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"Learning Perspectives"

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Abstract:

Learning as a socially situated activity involves an interplay between group and personal perspectives. Knowledge is constructed within nested perspectives that reflect social practices, shared meanings, and individual understandings. *Educational software to support collaborative learning can represent these perspectives for learners* to help them reflect on their own perspectives and negotiate group perspectives on knowledge.

By providing different views on a shared and growing knowledge base, perspective-based software distinguishes different people's ideas to make clear each person's perspective on common topics. Individuals work on their own ideas, share them, and propose them for group adoption. The convergence needed for successful collaborative learning emerges from a process of negotiation in which divergent positions are distinguished and discussed. Students using the software have a representation for thinking about learning perspectives, a mechanism for organizing their own perspectives in relation to those of their classmates, and a tool for mediating formative involvements in collaboration, research, and negotiation.

"Learning Perspectives" proposes *perspectives on learning* as a social, linguistic, and perspectival process. It introduces a software mechanism for representing and organizing group and personal knowledge to scaffold learners' *learning about perspectives*. Then it illustrates the use of *perspectives for learning* in project-based classrooms.

Keywords:

Perspective, learning environment, community of learners, educational software, collaborative learning.

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Talk only.

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Perspectives on Learning

The term *perspective* refers to a specific point of view in understanding things. For instance, there are different perspectives on learning, corresponding to different theoretical stances taken to the subject. One can adopt a social perspective by focusing (a) on groups of learners, (b) on the social context of learning, or (c) on social practices as the central unit of analysis, as opposed to looking exclusively at achievements of individual learners.

More specifically, one can distinguish perspectives on socially situated learning associated with dialectical, hermeneutic, and socio-cultural traditions of theory. (a) A *dialectical* perspective looks at the interplay between socially shared group knowledge and individual learning, arguing that the individual internalizes cognitive structures that were originally group constructs (Vygotsky, 1934/1986) or that individual learning takes place as a process of changing participation in groups (Lave & Wenger, 1991). (b) A *hermeneutic* view insists that all interpretation is perspectival, linguistic, and situated (Stahl, 1993b); that is, knowledge attains meaningfulness within the network of significances defined by a person's involvements, culture, and historical situation (Heidegger, 1927). (c) The *socio-cultural* perspective stresses that such meanings are culturally shared and that one should therefore focus on the social practices or activity structures that constitute culture if one wants to understand learning (Cole, 1996).

These perspectives on learning lead to a view of the learning process as *perspective taking and perspective making* (Bakhtin, 1986; Boland & Tenkasi, 1995; Bruner, 1990). An individual learns by taking up the perspective of someone else (a parent, mentor, teacher, or peer), understanding the knowledge the other person has constructed, and then adopting that perspective within one's own repertoire. Thereafter, when one makes one's own perspective on something one can incorporate the skills and understandings of the adopted perspective.

Perspective making and taking can transpire on the individual or the group level. In collaborative learning, a peer group constructs a knowledge perspective that is subtly distinct from the individual perspectives that help to build it and that emerge from it (Hatano & Inagaki, 1991). Collaborative or cultural learning is arguably a fundamental mode of human cognition (Tomasello, Kruger, & Ratner, 1993), though it is little understood. Recent educational theory stresses the importance of developing collaborative learning pedagogies and the potential of computer software to support processes of collaboration (Koschmann, 1996).

This paper is concerned with providing computer support for learning perspectives. In the following, the term *perspective* will be used both for the interpretive perspective of a learner or group and for a software perspectives mechanism that represents learning perspectives and that organizes knowledge in accordance with them. A specific software perspectives mechanism will be described in the following section and illustrated in the final section. One way to think of this mechanism is as a response to Bush's classic call for hypertext trails to guide learners through the burgeoning record of scientific knowledge (Bush, 1945). While Bush envisioned sequences of links from document to document built by trail makers and followed by trail takers, the perspectives mechanism defines exploratory realms of knowledge that perspective makers can develop and perspective takers can adopt. When one adopts a set of perspectives in the software, one can then view any information that has been organized in those perspectives, modify it at will without conflicting with anyone else's view of the information, and offer the revised perspective for others to share.

As the quantity and diversity of information that we must master rapidly expands, we need to become lifelong learners who understand the learning process and who master powerful learning technologies. This includes learning about perspectives and perhaps learning about software perspectives mechanisms to support our socially situated learning.

Learning about Perspectives

A child is born into a perspective, grounded in her physical body and immediate family. The child grows into a language and culture, eventually forming a unique self-critical self in response to individual and community perspectives (including that of the generalized other) with which she interacts (Mead, 1934). As she reaches adolescence, she becomes more capable of selecting perspectives to emulate and of articulating her perspectives reflectively. Middle school is a time steeped in self-doubt because one is required to engage in social interactions before one has quite settled into a comfortable set of perspectives. Project-based curriculum is designed to give students practice with communication, interaction, and collaboration (Blumenfeld et al., 1991; Brown & Campione, 1994). Software learning environments like CSILE aim to support intentional learning in groups, where students reflect upon their collaborative learning practices within the computer-based medium (Scardamalia & Bereiter, 1991).

This paper features a software system called WebGuide (Stahl, 1997). The WebGuide system is designed to make explicit and scaffold for students the structure of research, team collaboration, personal perspectives, and group negotiation that they may be pondering for the first time in their lives. In other words, WebGuide is designed to help students learn about perspectives as ways of understanding their world.

The developers of WebGuide learned about perspectives (in the sense of software mechanisms) through a series of computer prototypes that built on related work in the field including the following approaches:

- *Context Mechanisms.* The idea of structuring a database into a hierarchy of contexts that inherit content through a virtual copying mechanism was explored at Xerox PARC, but abandoned as too complicated for users at that time (Boborow & Goldstein, 1980). This approach took advantage of "delta storage," an efficient technique of storing only differences

between versions, well known in system software (Fitzgerald & Rashid, 1986). A related mechanism of *transclusion* was proposed by Nelson for hypertext (Nelson, 1981). McCall applied a similar approach for organizing hypertext information by domain and version in `Phidias` (McCall et al., 1990). Stahl extended McCall's approach in `Hermes`, implementing a hypertext version of virtual copying in a productivity tool for professional design teams (Stahl, 1993b). He subsequently adapted this mechanism in `CIE`, a collaborative information environment for supporting peer group management of ISO 9000 documentation (Stahl, 1996).

- *Hypertext*. Hypermedia structures offer an important mechanism for supporting collaborative work with shared materials. To some extent, this is provided by the World Wide Web itself, although many hypertext mechanisms have been explored that go beyond the web's simple model (Bieber, Vitali, Ashman, Balasubramanian, & Oinas-Kukkonen, 1997). The original perspectives mechanism of Stahl is a hypermedia implementation, based on a node and link structure; relationships among contents in different perspectives are defined by links (Stahl, 1993a). In `WebGuide`, the perspectives mechanism is reimplemented for dynamic web pages.

- *Computer Supported Collaborative Learning*. A number of software systems have been developed to support collaboration of research teams in schools, and CSCL has become an important new research direction (Koschmann, 1996). `CSILE`, for instance, is a threaded discussion system customized to scaffold classroom research (Scardamalia & Bereiter, 1991). Systems like `CoVis` and `CaMILLE` also provide a shared workspace or notebook area for collecting research results (Pea, 1993; Soloway, Guzdial, & Hay, 1994). Rather than supporting negotiation through the system, they rely on face-to-face interactions to make choices about what materials get entered into the team repository. When such systems talk

about "perspectives", they mean different representations of the same information, rather than views of information of interest to different individuals or groups.

- *Organizational memories.* By *organizational memories* we mean an approach to building a structured digital library of various forms of information that can be shared by community members through computer supported collaboration and communication mechanisms (Ackerman, 1994; Lindstaedt & Schneider, 1997). Perspectives can help to structure an organizational memory. For instance, when members of a community undertake a new project they can create a new perspective on the memory and negotiate which items from existing perspectives should be adopted for use in the new project. WebGuide provides an organizational memory for students engaged in a class project.

- *Automated approaches.* GroupLens is representative of approaches that try to automate the construction of personalized views (Resnick, Iacovou, Suchak, & Bergstrom, 1996). Statistical analyses are used to automatically determine which members of a group are interested in similar topics. Items of information that are of interest to one member are then sent to others. In WebGuide, information is automatically assigned to perspectives only in the sense that one perspective can adopt or inherit entire other perspectives; otherwise WebGuide leaves active selection or modification of information to its users.

The power of WebGuide to support perspectives for learning comes from the synergy of several technologies:

- The medium of *dynamic web pages* provides convenient collaborative access to information collected in a database, with the possibility of editing, adding to, and reorganizing the contents interactively.

- The *perspectives mechanism* allows shared information in the database to be viewed from personal and group perspectives, as though all that existed was one's own selection and version of the content.

- A *negotiation mechanism* permits teams of students to collaborate by bringing together their divergent individual contents and converging on an agreed upon perspective that they construct together.

- *Inheritance of perspectives* enables a given perspective to adopt the content of one or more other perspectives, facilitating diverse, flexible structuring of the database – as seen in the two examples in the following section.

Figure 1. Part of Kay's personal perspective in `WebGuide`.

Perspectives for Learning

A view of a student's personal perspective in a `WebGuide` project on the Aztecs is shown in Figure 1. The page has been generated dynamically from the database for a particular student, Kay. The window includes material on the Aztec religion that has been inherited from the perspective of a team that Kay belongs to. Other team members have proposed this material and Kay can participate in negotiating whether it should be officially included in their group

perspective. The window also includes two topics that Kay is starting to work on: "Founding Mexico City" and "Live Sacrifice." At the bottom is an interface for Kay to search the web for information to add to her personal page.

A typical application in `WebGuide` has many perspectives on the shared content, and the perspectives inherit information from each other in helpful ways. Just as Kay's and her teammates' perspectives inherit th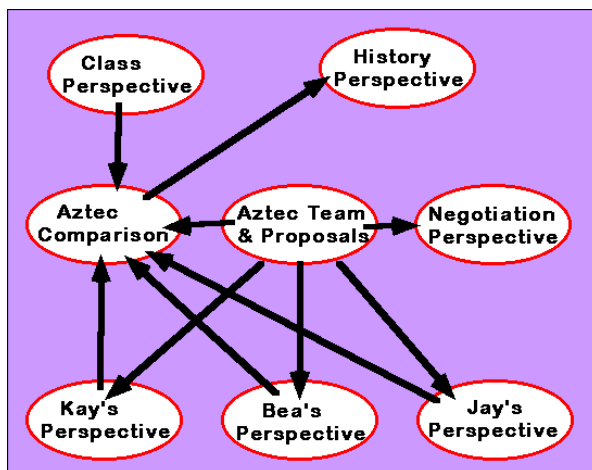e content that has been agreed upon or at least proposed for their team perspective, other special perspectives inherit from the personal perspectives, as represented in Figure 2. In particular, there is a team comparison perspective in which team members can see what each other is doing and adopt selected ideas. Students typically develop their own ideas and articulations within their personal perspectives, collecting and working with materials from various sources. As individuals develop the presentation of ideas to a certain point, they can propose them to the group for negotiation. In the end, each team is responsible for constructing a coherent, consensus view of their topic in their team perspective.

Figure 2. Automatic inheritance relations among several different perspectives in `WebGuide`.

Perspectives for Learning

`WebGuide` currently exists as a web interface design (Stahl, 1997). During 1998/99 it will be tried out in two middle schools. A school in Boulder will use it to support web research on the Aztec, Maya, and Inca civilizations while a school in Denver uses it to compile alternative

views on an environmental issue. These two trials of `WebGuide` will provide important experience in providing computer support for learning perspectives.

In the Aztec, Inca, and Maya project, `WebGuide` will support a community of researchers compiling information from around the web and other sources. They will start off with a knowledge base including background readings, initial web pointers, and guiding questions provided by the teachers. In the end, each team will have a research product that they can share with members of other teams, display on the web for other schools, and pass on to next year's students.

In the environmental project, `WebGuide` will be used to compile, debate, and analyze conflicting perspectives among different constituencies. Students at this school have worked for the past five years to locate the source of water pollution in Gamble Gulch – an old gold mine high in the Rockies – and to alleviate the problem. Now they are going to investigate related public policy from the perspectives of mine owners, local community, environmental groups, and governmental agencies. Here the web will be used as a communication medium within and between the different constituencies. Students will work with adult mentors to represent, understand, and critique the major ideological positions taken on the controversial issue. Perspectives in `WebGuide` will mirror and capture perspectives in the real world.

Acknowledgments

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