Teachers' Perceptions about Usability Of a Case Library

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Abstract

Rather than learning and then applying theory to the solution of problems, learners can be provided with stories about others' experiences while designing classroom instruction. However, the usability of case-libraries has not been documented with teachers. In this study, students accessed a case-library of technology integration stories (http:///kite.missouri.edu) while developing a technology integration plan. We compared student use and perceptions with their use of the ERIC clearinghouse, with which they were all familiar. Naturally, teachers varied in their perceptions and uses of the case library. Teachers most liked the authentic nature of the stories as information sources. The most consistent problem was the novelty of the environment. Some teachers also wanted to access the materials described in the stories. Successful integration of case libraries into learning activities will require an orientation to the effective use of cases and the environment itself.

Stories, Case-Based Reasoning, and Learning

Stories are the oldest and most natural form of sense-making among humans. Stories are the "means [by] which human beings give meaning to their experience of temporality and personal actions" (Polkinghorne, 1988, p. 11). Humans appear to have an innate ability and predisposition to organize and represent their experiences in the form of stories. To experience the importance of stories to teaching, one needs only to visit any teacher's lounge in any school for even a short time.

According to Bruner (1990), telling stories has many functions:

- It is a method of negotiating and renegotiating meanings among people
- It helps us to learn, to conserve memory, or to alter the past
- It assists us in understanding human actions and intentions
- It enables us to remember the unusual (e.g., a major event that we attend), and
- It enables us to articulate our identity so that we can explain to others who we are.

In spite of their centrality for recounting human affairs, stories have only recently been examined in psychology. To many, stories represent scientifically unacceptable forms of logic where logical explication implies formal and empirical proofs, while narrative convinces through verisimilitude (Bruner, 1986). Education has been traditionally dominated by the desire to appear scientific in its discourse within and outside the discipline, so it has opted for logical explication. However, despite the dominance of logical forms of exposition in academic disciplines, it is the narrative form of explanation that *just plain folks* (Lave, 1988, p. 191) use in their everyday negotiations of meaning.

Case-Based Reasoning

The inquiry into the use of stories for learning is known as case-based reasoning (CBR). CBR is based on a theory of memory that claims that people's knowledge and experiences are stored in memory as stories (Schank, 1990). When encountering a new problem, people examine the situation and attempt to retrieve a previously experienced situation that resembles the current one. Along with information about the situation, people retrieve the lessons that the situation provides. New problems are solved by finding a similar past case and applying the lessons learned from that case to the new one.

The process of understanding and solving new problems in terms of previous experiences includes three parts: recalling old experiences, interpreting the new situation in terms of the old experience based on the lessons that we learned from the old experience, and adapting the old solution to meet the needs of the new situation (Kolodner, 1992). Recalling old experiences depends on how well those stories are indexed; that is, how well the characteristics or attributes of the old experience were filed. More clearly indexed stories are more accessible and therefore more usable. Interpreting a problem is a process of mapping (comparing and contrasting) the old experience onto the new one. The CBR process is described by Aamodt and Plaza (1994) as a cycle of activity in which a newly encountered problem (the new case) prompts the reasoner to retrieve cases from memory, to reuse the old case (i.e., interpret the new in terms of the old), which suggests a solution. If the suggested solution does not work, then the old and/or new cases are revised. When the effectiveness is confirmed, then the learned case is retained for later use.

Although numerous accounts describe the assumptions and methods for developing case libraries to support formal and informal learning (Kolodner, 1992, 1993; Kolodner & Guzdial, 2000; Schank, 1990), there is virtually no empirical research supporting the use of case-based reasoning. Virtually all of the research on case-based reasoning has been design research. The use of case-based learning environments for teaching, on the other hand, has been investigated extensively. For example, CaseNet (Bronack & Thornton, 1999) provides numerous case studies as instructional tools. Cases have been used extensively in teaching, but not the use of case libraries designed using case-based reasoning. The use of stories, similar to CBR case libraries, has been shown to improve problem-solving skills and address misconceptions (Brown, 1992; Kearney & de Young, 1995). However, these studies examined the effects of stories on solving well-structured problems, not meaningful, everyday, ill-structured problems. Empirical research on the use of case-based reasoning in the form of case libraries (as used in this study) are more rare. In the only study of case libraries to support learning complex problems, students who had access to case libraries of experts' stories to help them solve product development problems in agricultural economics performed better on tests of problem solving (predictions, inferences, and explanations) than students who had access to expository descriptions of the issues raised in different cases (Hernandez-Serrano & Jonassen, 2003). In this paper we begin to examine the usefulness of a newly developed online case library for helping teachers integrate technologies into their classroom instruction.

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KITE: A Case Library of Technology Integration Stories

We have constructed and implemented an online case library of technology integration stories provided by teachers, Knowledge Innovation for Technology in Education (KITE), which was funded by a PT^3 (Preparing Tomorrow's Teachers to Use Technology) grant from the U.S. Department of Education. The KITE project is a consortium of eight teacher education programs (KITE partners) collaborating to diffuse technology integration experiences for use by preservice and inservice teachers by co-constructing an online case library of technology integration stories. The stories are collected by KITE scouts, who are members of the KITE project partner teams, through structured interviews with individual inservice teachers. The audio tapes of interviews (stories) are first transcribed and then submitted to the KITE indexing team who analyzes these stories and identifies instructive cases, i.e., those cases that denote the kind of problem situations where a teacher seeks to integrate technology. A sample of story transcript is provided in Appendix I (page 73). In order to ensure that cases can be retrieved at appropriate times, each case in the case library is indexed by assigning it labels at the time it is entered into the case library (Kolodner, 1993). While searching the online case library, KITE users may select any values in any combination of indexes listed in Appendix II (page 74). For example, a teacher interested in finding all the stories where middle school teachers from urban school used simulations would select "middle school" from *Kind of School*, "urban" from *School Location*, and "laboratory experience" from *Purpose*. The KITE search engine uses a nearest neighbor algorithm to retrieve the stories that are the exact match to the stated search terms and also the stories with content that is most similar to the search statement. The search engine returns a list of stories with percentages of matching associated with them. Figures 1–4 provide a selection a screens the users interface with while searching KITE.

Following the indexing, the story is uploaded to the case library database. Each story consists of the entire interview and a list of relevant indexes for the case. For each index there is an excerpt from the interview where the interviewed teacher addressed the content that was coded with a specific index term.

Learning Support: Case Libraries

The primary purpose for building the KITE case library is to support instruction of preservice and inservice teachers. One reason why teachers are reluctant to integrate technology in their classrooms—especially the novice teachers employed in this study—is their lack of experience. The most important characteristics that all novices lack are experiences around which they can build their personal theories. The case library can supplant those experiences that novice teachers lack. Rather than having to experience an activity themselves, teachers can search the case library for situations similar to theirs. The case library provides numerous teachers' stories about how they used technology in their classrooms. Inexperienced teachers developing lesson designs can search and read those stories to

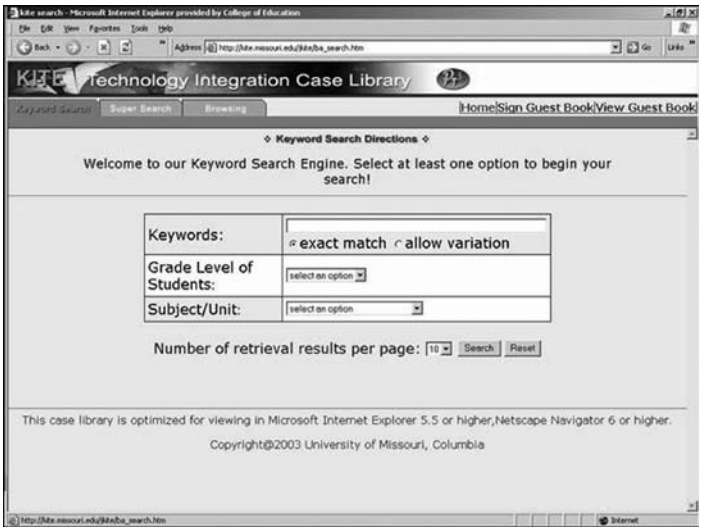

Figure 1. Keyword search interface for KITE

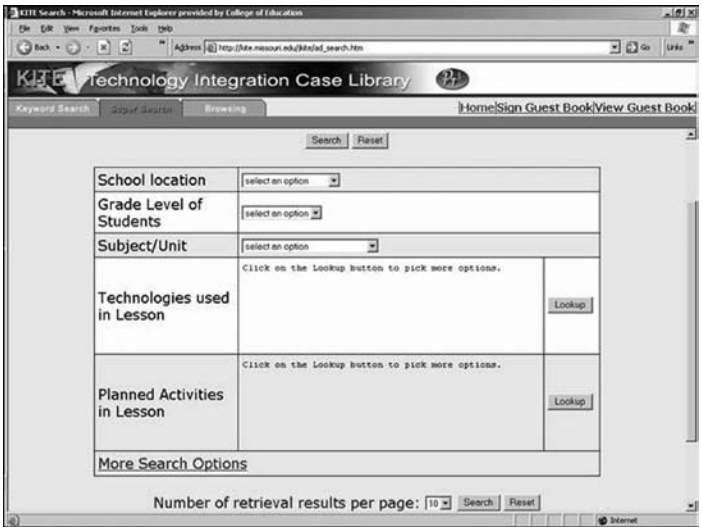

Figure 2: Advanced (super) search interface for KITE

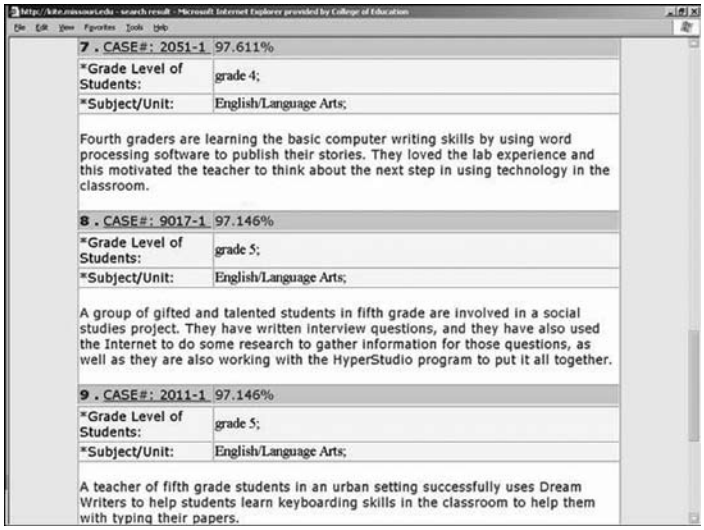

Figure 3. KITE search results

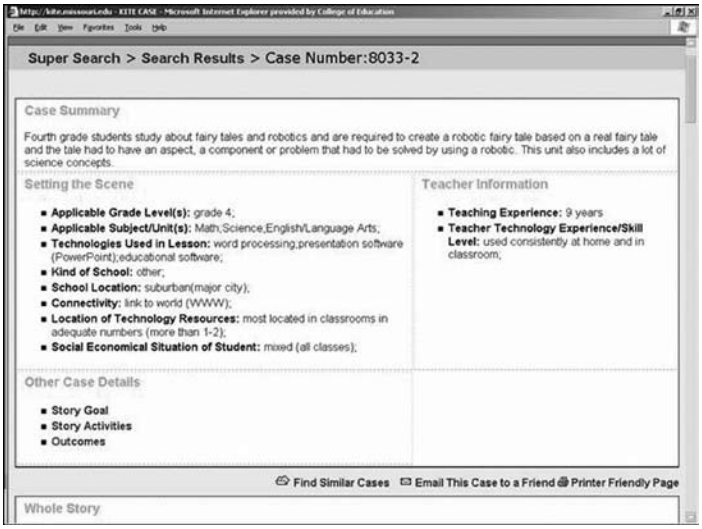

Figure 4: KITE case summary

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find ideas on how to use technology in their teaching. Through the Web portal, teachers can access the KITE case library to search for new ways to use technology whenever they are designing new lessons. They can retrieve from cases advice on how to succeed, pitfalls that may cause failure, information about what worked or did not work for other teachers, and insights into why it did not (Kolodner, 1993). The teachers who access cases from the library can use the ideas presented in the stories or can adapt the ideas based on their own classroom characteristics.

Although the above statements suggest that teachers would accept and use stories from peers in their design activities, there is no research supporting these assumptions. We designed a study to capture teachers' perceptions about the use of KITE case library in the context of performing lesson design activities. The first major issue addressed by the study was:

- How do inservice teachers perceive usefulness of a case library of technology integration stories for designing their own teaching activities?

An additional aspect of the study was to evaluate the scope and usefulness of KITE in comparison to other online information sources the teachers may be inclined to use when designing their technology integration activities. Therefore, the second major issue for the study was:

- How does a case library of technology integration stories compare to a traditional educational bibliographic database as a resource for inservice teachers' lesson plan activities?

Methods

In order to address the above issues in a research context we decided to conduct an exploratory study. The study was designed to expose teachers to KITE and one bibliographic database and to capture teachers experiences with using these resources through a survey instrument and system use logs (for KITE). This research approach allowed us to collect the teachers' feedback after the use of a case library in a context that simulates its real-life uses.

Participants

The study participants were 14 students at a Midwestern U.S. university, enrolled in the online graduate level course titled Using Technology to Enhance Learning, taught by one of the authors of this paper. The convenience sampling as a method for selection of study participants was deemed to be most suitable to the descriptive and exploratory purposes of the study. All the participants were inservice teachers; twelve in K–12 environments and two in other types of educational institutions. They have been employed in a teaching profession for at least three years, with close to one third being in their sixth year of teaching. Because of the level of participants' teaching experience it is reasonable to assume that they have been exposed to some level of technology integration, however, their specific background in this area was not measured. None of the participants had a prior experience with KITE and were not provided training in how to use it. However, they had access to the "How to search KITE" function readily available on the KITE homepage. The participants had an average of 3.5 years of experience in using bibliographic databases and 4.2 years of experience in using Web search engines.

Procedure

The overall study design engaged the participants in the task of developing a plan for technology integration into an instructional unit of their choice. The context of the study was a final course assignment in which we instructed students to use the KITE case library and the Educational Resources Information Center (ERIC), a well-known database of educational resources, as the information resources for the assignment. ERIC was included in the study to generate comparative data regarding participants' perceptions about use of case library and a traditional document-based information resource for their study task.

For the purpose of the assignment, the *technology integration plan* was defined as a series of lesson plans that incorporate technology in integrated and meaningful ways to accomplish the learning goals of the specific instructional unit. In their plans the students were expected to use the concepts and principles about learning technologies they have studied in the course. Their first task was to create a summary of the educational context for their technology integration plan, including:

- A description of the overall learning goals for the unit
- A description about how the unit addresses state/district standards
- A list of tools needed
- A pedagogical basis for the plan, and
- An explanation of how is the unit connected to other units experienced at appropriate grade level.

The main task of the assignment was to provide a series of lesson plans with a statement of the grade level for the lesson, learner objectives, and detailed descriptions of student/teacher activities involving technology integration. The students had an additional requirement to provide two examples of technology materials that could be used in the course. This requirement was intended to mimic the real-life situations of technology integration and to promote students' need for information about practical experiences of instructional technology use that are available in the KITE case library. Finally, in addition to detailed instructions for the assignment, the students were also provided the rubrics for assessment and evaluation of the technology integration plans.

Instruments

Following the submission of the technology integration plan assignment, students completed an online survey about the use of information resources for the assignment. The survey questionnaire consisted of 15 questions (nine close-ended and six open-ended). The close ended questions collected data about:

- The participants' demographics (the type of profession and the length of their employment)
- The type of resources used by the participants to complete the assignment (multiple answer format)
- The participants' self-perceived level of expertise in searching bibliographic databases, Web-search engines, KITE case library, and ERIC (Likert scale, 1–5)
- The total length of time participants spent using KITE and ERIC for the assignment (multiple choice), and
- The participants' assessment about the usefulness of KITE and ERIC for completion of the assignment (multiple choice).

In the open-ended questions, the participants were asked what about KITE and ERIC they liked the most and what they liked the least. They were also asked to provide the examples of how they used KITE and ERIC in completion of their technology integration assignment.

We provided the students with individual login passwords for KITE access and informed them that their use of KITE will be monitored. Therefore, an additional source of data was log files of study participants' KITE use. The log files captured the basic information about KITE use, such as the length of time the students spent using the case library, the index terms they used in their searches, and the individual cases they accessed during their search sessions. A data collection on the system level was possible because the KITE case library has been developed in house and we had direct access and control over its system environment. However, access to the ERIC database was provided by the Cambridge Scientific Abstracts (CSA) Illumina information service available through the university library Web portal and we were not able to directly capture students' use of this resource.

We tabulated and analyzed the close-ended questions using simple descriptive statistics and content analyzed answers to the open-ended questions. The content analysis was performed through several coding iterations, open coding and axial coding (Strauss & Corbin, 1990), thus allowing for the coding categories to emerge from the responses.

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Results

According to the online survey results, while working on their technology integration plans 11 study participants used KITE case library, 13 used ERIC, 12 Internet, and nine students reported using various other resources. The log files revealed that the average amount of time per user spent in KITE was 23.3 minutes each (ranging from one minute to 180 minutes). In response to a survey question about the length of time devoted to KITE use, six students claimed to have used it for 30 minutes to an hour, while five claimed that they used it for one to two hours. Interestingly, according to the log files only one student recorded more than one hour of KITE use. Despite very specific assignment instructions, three students admitted that they did not use KITE at all. The total length of ERIC use ranged from less than 30 minutes (one participant) to more than two hours (two participants). The majority of students (six) used ERIC from one to two hours, while only one reported not using it at all.

Perceptions about Usefulness of KITE Case Library

In response to a question that asked what they liked most about KITE, the most prominent comment among eight students who used KITE for their technology integration plan was the ability to learn from both positive and negative real-life experiences of other teachers. This is illustrated in the following responses:

> …I like the way it [KITE] gave real lesson plans and ideas, not just theoretical ones.
>
> ...feedback from other educators was important to determine how successful tech integration could be or would be.
>
> The lessons/cases had actually been implemented in a real classroom. There were comments about the pros and cons.

Two respondents praised KITE's organization and its ease of use, as explained by a student who developed a successful strategy for using the case library and found that the case summaries were the most effective component of the cases:

> The summaries at the beginning are extremely useful for weeding out cases that will be beneficial to your purpose. The transcriptions are accurate and the cases are organized well so that the search engine works well. The cases read easily and information can be easily extracted from them.

The potential usefulness of KITE and case libraries with teachers' instructional experiences as a new type of instructional resources was especially present in the following responses:

> The thing I liked best about KITE was that it was new to me. I had no idea that it existed. The case studies were very interesting to read. I found myself wanting to read for enjoyment, so I'll return later. The information will be useful to my project because it is evidence that technology can be used effectively at all grade levels.
>
> I used the two case studies from KITE to prove to my reluctant teachers that technology can indeed be used in kindergarten and cross curricular in sixth grade. Both grades have teachers who hate technology integration. I like having proof to present to them.

Additional evidence of potential value of KITE is provided in the comments that students made about how they used the KITE case library. Some students, for example, directly applied ideas from the library:

> I used quotes from teachers and general objectives. I also was inspired to include activities in my unit that were detailed in one case.
>
> I found a lesson plan that was in a format I could use as a model for my integration plan.

The desire to directly apply information to the prescribed task was also supported by the types of indexes that students used to search the KITE case library. Although KITE includes 20 different searchable indexes, log files recorded that study participants used only three. With one exception, the only indexes used were grad level, subject, and keyword (used when looking for a specific topic).

However, a few students used the cases more reflectively, as explained in the following example:

> I did not use any ideas directly. Instead, I would read an article, and then reflect on how I could modify it or it would cause me to think about technology in my classroom. Also, I had been working on the project for some time and had a pretty substantial idea of what I wanted to accomplish. By the time I learned about this resource, I was pretty set in my plan.

Despite many positive comments about the usefulness of KITE, not every student who used it found that experience useful for completion of the technology integration assignment. For example, one student claimed that:

> In all honesty, I used it to get ideas, etc. but really I developed my project based on my own experiences, the resources available at my school, and what I thought would work best for my students.

Some of the reasons for the lack of use of the case library may be found in students' responses to a question about what they liked least about KITE. The most common concerns were the novelty of this kind of resource and corresponding lack of familiarity with how to use it:

> I found it harder to find what I needed.
>
> KITE was new to me. It was just different. I have always gone with the resources I always use because I am comfortable.
>
> Maybe it was because it was the first time I used it, but I found it time consuming trying to maneuver through the site.

Interestingly, another student commented that cases do not have the "jargon" required by the assignment. She found the case material was inconsistent with her perception of what the professor was looking for in a response.

Finally, the additional perceived weak aspects of KITE were lack of comprehensiveness, depth, and content of cases:

> …it didn't have as many examples—also my field was a little different so there weren't as many examples.
>
> I wanted more information from the case studies. One that struck me in particular talked about a PowerPoint presentation. I wanted access to that presentation so I could relate more to the case study.
>
> …no specific data to back up what was said.
>
> No illustrations. The interviewer says things like, "Is this a sample of the Web page your class created? It is very nice." I would like to see it, too, to get a better idea of what they are talking about.

Perceptions about Usefulness of ERIC

All but one of 14 study participants used ERIC database for completion of the assignment. Students' ratings of the usefulness of ERIC were similar to KITE: five of the students rated ERIC as not very useful or slightly useful; four rated it as fairly useful, and four rated it extremely useful.

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Unlike KITE, students were familiar with ERIC, so a common preference that was stated about ERIC was its ease of use:

> It's easier to search for articles and various resources.
>
> The ease of finding things.
>
> I like ERIC because it's a good way to find valuable resources quickly and easily. I like it that you can weed out articles that aren't full text. It's a great time saver and a very efficient.

Another equally common reason for liking ERIC was its content and the comprehensiveness of its coverage:

> …I think it provides wonderful resources and examples of lesson plan.
>
> Happened to get directed to ERIC database in some of my searches—really good stuff there.
>
> …its comprehensiveness.

Interestingly, its vast size also may have contributed to what students liked the least about ERIC. The most specific criticism was about slow and confusing navigation (five students), such as:

> ERIC is too busy. There is so much on the screen to sift through to get to what you need. It needs to be simplified.

Seven students provided specific examples of how they used information from ERIC in their assignment. Four examples referred to use of articles about student evaluation such as rubrics and peer editing, while three identified use of factual information about technology products, such as digital cameras.

Discussion

The study participants were intrigued with the novelty of KITE and liked that it provided information with real-life experiences of practicing teachers instead of academic papers. The students sought to directly apply the information from KITE to the task prescribed in the assignment, which is the way many other sources of information are traditionally used. This practical focus (as in "*What can I find that I can use immediately?*") is well documented among teachers and may create a mental barrier to some other useful applications of case libraries. One such potential application is the use of case libraries as a source of ideas and inspiration for instructional activities that teachers could model in their own teaching. Through dissemination of ideas and adaptation of pre-tested models, a case library of stories with teachers' instructional experiences, such as KITE, could grow into what Lave and Wenger (1991) call communities of practice. Such evolution could be facilitated by addition of interactive modules that allow and encourage users to share comments about how they use case libraries and exchange experiences about how to do it better.

The data about the extent of students' use of KITE in this study are both conflicting and intriguing and deserve specific attention. First, only 11 out of 14 study participants used KITE, even though this was a specific requirement of the assignment. Second, the comparison of self-reported survey data and actual usage logs indicated that students exaggerated their use of KITE. This is not surprising, given that the context of the study was students' work on a graded assignment. However, overestimation in KITE use may also be an indication of students' discomfort with using case libraries, which in turn may have increased the perceived length of time spent in its use.

The lack of participants' prior experience with case libraries meant that they did not possess conceptual schemas for using this information source. Without a mental model of case libraries, and KITE in particular, several participants expressed frustrations about its navigation and searching. For example, as it was explained earlier, the system is not designed to provide an exact match to the user's query but rather the next nearest match. Therefore, a search for stories related to K–1 grade level may return cases related to grade 2–3 and a search for stories about teachers' use of digital camera may also return cases that report on the use of video cameras. In the above examples, the CBR system will automatically recognize that grades 2–3 are close to grades K–1, and that a use of digital camera is conceptually close to a use of a video camera. When users without a mental model of CBR systems review the list of cases generated in response to their query, they may be confused about why some of them do not exactly address their specific request. Furthermore, as suggested by Dimitroff and Wolfram (1995) users' prior experience with traditional information retrieval systems (specifically with Boolean-based systems) may create a mental barrier in their adoption of new mental models of online searching and, therefore, create frustrations in attempts to use the new system.

Once the study participants were exposed to KITE they became more familiar with its story-type content. The novelty of the content also inspired new expectations for what else should be available in KITE, such as examples of actual products (presentations, photos, documents, Web pages, etc.) created by the teachers whose stories have been captured in the case library. The reluctance to use KITE may indicate teachers' resistance to try new information resources and their preference to stay with the ones they have successfully used before, e.g., ERIC or resources that are freely available on the Web. This is supported by our survey data about the extent of use of KITE and ERIC for completion of the assignment, where the study participants reported using ERIC more than KITE. Overall, the participants also found ERIC more useful for the assignment than KITE. Unfortunately, as explained above, we did not have access to ERIC log files and therefore cannot corroborate students' self-reported use of ERIC with their actual use recorded by the system.

Some additional points of the KITE and ERIC comparison (such as the aspects of these search environments that users liked the most and the least) suggest that students found both strong and weak points in terms of their usability and their content. Although the perceived weakness of KITE may be attributed to students' lack of experience with electronic case libraries, students' negative view of specific features of ERIC may stem from their ability to reflect upon these based on their prior use.

Conclusion

The objective of the study was to provide an initial insight into usability aspects of a specific case library. Although our findings cannot be generalized to boarder categories of users nor to other case libraries, they offer guidance for implementation of case libraries in teacher education and they also identify areas where additional research is needed.

For the participants in our study, case libraries represented a completely new information searching environment. Our findings indicate that students (all already employed as teachers) were attracted to the novelty of KITE and to the access it provides to the experiences of other teachers. However, for many of students in the study the lack of prior experience with case libraries made the use of KITE uncomfortable and even frustrating. Under the imposed constraints of the assignment, which was a backdrop for our exploratory study, the students exaggerated their use of KITE and reported relying more on other available resources such as ERIC and the Web.

To foster the use of KITE in the context of teacher education, we need to better educate their future users (students and teachers) about the characteristics of case libraries and about the effective ways of searching them. We need to be aware of the potential negative influence of prior experiences with other information retrieval environments on the successful use of case libraries. To alleviate this problem, attention needs to be devoted to training that facilitates development of users' mental models of case libraries, especially in terms of similarities and differences with other information

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search environments such as bibliographic online databases and the Web. An example of an attempt to provide training to the users of case libraries is the Technology Integration Learning Environment (TILE) module that was added to KITE after completion of the study reported in this paper. Additional research is needed to evaluate the effect of training on the users' experience with KITE. Furthermore, research is currently in progress to better understand the characteristics of users' mental models when searching traditional information retrieval systems and CBR systems. With training and additional research, we hope to help teachers refocus their attention from the search environment itself to discovering novel and creative ways to integrate the experiences of other teachers into their own teaching practice.

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Appendix I: Sample story from the KITE database

Note: The text in italics indicates the questions asked by the KITE scout. The teacher's response follows each question.

Would you begin by telling us what grade level of students you are working with on this project and what is the content or subject area?

The grade level is second grade level. The content area is a cross between social studies and science with a rainforest project.

Where did you use this technology, in the classroom or in a lab setting?

We used it in the classroom since we don't have a lab setting in our school.

Can you tell me the name of the project and the purpose of the project?

The purpose of the project was a rainforest research project that the students were supposed to complete by themselves. They were supposed to do most of it in class, but I did want the parents to help their children find some information.

Why did you decide to do this particular project?

I believe in teaching with more than one way of letting students respond to the teacher. I think that some students can do better if it is not a written report. This is a report that appeals to visual learners. Some students like to create songs or raps. I want the students to feel free to express and describe their information in multiple ways. I also tell the parents that I do this in second grade because I am preparing the students for future research projects.

Can you describe the project from start to finish? Tell me things you did to plan and the steps the students went through as they completed the project.

We had been studying about the rainforest, and the students had been reading different things by themselves and in class. We had been doing quite a bit. This was the culminating activity that I wanted them to do. It was a formative evaluation, but it was also a summative evaluation for me to see how much they had learned from the study of the rainforest. So I first planned it. Then I told parents in newsletter what we would be doing. I gave the students and parents what would be required. I gave them a very basic rubric of what I wanted to see. I went over it with the students and I gave them a list of ideas that they could do. It wasn't just write a report. You could make a poster using word processing. Then tell about the things in the poster. It could be a song that you have recorded using the digital video camera. It could be a poem that was recorded using the digital video camera. It could be a PowerPoint presentation. Whatever they wanted to do. I introduced it that way toward the end of our study. They were working on it during class time and when they had free time. They started looking up information. Some used a little Internet, but it wasn't as much Internet as I would probably use now. They used a lot of resources. I tried to furnish them with the resources. They all knew that they were going to present it in class. They knew that they would be rated not only as a presenter, but also as a listener. When a student was done presenting, the other students had to share two things that they had learned or they had found out.

When they were finished, did they share this project with anyone?

We shared it with our class, and we invited two other second grades to come in and watch. We invited the parents. Unfortunately, the times were during school times, so we didn't have many parents. I have shown a few of the finished projects during staff meetings with our staff.

You mentioned the rubric. What were some of the things that you were looking for in that rubric?

I was looking to see if the information was correct or if they had fudged on it a little bit. It wasn't quantity, it was quality of the information and presentation. For example, some of the PowerPoint presentations were only six to eight slides long. Many of those students didn't have a lot of information. They had maybe two sentences on each slide. It wasn't an awful lot. For both the posters and the PowerPoint, they had to select their information and the pictures they wanted to include in the project.

Was there specific information about the rainforest that you were expecting them to get?

No. Basically, it was very open. Some students were really more into it. Others were more on the surface. Some took a specific animal and really researched that animal. Others it was just general rainforest. The layers. The plants. What some of the plants are used for. Where you find the rainforest in the world.

What did you expect the students to learn from this? As they were going through, what did you expect them to learn from listening to others?

I expected them to not only learn some of the social studies and science standards about habitats and the environment, but also we have a listening standard. They can listen to others. A speaking standard. They have to be able to present information. All of the students had to tell about their project. They had to do it in a way that was easy for the audience to listen to. Also for them to speak in a voice that was understood. Some students are very quiet. You couldn't hear them. Some would play with the mouse or the poster. It took away from their presentation. I told them, 'You can't do that. You have to be professional.' Then, the others who were listening, they were listening for facts.

Were there any problems along the way, with the Internet, Microsoft Word, PowerPoint, or the digital video camera?

Sometimes we couldn't always find the pictures we wanted on the Internet. I wasn't sure about all of the sites that you can go to. That was a problem. Another problem is only having two computers in the classroom. Then it takes second graders so long to type. For them to type small amounts. It was hard for them to wait on others. A paraprofessional came in and she helped them. They were on the school computers. She burned the projects onto CDs so that the students could take them home. I think they can play it on their regular computer at home.

You mentioned that you have only two machines. How many students did you have?

I had twenty five students.

They worked individually?

This time they did.

Do you have any special populations of students, English Language Learners or special education students, that you made accommodations for?

We had a special education student. He was allowed to have help from the resource teacher. The speech teacher also helped him. I didn't water the expectation down. He still needed to do it. He needed to learn these skills too. It was non-threatening. They do get rated. However, it is not that every project has to have glitz or show. Every project that is done, you can always find good in it. He did very well. ESOL students had tested out of that program. There were a few times they struggled with terminology. But we worked through that. Really there wasn't a problem.

How long did the project last? How much time did you devote each day or a week?

Between thirty to forty minutes a day. There were some days we didn't. Other days ended up being longer. Per week we probably spent two to three hours a week. It lasted a little bit over a month. Five or six weeks.

What would you say your role was during this project?

I was trying to be a facilitator. Trying to find the right Internet sites. Get on them. Guide them. Help them find information. Not get it for them, but oversee what was going on.

Appendix I continued on p. 74

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Appendix I continued from p. 73

Their role during the project?

They were supposed to be active participants. This is one thing they really stayed on task for. They really worked. They liked this a little better. When they were getting their presentations ready, the participant and the interest level rose.

How do you think the project benefited them?

Some of them really enjoyed it. Some of them have made other presentations. Some of them have asked if they can do similar projects. One little boy gave his presentation. He started by saying, 'I'm so nervous. I can't do this.' He got up there and he was one of the best presenters.

What would you say you have learned from doing this?

I would probably try and make it the schedule so that we could use the Internet at different times. If they want to stay in at recess, to give them more time. It just really takes a lot of time.

Overall thoughts about how it went? Things you would keep the same or change?

Just give more time for the students to work. I also might try to do it so that we could share the projects during the evening. They really enjoyed it. The few parents who came. They really thought it was neat. I would like to try it with something else that is easier. Some of the animals were hard to find pictures of and information about. I might go to the public library and see what they have too. Any advice? I would just be patient. It was a little frustrating at times. I would have other things that students could be working on. They were really good. Most were really busy all of the time. There were a couple of times where some wanted to get on the computer and they had to wait. That might be a scheduling problem. Next year, if we do get the computer lab, I think we won't have as many problems.

Appendix II: Indexes for KITE Case Library

Assessment of learning: quiz; test/exam; assessed product using rubric; assessed presentation using rubric; written assignment or paper; subjective assessment (e.g. observation); none

Connectivity: Classroom only (e.g., CD-ROM, computer software); linked to school and district-wide resources (e.g., district LAN); link to world (WWW)

Grade Level: 1–12

Help/assistance used: fellow teacher; technology specialist from school or district; Web site; manuals only; administrator; looked in journals/books; participated in training

Kind of school: primary (K–3); intermediate (4–5); middle school (6–7); junior high (7–8) or (7–9); high school (9–12) or (10–12); magnet school; other

Level of learning outcome sought: remembering information for test; comprehension of information for writing or presentation; solving textbook problems; designing a product, method, or process; modeling a system or object; decision making activity; completing laboratory activity

Location of technology resources: primarily in labs; primarily in library/media center; most located in classrooms in adequate numbers (more than 1–2); located in labs and distributed to classrooms; only teacher has computer

Nature of activity: experimentation; presentation by students; presentation by teacher; data collection; virtual field trip; data analysis; drill and practice; writing; using tools to represent knowledge; creative, situated in captivating and challenging activities; games

Observations: students performing required activity; students refuse to perform; students excited; collaboration increased; writing performance increased; mathematical skills increased; communication skills developed; presentation skills increased; collaboration decreased; writing performance decreased; mathematical skills decreased; presentation skills decreased

Purpose: information searching; making a presentation; constructing multimedia programs; organizing information; assessing information; writing papers; viewing pre-recorded presentation; laboratory experience; creating homepages; role playing; corresponding with experts/mentors; collaborating with learning communities; collaborating with outside communities; assessing student learning; drill and practice; tutorial instruction; creating a student centered environment; increased information exchange; stimulate collaborative work environment

Reason for using technology: recommendation from colleague; read about it in journal; heard about it at a conference; administrator priority; thought it up; to meet standards

Role of student: explorer, discover concepts and connections; student, learning through structured activities; apprentice, observing, applying, and refining through practice; teacher, sharing and representing what they have learned; producer, creating products to represent their learning; experimenter, trying out new processes

Role of teacher: facilitator, supporting collaborative problem solving; director, giving structured learning activities and explicit directions; expert, providing information; monitor, circulating among students; coach, providing hints, clues, and other feedback; partner, learning along with students

School location: urban, major city; suburban, major city; urban, other; suburban, other; rural; charter; other.

Socio-economic status of students: poor (most families on support); mixed poverty and lower middle class; mixed lower middle and middle class; mixed (all classes); affluent; mixed middle class and affluent

Standards: activity not associated with standards; activity generally relates to one standard; activity generally relates to more than one standard; activity directly address one or more standards

Subject: Math; Science; Social Studies; English/Language Arts; Foreign Language; Health; Physical Education; Home Economics; Business; Consumer and Family Studies; Industrial Technology; Music; Visual/Performing Arts; Special Education

Teacher's technology experience/skill level: never used before; used occasionally for personal tasks; used frequently for personal tasks; used occasionally in classroom; used frequently in classroom; used consistently at home and in classroom; used in professional settings

Teaching experience (# years):0–35

Technologies used: graphic calculator; digital camera; video camera; image scanner; graphics program; word processing; database management; spreadsheets; multimedia construction tools (Director, Premiere); hypermedia construction (StorySpace, Linkway); internet searching; e-mail; chat rooms/MUDs; conferencing/BBS; videoconferencing; audio-conferencing; data collection; presentation software (PowerPoint); adaptive/assistive devices; systems modeling; concept mapping; expert systems/AI; programming (Visual BASIC, C++; Web page programming (HTML, CGI, Perl); microworlds; visualization tools; educational software (Jostins); simulations; web development tools; webpages/linklist; computer assisted design (CAD); Internet searching; data exchange; video editor/Movie maker; sound editor; other

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