THIRDSPACE : ORCHESTRATING COLLABORATIVE ACTIVITIES IN PLES FOR FORMAL LEARNING

Yvan Peter
Université Lille 1 - LIFL
Bât M3 – Cité Scientifique – 59655 Villeneuve d'Ascq, France
Yvan.Peter@univ-lille1.fr

Eloy D. Villasclaras-Fernández
The Open University - Institute of Educational Technology
Walton Hall - Milton Keynes - MK7 6AA, UK
eloy.villasclaras-fernandez@open.ac.uk

Yannis Dimitriadis
Universidad de Valladolid, GSIC/EMIC
School of Telecommunications Engineering - Paseo de Belén, 15
47011, Valladolid, Spain
yannis@tel.uva.es

ABSTRACT

This article presents *ThirdSpace*, a platform aiming at the integration of the learner centric and personalised Personal Learning Environments (PLE) with the more structured organisation of formal (institutional) learning. Towards this end, collaborative learning best practices are proposed to teachers through the WebCollage authoring tool. The resulting collaborative scripts are modelled using workflow technology and orchestrated automatically by a workflow engine. The *ThirdSpace* platform then allows the publication and monitoring of the learning activities in learners' PLEs. Thus, *ThirdSpace* enables the students to participate in the activities through their own self-configured PLEs, using the tools of their choice to engage both in individual and collaborative activities.

KEYWORDS

Personal learning Environment, Computer Supported Collaborative Learning, Collaborative Learning Flow Patterns, Learning scenario

1. INTRODUCTION

In this article we propose a platform aiming at the integration of the learner centric and personalised Personal Learning Environments (PLE) with the more structured organisation of formal (institutional) learning.

PLEs are built on Web 2.0 services and social software and are inherently user-centred. PLE services are selected, aggregated and managed by the learner, so that the most convenient tools for each person can be used to manage information and relationships on a learning topic. The concept has emerged from the pervasiveness of personal technologies and as a criticism of institutional control represented by closed Learning Management Systems (Wilson & Liber, 2007). PLEs thus represent a shift in terms of control of both the learning environment and the learning objectives (Fiedler & Väljataga, 2010). However, while the learners tend to use their everyday tools as learning support, effectively shaping their learning goals, activities and environment remains difficult and needs support (Dabbagh & Kitsantas, 2012). For this reason, Henri & Charlier, 2010 advocate that technical support for tool selection and aggregation should be complemented by pedagogical support to achieve the conceptual design and evolution of the PLE.

Web 2.0 technologies which form the basis for PLEs are deemed for their support for constructivist pedagogy by facilitating information production and management at an individual or collective level (McLoughlin & Lee, 2010). The social aspect of Web 2.0 also favours collaborative approaches (Downes, 2010).

On the other hand, in a formal learning context, the teacher and overall organisation are responsible for the definition of the learning path, resources and environment. Collaborative Learning is one way to organise the learning activities so as to enable interactions that support knowledge construction. Computer Supported Collaborative Learning proposes collaborative scripts as a way to create the conditions for learning interactions to happen or to structure these interactions into specific activities (Kobbe et al., 2007). Collaboration design patterns are one approach for script creation specially suited for teachers that may not have extensive expertise in the field of CSCL. Design patterns facilitate the design of these scripts by providing and documenting best practices to support designers (Hernández-Leo et al., 2006).

Our belief is that we must preserve the structured approach of formal learning to have the desired learning outcomes while giving more freedom to learners (McLoughlin & Lee, 2010)(Dabbagh & Kitsantas, 2012). Among the emergent research themes identified during PLE Conference 2012 unkeynotes (Conole, 2012) we are most concerned by the following :

- "The need for structured, guided learning pathways"
- "The balance between loose institutionally controlled systems vs. portable, learner-controlled tools"

We address these issues from the perspective of the learning activities rather than the learning services or resources. Our platform provides support for (a) the design of pedagogically sound collaborative activities by teachers at an institutional level, and (b) the orchestration (i.e. automatic flow control) of the learning activities while learners may still use their own PLE. We believe that, in addition to facilitating the teacher's tasks of orchestration and monitoring of the learners, this will improve learning and motivation of these learners by (i) relying on their chosen tools and personalised environment which they already use for everyday activities (ii) engaging them in collaborative activities which are well supported by web 2.0 and social software.

In the following section, we will present existing approaches toward the integration of institutional/formal learning and personal learning environments. Next, we will show the overall approach we follow, explain the technical architecture and present an illustrating example before conclusion.

2. INSTITUTIONAL LEARNING AND PLES

Some works already seek to combine the benefits from Web 2.0 and social services with a formal setting. Several LMS now integrate Web 2.0 services such as blogs or wikis. Still, this approach does not respond to the critics about LMS being closed and institutionally oriented systems that do not allow learners to personalise and adapt their learning environment and usually restrict the access to the resources to the duration of the course (Dalsgaard, 2006; Mott & Wiley, 2009).

Other works rather provide the ground for the integration of LMS and PLE services in a common environment. This environment can be as simple as a Web start page like iGoogle or Netvibes. These start pages support the integration of Widgets that are embeddable applications providing a user interface to a remote service. This has been done for instance by Casquero et al., 2008 using iGoogle and Widgets based integration of institutional services. Others seek to provide a specific integration environment like Taraghi et al., 2010 based on JavaFX to provide a more uniform user interaction. Marín et al., 2012 also rely on a specific Widget aggregator, SymbalooEDU for the integration of institutional and personal services. SAPO Campus is also an institutional platform that provides services commonly found in PLEs but it seeks to enhance sharing capabilities so as to enable the emergence of learning communities in a safe/institutional context. Enhanced "*collaboration, participation, openness and sharing*" are a mean to improve the engagement and motivation of the learners (Pedro et al., 2012). This platform supports openness and sharing

including towards people external to the institution. In most of these work the content of the PLE is defined by the institution but the technologies enable the integration of other Widgets thus enabling personalisation and appropriation by the learners.

If we consider the management of learning activities in a PLE, we can mention González-Tato et al., 2012 which also provide a set of Widgets to build an open e-learning platform based on iGoogle. These Widgets are dedicated to the management of learning activities from the author, tutor and learner perspectives. Mödritscher & Wild, 2009 propose an activity oriented mashup based on the *Learner Interaction Scripting Language* (LISL). LISL relies on {activity – outcome – tool} triplets to define a mashup of Widgets to provide a specific and adapted learning environment. Like our use of design patterns, the authors envision that good designs of mashups can be shared based on their language. Again, the definition of the learning environment is driven by the institution/teacher. The activities are supported through a kind of dashboard rather than a plain orchestration.

3. FROM DESIGN TO ORCHESTRATION WITHIN LEARNERS' PLES

Pedagogical scenarios place the focus of attention on the learning activities rather than the resources. They consider the flow of activities, the actors involved as well as the environment in/with which these activities will be done (resources and tools). IMS Learning Design is the prominent standard to describe pedagogical scenarios. It provides a formal representation of the scenarios based on XML that fosters interoperability, enables the sharing of scenario designs and provides the basis for an automatic orchestration of the activities.

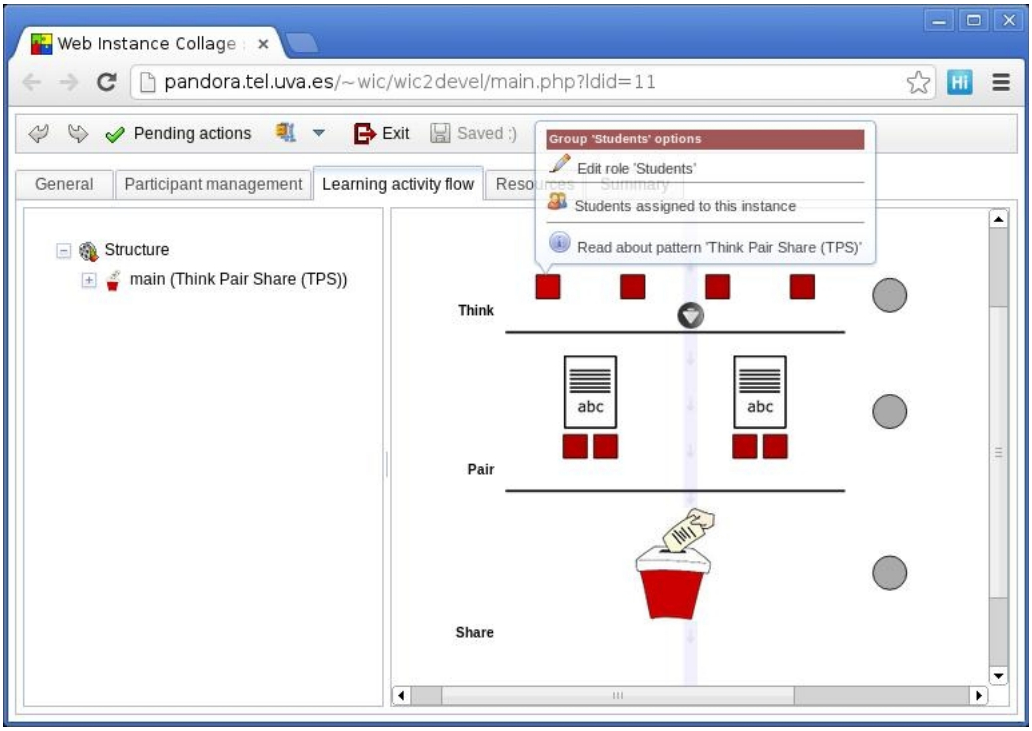

Figure 1: Think Pair Share pattern in WebCollage.

Collaborative learning scripts are a kind of pedagogical scenarios where the focus is to foster collaborative learning by a careful design of the activities and/or distribution of roles (Kobbe et al., 2007). We propose to use Collaborative Learning Flow Patterns (CLFP) to help teachers design collaborative activities. CLFPs capture best practices in terms of collaborative learning activities (Hernández-Leo et al.,

2006). Teachers can assemble and adapt known patterns such as *Jigsaw* or *Think Pair Share* using the WebCollage authoring tool (figure 2) which has been evaluated in real-life settings (Hernández-Leo et al., 2010). However, these scripts have been deployed in institutional settings (LMS) leaving no choice of environment to the learners.

Since the pedagogical scenario defines the flow of activity as well as the actors, it is possible to provide a computer supported orchestration that will propose the next available activities to the learners/tutors. Few learning environments embed an IMS LD engine to orchestrate the activities : GRAIL is tightly integrated in the .LRN LMS (de-le-Fuente-Valentin et al., 2007); LAMS (Daziel, 2003) which is an alternative to IMS LD can run standalone but as also been integrated into Moodle. Finally, CopperCore/SLED (McAndrew et al., 2005) is a standalone engine which provides integration APIs but also a standalone support environment that cannot be considered as a full fledge LMS. We have already used workflow technology for the modelling and to provide an orchestration engine of pedagogical scenarios (Peter et al., 2008). In general these environments provide the available activities through a dashboard that also enables to mark the activities as completed. They are integrated in a LMS or provide a limited support environment.

PLEs are appealing because they leverage learners' own tools and social networks providing an open learning environment. We would like to rely on this feature in a formal setting by providing collaborative activities based on CLFPs' best practices in learners' PLEs. The orchestration of these activities (i.e. automatic advancement from one activity to another) in such open environment will lower tutoring needs and provide the following pedagogical advantages:

- Collaborative activities can benefit from the affordance of Web 2.0 and social networks enhancing collective knowledge construction (McLoughlin & Lee, 2007).
- Providing learning activities to the learners directly in their personal services, is a way to scaffold their learning in an open environment and to sustain their motivation (De-la-Fuente-Valentín & Delgado Kloos, 2013).

ThirdSpace combines orchestration of collaboration scripts with self-configured PLEs which implies a distribution of responsibilities. On the one hand, teachers and educational institutions are responsible for creating suitable pedagogical scripts and for managing their deployment on the platform. On the other hand, students are responsible for selecting suitable tools of their choice to accomplish the activities of each course

Based on our previous experience, we use workflow technology for the modelling and orchestration of pedagogical scenarios (Peter et al., 2008). We have modeled the CLFPs good practices as workflow processes using Business Process Model and Notation. These processes can then be orchestrated by a workflow engine to manage learners' activities.

The *ThirdSpace* platform relies on the REST architecture of the Web 2.0 for the integration of personal services with the workflow engine (Figure 3) so as to publish and monitor activities in PLEs.

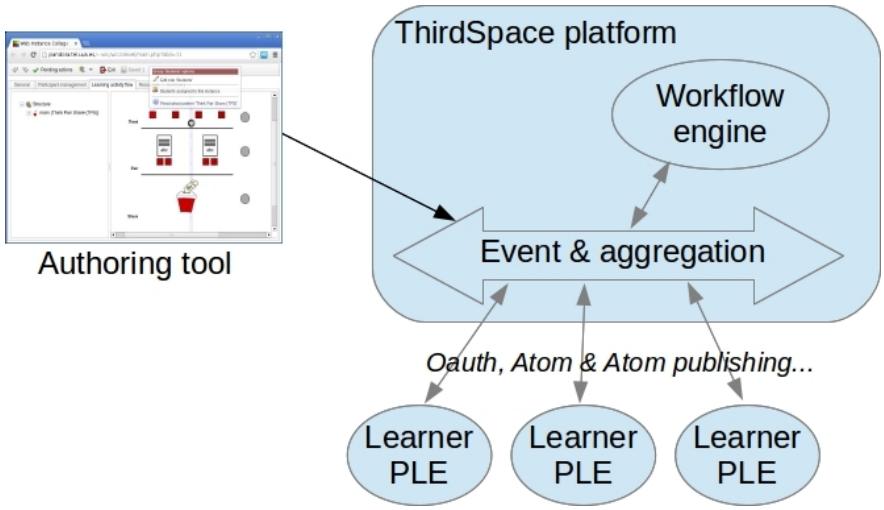

Figure 2: ThirdSpace architecture.

4. USE CASE

We will use the *Think Pair Share* (TPS) pattern as a use case. This pattern organises the activity into three phases to have learners produce a shared view/artefact on a topic or problem. The three phases are :

- *Think* is an individual phase where each learner has to reflect and elaborate on an topic or problem.
- The *Pair* phase let learners confront their production. This confrontation should help learners build a more thorough understanding of the topic/problem and provide a better solution.
- Finally, the *Share* phase gathers all learners to build a consensus based on previous discussions and productions.

This pattern defines the activities as well as the grouping of the learners during each phase. It could be used in classroom, within the LMS or as proposed in this paper within the learners' PLEs. In the latter case, instead of providing a collaboration tool, the learners are allowed to select their own. A typical example is the usage of blogs : a learner may select to use her blog as the tool to complete the activities. Using this tool means that the platform must publish the activities on the learners' blogs and let them perform those activities as blog posts or comments.

Considering the teacher's point of view, she will have to select the *TPS* pattern in Web Collage and customize it to the intended topic and to select the learners and pairing. The deployment of the learning script in *ThirdSpace* involves exporting the design from Web Collage (activity flow, learners), thus triggering the instantiation of a new process in the workflow engine. From the learners' point of view, they will have to provide information about their personal services and grant access to *ThirdSpace* so that it can publish information. Then, they will see activities published on their PLE services.

Figures 3 to 5 illustrate the operation of *ThirdSpace* on the first activity (*Think*) of the *TPS* pattern deployed by a teacher in *ThirdSpace*. The instantiation of the process will make the first activity available for the learners associated to that instance. *ThirdSpace* polls the workflow engine regularly on behalf of the learners. When an activity is available, its description is retrieved and published on the learner's blog (figure 3).

Figure 3: Publication of the activity on the learner's blog.

The user can then perform the activity by providing a response to the initial question through a comment (figure 4). At this stage and with this particular activity, we consider that the activity is done by writing a single comment to the post. We rely on the fact that the blog provides atom feed for posts but also for comments. By polling the learner's blog comment feed, *ThirdSpace* is then able to monitor the completion of the activity. In more complex situations where the monitoring of the learners' tools is not enough to detect the completion of the activity we must provide user based declaration either from a tutor or learner to generate the activity completion event.

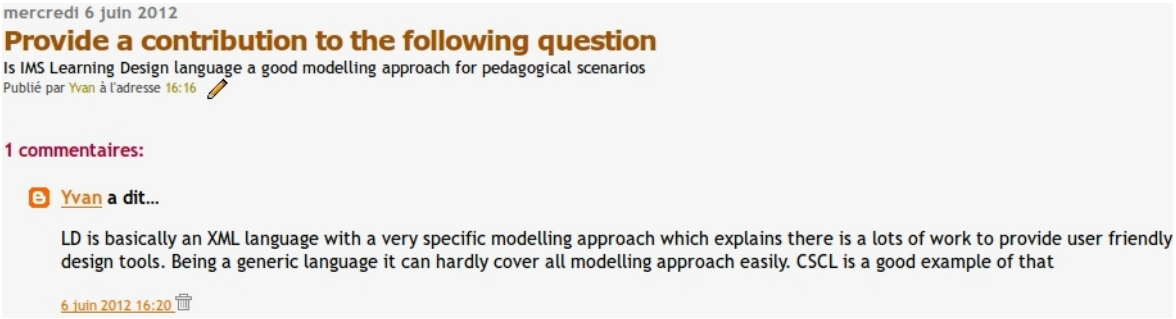

Figure 4: Activity done as a comment to the published activity.

Upon completion of the activity, *ThirdSpace* will complete the activity in the workflow engine and post a message on Twitter to support awareness (figure 5).

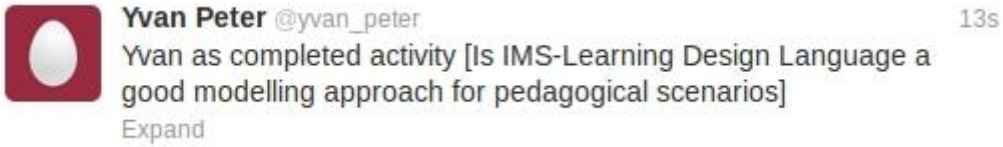

Figure 5: Activity completion posted on Twitter.

When the *Think* activity has been done by all learners, the first phase of the pattern will be done and the workflow engine will make the *Pair* activity available.

5. CONCLUSIONS

Our work seeks to enable the structured approach of formal learning in the scope of learners' PLEs. Towards this end, collaborative learning best practices are proposed to teachers through the WebCollage authoring tool. The resulting scripts are modelled and orchestrated automatically by a workflow engine. The *ThirdSpace* platform then allows the publication and monitoring of the learning activities in learners' PLEs.

Our work does not address the elaboration of the PLE itself. On the institutional side, we provide sound pedagogical design while helping to cope with the tutoring work with the automatic orchestration of activities and awareness features. On the learner side, one can use personal learning services and social networks. Learning activities become available in the chosen services and learners may be aware of other learners progress through social network notification like in the Twitter notification presented in the use case. This provide an awareness of activities. Taking part in collaborative activities proposed in the PLE and being aware of others actions can help learners being conscious of the learning path thus providing a kind of scaffolding for the learning activities Also proposing activities provide learning objectives that may help sustain learners' motivation (de-la-Fuente-Valentin et al., 2013).

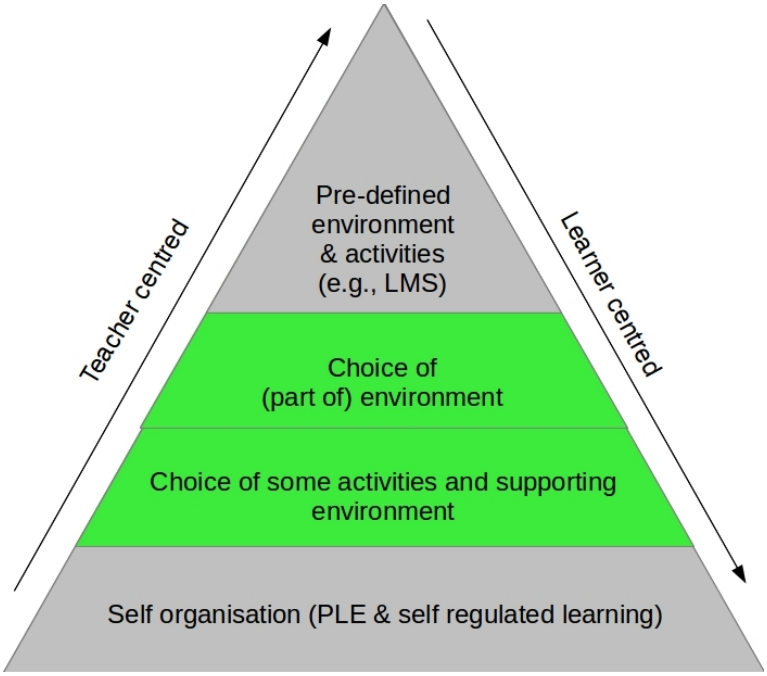

Figure 6: Teacher vs. learner centred.

Integrating formal learning and Personal Learning Environments requires to find the right balance between the necessary structuring of the learning environment (either in terms of resources, services or activities) and a user-centred environment which also encompasses personal activities, relationships and informal learning goals. This balance falls into the middle part of figure 6 where lies our work and most of the works presented in section 2. They seek to provide an integration environment that lays the ground for extension and personalisation with more personal services and networks.

However, as mentioned among others by Chatterjee & Mirza, 2012 or Dabbagh & Kitsantas, 2012, learners may not have the digital skills necessary to effectively customize their learning environment to provide a useful learning support and experience. Hence, we will have to take that into account in our work. One direction may be to recommend tools, or provide default tools, that have good affordance for the tasks at hand to help learners organise their environment.

ACKNOWLEDGEMENT

This work is partially supported by the STIC-AmSud FUELS project.

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