Making learning designs happen in distributed learning environments with GLUE!-PS

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Abstract. There exist few virtual learning environments (VLEs) which allow teachers to make learning design decisions explicit and reusable in other environments. Sadly, those few VLEs that do so, are not available to most teachers, due to institutional decisions and other contextual constraints. This panorama is even grimmer if a teacher wants to use not only the tools offered by the institutional VLE, but also other web 2.0 tools (in a broader, so-called "Distributed Learning Environment"). By using the GLUE!-PS architecture and data model, teachers are now able to design learning activities using a variety of learning design tools, and to deploy them automatically in several different distributed learning environments. The demonstrator will show two authentic learning designs with different pedagogical approaches, and how GLUE!-PS helps set up the ICT infrastructure for both of them into two different distributed learning environments (one based on Moodle, the other on wikis).

Keywords. learning design, deployment, virtual learning environments, web 2.0 tools, distributed learning environments

1 Introduction: Designing learning, and then... what?

The discipline of learning design (LD, [1]), and other sibling and ancestor fields (instructional design, etc) have now a long and established position in educational research. However, we still see relatively low penetration of such learning design practices in our schools and universities, especially where ICT tools are involved. The failure of educational standards (e.g. IMS-LD, [2]) to achieve widespread adoption is a much-discussed topic in the field of TEL, which exceeds the scope of this paper.

However, as discussed in [3], some researchers believe that a big part of this limited adoption of (technology-supported) learning design comes mainly from the fact that few solutions exist that allow a teacher to use any of the wide array of existing LD authoring tools, and translate those designs into the ICT infrastructure needed to enact the design ideas in the (physical or virtual) classroom. Those few solutions that exist, are either not usable by teachers without a technological background, or simply are not widespread in educational institutions, and thus are not a viable option for a great majority of teachers who “work with what they got”. The problem is even worse in the (increasingly common) case of teachers wanting to go beyond the walls of the

VLE-included tools, and use external web 2.0 tools for their learning designs. In this case, the effort and time needed to set up and orchestrate most non-trivial learning designs in such a distributed learning environment is out of the reach of all but a few teachers. This is what we call the **"deployment gap"**.

This paper presents a demonstrator for GLUE!-PS, a service-oriented architecture and data model designed to bridge this deployment gap. The GLUE!-PS proposal is described in the next section, which is followed by two examples of GLUE!-PS usage that follow the learning design from the original teachers' ideas to their implementation in distributed learning environments (DLEs) that integrate mainstream VLEs (such as Moodle[1]) and external web 2.0 tools (such as wikis or shared web apps). The paper closes with remarks about this proposal's relevance and applicability.

2 GLUE!-PS: An architecture to deploy learning designs in distributed learning environments

The aforementioned "deployment gap" problem is common to many authentic TEL environments, where ad-hoc enactment solutions exist (e.g. for CSCL activities) on one side, while most institutions adopt general-purpose learning environments like Moodle or Blackboard[2]. However, this problem is even more insidious in the increasingly common case of "distributed learning environments" [4], where a central VLE or personal learning environment (PLE) is used along other learning tools, especially web 2.0 tools like wikis, blogs, shared apps or social media.

In this demonstration we present the Group Learning Unified Environment - Pedagogical Scripting (GLUE!-PS), a service-oriented architecture that aims at allowing a non-technology-expert teacher to deploy learning designs, **authored with a variety of learning design tools and languages**, into **distributed learning environments** comprising one of multiple virtual learning environments (VLEs), plus multiple other external learning tools (such as web 2.0 tools). It is important to note that this last part (the integrated use of external learning tools) is provided through the usage of the GLUE! architecture [5].

As described in [3], the GLUE!-PS architecture is based on adapters (see Fig. 1), which translate the original learning designs to a common data model, which is then translated to the models and concepts of the different target VLEs (also creating and linking the needed external resources, such as web 2.0 tools). This central data model (also described in [3]) was developed to include the most common traits of existing learning design languages, that are *deployable* into current mainstream VLEs. Although these two translations forcefully introduce a certain loss of information from the original designs, analytical evaluations and experiments with teachers show initial evidence that the final result represents the original designs well enough to be used in real situations [6].

[1] http://moodle.org (Last visit: 30/03/12)
[2] http://www.blackboard.com (Last visit: 30/03/12)

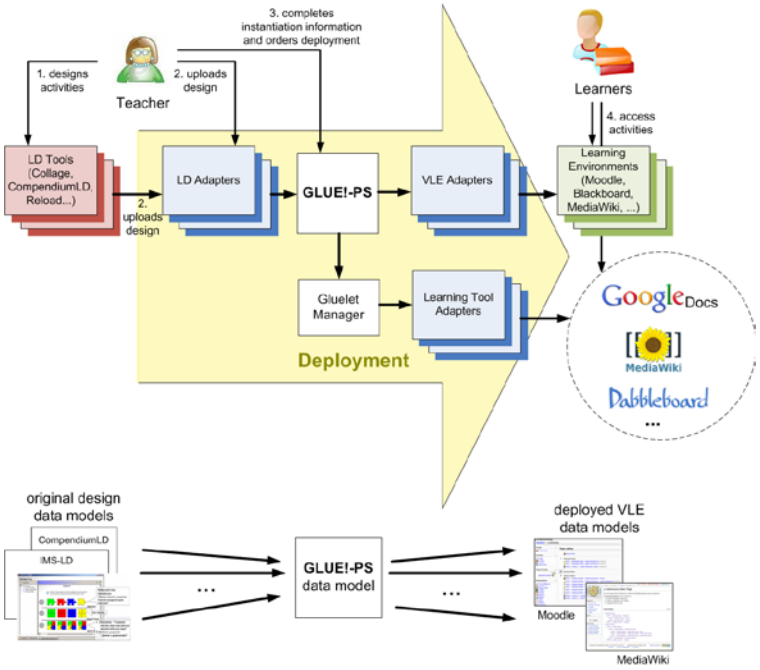

Fig. 1. Simplified GLUE!-PS architecture and data model (adapted from [3])

3 The demonstrator

In the "Prototype-SLAM" session, a **fully functional prototype** of the GLUE!-PS architecture reference implementation will be shown. In order to demonstrate how the whole design lifecycle can be followed from learning design idea to an enactment-ready ICT-supported course in a distributed learning environment, we will use two real examples of learning designs and their deployment. These learning designs have been taken from real educational experiences in higher education, which are being enacted during this academic year. The designs and deployments were made by two different teachers with very different approaches and needs, as they went from their learning design ideas to the ICT infrastructure that embodied those ideas in two very different distributed learning environments comprising a VLE (Moodle vs. a MediaWiki[3]-based wiki) and external web 2.0 tools (GoogleDocs[4], Dabbleboard[5]).

In our first example, a university teacher has an idea of proposing a complex collaborative learning experience, following the **Jigsaw pattern**[6] (a very common col-

[3] http://www.mediawiki.org (Last visit: 30/03/12)
[4] https://docs.google.com (Last visit: 30/03/12)
[5] http://www.dabbleboard.com (Last visit: 30/03/12)
[6] A jigsaw implies the subdivision of a problem into parts, which are first studied separately by "experts". Later, a global solution is proposed by "jigsaw groups" that comprise experts in every sub-problem.

laborative pattern) in a master-level course about pedagogical approaches in secondary education. In this experience a blended learning approach (combining face-to-face and distance activities) will be used. The main technological feature of this experience is that the course is structured around a **wiki** as the central VLE, where students can find all the needed resources for the experience. The experience will span several weeks, and she also wants to use non-wiki ICT resources such as shared whiteboards (Dabbleboard, in this case), shared office tools (GoogleDocs) and individual and group questionnaires (GoogleDocs), all of them integrated into the wiki for student convenience.

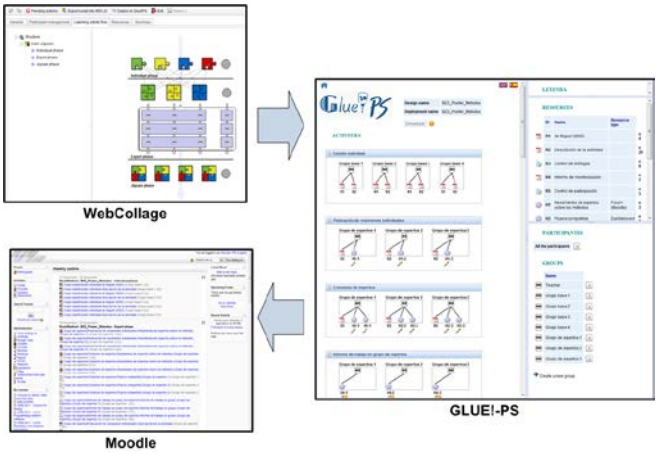

Fig. 2. Screenshots of the different applications involved in one example from learning design to implementation: WebCollage (top-left), GLUE!-PS (right), Moodle (bottom-left).

In order to make a computer-interpretable learning design with this idea, and given the pattern-based nature of the collaborative activities, the teacher chooses **WebCollage**[7] [7] as her LD authoring tool. WebCollage allows non-expert teachers to design collaborative learning activities based on collaborative learning flow patterns (such as Jigsaw, Pyramid, etc). Moreover, unlike many other LD tools, WebCollage also allows teachers to particularize their learning designs for a concrete classroom, setting the number and composition of groups on each phase. Fig. 2 shows a screenshot of the WebCollage LD tool where we can see the three activities that conform the "experts phase" of the design.

In the case teacher would like to use a different VLE (Moodle) to enact this very same learning design (e.g. because her institution enforces the usage of an institutional environment, or because she has shared her design with another fellow teacher who prefers to use Moodle), WebCollage and GLUE!-PS would allow her to do the particularization and deployment to this new target VLE, as long as GLUE!-PS has an LE adapter for it. Fig. 2 shows a real deployment of the same design into a Moodle-centric distributed learning environment.

[7] http://gsic.uva.es/wic2 (Last visit: 30/03/12)

As a short follow-up to this full-cycle demonstration, we will show briefly how a different (but equally authentic) blended learning experience was designed (in a few minutes minutes) by a teacher in a hurry, who wanted to deploy a blended learning activity based around a role playing situation. Since she found that the WebCollage tool did not suit her needs (her conception of the role-playing clashed with WebCollage's), she chose to use a different, simple learning design tool, the **Pedagogical Pattern Collector** (PPC, developed by the London Knowledge Lab, see [8]) and GLUE!-PS to create a Moodle course (she uses Moodle for the whole course). In this case, due to the lack of particularization information in PPC, the teacher used the GLUE!-PS graphical interface to set up the participants, groups and web tools for the lesson, and finally deployed it to her **Moodle** course. This very same design could have been deployed, e.g. to MediaWiki as the first design was, if the teacher had used such a VLE to centralize her course. These two mini-cases show how it is *the teacher* who chooses the best technological solution (combination of LD tool and VLE) to suit her needs and contextual constraints, and not the other way around.

All in all, this demonstration will show the ability of the GLUE!-PS to cover **four different conversions** from learning design to enactable course in a distributed learning environment (two learning design tools, by two virtual learning environments). The fact that those distributed learning environments include not just mainstream VLE tools (e.g. Moodle), but also external web 2.0 tools like GoogleDocs or Dabbleboard (thanks to the GLUE! architecture), only highlights further the myriad of possible learning situations for which GLUE!-PS is a relevant orchestration help. It is also important to note that, due to the adaptor-based architecture of GLUE!-PS, and the relative simplicity of its data model, such variety of combinations has been attained at a comparably low cost in development efforts. Moreover, the approach is fully extensible to adapt also other LD tools and VLEs that may emerge in the future.

4 Conclusions

The current GLUE!-PS prototype has already undergone several iterations of design and usability testing with teachers. Moreover, this prototype, along with the WebCollage authoring tool, has already been tested in the deployment of 37 learning designs made by non-technology expert teachers (see [6] for more details). Also, it has been used to deploy and enact collaborative learning designs in several authentic situations (mostly collaborative blended learning experiences in higher education): two professional development workshops about learning to design collaborative activities, and two master-level courses where complex collaborative flows with VLEs and external web tools were needed. More experiences, using different learning design tools and VLEs are also being conducted in the upcoming weeks.

Even at this early stage of development, GLUE!-PS has shown the potential for this kind of system to unload part of the (considerable) orchestration burden that enacting blended collaborative learning in a distributed learning environment can impose on the shoulders of teachers. We believe that the opening of GLUE!-PS (and the code of its reference implementation) to the public will help a wide array of teachers

and institutions in overcoming one of the main current barriers for widespread adoption of learning design in TEL: the deployment gap. This opening will also enable multiple implementations of the GLUE!-PS adaptors for different learning design approaches, institutional VLEs and sets of learning tools. Such adaptors ecosystem may allow teachers to choose the learning design approach that best fits their needs, and then convert those ideas into ICTs ready to be used in her authentic setting.

Acknowledgements. The authors would like to thank Beatriz and Alejandra, the teachers who kindly provided the example learning designs and authentic contexts. This work has been partially funded by the Spanish Ministry of Economy and Competitiveness (TIN2008-0323, TIN2011-28308-C03-02 and IPT-430000-2010-054) and the Autonomous Government of Castilla y Leon, Spain (VA293A11-2 and VA301B11-2).

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