A Psycho-Pedagogical Framework for Self-Regulated Learning in a Responsive Open Learning Environment

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Abstract: To empower the learner for true lifelong and personalised learning with a responsive open learning environment (ROLE) is one aim of the ROLE project. A psycho-pedagogical integration model (PPIM) towards supporting learning has been developed by facilitating the concept of personalised self-regulated learning. The first version of the ROLE PPIM is presented in this paper and gives a general view of the components of this model. The central part of the PPIM is the description of the self-regulated learning process and how it can be personalised by learners using adaptive guidance of ROLE.

1 Introduction

How to empower a learner for true lifelong and personalised learning with a responsive open learning environment? This is one question with which the ROLE project has been dealing since it has started in February 2009. ROLE stands for “Responsive Open Learning Environments”, and is a four-year project funded by the European Commission under the 7th Framework Programme (for more information about ROLE please see http://www.role-project.eu/). The vision of ROLE is to empower the learner to build his or her own responsive learning environment, which supports the learner to be aware of his or her own learning process and to reflect this process. ROLE should be user-centred in the way that it will be an individually adapted composition of the learner’s own learning environment [Re08]. An outreach
programme tries to involve stakeholders who contribute with learning tools and services that are included in a pool from which a learner can choose. Considering the fact that ROLE will consist of a great number of learning resources (tools, services, content, peers, and communities etc.) we have to research and design a psycho-pedagogically sound framework for supporting the individual composition of learning services and their usage. Therefore the ROLE team has been developing a psycho-pedagogical integration model towards supporting learning by facilitating the concept of personalised self-regulated learning.

In this paper a first version of the ROLE PPIM is presented. Section 2 describes the self-regulated learning process model, which basically outlines the learning trajectories that learners should make using the ROLE infrastructure. In order to move towards implementation, information models are needed which act as basis for personalised guidance (learner model, activity model, and skill model; Sections 3-5). Finally, the basics of the recommendation strategy which should provide personalised and adaptive guidance is described in Section 6. The Outlook section gives insights in further work. The PPIM is the theoretical basis upon which formal information and process models are defined that are used for the implementation of self-regulated learning tools and recommendation and monitoring services.

2 Self-regulated learning process model

Especially self-regulated learning (SRL) is an important aspect, because ROLE should support the learner for lifelong learning across institutional boundaries. This means that learning with ROLE services will also occur to a high degree in non-academic learning environments, and these less instructor- or teacher- oriented learning environments and primarily learner- oriented environments claim a greater extent of self-regulated learning skills from learners (Hofer et al., 1998 in [St06]). Another central reason for the importance of self-regulated learning in ROLE is “that the extent to which learners are capable of regulating their own learning greatly enhances their learning outcomes” ([St06], p. 353). According to [Zi89] “students can be described as self-regulated to the degree that they are metacognitively, motivationally, and behaviourally active participants in their own learning process” (p. 329). To define students’ learning as self-regulated, the learner has to use specified strategies for attaining his or her goals and all this has to be based on self-efficacy perceptions [Zi89]. In this context [Zi89] stated three elements which are important, namely the self-regulated learning
strategies of a student, his or her perceptions of self-efficacy regarding to his or her performance skills and his or her commitment to academic goals [Zi89]. From a psychological point of view, self-regulated learning is a complex field of research that combines motivational as well as cognitive and personality theories. Components of SRL are cognition, meta-cognition, motivation, affects, and volition [Ef09]. [Ki02] and [DK04] listed six key-processes which are essential for self-regulated learning - these are goal setting, self-monitoring, self-evaluation, task strategies, help seeking, and time management. The SRL process model (Figure 1) defined for ROLE is built on the concept of the self-regulated learning approach from [Zi02] and the work done in the iClass project [Eu08] which adopted the Zimmerman model. Basically, the [Zi02] model consists of three phases in which certain self-regulated learning activities are performed, namely the forethought phase (e.g. goal setting, planning …), the performance phase (e.g. self-observation processes), and the self-reflection phase (e.g. self-reflection processes). The iClass project [Eu08] extended this model towards a self-regulated personalised learning approach by adding a self-profile where the learner can indicate the own preferences. They created the three catchwords “plan”, “learn” and “reflect” which are adopted and imaged in the SRL process model. These words should symbolise the self-regulated learning approach in the ROLE PPIM and act as basis for the learning process model of ROLE. On that basis and on the four predominant activity groups, which result from the collection of learning activities we assume a learner will implicitly or explicitly perform during learning with support of the ROLE services, four phases of the learning process model have been defined. These learner-centred phases are learner profile information is defined or revised, learner finds and selects learning resources, learner works on learning resources and learner reflects and makes on strategies, achievements and difficulties.
selected learning resources, and learner reflects and reacts on strategies, achievements and usefulness.

From the components of self-regulated learning (cognition, meta-cognition, motivation, affects, and volition [Ef09] and from the objectives of the ROLE project, five key aspects for the self-regulated learning process model have been derived, which theories being behind them have to be carefully integrated in the PPIM. These key aspects are guidance and freedom, motivation, meta-cognition and awareness, collaboration and good practice sharing and personalisation. The key aspects are interconnected and have also influence on each other. As they are derived from the components of self-regulated learning there is a strong connection to the self-regulated personalised learning approach and to the learning process model. In ROLE these key aspects should be intensively supported and enhanced through ROLE in form of recommendation, which are based on the learner’s profile information and needs, e.g. ROLE services could offer guidance to the learner, without limiting the degree of freedom through the recommendation of tools etc., meta-cognition can be facilitated through the recommendation of SRL activities or tools for self-regulated learning, collaborating and good practice sharing can be enhanced through the recommendation of peers, communities or forums.

3 Learner Model

The learner model, which is the basis for personalised recommendation in ROLE, should contain important information about the learner (learner profile). From a psycho-pedagogical point of view we will integrate the goals and sub-goals of a learner, the learner’s skill profile, the learning history, the learning progress, the background of a learner and the learner’s preferred instructional technique as important information in the learner’s model. To get information regarding these profile points, input is needed from the learner, but some input is also collected through monitoring. Monitoring is the automatic capturing of the behaviour of the learner (log data). Since it is important for self-regulated learning, especially for the self-reflection process, the learner has to be made aware of the information collected in the learner model through visualisation of these data and their content. In nearly all cases ROLE services need input from the learner him- or herself, to be able to give personal and helpful recommendation. But in ROLE we also have to take into account, that maybe the learner is not willing or has no time to give the ROLE services this information.
4 Learning Activity Model

As the SRL process model is mainly grounded on activities (e.g. plan, learn, and reflect from the self-regulated learning approach and the four predominant activity groups), the learning activity model is an essential element of the whole ROLE PPIM. All learning activities of the learner in ROLE are components of this model. The learning activity model distinguishes between three different types of activities which are domain- (D), tool- (T), and SRL learning activities. Domain learning activities are carried out if a learner learns a domain topic like reading a journal article about brain functions. Domain learning activities aim on domain knowledge acquisition. Based on the eight learning events (8LEM) from [LP05] we have derived eight possible key domain learning activities for learning in ROLE, namely imitating, receiving, exercising, exploring, experimenting, creating, self-reflecting, and debating. The list of key-activities is not yet completed. It has to be continued during further elaboration. Tool learning activities are carried out by the learner for two reasons, first to learn the usage of a special tool for learning, e.g. learning the usage of a Mind Mapping tool for learning and second for learning with a tool per se, e.g. to learn English vocabularies with a vocabulary trainer. Like the domain learning activities also the tool learning activities can among others be derived from the 8LEM [LP05]. Activities with qualities on SRL typically aim on realisation or maintenance of SRL of the learner. SRL activities are conducted for self-regulated learning, e.g. for constructing a learning time plan, and for learning self-regulated learning, e.g. for practising goal setting or self-evaluating. In ROLE services we assume six key self-regulated learning activities. These SRL activities are referred to [Ki02] and [DK04] SRL key-processes, namely goal setting, self-monitoring, self-evaluation, task strategies, help-seeking and time management.

5 Skill Model

For performing activities within the ROLE services the learner needs skills and by performing of activities he or she also can increase and improve his or her skills. In ROLE the skills of a learner (if known) are an important source for recommendation and also part of the learner profile information. For example based on the learner’s skill profile ROLE services can recommend learning activities, tools and services, peers, and content etc.
The skills of a learner influence the learning activities, the degree of guidance and freedom of a learner within the ROLE services, the degree of personalisation of the ROLE services, the motivation of the learner, collaboration, and meta-cognitive activities. In ROLE a more complex skill model is needed because in addition to domain knowledge, also self-regulated learning and the handling of ROLE services and tools has to be considered. Therefore the assumed skill model in ROLE should consist according to the three learning activities of three different kinds of skills, namely domain-, tool- and SRL skills. Domain skills are skills which a learner possesses if he or she has a certain level of expertise in a knowledge domain, e.g. the learner can explain what percentages are. Domain skills will be built on projects like iCLASS, with the Competence-based Knowledge Space Theory [Eu08] and theories and developments of the TENCompetence project (for an overview see http://www.tencompetence.org). In ROLE we will especially focus on tool skills and self-regulated learning skills. Tool skills are defined as skills which a learner possesses if he or she is able to perform a learning activity with a learning tool in a domain context, e.g. the learner can use a tool for goal setting or can use a tool in order to get domain knowledge of a certain topic. The tool itself can also be the subject of learning. Different learning activities with the same tool can require different skills e.g. for telephoning with your mobile phone other skills are needed than for writing messages. Self-regulated learning skills express the ability of a learner to regulate his or her learning activities by him- or herself e.g. the learner can realistically set his or her goals, the learner can monitor him- or herself, the learner has an effective time management, he or she can self-evaluate etc.. Self-regulated learning skills are skills on a meta-level and domain independent. In ROLE we will define a set of SRL skills, which are needed for conducting the key processes of SRL.

In Figure 2 the assumed interactions between the skill-, activity- and learner model are represented. Based on the information in the learner model, especially regarding available SRL-, tool- and domain skills, activities will be performed in each phase of the learning process model. For the performance of these activities specific SRL-, tool- and domain skills are required. The required skills, particularly the tool skills depend on whether the activities are performed with or without a tool. Through the performance of activities new SRL-, tool and domain skills (could) have been obtained. Information about the obtained skills updates the learner model.
6 Recommendations

As already mentioned, recommendation is an important part in ROLE. It is essential for personalisation, adaptation, and responsiveness. Recommendation is a kind of adaptive guidance but without limiting the freedom of the learner, because the learner can freely choose between the recommendations made by ROLE services or other alternatives. Recommendation in ROLE should be based on the learner’s profile information contained in the learner model, on theories of the psychopedagogical framework and on information of/from peers, tutors or teachers. Following learning resources and activities can be suggested to the learner by recommendation, namely learning process phases, learning activities, learning tools, learning content, and peers and communities. The learning process phases could be recommended based on the learning process model and on the information from the learning history. Learning activities could be suggested based on the current learning process phase of a learner, and learning tools can be recommended based on the chosen learning activities and on the skills of a learner. Recommendation for learning content could be based on personal goals. Recommendation for
peers, tutors, teachers, and communities could for example be based on common or complementary goals and skills of the learner. The activities and tools recommended by ROLE services should help and support the learner to work with ROLE regarding the learning process model (recommendation of process phase and process phase activities), to learn in a self-regulated way (recommendation of SRL-key activities), and to learn with the preferred instructional techniques (recommendation of 8LEM key activities). For the performance of the recommended SRL- and 8LEM key activities the learner will get recommended concrete activities, which should give him or her guidance. To get a list of these concrete activities and also to get more information regarding the recommendation of these activities an extensive literature study for the 8LEM and SRL key activities has been carried out. For getting more practical insight regarding activities and regarding the use of tools for performing 8LEM and SRL key activities a pilot study has been conducted. In this online survey the participants were asked to assign the tool they use or like most to one or more categories (SRL-and 8LEM key activities) which describe this tool best. Then the participants were asked to list the activities which they perform with these tools. The derived lists of concrete activities and assigned tools from the empirical- and from the pilot study have been cleaned up regarding multiple indications. These lists will be integrated in the recommendation process of ROLE (as example see Figure 3, level 4 and level 6) and serve as starting point for further empirical studies and expert surveys. In Figure 3 the SRL key activity goal setting will be presented as example for the ROLE PPIM recommendation process. In this figure the recommendation levels of the ROLE PPIM recommendation process are depicted. On the first level the learning process phase will be recommended (e.g. phase 1) and on the second level the process phase activities. These are activities which should be predominately performed in a process phase (e.g. in phase 1 -> to set profile). On the third level there can be recommended three kinds of activities, depending on the recommendations of level one and two, namely SRL- and 8LEM key activities or concrete activities of the process phase activity. In level four the concrete activities of the recommended SRL-key activity goal setting are listed. To these concrete activities a tool class (level 5) is recommended and to this tool class, tools will be recommended which are helpful for performing goal setting activities. The arrows in the graphic representations should symbolise that not all recommendation levels have to be processed. Parallel to the recommended phases and activities according to the recommendation process, additional SRL-key activities will be recommended which should support the learner for example at self-reflecting. In addition to the recommendations ROLE services will provide explanations regarding the
Figure 3: Example of ROLE recommendation process for recommending SRL-key activity goal setting in phase 1

usefulness of the performance of the recommended activity and hints for the activity performance – these explanations are based on information derived from the literature study. To support and foster the integration of this theoretical framework model into praxis we have started to design a navigation tool, which should guide and assist the learner by the help of the recommendations and explanations.

7 Outlook

In this paper a first version of the ROLE PPIM has been presented, which forms the theoretical basis of information and process models that are needed for implementation. To verify connections, correlations and inter-correlations of and between the components, models, and model elements of the ROLE PPIM in detail, supplementary literature studies have to be carried out and empirical studies have to be examined. As a next step we will further concentrate on the activity and tool recommendation. Therefore the derived activities and tools of the literature study and the pilot study will be complemented and checked through expert surveys and their implementation in the navigation tool will be tested through empirical studies. Moreover we will determine skill structures of used tools and define connections between the tool skill structures.
References


