Learning Geography with the G-Portal Digital Library

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INTRODUCTION

With the rapid growth of digital information, there is increasing recognition that digital libraries (DL) will play important roles in education, research, and work. DLs have correspondingly evolved from being static repositories of information, in which access is limited to searching and browsing, to those that offer a greater array of services for accessing, interacting and manipulating content (Agosti, Ferro, Frommholz, & Thiel, 2004; Goh, Fu, & Foo, 2002).

Within the classroom environment, DLs have the potential to be useful tools for active learning in which activities are characterized by active engagement, problem-solving, inquiry, and collaboration with others, so that each student constructs meaning and hence knowledge of the information gained (Richardson, 1997). Consider, for example, a group of high school students working on a class project. Typical activities would require these students to acquire content from the teacher, gathering reference materials from the library or other sources, such as the Web, compiling and making sense of all the available information, synthesizing content, writing the project report and submitting the completed project for grading. Here, DL services could be designed to support these activities. An integrated work environment could allow students to collaboratively retrieve and store personal and group information objects relevant to the task at hand. Such a DL would therefore depart from the traditional role of facilitating access to digital content, and instead become an integral part of the learning process.

While there is much work in making such DLs a reality, many systems still offer basic levels of support for educational services, and users typically encounter one or more of the following problems:

- Content access is a separate task from other applications. Although advanced features for searching and browsing are available, DLs provide, at best, limited support for sharing content among other applications that support learning (Ancona, Frew, Janée, & Valentine, 2005). Exceptions are query and data dissemination services through protocols such as Z39.50 (Lynch, 1997) and OAI (Lagoze & Van de Sompel, 2001), but these are usually between other DLs instead of with integrated learning environments.
- DLs are not designed to cater to the needs of different learning activities. Instead, they excel at tasks such as cataloging/classifying content and metadata, searching, and browsing. Thus, activities such as laboratory experiments and field studies that need to use the services of a DL must be tailored to its capabilities.
- DLs are often not designed to meet the learning needs of individuals or groups. They are rather created as a generic collection of services for their target user populations. Support for groups within these target populations requiring specialized services or content are typically lacking.
- Single-user delivery of information. In DLs, that support personalization, content is accessed and manipulated individually via personalized workspaces.

One side effect of this feature is that users are often unable to share their findings with others. Thus, while individual learning can be supported, collaborative group-based learning is more difficult.

In the remainder of this article, we describe G-Portal, a DL of geospatial and georeferenced resources. G-Portal is designed to address the shortcomings previously mentioned to support collaborative learning among its users. This is achieved through personalized project spaces, in which individuals or groups gather and organize collections of resources drawn from the DL's holdings that are relevant to specific learning tasks. In addition, G-Portal provides facilities for classification and visualization of resources, spatial searching, annotations and resource sharing across projects.

G-PORTAL: AN OVERVIEW

G-Portal is a Web-based DL that supports a variety of services to access, manipulate, and manage geospatial and georeferenced resources (Lim et al., 2002). The resources in G-Portal are primarily of metadata records that describe and point to actual resources, such as Web pages, images, and other Web-accessible objects. Other types of information managed by G-Portal include semi-structured data records and annotations.

Since G-Portal focuses specifically on geography-related resources, they may be associated with spatial locations and plotted on a map. Consequently, all resources have an explicit inclusion of location in their metadata definitions. This location attribute, together with several other attributes such as ID, name, and source, constitute the core attributes that every resource must have. In addition, each type of resource may define attributes for descriptive purposes. The set of core attributes, together with the customized attributes, is defined by a resource schema (Lim et al., 2005). Examples of resource schemas include description of places of interest, examination questions, and user annotations.

G-Portal organizes resources into projects which are user-defined collections of resources relevant to a specific topic or learning activity. Within each project, resources are further grouped into layers for finer grained organization. Each layer serves as a category to store logically related resources. For example, a project studying flora and fauna in nature trails may include rivers, lakes and hills in a map layer, flora and fauna information in separate layers, and user annotations in another.

G-Portal offers three ways to accessing its resources. The map-based interface visualizes resources with location attributes on a map (see Figure 1). Navigation aids such

Figure 1. G-Portal's map-based and classification interfaces