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Understanding User Perceptions on Usefulness and Usability of an Integrated *Wiki*-G-Portal

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Abstract. This paper describes a pilot study on *Wiki*-G-Portal, a project integrating Wikipedia, an online encyclopedia, into G-Portal, a Web-based digital library, of geography resources. Initial findings from the pilot study seemed to suggest positive perceptions on usefulness and usability of *Wiki*-G-Portal, as well as subjects' attitude and intention to use.

1 *Wiki*-G-Portal: Community-Based Geospatial Digital Libraries

Although geospatial digital libraries (DLs) are beginning to play key roles in education, especially in the provision of information to learners, there is a lack of systematic support in ensuring that geography resources are continually being monitored and updated. This is far from desirable, since 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 [3].

Despite these issues, the evolution of DLs from being static repositories of information in which access is limited to searching and browsing, to more subject-based DLs that offer a greater array of services, allowing users to new ways to access, interact and manipulate content including annotations, workspaces and user content contributions, has come a long way due to a growing trend in recent years towards community-based, participatory systems such as Wikipedia (http://www.wikipedia.com; retrieved 30 June, 2006) being a good example.

With so much knowledge embedded in Wikipedia, it presents an interesting test-bed for geospatial DLs such as G-Portal to investigate whether community-contributed resources like the Wikipedia can enhance geospatial DLs. The implementation issues involved in *Wiki*-G-Portal represent a very much unexplored area in interoperability. Using this reverse proxy approach (see http://en.wikipedia.org/wiki/Reverse_proxy; retrieved 30 June, 2006) in *Wiki*-G-Portal, users can create own personalized projects, and bookmark useful Wikipedia resources by creating metadata in G-Portal projects. Resources can be classified into different categories. Users can also locate geographical resources, such as cities and countries, using the map interface. Users can also define new resource types and create new resources. Further, they are free to give ratings and comments to the resources through G-Portal's review module [2].

2   Pilot Study

The pilot study gathered initial feedback on the *Wiki*-G-Portal system to understand users' perceptions of usability and usefulness of integrating Wikipedia into G-Portal, based on the well-established Technology Acceptance Model (TAM) [1, 4] (see Figure 1). In this paper, we refer to usability as defined in ISO 9241-11 as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". Davis et al. [1] define *perceived usefulness* as "the degree to which a prospective user expects the target system to be free of effort". Usefulness, on the other hand, refers to measurements in reference to system specifications and the extent of coverage of end-users' tasks supported by the system, but not on end-user performance testing. Davis et al. [1] see *perceived usefulness* as "the prospective user's subjective probability that using a specific application system will increase his/her job performance".

Two sessions of three subjects each were carried out in a specially designed usability lab to provide a consistent environment for usability evaluations. Each subject was given a computer in each of the three rooms with Internet facilities to access the *Wiki*-G-Portal. The sessions took approximately two hours with the subjects carrying out six tasks. The subjects were asked to think aloud, and the sessions were captured using the Morae software (see http://www.techsmith.com/morae.asp).

The six subjects recruited were frequent Wikipedia users, and they were undergraduates at a local university, proficient in the use of the Internet and computers. A suite of six tasks was given for the subjects to work on as they used the *Wiki*-G-Portal system. After completing the tasks, the subjects were then asked to complete a survey instrument which consisted of closed questions in which users were asked to comment using a 5-point Likert scale, and open-ended questions on advantages and disadvantages.
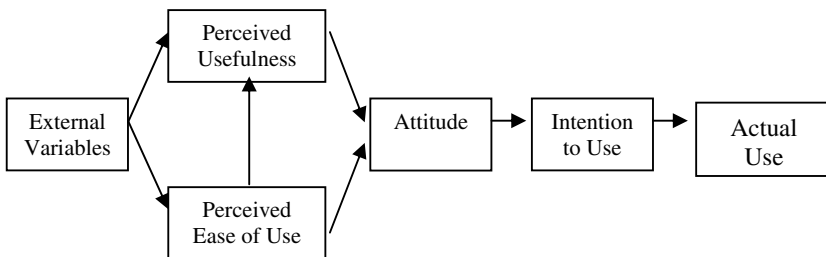

Fig. 1. Technology Acceptance Model (TAM)

3   Results and Analysis

3.1   Tool Functionality

Tool functionality refers specifically to the perceived ability of *Wiki*-G-Portal to provide flexible search and retrieval to geography resources. Positive responses

indicated that *Wiki*-G-Portal was easy to use, with reasons such as: (i) it was easy to browse resources from both the map interface and the resource list; (ii) Wikipedia page URLs provided in *Wiki*-G-Portal resources were helpful to link to related Wikipedia web pages; (iii) it was easy to read resources in *Wiki*-G-Portal; (iii) the map interface was helpful in locating geographical resources (e.g. cities, countries) easily; (iv) the bookmarking was helpful and easy to use; (v) good organization of resources into categories; and (vi) the review module, showing subjects' opinions to the resources, was easy to use.

In contrast, negative responses seemed to point out that it was not easy to search a resource on the map if the resource location was not known to the user. In addition, *Wiki*-G-Portal resources were not well-organized, for example, due to an encoding problem, unrecognized characters might be contained in the resources. Another comment from an expert in geography indicated that the map interface was not an added value. The bookmarking procedure was tedious, and subjects needed to key in the attributes' values manually. It would be better if the system was able to automatically extract useful information from the bookmarked page when the URL was provided.

3.2   Intrinsic Motivation, Perceived Usefulness and Perceived Ease of Use

Intrinsic motivation refers to users' experience of "perceived helpfulness and enjoyment". Four out of six subjects agreed that *Wiki*-G-Portal was helpful for locating geography resources. They found *Wiki*-G-Portal friendly to use, and that the world map was helpful in locating geography resources. The two subjects who were "neutral" in their responses thought the map-based interface was not so easy to search for a resource on the map since the resource location might not be known to the user. All 6 subjects thought their experiences using *Wiki*-G-Portal were pleasant, as it was easy to learn to use, and they were able to find the correct way within a short time.

In general, the subjects felt that *Wiki*-G-Portal was useful and helped them to accomplish the tasks effectively and efficiently. However, subjects commented that the Wiki-G-Portal resources did not provide enough information, and they needed to refer to Wikipedia for detailed information.

Two subjects (1 "strongly agreed"; 1 "agreed") commented that it was easy getting *Wiki*-G-Portal to do what they wanted it to do during Geography study, with the other 4 subjects thought it was alright, giving a "neutral" response. In terms of learning how to use, 5 out of 6 subjects (3 "strongly agreed"; 2 "agreed") commented that they learned how to use *Wiki*-G-Portal quickly but 1 subject disagreed. However, in general, *Wiki*-G-Portal was perceived as easy to use by 5 subjects (1"strongly agreed"; 4 "agreed"), with 1 subject giving a "neutral" response.

3.3   Attitude and Intention to Use

A user's attitude is defined as his/her belief about the consequences of using *Wiki*-G-Portal. All things being equal, Davis et. al [4] argue that people form intentions to perform behaviors toward which they have a positive attitude. All 6 subjects (1 "strongly agreed"; 6 "agreed") thought it was a good idea as the experience when using the *Wiki*-G-Portal was pleasant. As for liking it enough to use *Wiki*-G-Portal for Geography study, 4 subjects (1 "strongly agreed"; 3 "agreed") indicated positively.

Two subjects giving a "neutral" response, however, thought the system could be further improved.

Finally, "intention to use" responses showed that 5 out of 6 subjects (2"strongly agreed"; 3 "agreed") would like to use *Wiki*-G-Portal for geography study in the future. However, 1 subject was willing to use *Wiki*-G-Portal in the future provided *Wiki*-G-Portal has more resources in terms of higher quantity and better quality.

3.4 Discussion on Subjects' Experiences with *Wiki*-G-Portal

Findings from the pilot study were positive in suggesting that *Wiki*-G-Portal was easy to learn and had a user-friendly graphical user interface. The map-based interface provided users a convenient access when they only roughly knew the location of a geography resource but not the resource name. Some felt that the *Wiki*-G-Portal could be developed into a more efficient tool to search for that resource when compared with Wikipedia. Many useful features in *Wiki*-G-Portal were implemented, for example, the classification module and the review module.

Our results provided good insights on subjects' positive perceptions on usefulness and usability of *Wiki*-G-Portal. As the evaluation statements were formulated based on TAM, the reasons for subjects' perceptions on usefulness and usability could also be gleaned from subjects' responses to other factors such as intrinsic motivation, tool functionality and task-technology fit. Finally, responses to "attitude" and "intention to use" were also positive.

4 Conclusion and On-Going Work

Although this was a pilot study with only six subjects, findings seemed to suggest that perceived usefulness was more important in influencing "attitude" and "intention to use", since subjects would be driven to adopt an application primarily because of the functions they performed. The ease or difficulty of getting the system to perform those functions was of secondary relevance. Further work involves carrying out a quantitative study with more subjects across different age groups for statistically-based results.

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