

Identifying Requirements for a Psycho-Pedagogical Mash-up Design for Personalising the Learning Environment

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Abstract. This paper examines educational components that influence the creation of mash-up designs in a Personalised Learning Environment (PLE). These educational components are linking widgets, small tools, to psycho-pedagogical information and competences of a learner. Taking these into account principles and rules for an adequate PLE mash-up can be identified and empirically studied. Finally an approach is introduced to validate these assumptions.

Keywords: mash-up design, self-regulated learning, personal learning environments.

1 Introduction

In the context of e-learning Personalised Learning Environments (PLEs) attract more and more users. PLEs are environments that combine services and tools, and therefore, provide access to different learning resources on the web. By means of this functionality, a learner is enabled to control, manage and compose her own learning environment, which could be maintained across institutions (e.g. from school through university and to a workplace).

However, it seems to be unclear what psycho-pedagogical rules should be applied to mash up a PLE. Therefore, the main purpose of this paper is to identify important educational components that have an influence on composing a PLE during a self-regulated learning (SRL) process. These educational components will be the basis for adequate recommendations for mashing up a PLE. The usefulness of the educational components will be empirically studied. For this reason a validation approach is introduced.

2 Educational components

In the EC-funded project ROLE (Responsive Open Learning Environment) the SRL behaviour of a learner within a PLE is based on a SRL process model. The model consists of four phases (see section 2.1). An important building block for mashing-up a PLE and modelling SRL is the categorisation of learning strategy strategies. In order to apply learning strategies, learning techniques are used. Learning techniques can be applied by using widgets or tools. In this way tools can be related to learning strategies. Further building blocks are competences, such as tool competences, SRL competences.

For compiling the widgets rules and principles need to be taken into account. First, the mash-up is defined and explained on the level of learning strategies. Meaningful designs can be derived through the assignment of learning tools to learning techniques and strategies. Secondly, the tool and SRL competences of learners are considered, e.g. if learners are able to use the mash-up. Though the relation of these competences to learners, the mash-up can be related to learners and his/her PLE profile (this is part of the SRL process model).

2.1 The self-regulated learning process model

The SRL process model in ROLE generally builds upon the cyclic SRL model introduced by [9], also see [3]. [9] proposed three SRL phases: the forethought phase, the performance phase and the self-reflection phase. In ROLE it was assumed that the learner will implicitly or explicitly perform four phases based on four predominant activity groups. These phases are: (1) learner profile information is defined or revised, (2) learner finds and selects learning resources, (3) learner works on selected resources, and (4) learner reflects and reacts on learning strategies, achievements and usefulness [3].

Within this SRL process the learners perform key activities, such as goal setting, self-monitoring, self-evaluation, help seeking, time planning and management. These key activities are of metacognitive nature and enable the learners to take control over their own learning processes and influence the actual learning and working phase (3). The ROLE SRL process model features the possibility to repeat the complete learning cycle for every learning task and recursiveness, which can be understood as possible iteration of every activity or set of activities within the learning cycle. In general, the SRL process model can be seen as repository of learning strategies and techniques to carry out learning activities (e.g. Learning Event Activities [8]).

2.2 Assigning learning techniques to learning strategies

From a psycho-pedagogical point of view, it seems suitable to argue that learning within a configurable PLE is subject to certain learning conditions. In this regard, learning strategies and learning techniques play a crucial role. It is suggested [4] that applying appropriate learning strategies and using learning techniques in the right manner lead to better learning outcomes. Surprisingly, literature provides no clear

distinction between learning strategies and learning techniques e.g. [6], [1]. However, learning strategy is rather an umbrella term to classify learning techniques. Learning techniques in turn are highly sophisticated methods to fulfil or act out learning activities. Learning strategies are the “What” (What do I want to do?: organize, manage time, plan etc.) and learning techniques refer to the “How” (How do I organize?: e.g. Mind-map, slow-fast, calendar etc.).

According to the classification of strategies [7] organization strategies, elaboration strategies, and rehearsal strategies are assigned as cognitive strategies, whereas self-control is considered as a metacognitive strategy and time management as resource management. For each type of learning strategy different learning techniques are available.

2.3 Assigning widgets to learning techniques

The classification of learning techniques to learning strategies introduced above provides the basis of matching learning techniques to widgets. Widgets are small programs that usually fulfil one task that are used in PLEs. One application for such widgets could be a language learning scenario [5]. In an English learning context a voice-recording widget can be used to hear one’s pronunciation of words and compare it to recordings of peers or pronunciation examples provided by online English dictionary services.

In reference to a learning strategy, the voice-recording widget imputes meta-cognitive strategies, more precisely, regulation and evaluation. Therefore, the voice recording widget could be assigned to the actual learning technique recording.

However, why should widgets be assigned to corresponding learning techniques? If widgets are assigned to learning techniques, ROLE services could provide recommendations according to appropriate learning strategies and learning techniques, respectively, based on scientific research. The use of learning strategies and techniques improve learning outcome and success, especially in the context of self-regulated learning [9].

2.4 The role of competences

Once widgets are classified another education component comes to play, the competence. In ROLE the focus lays mainly on tool and SRL competences. The tool competence is captured through the usage statistics and user input (assessment) and influences the order in which the tools are recommended. The competence model in ROLE distincts between domain knowledge, skills and competences and corresponds with the European qualification framework model [2].

Further on, the term competence is used as a master category. Special competence areas are domain competences, tool competences, and SRL competences. In order to learn effectively and efficiently in a self-regulated way within a PLE, the learner needs competences particularly on the SRL and tool levels. On the SRL side, the environmental structuring competence, which can be seen as a competence in coping with a learning environment in terms of assembling the widgets and managing

resources, is crucial. Tool competence comprises the ability to perform learning activities with a specific tool, it captures declarative knowledge (learning tool) and procedural knowledge (learning activity).

3 Mash-up design

The identified education components come into play by means of composing an applicable mash-up as a teacher or to recommend a mash-up design by the ROLE system that does not overtax or distract the learner [comp. 5]. For instance, a learner sets the learning goal to learn new vocabulary and pronounce the words accurately in in the first phase of the SRL process model. In this language learning scenario ROLE services identify the need for regulation, a metacognitive strategy, respectively (What should be done?). Additionally, the competences that are required to accomplish this learning goal (according to the ROLE competence model) are assessed. These enable ROLE services to recommend e.g. a voice-recording-widget (“How should it be done?”), which should be added to the ROLE mash-up design in the second phase of the SRL process model. In the third phase the learner actually uses the widget. The next step is the crucial one: There are other widgets available that could benefit the learner, such as the text2speech or a dictionary-tool.

However, it has to be clarified, whether these other widgets distract or confuse the learner and/or what number of widgets would be suitable for this particular learning attempt. Further research questions arise: Is the learning outcome higher if planning or goal-setting- (metacognitive), concrete learning- (cognitive) and feedback-widgets (meta-cognitive) are mash-up within one single design or should they be separated? A validation approach will attempt to bridge that gap.

4 Validation and evaluation criteria

As outlined above, systematic investigations of the moderating, and especially interacting effects of administering different widgets in a PLE mash-up are lacking. The present three step validation approach is designed to fill the lacuna.

In the first step it is planned to empirically verify the assignment of learning techniques to learning strategies. For this purpose a list of learning strategies and a list of learning techniques will be presented to experts of the research field, who then are kindly asked to assort the learning techniques to associated learning strategies. An interrater-reliability analysis will be applied. In the second step the learning techniques are supposed to be associated with corresponding widgets. Again, expert of the research field will be asked to assign widgets to learning techniques.

Hence, appropriate learning strategies and learning techniques need to be identified for a concrete language learning scenario. This psycho-pedagogical information will be implemented in the ROLE services according to the SRL process model and by taking into account the competences, described by the competence model. In the third validation step an experimental pre-post 3x2 design will be determined. Independent variables are mash-up design operationalized by the number

of widgets administered at the first use (0 vs. 3 vs. 6) and the pre-set degree of freedom operationalized dichotomous (maximum guidance vs. maximum freedom). During the learning phase the learning should be allowed to personalise the mash-up. In a pre-phase of the experiment a language test will be applied. In a post-phase of the experiment a parallel version of this language test will be applied, and the difference between these two tests will be interpreted as the learning outcome. As an additional performance indicator grades provided by lecturers in a university context might be feasible. Furthermore, log- and CAM (Contextual Metadata Model) data, respectively, will be analysed.

4 Conclusion and Outlook

To sum up, assigning widgets to psycho-pedagogical information has been identified to be an important issue to provide learners with meaningful recommendation in order to guide them through the SRL process. In this regard, Tool and SRL competences need to be taken into account to meet the requirement of a PLE. Validation and evaluation of the moderating, and interacting effects of these education components on an empirical level will be the focus of the further research activities.

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