Researching orchestration

Luis P. Prieto, GSIC-EMIC group, Universidad de Valladolid, School of Telecommunications Engineering, Paseo de Belén, 15. 47011 Valladolid (Spain), lprisan@gsic.uva.es

Abstract: As an early post-doctoral researcher with prior experience in the telecom industry, I am highly interested in the challenges of applying CSCL research in authentic educational settings (what some authors call "orchestration"). This brief document provides a short summary of my CSCL-related research delving into that multi-faceted and ill-defined problem, including conceptual frameworks, technological systems and approaches to professional development of practitioners.

Research summary

Computer-Supported Collaborative Learning holds the promise that collaborative learning can be made more effective and efficient by the use of ICT. However, in formal education practice we seldom see this promise fulfilled: the introduction of novel technologies and pedagogic approaches in the classroom often puts new burdens on teachers and students, with the net result being that innovation is scarce and technology appropriation, painfully slow. My main research interest dwells in *how CSCL research can be successfully applied within the constraints of authentic educational settings*, a concern that in the last few years has crystallized around the term "orchestration" (Dillenbourg et al., in press).

This research interest on CSCL and the topic of orchestration, which might seem odd for a person with mostly technical background, is the consequence of an atypical career path. Initially a software developer in the telecom industry, I engaged in grid computing research. Since I found research work more rewarding than my prior roles in the industry, I decided to pursue an academic Ph.D. degree. More concretely, I set out to do multi-disciplinary CSCL research work at the GSIC-EMIC group (1) in the University of Valladolid. Along this journey, I have always been interested in how technology shapes the way we think and do things, and vice versa. This motivation, along with my fieldwork in authentic educational settings (e.g. primary schools, but also in higher education), where I've seen teachers and students striving to integrate new technologies and pedagogical practices, has led to my current research interest on how to facilitate the "orchestration" of authentic CSCL scenarios.

My research in the field of CSCL so far has touched upon a number of theoretical frameworks, such as design thinking or activity theory. However, the lack of an established analytical lens to study the problem of orchestrating CSCL, led our research group and other researchers to propose a *new conceptual framework* that could serve to analyze more methodically this multi-faceted problem. This '5+3 Aspects' framework (Prieto et al., 2011a) represents the first contribution of my Ph.D. thesis, and has already been used to analyze and evaluate several technological innovations applied to authentic classroom settings, both by our research group and by other researchers.

I have also made other contributions, both in the conceptual and technological sides of the orchestration problem. We proposed the notion of 'atomic patterns' as *practices of value to aid non-expert teachers in orchestrating complex CSCL situations* (e.g., in professional development actions, see Prieto et al., 2011b). These atomic patterns are extracted from the observation of successful CSCL practice, and they are similar to other design patterns. They have, however, certain particularities (e.g., they are of smaller granularity and contain explicit references to classroom contextual elements), to make them easier to identify and use by practitioners.

In the technological side of the orchestration problem, we have proposed GLUE!-PS (2) as a *system to support non-expert teachers in orchestrating blended, web-based CSCL* that involves Virtual Learning Environments (VLEs) and other external "Web 2.0" tools (see Prieto et al., 2011c). This service-based architecture can be used to deploy learning designs (e.g., CSCL scripts), expressed using multiple computerized formats, across different flavors of these distributed learning environments, also enabling the management of the resulting scaffolding in run-time. Aside from being available as open source, the system is naturally extensible, and requires little or no modifications to existing infrastructures available at institutions, thus increasing the feasibility of its application to authentic educational settings.

During my work in the Ph.D. thesis, and also in the ongoing follow-up work that is being conducted at the moment, we have mainly used an iterative research process typical in software engineering (inform, propose, analyze, evaluate – see Glass, 1995), which resembles in many ways other methods more typically used in CSCL such as design-based research. Especially important in this regard are the evaluations conducted so far, which have followed a mixed methods approach derived from the one proposed by Martínez-Monés et al. (2006). The data gathering and analysis, which had more emphasis on the qualitative side, was in some cases guided by the aforementioned '5+3 Aspects' framework, as a way to assess more systematically the support that

the proposed conceptual and technological tools provided to the multiple challenges of orchestration in authentic settings.

Current and future work

More recently, during my post-doctoral research still at the GSIC-EMIC research group in the University of Valladolid, we are continuing several lines of work that my Ph.D. thesis first opened. A considerable part of my current work is related to the METIS European LLP project (3), which explores novel ways of *supporting practitioners in learning design thinking*, through the combination of professional development actions (e.g. teacher workshops) and supporting technological environments. This path was started during the evaluation of the atomic patterns and the GLUE!-PS system during my Ph.D. thesis work, where authentic professional development actions played a crucial role. Another important thread of current work is the *extension of the technological support for orchestration* that GLUE!-PS provided for web-based Distributed Learning Environments, beyond web-based activities (e.g. in physical spaces by the usage of Augmented Reality techniques, or through tabletop interfaces). This line of work is now being explored in the context of a Spanish national research project (4), as well as through an ongoing Ph.D. thesis and ad-hoc collaborations with other research groups (e.g., the CHAI group at the University of Sydney).

Aside from these lines of work, which stem directly from my thesis work, in January 2014 I will start doing research at Pierre Dillenbourg's CRAFT group in the École Polytechnique Fédérale de Lausanne (EPFL), Switzerland. In this upcoming endeavor, framed within a Marie Curie Intra-European Fellowship (IEF), we will explore the possibility of *modeling the orchestration of authentic face-to-face CSCL classrooms*, and we will focus especially on proposing new ways of *facilitating such orchestration through paper and tangible user interfaces*.

Endnotes

(1) See http://gsic.uva.es (Last visit: 9 Apr 2013).
(2) Available at http://gsic.uva.es/glueps (Last visit: 9 Apr 2013).
(3) Lifelong Learning Programme project 531262-LLP-2012-ES-KA3-KA3MP, see http://www.metis-project.org/ for more details (Last visit: 9 Apr 2013).
(4) EEE: Orchestrating Educational Reflected Spaces, project TIN2011-28308-C03-02, see http://eee.gast.it.uc3m.es for more details (Last visit: 9 Apr 2013).

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