Expanding the Role of Design to Support CSCL

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Abstract: This paper argues for the need of different strategies to explore and promote innovative collaborative educational technologies. One strategy can be to expand the role of design in research. By using design processes that guide the realization of products helps to balance the different needs of researchers and practitioners while addressing the challenges of usability, sociability, and learnability. An improved design process is presented that suggests solutions to tackle these challenges for CSCL.

Introduction

Nearly 20 years ago, it was argued that the limitations of computer use for education in the coming decades would likely be less a result of technological limitations than a result of limited human imagination and the constraints of old habits and social structures (Kaput, 1992). These two latest behaviors are still observable in many of today's classrooms and impact the research, design, evaluation, and assessment in the CSCL community (Dillenbourg & Jermann, 2010). Therefore, different strategies are needed to explore and promote innovative educational practices supported by collaborative technologies, and this paper will argue that design can be the catalyst for such a change. The main research question to be raised is as follows: what design approaches can be applied to improve CSCL research in learning environments.

Background

Vatrupu and colleagues (2008) have argued that usability, sociability, and learnability can provide a design framework for CSCL. Dillenbourg and Jermann (2010) position orchestration as the key design implication for making CSCL, "work well" for teachers. These different factors of usability, sociability, learnability, and the notion of "working well" can be classified as design challenges. Additionally, these types of challenges can be considered "ill defined" or "wicked" and they do not map well to rigors of science (Rittel & Webber, 1973). Design-based research for education attempts to solve these challenges by relaying on cycles of prototyping and theory building (DiSessa & Cobb, 2004). The purposes of these iterative cycles are to generate theoretical knowledge and educational innovations (products and services) for the classroom that attempts to bridge research outcomes and the social factors for innovative educational uses. DBR has been shown to be an excellent process for localized research outcomes, but it presents problems for higher-level generalized theories (Cobb et al., 2003). Therefore, a different approach is needed that addresses the design problems of making CSCL "work well" that supports research requirements while keeping in mind the users. Therefore, a revised design approach can be developed to support and guide research and practice can be used to expand local theories and help align CSCL for both science and the user experience.

Inspired by the different design processes and differences between "scientific and design problems" a process can be developed that bridges DBR and interaction design (Ejersbø et al., 2008; Rogers, 2009; Schwartz et al., 2008). Viewing the scientific and design challenges as a single larger one, we can now consider the overall problem as a bridge between educational innovations that supports theory generation and the realization of educational tools (Edelson, 2002; Krippendorff, 2006). Figure 1 illustrates this simplified design process that brings together research and product design. In the figure, the top right side illustrates how scientific problems are identified, hypotheses are formed, data collected, and theories generated. The bottom right represents the creative and engineering design points of view, where the problem can be identified through observation and working with the users, after which designs then can be created and delivered. (This simplified model does not reflect the complexity of either the scientific or professional design process; rather its purpose is for comparison.) For the research community, the outcome is peer-validated and for design, validation is based on the end-user and the market. What this model offers are clear roles for the different stakeholders represented in the design-based research approach for CSCL. In the research space, there are the researchers and the respective organizations (academia, enterprises, funding, etc.). In the use space teachers, learners, and organizations are represented as the users of the system. Each of the different stakeholders has different requirements for outcomes and validation. Shifting the role of the design provides a membrane between theory generation and artifact creation that provides means to address and frame the problems of usability, sociability, and learnability. Additionally, the design space provides a legitimate space to ask does it "work well" for teachers and learners. By considering design as a membrane provides researchers and other stakeholders the tools manage the relationships and help insure both research outcomes and innovative learning artifacts.

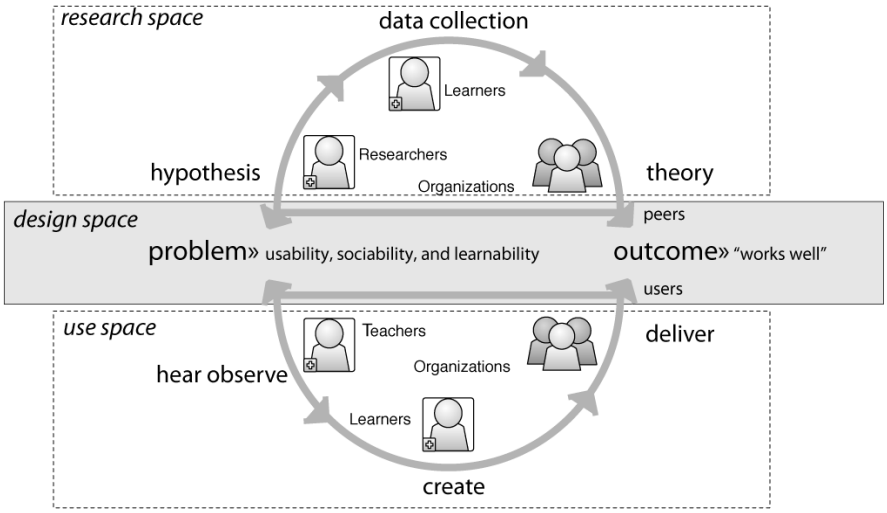

Figure 1. Proposed Role of Design for Supporting CSCL.

Design Process

The design process illustrated intention is to help guide the research and the development and implementation of CSCL. Where the design process differs in its approach, is to help manage the research and product design methods. By adding a research focus to the design process enables a shift from the preoccupation with appearance and surfaces of tangible products to design materials that can make sense to the user of the communities (Krippendorff, 2006). Additionally, design synthesis offers the researcher methodological approaches for going beyond local theories. More empirical work and evidence are required if this expanded role for design is to generate significant results as an approach for CSCL. Dillenbourg and Jermann (2010) have argued that CSCL needs to embrace both individual and social learning while supporting the role of the teachers, and that technology should follow suit, otherwise it will not be adopted into practice. This focus on supporting and empowering teachers and learners is a goal for conducting successful research that requires a different way of framing problems for CSCL.

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