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# Evaluating G-Portal for Geography learning and teaching

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# Evaluating G-Portal for Geography Learning and Teaching

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## ABSTRACT

This paper describes G-Portal, a geospatial digital library of geographical assets, providing an interactive platform to engage students in active manipulation and analysis of information resources and collaborative learning activities. Using a G-Portal application in which students conducted a field study of an environmental problem of beach erosion and sea level rise, we describe a pilot study to evaluate usefulness and usability issues to support the learning of geographical concepts, and in turn teaching.

## Categories and Subject Descriptors

H.3.7 [Digital Libraries]: Collection, systems issues, user issues.

## General Terms

Design, Human Factors.

## Keywords

Geospatial digital libraries, teaching and learning, geography.

## 1. G-Portal

G-Portal is a geospatial digital library of geographical assets, and provides a platform for building applications that use geospatial and geo-referenced content [1]. This is achieved through *projects* which are user-defined collections of related resources. Resources within projects are further organized into *layers* which allow finer grained organization of content. Resources within a project are visualized using either a *map-based* interface or a *classification*

interface. The map and classification interfaces are synchronized in order that when a resource on one interface is accessed, related resources on the other interface can be displayed.

Subsequent G-portal development focuses on improving existing capabilities of digital repositories and multimodal representations, so students could solve authentic problems based on real world resources. In contrast with current learning management systems and geographic information systems, G-Portal is unique in that it provides a range of capabilities that support students in the creation, manipulation, exportation and deletion of geographical knowledge. Students can create personal workspaces to build their own collections of resources and annotations in the form of personalized projects (see Figure 1). Supporting the personalised workspace module are the following :

- *Built-in tools* such as zoom and measurement tools to allow students to query the data spatially.
- *Layer management*. Within a personalized project, project owners can define and update appropriate layers to group resources logically or according to their project needs.
- *Schema and resource management*. Schemas can be user-defined to meet the needs of a learning activity for a student (or a team). Students can reuse objects that have been created by others, thus the system supports learning and the creation of new meanings out of existing collections of information.
- *Personalized Project Export*. This allows students to publish the object of their learning activity in a documented artefact.

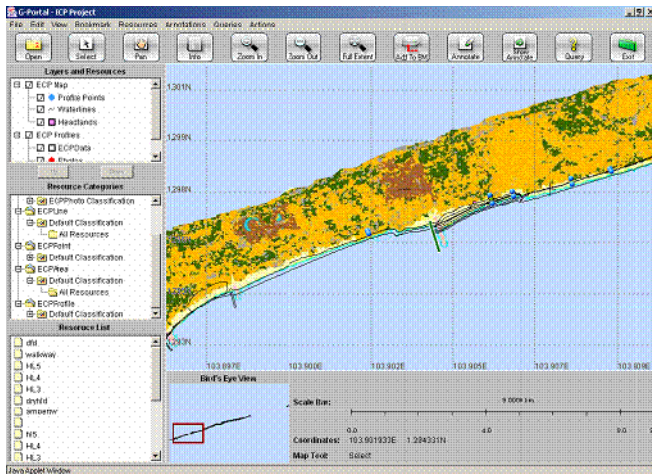


Figure 1. G-Portal's Personal Workspace.

## 2. THE STUDY

To determine the utility of G-portal for learning geographical concepts by teachers and students, we carried out an initial study as part of a participatory design methodology [2]. This study addressed the research question: "How do students effectively learn geography concepts while using G-portal in their tasks?", and more specifically:

- How did students find information?
- How did students form arguments in their artefacts?
- Were students aware of modality of information sources and artefacts?
- How did the students construct artefacts?

### Subjects

Five subjects forming two groups (G1-G2) were undergraduate students from the second year "Coastal and Ocean Systems" module at the National Institute of Education. This module traditionally required students (also trainee teachers) to investigate a stretch of the local coast and solve some geographical problems related to erosion.

### Protocol

An introduction to G-portal was given at the beginning of the module. The students then accessed information via the G-portal throughout the semester. As part of their term assignment, they were given a task to make use of available geographic data to solve an authentic problem for a resort development consultancy. They were asked to carry out this investigation using G-portal and to use other online resources as necessary.

The study was conducted in a lab, and the subjects working in pairs were asked to think aloud. The screen interventions with G-portal were video-taped. They had to present a report to explain their findings to the resort developer using MS Word or MS Power Point or any other supporting software. The report had to include visuals gathered either from G-Portal or the Internet.

They had 40 minutes to complete the task and report. They were then interviewed using the four sub-questions (a) to (d).

### Transcription and Coding

Since this was a qualitative study involving two groups of subjects, subjects' interactions with G-portal gave us understanding on how well G-portal was designed to support the

task, while interviews elicited deeper issues and provided reasons for subjects' interactions in which the interviewer could clarify. To explain subjects' interactions with G-portal, a generic set of codes was devised, and progressively refined to capture the respective schema addressing the four sub-questions :

- Type of Navigation.* This refers to how G-portal's built-in schema or search engines were used by students to search for information sources.
- Forming Arguments.* This refers to procedures describing scientific activity and their evidence, such as experiments, observations, explanations (e.g. sequential, theoretical, causal) that occur.
- Awareness of Modality.* This refers to the kinds of modes used to represent content in the source: text; images; video/animation or/and sound.
- Constructing Artefacts.* This refers to collating information together from G-portal, from the web, from prior knowledge, etc. It also includes construction (e.g., copying, pasting, etc.) to create the final artefacts.

## 3. DISCUSSION AND CONCLUSION

Space constraints do not permit us to describe our findings in detail. Highlighted below are some insights:

- Information Finding.* G1 and G2 sought information either from within resources on G-portal or the Web. No additional non-digital sources of information, such as books or notes, were used for the task. In particular, the subjects used built-in tools and resource and schema management tools of G-portal; they also used only the keyword and phrase search types of the web search engine to source their information.
- Forming Arguments.* Both groups used different approaches in forming arguments to form learning artefacts, and were in continuous dialogue amongst themselves as they tried to solve the problem by analysing information obtained from resources on G-portal.
- Awareness of Modality.* G2 used images from both G-portal and the Web, but G1 used only visual images from G-portal in their artefacts. G2 showed greater evidence of multimodality, using text, numerals and images, and creating figures from data tables.
- Constructing Artefacts.* This refers to whether students used the content they took from a source, the extent of synthesis as solution, and additional content created. G1 demonstrated minimal transduction of modes of representations in the learning artefacts created, compared G2 in which the artefact was eventually written based on the arguments formed after analysing information from G-portal.

This is on-going work for us. The pilot study, being part of a larger study, explored possible ways students could use G-portal to learn about geographical concepts. The analyses of the artefacts created by G1 and G2 suggested that G-portal was useful and usable to some extent in providing resources to support them in finding information. Learning how students learn could help teachers teach more effectively. Further studies would involve more students and teachers, working on more tasks.

#### 4. ACKNOWLEDGMENTS

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#### 5. REFERENCES

- [1] Lim, E.P., Goh, D.H.L, Liu, Z., Ng, W.K., Khoo, C.S.G., & Higgins, S.E. (2002). G-Portal: a map-based digital library for distributed geospatial and georeferenced resources, International Conference on Digital Libraries, Proceedings of the second ACM/IEEE-CS joint conference on Digital libraries, pp. 351 – 358.
- [2] Theng, Y.L., Goh, D., Lim, E.P., Liu, Z.H., Yin, M., Pang, L.S., Wong, B.B. (2004), Applying Scenario-Based Design and Claims Analysis on the Design of a Digital Library of Geography Examination Resources. *Information Processing and Management Journal*, 41, 23-40.