Google Wave and Computer-Supported Collaborative Learning: Impact on Higher Education

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Overview

It doesn’t work to leap a twenty-foot chasm in two ten-foot jumps.
—American proverb

Google describes Wave, its recently developed tool, as equal parts conversation and document, shared and live. The Google Wave home page says, “Communicate and collaborate in real time. Or anytime.”¹ This means that within a wave, you can work on a common document and simultaneously have conversations—in real time. Google Wave is not a program per se. Rather, it is an online tool for real-time communication and collaboration. The developers also claim that Google Wave is a natural way to reinvent e-mail.² Traditional e-mail is linear, but a wave is multidimensional. Google Wave is all about sharing and collaborating—that is, Wave could be a more suitable way of communication for learning in a Web 2.0 context.³

Before digging deeper into the subject, it is important to note several things. This ECAR research bulletin is being written while Google Wave is available only by invitation to a limited audience in preview version. Although Wave is still in the early stages of development, ECAR is publishing this bulletin because Wave has attracted the interest of many people in higher education, especially with respect to support for computer-supported collaborative learning (CSCL). With respect to terminology, “Wave” with an upper-case “W” refers to the protocol developed by Google, and “wave” with a lower-case “w” refers to the document/communication workspace. It is also useful to know that Wave is built as a protocol, rather than a service or program, which means that the protocol can be used by others besides Google. Google has created client software to work with Wave, but others will be free to create clients of their own and customize the way they want to use Wave. This model is similar to e-mail, which is also a protocol. Google used the e-mail protocol to develop Gmail, its own e-mail client (or e-mail reader), but because Gmail, AOL, Hotmail, Yahoo mail, Microsoft Outlook, Eudora, Microsoft Entourage, and other clients use the e-mail protocol, each client can include different features.

To improve and specialize the way in which different groups of people choose to use Google Wave, there are a lot of extensions, or so-called gadgets. Anyone with programming skills can develop a gadget, such as a map, a photo album, a poll, a calendar, or something else.

This research bulletin is based on a study⁴ that was part of an examination assignment in the course Introduction to Communication, Learning, and IT at a Swedish university (Gothenburg) in 2010. The study focused on the potential benefits and drawbacks of Google Wave for educational purposes. A number of people who had declared their interest in Google Wave in a group at the social network Facebook were invited to take part in the discussions. The participants’ discussions were observed and analyzed in conjunction with literature on CSCL and the social constructivist view on education.⁵ Additional perspectives were collected from the public online debate. While discussing the use of Google Wave in education, participants also discussed their own use of Wave. One might say that they acted as learners who learned how to communicate in a new way through online real-time social interaction.
This research bulletin seeks to describe and analyze the way in which Google Wave can be used for CSCL in higher education from a social constructivist point of view. It includes a discussion on opportunities for using Google Wave in higher education as well as suggestions for further research. The purpose of this bulletin is to help educators and students interested in collaborative learning understand what possibilities Google Wave has to offer for higher education and to encourage people working in higher education to develop and personalize this new CSCL tool by participating actively in the current discussion, trying it out, and analyzing the results in order to create something that could be extremely useful for higher education.

**Highlights**

Joseph Petraglia, assistant professor of rhetoric and cognitive science at the Georgia Institute of Technology and author of *Reality by Design: The Rhetoric and Technology of Authenticity in Education*, says that the constructivist position argues that we learn by doing and by being in the world. If this is true, the structure of formal schooling can be viewed as more of a hindrance than a help. As professional educators, we have had two choices: either give up on school learning, or make school learning as close to other kinds of “natural” learning as possible. How would authentic natural learning in a school setting manifest?

In order to achieve authenticity, social constructivists propose collaboration as the best way of learning: “[A]ccording to Dewey, collaboration in the classroom induces a social order similar to that which we find in the world around us.”

Since Google Wave was developed for collaboration, this new way of communication really allows participants to be active contributors to their own learning. My study shows how discussions about this developed alongside discussions of Wave itself.

**Social Constructivism**

Google has let its users take part in developing the Wave protocol by inviting people to a preview version. The users can come with their own ideas and invent new gadgets without having to ask Google for permission. This is an excellent example of a social constructivist approach to education.

**Main Principles**

The three main principles of social constructivism are:

- Knowledge construction through social interaction
- Knowledge construction through mediating artifacts
- Knowledge construction through argumentation

Swedish professor Roger Säljö says that people do not alone make all experiences that are important in their lives. He argues that we get many of them from others who tell us what they have experienced or what they have heard and read. This is an important prerequisite for acquiring knowledge and skills and must be built and passed on between people and generations. According to Säljö, the conversation has been, is, and always will be the main arena for learning. He also says that it is through
communication with others in our own “development zone” that we become involved in society’s collective experience.” Petraglia mentions that “constructivists drawing inspiration from Vygotsky and Dewey have always argued that learners must be active participants in the learning process for they are the only ones who experience the activities that provide the grist for construction.” This means that in order to learn something, you have to be involved in social practices in which knowledge building can take place as a result of joint activities and reflection. Therefore, communicative processes will be essential in such a perspective on human learning and development.

People create artifacts as a way to externalize knowledge and make it accessible to others. Säljö thinks that these tools have become crucial to how we use our intellect and our bodies and how we interact with others. In the age of Web 2.0, “words, images, icons, and entire documents can be made ‘hot’ by an information designer (and increasingly, many of these nodes and links may be authored by the learner) who provides the links necessary to jump to associated ideas, creating a weblike structure of information readily accessible to the learner.” By virtue of how Google Wave is created, such webs are easy to build, providing a variety of possibilities to present the same information in many different ways.

If we accept that knowledge is socially constructed, we also must consider the statement that “authentic learning occurs when students are put into dialogue with others.” And if we accept this statement to be valid, we must reflect on how we can engage learners in dialogic processes rather than providing them with the “right” information. The educator must ask himself how he can persuade his audience, including himself, that what he is stating is valuable, worth paying attention to, and so forth. Educators will have to discuss questions such as “what arguments can be mounted, what criteria invoked, what questions asked, that would be persuasive on this issue?”

In Practice

In his book *Communities of Practice*, Etienne Wenger talks about learning in social environments. He mentions three main pillars:

- Practice
- Identity
- Design

Practice is the reality in which we operate, and Wenger suggests that “knowing” is something that cannot be abstractly defined. Hence, we cannot use it as point of departure when it comes to creating communities of practice. He maintains that students need three things: “1) places of engagement, 2) materials and experiences with which to build an image of the world and themselves, and 3) ways of having an effect on the world and making their actions matter.” This means that we can have an impact on the practice, but whether learning will happen or not is not possible to foresee. “Yet the learning that actually does take place is but a response to the pedagogical intentions of the setting. Instruction does not cause learning; it creates a context in which learning takes place, as do other contexts.” Obviously school is not the only place where learning happens.
People develop their identities in social settings. We define each other and ourselves in communities of practices, i.e., in all social groups to which we belong at different points of our lives. “Our identities become anchored in each other and what we do together.” Wenger states one important thing about design: “Learning cannot be designed: it can only be designed for—that is, facilitated or frustrated.” Our job as educators is, of course, to design for learning, but Wenger states that we cannot separate ourselves from the students in terms of learning: “Designing for learning, therefore, cannot be based on a division of labor between learners and nonlearners, between those who organize learning and those who realize it, or between those who create meaning and those who execute.”

Two important words in Wenger’s book are participation and reification (bringing into being; making concrete). He says that for learning to take place, there needs to be a balance between the two: “An excessive emphasis on formalism without corresponding levels of participation, or conversely a neglect of explanations and formal structure, can easily result in an experience of meaninglessness.” To be an educator means, then, to design social settings and organize communities of practice.

**Computer-Supported Collaborative Learning**

The development of new tools within information technology has often been tied to recent research on pedagogy. Google Wave is no exception. An important aspect is that research in CSCL is more process-focused than result-focused, and it is interesting to explore this process from the participant’s point of view.

Computer-Supported

In the world of Web 2.0, with a stable Internet connection, anyone can participate equally in online communities of practice. Suthers says that the computer itself, as a machine, cannot replace the knowledge building between teachers and students, but it can support and be a resource for co-learning. He also writes that CSCL should not and cannot necessarily replace face-to-face communication but can explore the advantages of going “beyond being there.” That is to say, it might be even better than direct communication in creating something lasting that encourages reflection and development over time. In Google Wave, everything that is written in a wave is saved, even those things that are to be removed or edited are stored in order to be watchable in “playback.” Participants can also always comment on what is written by opening new “mini-waves” (so-called wavelets) inside a wave. Weinberger, Fischer, and Stegemann say that one of the advantages of CSCL is that students can exchange arguments and later evaluate sequences of arguments over time in a completely different way from when communication takes place face to face. The authors talk about the benefits achieved when students gain both subject-specific knowledge and meta-knowledge. Through CSCL, students can visualize their own and others’ learning processes, and thus they become accessible for analysis.
Collaborative Learning

One of a teacher’s most difficult tasks is to evaluate and assess individual students’ work, and collaborative learning only complicates this task. If we believe that learning occurs in social interaction and through collaboration, individual assessment could make any teacher feel confused. Changing the way we think of learning and knowledge is a discussion that could fill another research bulletin, so we will stick to the current discussion. When faculty want to assess individual efforts but still encourage group work and negotiation of meaning, Wave is an excellent tool for documenting and showing each learner’s contribution. “Cooperative learning enables students to share their knowledge and skills while providing opportunities for them to observe the learning process of others. Collaboration not only allows the student the chance to see learning activities modeled, but also provides opportunities to articulate one’s thinking to an audience.” In this way, students can—by looking at their colleagues’ knowledge development—even catch sight of their own learning.

Learning

Collecting all information in one place (real or virtual) and discussing it at the same time will definitely help learning happen. In a world where there is an abundance of new information daily, we need tools to help us coordinate the information flow. Many of these services are already accessible, but Google Wave offers another dimension. In a wave, participants can highlight details of importance and use hypertext to create structure and a nonlinear order, providing instant access to new webs of information. The fact that a wave is also editable facilitates the process of negotiation of meaning. Zemel believes that the interaction in CSCL is about reading, interpreting, and producing additions to the ongoing discussion. Participants produce their posts alone, but together they create a series of posts where each post is designed to be read. How the interpretation of a post has been made is visible in subsequent posts. Dennen and Paulus ask how one could see that a student learns something. They talk about how the Internet has changed from being a source of knowledge to a tool for building knowledge. Wave is designed to reflect this shift. To analyze the learning process of dialogues, Dennen and Paulus say that we must look to the group rather than to each individual separately. They argue that just because you participate in a discussion, it is not certain that you have learned something. They conclude that we must look to the context in which learning occurs and to the structure of the dialogue that is going on. They argue that we can, by using methods like those used in discourse and conversation analysis, begin to understand how a team builds knowledge through discussion.

What It Means to Higher Education

By reading what participants in the study have discussed, as well as other ongoing discussions on blogs, wikis, forums, and elsewhere, the picture becomes clearer. Wave is supposed to be used for collaboration. Who would benefit from using it?

The following sections discuss potential pedagogical benefits and drawbacks of using Wave in higher education. They also explore the limitations of the preview version and what needs to be developed to be able to use Wave satisfactorily on a daily basis.
Pedagogical Benefits

First and foremost, Google Wave is developed for collaboration. It is a place where we can collect and store our resources and thoughts to create living documents that archive common knowledge that is never “finished.”

Google Wave has a function that allows playback. This means that anyone can follow a wave from its birth to the present state, including all changes made to it. This makes it possible for newcomers to review the development or creation of a wave without anyone having to explain it to them. It also offers a whole new possibility of looking back at one’s own work and development—an excellent function to encourage reflection and self-assessment.

Google Wave is not limited to real-time communication. In the same wave both synchronous and asynchronous communication are possible. This feature suits distance education, where participants cannot always easily communicate in real time because of schedule and time-zone differences. These participants can still see the activity on the wave since they last opened it.

Google’s approach to letting participants develop the tool themselves by creating gadgets is a wonderful way to encourage creativity in students interested in software development and programming. By using different gadgets and seeing Wave as a way of collecting all our knowledge in one place, Wave will be highly suitable for erasing the sometimes sharp lines between academic disciplines to create a more seamless experience of how these disciplines interconnect.

Pedagogical Drawbacks

At the moment, it is not possible to create read-only waves. This could present a problem when we want to protect certain materials, such as instructions, from being changed. Another drawback of the present version of Google Wave is that it is not possible to create a wave with different types of access for different people. A wave creator might wish, for example, to limit certain people’s access to read-only, while others can edit or comment.

The absence of common “rules” for creation and structuring of a wave is a major problem at this time, and it is probably the reason why many people stop using Wave. One might compare the disordered state of many “public waves to political anarchy.

What Comes Next?

We can only guess what is in store next for Google Wave. It does seem, though, that in order to deliver a protocol that will meet the users’ demands, the developers will have to take into the account many different things.

Restrictions

Several problems might keep educators from testing Google Wave in practice. For example, Wave functions best on a fast network. Slow network connections can make the experience of using Wave tiresome and frustrating. Second, waves that include more than 10 participants tend to get unwieldy. In a class of 30 students, for example, it
is probably best to split the students into three or more waves rather than to have all students participate in a single wave.

In this first version there is also a risk of losing what you have just written because of bugs in the system. Sometimes you have to refresh the wave, and if it was not saved properly, your data is lost. When you are just testing, this can be an acceptable risk, but in a public version, such bugs will have to be eliminated.

Right now, there is no way to delete a wave. Even if people do not use it anymore it will still exist. You can “mute” a wave by making it invisible in your inbox, but then you don’t know if someone starts using it again. There might be a situation where you would want to permanently delete a wave you created, and that is not yet possible.

**Possibilities**

As mentioned earlier, there is a strong need for a standard regarding Wave use and behavior. Even though Google has not released a public version, it is relatively easy to get an invitation to use the preview version. Instead of just waiting for something to happen, educators should continue to actively discuss these things, preferably by using Wave. This would improve our understanding of the protocol and help us create a standard for the use of Wave in education. By demonstrating interest in Google Wave, it should be possible to engage programmers to create the kind of gadgets we need.

**Revolution or Hype?**

Some people might never see the benefits of Wave, and for them, the chatter around Wave might sound like hype. It seemed as if everyone wanted access to Wave when it was new, but when people do not see what a new tool can do for them, they lose interest. There is also a tendency among some to be skeptical toward new technology, and educators tend to belong to this group. This time we might actually get something that is developed for learning and sharing knowledge, and if that is the case, Wave could be a revolutionary tool.

**Higher Education Requirements**

When it comes to the use of Google Wave in higher education, several common concerns come to mind. Typical needs for higher education include:

- Delivering distance education
- Working with very large groups of students
- Providing individual grading for each student participating in a collaboration
- Evaluating writing skills when students receive help from a tutor

Studies by So and Kim show that students are often dissatisfied with their collaborative learning in distance education. Half of the reasons for this dissatisfaction are linked to technology—networks, software, and lack of opportunities for synchronous communication. As previously mentioned, Google Wave is especially interesting for use in distance education because it delivers both synchronous and asynchronous communication solutions. Depending on the purpose of the collaboration assignment, it can also handle larger groups of people as long as everyone is not actively participating in the wave.
at the same time, giving the instructor the chance to see and comment on every student’s contribution as well as to follow the wave from the start via the playback function. In a writing process, the tutor can comment on every part of the student’s work as well as suggest changes inside the document.

Who Is Responsible?

At this time, educators have two choices. One is to wait and see what happens. Google will release a public version, and it will be more fully developed than the preview version. However, we also have the option to act. We can test the protocol ourselves and contribute to the discussion, propose changes, and help developers and programmers create what we need.

In the long run we can test the protocol in practice with our students, and if research shows that this is a good way to support learning, we might have some impact on how curricula in higher education will be developed in the future, making more room for social constructivist activities. Universities could develop their own Wave clients, and courses could be held through Wave. I agree with Wenger’s statement: “Those who can understand the informal yet structured, experiential yet social, character of learning—and can translate their insight into designs in the service of learning—will be the architects of our tomorrow.”

The future of Wave lies in the hands of its users, and educators can proclaim their rights to use and develop it. If we do not do it, no one will do it for us.

“It is as learners that we become educators.”

Key Questions to Ask

- How should educators assess the value of Google Wave for their institutions? In what functions of higher education is Wave most likely to have the greatest impact?
- How can educators develop Google Wave according to the needs typical for higher education?
- What is the relationship between Google Wave and learning management systems? Over time, is the former likely to replace the latter?
- Why should (or shouldn’t) our institution consider Google Wave a serious technology worthy of consideration?

Where to Learn More


Endnotes


5. Social constructivism is closely related to social constructionism in the sense that people are working together to construct artifacts. However, there is an important difference: social constructionism focuses on the artifacts that are created through the social interactions of a group, while social constructivism focuses on an individual’s learning that takes place because of their interactions in a group. See Wikipedia, “Social Constructivism and Social Constructionism,” http://en.wikipedia.org/wiki/Social_constructivism.


7. Ibid., 75.


9. Ibid., 225.


13. Ibid., 75.


15. Ibid., 131.


17. Ibid., 135.

18. Ibid., 271.

19. Ibid., 266.

20. Ibid., 89.

21. Ibid., 145, 151.

22. Ibid., 215.

23. Ibid., 273.

24. Ibid., 229.

25. Ibid., 234.

26. Ibid., 67.


28. Ibid., 15.


34. Ibid.

35. It is important to be aware that Google Wave is a preview version, not even a beta version yet. As a result, I am cautious about criticizing the protocol.

36. A public wave is when someone has given open access to view and edit the wave. Most often, waves are private, and only those individuals specially invited to it can take part in the communication.


38. Wenger, Communities of Practice, 225.

39. Ibid., 277.

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