Enhancing Self Regulated Learning Skills for Improved PLE Use
A Problem Based Learning Approach

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Abstract. Traditionally web-based learning management systems reflect a lack of sufficiently personalised support for learning. The new generation of personalized open learning environments can be seen as an attempt to fill this void. However, literature suggests that PLEs even though pedagogically desirable pose immense challenges for learners and they require support, guidance, and pedagogical interventions to make the best possible use of associated technologies to fulfil their learning goals. This paper examines how problem-based learning can be used to enhance self-regulatory skills among learners resulting in improved adoption of PLEs.

Keywords: problem based learning, self-regulated learning, personal learning environments

1   Introduction

Personal Learning Environments, an emergent breed of learning environments, enable learners to build their own learning environments to meet their personal aims and goals of learning [1] depending on their context. PLEs are built on externally hosted (in-the-cloud) Web 2.0 tools and services, designed to help learners aggregate and share resources, participate in collective knowledge generation, and manage their own meaning making [2], [3]. Attwell [1] suggests that PLEs can be perceived as individuals organizing their own learning in multiple contexts where informal learning can be used to supplement formal learning and added that PLEs play an important role in advancing the understanding of e-learning. Mott [4] emphasises learners' self-regulating role by defining PLEs as learner-created matrices of resources that they themselves select and organize. A self-regulated learning (SRL) process model is the learner-centric model based on Zimmerman's [5] self-regulated learning approach. According to Schunk [6], self-regulated learning can be defined as "learning that results from learners' self-generated thoughts and behaviors that are systematically oriented towards the attainment of their learning goals" (p. 125). The learners take personal initiative, apply powerful strategies to attain individually valued learning goals and monitor their understanding in order to detect and eliminate possible comprehension problems [7][5]. Fruhmann et al. [8] outlines a pyscho-pedagogical framework

based on SRL that could facilitate learning within a learner curated environments like PLEs.

A recent 'NMC Horizon report' [9] identifies personalized learning systems will probably be adopted in 4-5 years time mainly as they are still in their conceptual phase and there is a lack of robust documentation and relevant case-studies. One of the main problems is in the way current learning approaches are envisioned where the role of the academic (expert) is not well defined and the learner is expected to curate learning resources using a very broad self-regulated learning paradigm. Technologically this leaves the learners completely confused on how to sequence their learning using the available technologies. It has also been vigorously suggested that LMS/VLE are a thing of the past and PLEs are the present and future. The NMC report mentioned earlier disproves this view due to lack of evidence and we feel what is instead required is a transitional model where the role of the academics and pedagogical experts is well defined allowing learners to be supported in effectively utilising a range of Web 2.0 tools within their context.

2 Pedagogical Challenges for PLEs

One of the key assumptions behind the current pedagogical approaches is that learners are competent IT users and proficient at learning design. Even though it is largely known that learners may be familiar with the Internet and social software, it seems they do not necessarily know how to use these technologies for 'learning' [10]. Lehtinen [11] would have described the current pedagogic trends as 'romantic constructivism', the assumption that learners are skilled at using open learning environments and finding appropriate sources and information and the best methods for learning etc. He further argued that such pedagogies typically lead to learners impulsive wondering from one source to another, causing frustration and disengagement. The existing pedagogical approaches are also viewed as generic and some form of demarcation between formal, informal and non-formal learning context must be realized in order to make learning relevant to respective contexts. For example a learning environment designed solely around the premised of self-regulated learning environment might not be best suited for formal education. According to Henri et al. (2008), resources used in formal education to support metacognition, self-direction, and reflexivity should be reconceptualised and redesigned in PLE tools that may play a key role in competence acquisition of learners in the near future. Hence e-Learning solutions must second a real evolution where the main efforts should be devoted to support the whole learning process, not only specific parts of the process (i.e. content management, resource delivery, etc.)

It has been noted that the organization of learning contents through the identification of main ideas and interlinking of concepts [12] are seldom employed spontaneously. Metacognitive strategies such as monitoring of one's understanding to identify and overcome impasses are prone to be avoided by many learners [13]. It has also been stated that SRL processes require an initial and sustained level of motivation [14] to proceed. The authors are of the opinion that a combination of these three factors poses a major challenge towards the widespread adoption and utilisation of PLEs. Typically, learners are expected to assemble a set of tools to fulfil their learning goals. As stated earlier, learners are predominantly used to a top down didactic ap-

proach to learning where the instructor is responsible for assembling the learning resources and tools that will best meet the learning objectives of a course or module. The learners usually follow instructions based on a fairly rigid structure. The learners do have the option to engage with interactive content, to a limited degree, depending on the pedagogical approach selected by the instructor. Learners progressing through such a mind-set towards learning in their early stages of their education may not look favourably to the concept of PLEs. In a recent study the researchers [15] observe similar findings and recommend that (a) learners should be encouraged to develop skills and confidence in the selection, application, and use of social media tools for personalized learning and that (b) new pedagogical models and approaches are needed to enhance learners' abilities to organize and customize their own learning environments and advance their self-direction and self-awareness in a PLE. This, along with personal experience with current conceptualization of PLEs, prompted the authors to explore potential pedagogical approaches that could be applied or utilized to help the learners in the gradual transition from the VLE to the PLE era.

3   Problem Based Learning

Problem-based learning (PBL) emerged from a rich pool of enquiry in how people acquire and transfer knowledge. PBL has it roots within constructivism. PBL is also regarded as an approach to learning whereby the learner actively constructs knowledge in the learning process [16]. The educational significance of PBL is that it incorporates the goals for learners that are much wider than the acquisition and application of content [17]. The approach is expected to involve or influence the 'whole', or at least many aspects of, the learner's learning experience. It is the ontological and epistemological similarities between PBL and PLEs that prompted the authors to explore how aspects of PBL may be utlised to facilitate the uptake of PLEs. In PBL three phases were identified within a cyclic process. In the first phase, learners encountered problems, instead of facts and theories. Professional reasoning skills were developed and learning needs identified in a co-operative setting with a tutor. Prepositional knowledge is presupposed when dealing with problems [18]. However, PBL is not equated with being an expert in the subject, as subject-based learning views tend to do. Instead, importance is placed on what is needed and on the ability to gain prepositional knowledge as required. PBL requires integration of '*knowing that'* with '*knowing how'*. What is relevant matter is not prejudged. This author's feel is the key similarity between PBL and PLE. PLEs enable learners not only to develop their cognitive abilities but also have a strong emphasis on meta-cognitive elements (*learning how to learn*). In the second phase the learners undertake individual self-directed study. A variety of information resources (books, journals, reports, online information, and a variety of people with appropriate areas of expertise) are used in the search for such information. In this way learning is personalized to the needs and learning styles of the individual. Gijselaers [19] asserts that metacognition is an essential element of skilled learning. Goal setting (What am I going to do?), strategy selection (How am I doing it?) and goal evaluation (Did it work?) are included in this learning. Typically the tutor stimulates the group to reflect on problem-solving behavior by stimulating learners to ask the right questions instead of telling them the answers. In the third phase, the cycle is closed by a co-operative phase again where

newly gained knowledge is applied to the problem and summaries of what has been learned made. The next cycle starts with a new problem.

4   Utilising PBL to Enhance Self-Regulation in PLEs

Knuth and Cunningham [20] postulates that in the learning process learners tend to adopt the thinking that in the world there is a single 'correct' answer to any one problem. This thinking is due to some "authority figure decrees that we must." The principle of multiplicity underlines the importance of dialogue with other individuals through collaborative learning. An environment (such as PLEs) where an exchange of views is practiced can be done individually or in small groups, which PBL is very well placed to do. This practice concurs with the idea of constructivism that states that knowledge of concepts is best achieved through multiple and varied applications of the concept. Koschmann el. al. [21] in agreement with this concept pointed out that "aspects of richness in concepts and cases will be missed with single representations, and the resultant simplification may prove misleading." People have different views towards different problems and on how to solve them. PBL encourages an environment of open-minded, reflective, critical and active learning.   In this environment, due respect is paid to both learner and tutor as persons of knowledge, understanding, feelings and interests who come together in a shared educational process [18]. Similarly PLEs ensure that there is no 'single' way to learn and the means to learn can vary widely encouraging concepts of openness and personalization. Based on above-mentioned ontological and epistemological similarities between PBL and PLEs we propose a preliminary framework on how PBL can be used to enhance SRL skills enabling the transitioning learners from VLEs to PLEs. In the table below the Personal Learning Space (PLS) is refereed to as a "configurable space every user can access to create content, share content, and aggregate content from other sources" [22].

Table 1. Using PBL to enhance SRL in PLEs

Time / PBL-SRL	Stage 1 (Structured) (Years 1-2)	Stage-2 (Semi Structured) (Years 2-3)	Stage 3 (Unstructured) (Years 3+)
Contextual Problem Statement	The instructor provides the problem and demonstrates how it links to the learning outcome/s	The instructor states the learning outcome and sets a task to collaboratively identify a series of problems that will be used for learning	Learner identifies learning goals and problems
Learning Activities	Instructor decides on the pre-requisites and a set of activities required to tackle the problem	The instructor encourages learners to identify pre-requisites and prepare set of required activities in groups	Based on the problem statement learners decide on pre-requisites and resulting activities.
Environment Selection	Instructors selects the learning environment and creates learning space for each activi-	Instructors present alternative options and collaboratively decide on a learning environment.	Learner selects learning environment and creates spaces for them-

	ty	Learners create activity based learning spaces as groups	selves
Resource and Tool selection	Instructor pre-selects resources and tools but demonstrate how learners can alter them if they want. Must include e-portfolio type tool.	Instructor pre-selects some tools and re-sources clearly stating that learners need to find the rest	Learners select tools and resources
Collaboration and sharing	Instructor actively leads collaboration by forming groups and posing probing questions. Provide pre-populated social bookmarking, web 2.0 content etc. Encourage use of like/rating buttons.	Instructor actively facilitates collaboration by encouraging shared group spaces. Encourage to comment on bookmarks, web 2.0 content, upload/share and peer reviews.	Instructors invited to learning spaces for participation. Learners create bookmarks, web 2.0 content and actively engage without any extrinsic motivation.
Motivation	Extrinsic motivators with impact on performance outcomes (part of assignments etc).	Extrinsic motivation with some impact on performance but largely tokenistic in nature.	No extrinsic motivator.

Table 1 describes an early transformative framework of PLE diffusion among higher education learners during and after their course. The framework is based on the premises of problem based learning wherein the learners are expected to learn by solving problems contextual to what they will be expected to do as part of their day-to-day job once they finish their course. In order to support the learners to make this transition, the amount of personalization a learner needs to engage with is the least at the very beginning of their course. Gradually over a period of time the learner is expected to take more and more control of their learning based on their personal preferences. The various phases of SRL are subsumed within each of the instructor-learner activities outlined above involving planning, environment orientation, feedback and reflection. The framework can be flexibly used within any learning context.

5 Conclusion

This paper attempts to propose an early framework on how PBL can be used to enhance SRL skills, which in turn could have an impact on wider PLE adoption within learner cohorts. It is worth mentioning here that the authors are using some concepts from PBL the principles of which are hugely overlapping with PLEs and SRL. Specially, it has been noted [23] that problem-based learning has a positive effect on skills and students taught using problem-based learning had less knowledge but had better recall of the knowledge they had. Researchers [24] have also found positive effects on application and principles. They concluded "PBL had the most positive effects when the focal constructs being assessed were at the level of understanding the principles

that link concepts, the second level of the knowledge structure" (... p. 45). The application of knowledge, not development of knowledge, is the heart of the success of problem-based learning [25]. It is evident from the literature that PLEs even though pedagogically desirable pose immense challenges [12–14] for learners and they require support, guidance, and pedagogical interventions [26] to make the best possible use of associated technologies to fulfill their learning goals.

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