Designing for enactment: Multi-level patterns and routines in teacher practice

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Abstract

Although there exist many approaches and frameworks for the design of learning activities, from different theoretical and pedagogical standpoints, very few of them take into account the fine-grained, contextual logistics that are required to enact those designs in an authentic classroom. These enactment aspects, especially when ICT and multiple collaboration levels are in play, have been termed "orchestration" in the recent years. This paper proposes an approach for learning design based on the concept of patterns of different levels, that tries to address the orchestration of activities by teachers in authentic classrooms. This approach does not enforce a theoretical or pedagogical point of view, and it may be thought of as a complement to other LD approaches, in order to make them fitter for its comprehension and enactment by teachers in authentic situations.

Observing teacher practice in authentic classrooms – Orchestration

As learning designers, we try to develop activities that promote certain kinds of learning, according to our pedagogical and theoretical points of view. Moreover, we often try to abstract the most prominent aspects of our designs, removing contextual restrictions and characteristics from them, in order to increase reusability. However, there is an inherent tension between this effort (which can be seen as a kind of de-contextualization) and the task that a teacher faces when he or she tries to enact that design in a real classroom (which can be seen as a re-contextualization task, see Prieto et al., 2011b). Given this tension, one may ask whether we should think about the restrictions and logistics of the enactment in the classroom as we design. This is the main problem that this position paper addresses: *what can we do to support teachers in enacting learning designs, in a way that is aligned with their pedagogical purpose, without losing the all-necessary flexibility that an authentic classroom situation calls for?*

At the GSIC-EMIC group we have been studying several instances of authentic teacher practice, in order to understand how teachers design and enact computer-supported collaborative learning activities in authentic educational settings, and how those designs are transformed as they are enacted in the classroom (Prieto et al., 2011a). This position paper presents a pattern-based approach that tries to take these matters into account. This approach can be seen as part of a movement in the field of technology-enhanced learning, that tries to increase the impact of this kind of educational research in authentic settings. This movement often is referred to in relationship with the concept of teacher *orchestration*: the design and real-time management of multiple activities, at multiple social levels and using multiple tools (Dillenbourg, Järvelä and Fischer, 2009; Prieto et al., 2011c). The proposed approach (as well as this notion of orchestration) does not represent a new theory or a new pedagogy, but rather it can be seen as *complementary* to other approaches or theories for learning and learning design.

The concept of design patterns and the role of pedagogical patterns in practice

One of the main aspects of our approach is that it is pattern-based, in the sense of using *design patterns* (Alexander et al., 1977). Design patterns are recurrent solutions to common problems in a design domain, which can be combined creatively to design artifacts and to communicate among practitioners. This kind of approach has been successfully applied to a variety of fields: architecture, software engineering and even pedagogy and, more concretely, learning design (see, for example, Hernández-Leo et al., 2009 or Conole et al., 2011).

One of the main objectives of a learning design is to be *enacted* in an educational setting. Then, we can raise the question as to what is the role of patterns in the enactment of a learning design. As we observed teacher practice in classrooms, we noticed that not only the designs of teachers contained recurrent elements (that we saw as akin to *design patterns*), but also that the enactment of those designs showed a limited set of recurrent elements, that we thought of as *enactment patterns* (see Prieto et al., 2011a for a more detailed description of these enactment patterns and their role in teacher practice). For example, a teacher may recurrently assess a collaborative task by telling one group of students to assess the work of another group in front of the class, while another teacher could do the same by taking advantage of a (software) collaborative tool to monitor and assess tasks "on the fly", in order to guide certain groups about some problematic notion in the task.

These "concrete ways of doing things" in the classroom, these *recurrent solutions to enactment-time problems* never appeared on the teachers' learning designs (in written or spoken form). Thus, these enactment patterns served as a sort of "meat to fill the bones" of the learning design. Furthermore, when teachers had to deviate from the designed path (due to unexpected problems or opportunities in the classroom) and *improvise* parts of the lesson, normally the improvised parts were constructed using these very same fine-grained or *atomic* patterns (either design-time or enactment-time patterns). It was also noteworthy that expert or more successful teachers often showed a wider catalogue of these atomic patterns, as well as more patterns that could be seen as *aligned* with the pedagogical intent of the design (e.g. routines that implied small-scale collaboration in a collaborative learning design). Our approach rests on this idea of *trying to use these atomic patterns, mostly elicited from actual practice, to support orchestration (including. design and enactment) by teachers in authentic classrooms*, using them by themselves or complementing other design patterns. We contend that these atomic patterns are easily recognizable by teachers as practices they can apply in their everyday teaching, and that they can help teachers in enriching learning designs and reflecting about how to enact them. Our initial efforts using this approach in teacher workshops support this assertion (Prieto et al., 2011a).

Multi-level pattern approach to learning design

Nonetheless, however useful this notion of enactment patterns is *per se*, we also believe that it works best when used in conjunction with other sets of pedagogical patterns which have been developed with different pedagogical or theoretical principles in mind (e.g. DeBarger et al., 2011 for interactive assessment, or Hernández-Leo et al., 2009 for collaborative learning). This combination of patterns at different levels is similar to the notion of pattern language in Alexander's seminal work (1977), which has already been applied to learning design, e.g. by Hernández-Leo et al. (2009).

However, even the most complete learning design developed with this kind of pattern language can be rendered ineffective by a poor teacher enactment in the classroom (even if the enactment follows closely the script): not reacting flexibly and in-time to the classroom occurrences, not establishing a collaborative atmosphere in the classroom… the list of contextual and logistic factors that take part is endless. The proposed approach extends the idea of using pattern languages, to take into account the

different concerns and moments in the whole activity lifecycle (not stopping in the design of activities, but also going through their enactment). Thus, we propose that *these atomic patterns elicited from actual practice can be used by teachers to design and think about the enactment*, but also, that their use can (and should) be *combined and aligned* with the overall pedagogical intent of the design, be it pattern-based or otherwise. The main aspects of this approach are represented graphically in Figure 1, along with examples of how we have used it:
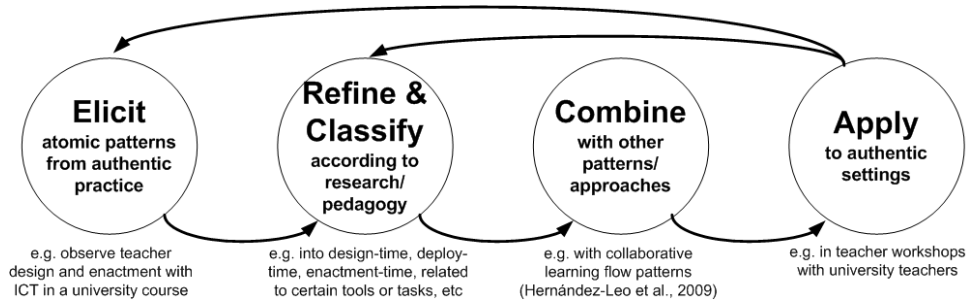

Figure 1: Graphical representation of the multi-level pattern approach

As it can be seen in the figure, our approach starts with the *elicitation of atomic patterns from authentic teacher practice* in the educational setting of choice, paying special attention to recurrent elements in how teachers orchestrate their classrooms (by designing activities, enacting them, and all the steps in between). This corpus of atomic patterns elicited then is *refined and classified*, so that practitioners can easily use it. This classification can be guided by the researchers' theoretical and pedagogical viewpoints, as well as by the aims of their research. Afterwards, the atomic patterns have to be *combined with the existing design patterns and pattern languages* available for their approach. Finally, this extended approach can be *applied in the field*, gathering data to further refine the set of patterns or to guide further iterations of the cycle.

This kind of approach has been taken, with promising results, not only by our research group, but also by colleagues in the US (see Prieto et al., 2011b). However, it is important to reiterate that the sets of enactment patterns that we have used should not be seen as prescriptive, or as a complete list of what teachers should do in the classroom. Rather, we see them as *starting points* (arguably, "good" starting points, since they were extracted from successful practice) which can be easily called forth, combined, tweaked and, generally, used for inspiration when designing and preparing for the enactment of a learning design, especially if it involves orchestration (multiple activities, multiple groups, multiple tools and, especially, ICT tools). Moreover, they also serve a common aim of learning design: to make practice visible and explicit, thus allowing practitioners to communicate, share and reflect upon them (with potential benefits for professional development, as we see next).

Using the approach in practice: current and future work in teacher workshops
This pattern-based approach has been tried out in primary schools, in the form of professional development workshops with in-service teachers. In these 2-hour workshops, teachers designed collaborative learning activities that utilized the technology available in their classrooms. They also used the proposed design and enactment patterns to enrich their lesson ideas. Finally, a classroom enactment of the designs was role-played, with teachers taking part in the simulation of unexpected classroom situations, and using the enactment patterns to reflect and react on those situations.

Also, a similar approach is being taken in a 10-hour blended teacher workshop with 21 university teachers, where advanced collaborative learning activities are being designed by teachers, using the aforementioned CLFPs as the starting point for the collaborative activity structure, and completing it

with the other kinds of design and enactment patterns elicited from higher education teacher practice. In the ASLD11 workshop, we will provide, not only an extended vision of the approach presented in this paper, but we will also provide more evidence of its practical application in this teacher workshop that is currently taking place.

In summary, in this short statement we have provided an outline for a pattern-based approach to learning design, which could be seen as a particularization of the pattern lifecycle for learning design proposed in Retalis et al. (2006). The main novel characteristics of the approach presented here is the consideration of enactment aspects (or, in a wider sense, *orchestration* aspects), and its consequent potential for application in *professional development* actions such as the aforementioned workshops. As evidence accumulates through this kind of actions, we hope to delve deeper into understanding the role of different kinds of patterns as "mediating artifacts" in the process of learning design and teacher orchestration in the classroom.

References

Alexander, C., Ishikawa, S. & Silverstein, M. (1977). *A Pattern Language: Towns, Buildings, Construction*. Oxford University Press, Vol. 2

Conole, G., McAndrew, P., & Dimitriadis, Y. (2011). *The role of CSCL pedagogical patterns as mediating artefacts for repurposing Open Educational Resources*. In Pozzi, F. and Persico, D. (ed.), Techniques for Fostering Collaboration in Online Learning Communities: Theoretical and Practical Perspectives. IGI Global Publishing

DeBarger, A.H., Penuel, W., Harris, C.J. & Schank, P. (2011). *Teaching routines to enhance collaboration using classroom network technology*. In Pozzi, F. & Persico, D. (ed.), Techniques for Fostering Collaboration in Online Learning Communities: Theoretical and Practical Perspectives. IGI Global Publishing

Dillenbourg, P., Järvelä, S. & Fischer, F. (2009). *The Evolution of Research in Computer-Supported Collaborative Learning: from design to orchestration*. In Balacheff, N., Ludvigsen, S., de Jong, T., Lazonder, A. & Barnes, S. (ed.) Technology-Enhanced Learning: Principles and Products. Springer, pp. 3-19

Hernández-Leo, D., Villasclaras-Fernández, E.D., Asensio-Pérez, J.I. & Dimitriadis, Y. (2009). *Generating CSCL scripts: From a conceptual model of pattern languages to the design of real scripts*. In Goodyear, P. & Retalis, S. (ed.), Technology-Enhanced Learning: Design Patterns and Pattern Languages. Sense Publishers, pp. 49-64

Prieto, L.P., Villagrá-Sobrino, S., Jorrín-Abellán, I.M., Martínez-Monés, A. & Dimitriadis, Y. (2011a). *Recurrent routines: analyzing and supporting orchestration in technology-enhanced primary classrooms*. Computers & Education, Vol. 57(1), pp. 1214-1227

Prieto, L.P., Villagrá-Sobrino, S., Dimitriadis, Y., Schank, P., Penuel, W. & Haydel DeBarger, A. (2011b). *Mind the Gaps: Using patterns to change everyday classroom practice towards contingent CSCL teaching*. Proceedings of the 9th International Conference of Computer-Supported Collaborative Learning (CSCL2011), Vol. 1, pp. 518-525

Prieto, L.P., Dimitriadis, Y., Villagrá-Sobrino, S., Jorrín-Abellán, I.M. & Martínez-Monés, A. (2011c). *Orchestrating CSCL in primary classrooms: One vision of orchestration and the role of routines*. Paper presented at the workshop "How to integrate CSCL in classroom life: Orchestration", 9th International Conference on Computer-Supported Collaborative Learning(CSCL 2011). Available at http://www.gsic.uva.es/~lprisan/CSCL2011_WSOrchestration_Prieto_submission.pdf

Retalis, S., Georgiakakis, P. & Dimitriadis, Y. (2006). *Eliciting design patterns in e-learning systems*. Computer Science Education, 16, pp. 105-118