

---

# 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

**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.**

**SEARCH PARTY**
bederson [Logout](#) [Lessons](#)

Lesson code:  
**27805**

1. Mountain range

Problem:  
You'll need diving gear to visit most of the Earth's longest mountain range. Where does it extend above the ocean to form its largest island?

Students (60)

Queries (109)

Words (115)

Links (52)

Answers (9)

# students logged in: 9

[Download](#)

**Queries**

Iceland (👍1)

alps (👍3)

**longest mountain range (👍3)**

mountain (👍2)

mountain range (👍2)

earth's longest mountain range (👍1)

longest undersea mountain range (👍2)

longest underwater mountain range (👍1)

mid-ocean ridge largest island (👍1)

ocean ridge (👍1, 🇺🇸1)

underwater mountain range (👍2)

"largest mountain range"

"mid-ocean ridge" largest island (👍1)

"ocean ridge" "largest island"

"ocean ridge" "largest island" iceland (👍1)

@puppies

Andes mountains (👍1)

coffee break

Cordillera de los Andes

deep sea mountains long range (👍1)

diving gear mountain (👍1)

earth (👍1)

earth longest mountain range

Earth's largest underwater mountain range

Earths highest undersea mountain range island (👍1)

Earth's longest mountain range (👍1)

**Students**

- anne+charley
- Jennie
- Jessica

**Words**

- longest (👍3)
- mountain (👍3)
- range (👍3)

**Links Followed**

- [What is the longest mountal...](#) (👍2, 🇺🇸1)
- [Mountain range - Wikipedia...](#) (👍1)
- [World's Longest Mountain Ra...](#) (👍1)

**Answers**

- Iceland
- Iceland
- mid-ocean range or the Andes. Do we mean total world or continental?

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.**

The screenshot shows the SearchParty interface for a student named Ben. At the top right, it says "Ben Logout". Below that, it says "Student logged in: Hello Ben". On the left, there is a "Lesson code: 27805" and a dropdown menu showing "1. Mountain range". Below this is a "Problem:" section with the text: "You'll need diving gear to visit most of the Earth's longest mountain range. Where does it extend above the ocean to form its largest island?". There is a "Response:" text area and a "Note:" text area, both empty. A "Save" button is located below the note area. The main search area shows the search term "longest mountain range" with "About 1,040,000 results (0.24 seconds)". The search results include:
 

- "Mountain range - Wikipedia, the free encyclopedia" with a snippet: "The Himalaya Range contains the highest mountains on the Earth's surface, the highest of which is Mount Everest. The world's longest mountain system is ..."
- "What is the longest mountain range on earth?" with a snippet: "The longest mountain range on Earth is called the mid-ocean ridge. Spanning 65000 kilometers (40389 miles) around the globe, it's truly a global landmark."
- "List of longest mountain chains in the world - Wikipedia, the free ..." with a snippet: "The world's longest mountain chain is the Andes, about 4350 miles (7000 km) long. The chain stretches from north to south through seven countries in South ..."
- "The Longest Mountain Range — Infoplease.com" with a snippet: "What is the longest mountain range in the world? The Answer: The Andes Mountains, which stretch more than 5000 miles through seven South American ..."
- "List of mountain ranges - Wikipedia, the free encyclopedia" with a snippet: "Physiographic world map with mountain ranges and highland areas in brown and gray ... This is a list of mountain ranges organized alphabetically by continent . .... Emperor Seamounts · Mid-ocean ridge (the longest mountain range on Earth ) ..."

 At the bottom left, the "Search History" section shows a list of searches:
 

6. longest mountain range
- Mountain ra...
5. Iceland
4. alps
- Alps - Wiki...

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](http://google.com) in an iframe (like [agoogleaday.com](http://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](http://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.

### **REFERENCES**

- [1] Shneiderman, B., Borkowski, E., Alavi, M., Norman, K. (1998) **Emergent Patterns of Teaching/Learning in Electronic Classrooms** *Educational Technology Research and Development* 46, 4, pp. 23-42.
- [2] Morris, M. and Horvitz, E. (2007) **SearchTogether: an interface for collaborative web search**, in *Proceedings of Conference on User Interface Science and Technology (UIST 2007)*, ACM Press, New York, pp. 3–12.
- [3] Moraveji, N., Morris, M., Morris, D., Czerwinski, M., and Henry Riche, N. (2011) **ClassSearch: facilitating the development of web search skills through social learning** in *Proceedings of Conference on Human Factors in Computing Systems (CHI 2011)*, ACM Press, New York, pp. 1797-1806.