

Publishing Geographic and Statistical Online Learning Activities for Middle School Children

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Introduction

The *MapStats for Kids* project, supported by FedStats, is focused on developing a range of dynamic geographic and statistical online learning activities for middle school children (see URL above). FedStats is a cross-agency Internet portal designed to help all Americans find statistical summaries to support personal or business decisions, enable research on a myriad of topics, and participate in public policy debates (see <http://www.fedstats.gov>). One objective of *MapStats for Kids* (a subproject within the *Quality Graphics for Federal Statistical Summaries Project*) is to explore how online learning activities can facilitate the use of MapStats products by middle school children (MacEachren, et al. 2002a). Our demonstration will include four of these online learning activities, each focusing on national education standards and cognitive and knowledge abilities of middle school children. It will also introduce the *MapStats for Kids* portal which provides access to these applications as well as to supplemental materials that will help educators make use of the applications within standards-based learning activities.

Online learning activities

In our demonstration, we will focus on four online learning activities. The most basic of these (called *Paint-the-Map*) can be described as a map-puzzle in which children build (paint) a map to represent state-level statistics. In this activity, school children need to (1) identify the US states (in the beginner level the map includes US state labels; in the advanced level the map does not provide labels and, thus, requires its users to know which state is which), (2) categorize states by interpreting data represented numerically or in bar charts, and (3) “paint” the identified state with the correct color, representing a value (MacEachren, et al. 2002b). This activity (in addition to being a fun game) offers educators the potential to introduce the concepts of mean and median and allows the comparison of US states on a variety of factors, e.g. household income, energy consumption or population change (see figure 1). The resulting maps depict regions of the U.S. that fall above or below (or at) the specified measure of central tendency.

A second learning activity is the *Data-to-Graphics Tool*. This application is designed specifically for structured learning activities related directly to National Standards in Math and Geography associated with understanding bar graphs and maps. The primary goal of this application is to foster an understanding of typical summary statistics through tabular and graphical representations of data by exploring the connections between a spreadsheet, a map, and a graph (MacEachren, et al. 2002a).

The third learning activity (*Network Challenge*) focuses on the concept of networks. Specifically it addresses the understanding of topological relationships and problem solving strategies to support spatial decision-making. In this learning activity, a user (child) uses data presented in a map, table, graph, and other forms to plan efficient and effective routes (campaign stops, band tours, vacation trips), starting from a randomly generated state capital (MacEachren, et al. 2002a).



1. *Paint-the-Map* Online learning activity

The fourth learning activity to be demonstrated, the *Market Manager*, focuses on the concept of regions, specifically on building comparable sales regions that balance population and demographic characteristics of the population. It has two levels. Level 1 is a predefined activity that varies with map extent (e.g., an ice cream distribution challenge), while Level 2 allows educators to customize the application to address specific school curricula goals in mathematics, civics, or other disciplines. The application operates on different geographic extents (specifically three map scales): national, state, and greater metro area. At each scale, the goal is to classify the units (states, counties, or ZIP-codes) into four contiguous regions (market territories) with equal values (e.g. populations of children aged 5-17).

Our process of developing these online learning activities includes assessing their usefulness and usability, with input from teachers as well as from school children and their parents (both are ongoing) (Fuhrmann, et al. 2003).

Publishing web site content for “kids”

The applications discussed above (and others) are being delivered through a *MapStats for Kids* web portal that focuses on attracting kids but that also includes educator sections. The latter provide ideas for use of applications in learning activities. Each part of this portal will be highlighted in our demonstration.

Designing web content for school children is not an easy task, especially when the design has to be consistent with an overall agency web site design (developed for adults). Our overall goal for *MapStats for Kids* content is to produce graphically attractive, usable, and useful web pages. We approach that goal through three sub-goals: (1) attracting users (kids) attention and interest, thus encouraging them to explore the web site, (2) providing stimuli that are viewed as fun (but serious), easy and interesting to use, and (3) providing scaffolding for learning. With these three points we are not only focusing on school children but also on parents and teachers, who might use the web site for class preparation or home school activities.

In order to serve school children, parents and teachers, the web portal structure takes a tiered approach. The most visible level includes the content for children. Information for educators is available through less conspicuous links at each level. Through these links educators can obtain detailed information about the learning goals and ways to apply or adapt applications to support standard-based learning. Animated characters are used to attract the children’s attention and stimulate them to explore the online learning activities. In addition, pictograms signify the online learning activities and guide children through different thematic geographical and statistical topics that might affect “their” daily lives.

We anticipate having the *MapStats for Kids* web portal live on the FedStats web site in time for the Digital Government Conference. The portal design is under construction and will undergo usability testing to ensure that it is usable for children, parents and teachers.

Literature

- Fuhrmann, S., J. Bosley, B. Li, S. Crawford, A. M. MacEachren, R. M. Downs and M. Gahegan (2003). Assessing the usefulness and usability of online learning activities: MapStats for Kids. *Proceedings of the dg.o2003, The National Conference on Digital Government Research*, Boston.
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