SearchParty: Learning to Search in a Web-Based Classroom

Benjamin B. Bederson
Human-Computer Interaction Lab
Computer Science Dept.
Institute for Advanced Computer Studies
University of Maryland,
College Park, MD 20742 USA
http://www.cs.umd.edu/~bederson

Alexander J. Quinn
Human-Computer Interaction Lab
Computer Science Dept.
University of Maryland,
College Park, MD 20742 USA
http://alexquinn.org/

Anne Rose
Human-Computer Interaction Lab
University of Maryland,
College Park, MD 20742 USA
rose@cs.umd.edu

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CHI 2012, May 5–10, 2012, Austin, TX, USA.
ACM xxx-x-xxxx-xxxx-x/xx/xx.

INTRODUCTION

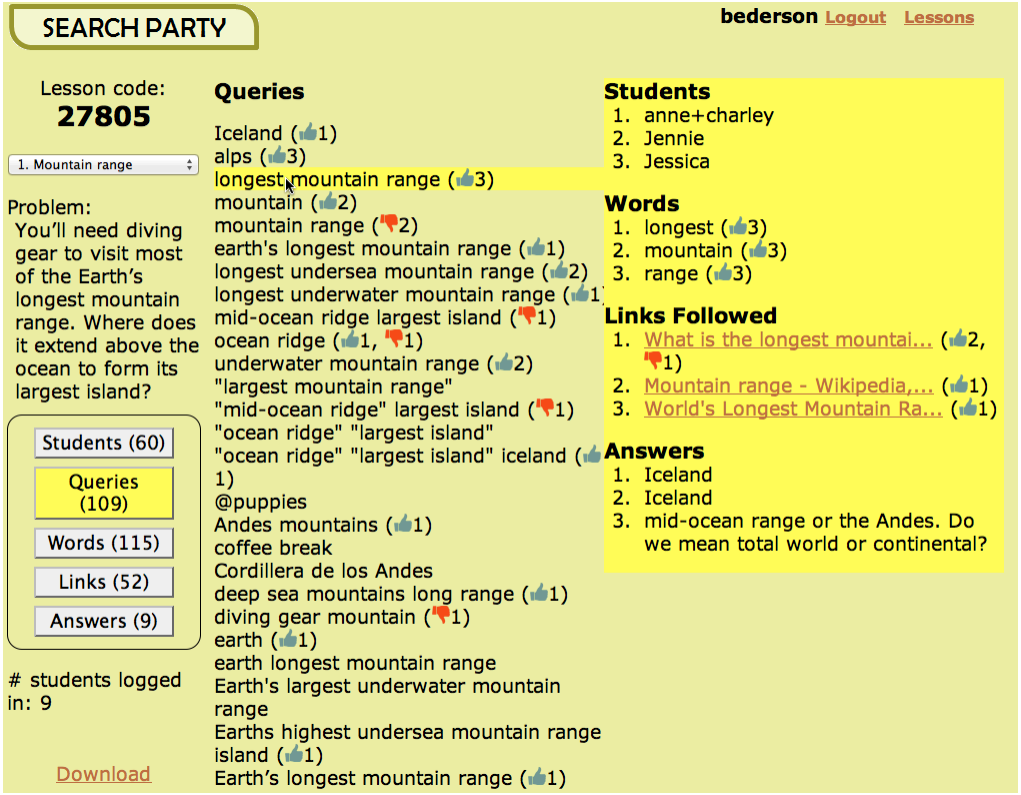
Learning to search the web effectively can be a surprisingly difficult task. The interface is, of course, straight forward. And doing basic searches is easy. But learning how to conceptualize the right choice of keywords to get at what you are looking for is not always obvious. Add in multi-step questions and untrustworthy sources, and the task can become downright difficult. Schools often attempt to teach search skills to children, but with teachers not always being expert themselves and the content continually changing, creative solutions are needed.

Problem Statement

This is a problem that calls out for collaborative learning. In a classroom of 30 students, someone is going to figure out the right way to specify a search to find even well-hidden results. And seeing the range of approaches that other students are using can be an effective learning tool. We are building a web-based peer learning tool designed for classroom use to enable teachers to help students teach each other how to search the web.

This project builds on years of research on technology in the classroom including my colleague Ben Shneiderman's early work on "Teaching/Learning

Figure: Teacher view shows summary of all student queries (generated in real-time) with one query selected, showing all the activity related to that query.



Theaters" (Shneiderman et al., 1998) which offered much of the same technology the SearchParty platform could—but at an expense of millions of dollars with full-time support staff. More recently, efforts such as SearchTogether (Morris & Horvitz, 2007) investigated how people can perform collaborative web search, but that focused on remote collaboration among a small number of users.

The focus here is on the classroom. The new problems are those of web deployment for a classroom-based collaboration architecture, support for peer learning among larger groups, and effective visualization and analysis tools for potentially large number of queries for the same target.

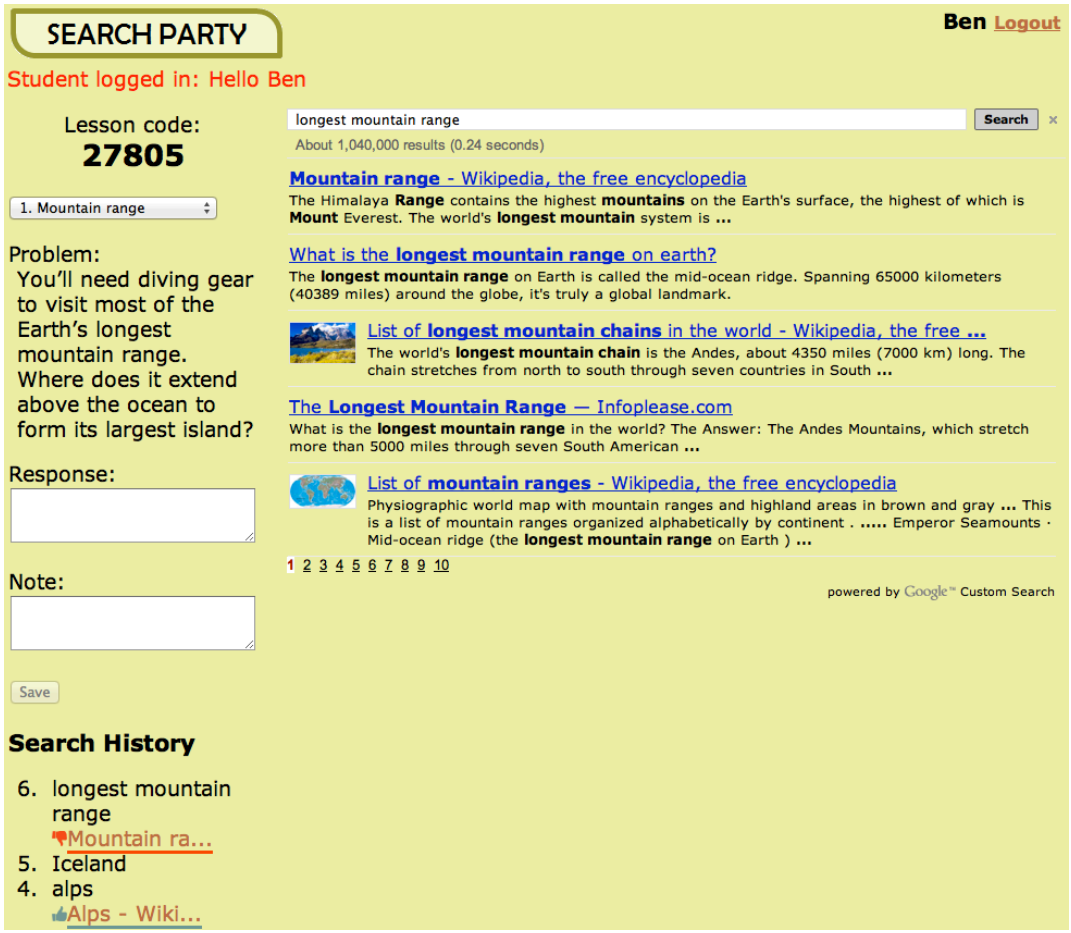
User Experience

Motivated by Neema Moraveji's "ClassSearch" paper published at CHI 2011 (Moraveji et al., 2011), we plan to build out SearchParty, a website we currently have started building. The essence of the user experience is that students visit a special search website where teachers can push activities to them. Their searches and followed links are recorded and sent to the teacher's page, designed to be shown on a classroom projected display. The two sides (student and teacher sites) are complementary. Students get specialized tools to support their learning (such as simple and visible search history for each task). Teachers see aggregated results showing everything the class is searching for (in real-time) along with the pages seen, ability to drill down to see who is doing what, student sequences of searches and page visits, etc. The goal is not "big brother", but peer learning through transparency. The aim is for students to see aggregated search behaviors so they can learn from successful peer behavior (and avoid unsuccessful approaches).

Technical Approach

In order to make this approach work well, there are a few key design and implementation techniques, which are demonstrated in the existing prototype to prove feasibility. The first issue to address is deployment. To avoid the unwieldy challenge of installation and configuration of native apps and collaboration settings, SearchParty is being implemented as a web

Figure: Student view shows current search of student for "longest mountain range", along with their personal search history in the bottom left.



application. Teachers log in with Google authentication. They are given a short numerical ID for each lesson. Students do not need Google accounts and instead log in with the numerical lesson ID. They enter their name, which can be real or a pseudonym depending on the classroom culture. This process connects the classroom together and supports bi-directional information sharing. The site uses Google App Engine's channels and presence features to support real-time aggregation and drill-down into students' search behavior on the teacher's display as well as the ability to observe which students are connected, etc.

The second deployment issue is observing students' search behavior. Instead of using google.com in an iframe (like agoogleaday.com), SearchParty uses Google Custom Search, the results of which are embedded in the student's page. Some JavaScript is inserted into the student page to observe the children's activity which gets invisibly sent to the server app and sent (with real-time channel push) to the teacher's site. Moving forward, we will investigate the possibility of building browser plugins in order to observe searches done on google.com while connected to SearchParty.

The key design challenge is to aggregate student activity using visualizations and simple representations that support a range of use scenarios. For example, within a classroom, it should be possible to see a range of search strategies for a given task along with an indication of which strategies were successful (we currently ask students to manually identify which websites were helpful). At a medium scale, a teacher might like to see what a series of classes did over several days to see trends and identify outlying approaches and individuals. At a larger scale, a researcher might like to see a dashboard with the summary of thousands of classrooms.

Diving into the classroom level, imagine a search task which is to find the name of a Chinese-American basketball team that was a for-pay team performing in the US during the 1940s. The key to finding the answer

is to transform "for pay" from the task description to "professional". The challenge in the design of SearchParty is to design representations of student activity that will enable the teacher—and class—to see the activity and identify that it was the addition of the term "professional" that enabled success. We will know we are successful when the tool supports individuals looking at aggregate behavior and identifying this kind of detail themselves.

The technical strategy is to make these aggregations pluggable so that it will be easy to build either custom representations or use existing visualizations from Google Chart Tools or JavaScript libraries such as D3.

SearchParty is being built with commonly used Google and web technologies including Python, App Engine, BigTable, Google Custom Search, HTML, CSS and JQuery. SearchParty is distributed as completely open source code at http://code.google.com/p/search-party, with the prototype hosted at http://search-party.appspot.com for public use.

Future Work

While this work will focus on supporting search learning, we hope in the future to generalize this as a strategy and framework for a broader set of classroom-based collaborative activities. We envision a future where a teacher could create a new module, whether it was math, history or vocabulary, which would fit into the SearchParty framework where all the elements of peer learning, aggregation, and larger scale study we learn in this project can be applied.

Workshop Activity

SearchParty is currently functional, and we expect to be able to perform a live activity within the workshop where all workshop members could actively participate in a real-time search task so the group could collectively understand the technology and then hopefully brainstorm about how this approach could be used in other contexts.

Acknowledgements

This work is supported in part by Google.

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