructional materials, the outcome will be materials that are so engaging that learning cannot help but occur”(3). Therefore, it is important for us not to force obscure cultural facts into our design, but to fuse fun and informative facts about other cultures that are also relevant to American children. Pinkard also highlights the importance of instructional relevance, or using prior knowledge as a scaffold, to increase the effectiveness of learning. As American children do not have homogeneous experiences within the culture, it is important for us to choose educational facts carefully as to include the largest number of kids with relevant experiences and pre-existing knowledge of the information.
Pinkard also stresses the importance of motivation in learning, which is especially important to our design, as American kids have not been traditionally motivated to learn geography. The learning process must be fun and culturally relevant in order to gain a geographic base that will motivate and excite kids to learn more. Lastly, Pinkard’s article provides support that cultural responsiveness, relevant learning, and motivation are possible to achieve through computer programs and technological toys.


This article is a summary of surveys in 1983 and 1993 of schoolchildren in San Marcos, Texas, concerning their attitudes regarding geography as a school subject.

“Numerous educational researchers affirm that children’s literacy in a subject improves as their interest in that subject increases (e.g., Inskeep and Rowland, 1965, Mager 1968, Bloom 1976, Haladyna and Thomas 1979, Shaughnessy and Haladyna, 1985). Moreover, developing positive attitudes toward a subject early in life influences whether an individual chooses to learn more about that subject later (Carswell, 1970).” (p. 128)

The Texas Case Study revealed that geography ranked lowest of six school subjects in both the 1983 and 1993 studies. While the subject showed statistically significant gains in popularity between 1983 and 1993, the subject still remains classified as the least favorite amongst San Marcos students. When analyzing gender differences, boys liked geography better than girls did in 1983. By 1993, there was no difference in the genders when it came to interest in the subject. The study does not suggest a hypothesis for this change.

Teachers rated geography more favorably than their students. Why the teacher’s positive attitude toward the subject does not translate to student interest is unclear to the researchers, and they call for further investigation. Teachers who used more active geography teaching methods such as discovery and inquiry methods were seen as the only classroom factor contributing to students’ more positive attitudes about geography. This finding emphasized the importance of more active teaching methods in the subject, as opposed to less active teaching methods, such as lecturing.

The researchers found that despite poor interest levels in geography next to other school subjects, there was an increase over the ten year study, in the number of students who regarded geography as their first or second favorite subject among the other listed
subjects, went from 8% to 14%; nearly double. The other subjects were not listed in the paper.

The researchers call for more investigation into how to improve geography’s status amongst students. They call for more teacher training, both pre-service and in-service. They call for special outreach to elementary grades.

Implications: This study has shown the low status that geography receives amongst students. We aim to improve the status of geography with fun and engaging adventure games, where children participate in geography education without the usual rote memory regurgitation of facts.


The author conducted a study which examined the influence of gender and social relationships upon everyday geographic experiences of 48 eighth graders (23 boys and 23 girls) in Eugene, OR. The students were mostly Caucasian and living in an economically depressed area of Eugene. Over the period of one week, the students kept detailed diaries of their movements about town. The students kept track of where they went, how they got there, with whom they traveled and for what purpose. Daily trips to school were excluded from the analysis. The researchers compiled the data as annotated map transparencies of the city of Eugene, and the transparencies could be layered to see patterns.

The results revealed that girls tended to travel more to commercial and residential locations, and the boys traveled to mostly outdoor recreation areas and residential locations. Girls stated that 70% of their time about town is spent with an adult, whereas boys state that only 50% of the time is spent with an adult. Boys spent equal time with peers and alone, whereas very few girls spent time alone while out of the house.

One of the implications the researchers cite from the study is that, given the degree to which girls are traveling to commercial spaces, there seems to be a greater opportunity for teaching economic geography, in which the girls can use their own experiences to learn about distribution of goods and services within the community, for example. The researchers believe there is a good opportunity for boys to be able to describe where they live topographically, given they have a good deal of experience exploring the city on bicycle, skateboard and on foot. One teacher participating in the study describes, “the
boys have a clear mental map of all the new bike trails in the city.” Boys were more apt to be out in the city exploring by bicycle or skateboard, and girls were being driven or walking. The researchers also suggest that their study points to a connection with topics in human geography by students’ ability to understand “cool places” or social hangouts.

Constructing and analyzing their own personal geographic data sets allowed students become more aware how gender can influence the experience of their own community as a place. The researchers cite anecdotal evidence from the study that suggests that students value a more personalized approach to learning geography. Finally, since middle school geography curriculum typically focuses upon historical events and more distant lands, the researchers cite the importance of developing a geography curriculum that relies more upon student’s personal geographic experience.

Implications: (1) Relying on a child’s personal experience is important. We will design features that speak to their own world, while making connections to other places. (2) We will consider the notion that boys may have more complete “mental maps” of their surroundings than girls. We will design for this discrepancy. (3) We will include in the scenario opportunities to learn “economic geography” to engage girls. (4) We will capitalize on the notion of young peoples’ ability to understand “cool places” and social hangouts by creating spaces like this in our scenario.

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Psychologist Jean Piaget is often considered to be the father of cognitive development. He examined the intellectual development of children, often using his own children as research subjects. Piaget believed that “the human mind was an active biological system that seeks, selects, interprets, and reorganizes environmental information to fit with its own existing mental structures.” (p. 134)

Piaget’s method involved posing problems to children, recording their response, altering the situation, and then recording their new response. Based on this research, he put forth a discontinuous stage model of development, where at each stage, the child has a dramatic change in cognitive ability.

Piaget’s three major guiding principles are schemes, assimilation and accommodation, and stages of cognitive development.
Schemes are mental structures that allow people to understand experiences and events. They allow us to organize our knowledge. Schemes are used to define properties (e.g., what are the properties of a cat) and to solve problems (e.g., how do we calculate an average).

Assimilation and accommodation are the basis of cognitive development. When we receive new information, we assimilate the information to fit with our existing schemes. If the information does not fit an existing scheme, we accommodate the information by restructuring our schemes or creating new schemes so that the information will fit. As a child gets older, the interaction between assimilation and accommodation leads to mental processes that rely less upon concrete external reality and more upon internal thought.

Piaget put forth four stages of cognitive development: the sensorimotor stage, the preoperational phase, the concrete operational phase, and the formal operational stage.

The Sensorimotor stage goes from birth till about age two. In this stage, children are likely just using their instincts to respond to stimuli, though there is some capacity for learning. Babies can recognize caregivers and they learn to coordinate their bodies to grasp things. During the second year, babies are able to make “mental representations” of objects (meaning they can make memories of objects) and later in the second year they can understand object permanence, meaning they understand that an object continues to exist when they can’t see it.

The preoperational phase runs from two to about seven years old. The child is now able to make more mental representations, solve simple problems, and realize that his or her self is distinct from the environment. Three limiting features of this stage are egocentrism, animistic thinking, and centration.

Egocentrism is the child’s assumption that the only way to see the world is through his perspective. He does not realize that others have a point a view and therefore, it is difficult for him to empathize. A child exercising animistic thinking believes that inanimate objects have feelings, mental capacity, and memories. Centration occurs when a child is only able to concentrate one obvious feature, thereby ignoring other important details. For instance, an example of centration on height is a child believing that a short, wide glass of water has less water than a tall, skinny glass. Centration is so strong that a child will believe that the shorter glass has less, even when he sees the liquid being poured between the two containers.
The concrete operational stage runs from around seven to eleven years of age. This stage is marked by a deeper understanding of object’s properties beyond the obvious superficial ones. Children at this stage are able to understand conservation, in that an object can look different (a scattered pile of 52 cards) but still be the same (in value – 52) as before (a stacked deck of 52 cards). Children at this stage can also solve problems in their heads or perform “mental operations.” This is important because it means that kids can have more intent in their actions. They can also use inference and logic for problem solutions; while the skills are not as proficient as in the later stage, they are still using symbols for reasoning.

The final stage is the formal operational stage. This stage begins around age twelve. At this point, the child is able to engage in abstract and complex thought. As they enter adolescence, kids are also able to question intangible ideas like justice, truth, and fairness.

Piaget’s theories are integral to our design. With the target age range of 8-12, we are focusing on the concrete operational phase and a bit on the formal operational phase, but we are also aware that all children do not develop at the exact times that Piaget has set out. Therefore, we should include levels in our design so that the earliest concrete operational child and the formal operational child will enjoy using and understand our product.

Additional Resources:


Appendix #1: National Geography Standards

The goal of the National Geography Standards is to produce a geographically informed person who sees meaning in the arrangement of things in space and applies a spatial perspective to life situations. The geographically informed person knows and understands:

The World in Spatial Terms
1. How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective
2. How to use mental maps to organize information about people, places, and environments in a spatial context
3. How to analyze the spatial organization of people, places, and environments on earth’s surface

Places and Regions
4. The physical and human characteristics of places
5. That people create regions to interpret earth’s complexity
6. How culture and experience influence people’s perceptions of places and regions

Physical Systems
7. The physical processes that shape the patterns of earth’s surface
8. The characteristics and spatial distribution of ecosystems on earth’s surface

Human Systems
9. The characteristics, distribution, and migration of human populations on earth’s surface
10. The characteristics, distribution, and complexity of earth’s cultural mosaics
11. The patterns and networks of economic interdependence on earth’s surface
12. The processes, patterns, and functions of human settlement
13. How the forces of cooperation and conflict among people influence the division and control of earth’s surface

Environment and Society
14. How human actions modify the physical environment
15. How physical systems affect human systems
16. The changes that occur in the meaning, use, distribution, and importance of resources

The Uses of Geography
17. How to apply geography to interpret the past
18. How to apply geography to interpret the present and plan for the future