inCITES: Towards a Pedagogically Sound Use of Technology in Higher Education

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Abstract: We are proposing an approach to collaboratively design, present, and reflect on pedagogically sound teaching practices and learning scenarios that involve technology in higher education. Among the questions we address within our project are: How do instructors, designers, technologists, and others at our institution go about the integration of technology in teaching and learning? How can the development of a ‘best practices’ case repository be used to facilitate critical discussion about the usefulness of technology to enrich learning? How can the development of such a repository become part of the workflow of the targeted communities? How should best practices be presented and structured? What are feasible and sustainable maintenance strategies for such a collection and how is it used? We present our approach in a first prototype, which aims to facilitate collaboration through the interaction with a web-based repository.

Introduction

Professional development for instructors in the area of new technologies is subject of an increasing number of projects and publications. Initially targeting K-12 education (Sandholtz & et al., 1997) the discussion of technology-enhanced teaching and learning has now moved into higher education as well (TLT-Group, (Barone & Hagner, 2001). With the initial efforts focusing on providing access to technologies, the challenges that arise around the pedagogically sound use of these technologies have been often ignored (Cuban, 2001). This aspect, however, is one of the crucial factors for the long-term success of technology innovation projects in education. Faculty who are typically under time pressures need to see an added value of using technologies in their classrooms before they commit to innovative practices. For example (Brewer, 2002), in a recent study based on a factor analysis of adoption motivators for a course management system found that when faculty knew how to use the course management system in pedagogically sound ways, they were more satisfied with the technology and felt their students were learning more than they did in face-to-face courses. However, when faculty used the system simply to distribute course materials, they felt they had to spend too much time for little or no benefit to their students.

Objective

The project described in this paper was originally born out of the need to better disseminate pedagogically sound teaching and learning practices at our institution. Proper documentation of educational technology projects is infrequent and inconsistent, leading to redundancy in parallel projects and repetition of mistakes. However, in order to grow a community of practitioners and induce changes in how and where new technologies are applied in learning and teaching we go beyond a mere collection and documentation of examples. Through ‘insights’ into the use of technology in education at Stanford it is our intention to help shape collaborations and facilitate critical discussions around the effectiveness of new technologies in fostering student learning, the difference between the kind of learning that occurs in traditional venues and the kind that occurs in technologically mediated settings, and the conditions necessary to effectively implement new technologies for learning.

Thus our project aims to develop

- a framework to guide the design and implementation of learning technology projects,
• a resource to invite critical discussions about the usefulness of technology to enrich learning, and
• an informational tool about examples of best practices for faculty and the community at large.

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There are other web-based projects that offer case studies of “best practices” in integrating technology into teaching. For example, the University of California Teaching, Learning and technology Center (TLtC) has a database-driven website that describes academic technology projects in the UC system. The site organizes its projects by discipline, and encourages collaboration by enabling electronic submission of new projects directly into the database in varied disciplinary settings. The Carnegie Foundation’s Knowledge Media Laboratory (KML) website contains a gallery offering detailed case studies of teaching techniques in different disciplines and at different levels of learning. Using a reflective portfolio structure, the KML gallery concentrates on documenting and representing pedagogical thinking, and highlights how this thinking impacts teaching practice in a course or series of courses. The University of Washington’s Catalyst website (Catalyst) is a rich resource of support materials and tools for using technology in teaching. Catalyst contains profiles of innovations in teaching with technology at the University of Washington, as well as teaching guides, which offer practical guidelines for furthering pedagogical goals with specific technological tools.

All of these web-based initiatives were valuable models for the approach we chose in our project. We retain the case study model of the KML gallery, as well as its focus on pedagogical reflection. Our project also devotes some attention to practical detail that both the Catalyst and the TLtC websites offer. However, it revolves as much around the formation of innovative, collaborative practices as it does the documentation and display of case studies.

The Project

inCITES is the acronym for “innovative Collaborations for Integration of Technology in Education at Stanford”. The project is conceived as a collaborative effort. In discussions with faculty, academic technology specialists, as well as other campus groups we are developing a framework to design, structure, present, and reflect on teaching practices and learning scenarios that involve technology. Discussions are based on real examples from this community and are documented and described as inCITES cases.

The inCITES Case

An inCITES case is determined by a pedagogical challenge and the corresponding attempt to meet that challenge. A case from our university (Hamilton, 2003) can serve as an example here. The distance and anonymity in large lecture classes were seen as a pedagogical challenge. In an attempt to meet this challenge faculty, learning designers, and research staff developed and implemented online problem sets with the option for individual student feedback.

The inCITES project revolves around the inCITES cases (Figure 1). It involves all the stakeholders and actors directly or indirectly involved in the process of the project. It serves as the catalyst, fostering interaction and creating opportunities for collaboration to mutually educate each other and advance in the implementation of new learning approaches through pedagogically sound practices that involve technology.
Figure 1. inCITES case at the center of the inCITES project

Case Repository

A companion website is being developed to capture and display the relevant pedagogical dimensions of an inCITES case, including its conception, intended purpose, construction, implementation, assessment, and the people involved. It documents current projects as they occur, but also draws on fruitful past experiences. Additionally, the site serves as a showcase and therefore helps to disseminate good practices and stimulate new ideas. The site is database-driven, and therefore searchable by several different sets of categories.

User Interactions

There are two primary modes users interact with the repository of inCITES cases: the addition of information about new cases and the retrieval of information about available cases (Figure 2).

The input of inCITES cases as well as the retrieval of case information are each important processes at the core of the inCITES project. It is here that the user interfaces with the content of the repository. This user experience will eventually determine if our approach to go beyond a mere collection of examples will be successful and if we will be able to meet the goals mentioned above. Accordingly, we put a high emphasis on observing, encouraging, and designing the usage practices that evolve around the tools we develop.

We currently envision several scenarios:
- Formative support in all stages of projects: brainstorming, preparation, execution, evaluation and extension
- Professional development in pedagogy: discussion of cases, case studies
- Portable portfolio: quick access to project showcase from anywhere and easily searchable repository

The interactions with the repository and the tools we are designing to help support these interactions are discussed in the following sections.
**Input**

In order to provide content to the inCITES case repository we have developed a series of questions. The questions cover all the relevant information to plan, implement, and execute a pedagogically innovative project that includes new media or technology components. They are meant to be used primarily by academic technology staff, generally in consultation with faculty and instructors. The questions correspond to fields in a database, which forms the backend for the case repository.

However, the questions are used not only to help us document the inCITES cases. They also are intended to support the planning of a new inCITES case as it develops. Thus, they can help to guide initial conversations between project collaborators, in order to keep the focus directly on concrete pedagogical goals. They can help to develop a project around the learning goal, instead of letting it be driven by technological tools. They can also facilitate early thinking about the ‘before and after’ of the instructional intervention and how the success of the project will be evaluated.

The user interface is designed so that questions are clustered in three different areas. We do not expect users to meticulously follow a certain order when going through the questions. The clusters of questions are hyperlinked, so there are different ways to navigate through the questions we pose. Instead of having to follow one pre-determined path, users can jump directly to different sections. We do suggest a path that progresses through the entire list of questions, however, and we are also adding hints, recommendations, and drop-down lists (like a list of possible pedagogical approaches), which we hope are helpful in planning the project. We also expect users not to answer all the questions at once, but rather to come back during the course of the project and update and complete their information. The three different areas are as follows:

1. Questions clustered around the context of the case: We assume that thinking about the general situation or challenge might be one of the entry points to the questionnaire. This area is focused on helping users think about their inCITES case as a whole with a vision of the ‘big picture’. They are asked to consider in what context their teaching or learning occurs. The questions encourage not to think about solutions, but rather to consider constraints, challenges, and opportunities. We also pose questions around the changes the intervention caused and potential techniques to measure successes and failures.

Once users have filled in the general questions related to the case we recommend moving on to the pedagogical concepts and implications. This will help to make a connection between a challenge and how a pedagogical approach might look like to potentially meet that challenge.

2. Questions clustered around the pedagogy: Here, we ask more specific questions about the pedagogy in order to encourage thinking about specific pedagogical concepts, learning activities and how these activities will be implemented. We encourage users to follow a certain instructional approach, like conceptual learning, problem solving, case studies, collaborative learning, authentic inquiry, etc. and carefully design their interventions and learning activities around that approach.

3. Questions clustered around the tool: These questions encourage users reflect on the technology tool itself. Apart from a few basic technical details we ask to describe and classify the tool in terms of how it might be used and recommend exploring its limitations and opportunities. Is it a generic tool with a broad spectrum of applications or is it a specific tool, developed for a singular purpose?

The exploration of a tool might be another entry point to start a potential inCITES case. After thinking about the tool we recommend to reflect on the pedagogy. There should be a close interaction between technology used and the pedagogy that informs the project. We recommend going back and forth between these two areas to make sure pedagogy and tool really match and complement each other in pursuing the goal for the project.

**Retrieval**
Retrieving information from the collection of inCITES cases is a completely separate interaction from the input of case information. Accordingly, we have developed a different user interface for this purpose. To browse or search the repository each inCITES case can be viewed from four different perspectives: pedagogies, disciplines, tools, and people. Each perspective presents the inCITES example in a different way, highlighting distinct aspects of the planning, development, implementation and evaluation of the project.

The **pedagogies perspective** is organized by different pedagogical approaches. It describes each inCITES case according to an instructional challenge and what learning approach was chosen to meet that challenge. This perspective offers insights into how a good learning design process begins, what critical questions guide that process, and how it is implemented.

The **disciplines perspective** is organized by academic discipline. It highlights the aspects of good teaching uses of technology in terms of the specific challenges and conditions of the field in which they are used. This perspective is useful for learning how others in a given field are using technology effectively in their teaching. It also helps bring out parallels between inCITES cases and approaches in neighboring fields, and suggests ways to adapt technologies to fit teaching needs in a given discipline.

The **people perspective** is organized by the various roles in a collaborative project. It presents the people involved in each inCITES case, and gives an overview of the roles they played in making the project successful. This perspective is useful for understanding how faculty, academic technology specialists, and others can best contribute to the project.

The **tools perspective** focuses on the actual technology involved - whether it is a piece of software, a website, or multimedia presentations produced by the students. This perspective illustrates what technologies are being used in Stanford classrooms, and how they are best implemented in specific settings. This may stimulate ideas for those who are curious about a particular technology, but unsure of its pedagogical use or potential.

**Conclusions**

This project is still in an early phase. We are continuously expanding the number of pilot cases, and we are experimenting with potential usage scenarios. This allows us to evaluate the usability of the templates and website structure in order to adapt them to match existing needs and to design and propose better practices. We are also working on strategies that will allow us to sustain the project—for example, taking advantage of existing resources, events, and infrastructure either to feed into our activities or to bring into our project as cases.

It is apparent that our approach bears similarities to action research, which has been suggested as an effective way to integrate educational research and teaching practice, including higher education (Zuber-Skerritt, 1992). In a similar way (Shulman, 1999) proposed the creation of “teaching academies at the intersection of teaching, learning, and technology”. A more thorough examination of these approaches will allow us to further develop our framework and propose more generic practices, tools, and strategies. Thus, even though in its current phase the project is focusing uniquely on cases from Stanford University, we believe this experience could be profitably transferred to other institutions and contexts.

**References**


