EARLY LEARNER EMPOWERMENT BY MEANS OF ePORTFOLIO

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Abstract

The last years have seen an increase in interest for and application of portfolios, more precisely in ePortfolios. Despite their different functions and areas of application, ePortfolios are usually seen in and of itself as a learning method; few have considered that ePortfolios need an instructional strategy for implementation. This paper exemplarily shows for process portfolios how learning theories request instructional scaffolding for different ability levels. In order to empower learners early in their achievement of lifelong learning competences, we propose a scaffolding aid in the form of a semi-formal description structure for learning processes to be used with the method of process portfolio.

ePortfolio Orientation

History of (e)Portfolio

Already in 1938, Dewey stated that experience alone does not suffice learning but that reflection is an integral part of the learning process (Dewey, 1997).

Paper-based portfolios have a long tradition within the field of art and architecture mainly used both for assessment during education and for presentation showing them to potential clients. For prospective artist students, portfolios by now are often requested for admission to university. In the United States, portfolios started to be used in teacher education as alternative means for assessment and examinations (Britten & Mullen, 2003). These portfolios are used to present real work, e.g. photographs, written text or pieces of painting.

As portfolios grow over time, their paper-based entries become difficult to manage and store. With the emerge of information technology, especially the widespread use of virtual learning management systems in educational institutions, electronic portfolios (ePortfolios) have grown in use over the last five to seven years in post-secondary education. Compared to paper-based portfolios, the benefits of ePortfolios are many and varied (Butler, 2006). The following summarise the most prominent:

- Collection of a large number of resources.
- Usage of more extensive material (especially incorporation of multimedia material).
- Easy maintenance allowing for efficient management and archiving of resources.
- Instant access and flexible management of access rights.
- Possibility of non-linear and non-hierarchical organisational structures.
- Quick and easy distribution allowing for a large audience.
- Quick feedback.

Nevertheless, from the time when the concept of ePortfolio took root, there are differences of views about what an ePortfolio is supposed to be (Grant, 2005). Some people regard an ePortfolio mainly as a personal digital archive to store material and pieces of work; other people, in turn, see an ePortfolio as something used to achieve specific competences and reflect on the respective learning process. When talking about ePortfolio, it is sometimes not clear whether one thinks of

- ePortfolio *application*,
- ePortfolio *method* as a – mainly constructivist – teaching/learning concept or
- ePortfolio *work* to be accomplished by learners (Grant, 2005).

There is a considerable lack of consensus regarding terminology which might be explained by the fact that the field of ePortfolio is relatively new and that time is still needed to develop a common vocabulary describing ePortfolio, its purpose and use in education (Grant, 2005).

Types of ePortfolio

In general, three main functions for ePortfolios are distinguished: the showcase or presentation function, the assessment function, and the process or development function (Aalderink, 2007).

The showcase or presentation function

The presentation portfolio is understood to be a specific view on a selection of collected purposeful evidence that the owner decides to publish. This type of ePortfolio is often used to put forward best assets and competences as well as information about education and prior activities to potential employers.

The assessment function

ePortfolios are sometimes seen as alternative means for assessment. Barrett (2005) distinguishes between assessment *of* learning (summative) or assessment *for* learning (formative and classroom-based) stating that

"portfolios used for accountability are not student-centered and are mostly despised by both students and teachers […]. However, ePortfolios used as assessment for learning, to provide the type of feedback that supports student reflection and improvement of learning, have the potential to engage students in their own self-assessment."

The process or development function

This type of ePortfolio is meant to capture the learning process. The Consumer Guide on "Student Portfolios: Classroom Uses" (Sweet, 1993) states that research in educational sciences shows that learners "benefit from an awareness of the processes and strategies involved in writing, solving a problem, researching a topic, analyzing information, or describing their own observations."

The process portfolio aims at supporting the learner in the development of learning strategies, achievement of competences and reflection on what has been learned so far. It thus appears to provide the appropriate means for supporting learners to reflect their process of learning and enable them to make connections between the learning which occurs in different contexts (Tosh, Light, Fleming & Haywood, 2005).

In practise, however, the differentiation between the assessment and process functions is not always clear-cut. Although an important aspect, the assessment function will not be discussed in this paper. Considering ePortfolio as a pedagogical *method*, we propose in the following sections a pre-designed structure that guides students especially in early stages of learning through defined steps when reflecting their own learning process using a process portfolio.

Change of Learner Role requires Early Learner Empowerment

Due to the high prerequisites of use, as for example the competence of developing learning strategies and formulating learning outcomes, process portfolios are often reported to be used in post-secondary education settings (cp. European Schoolnet, 2007).

The relatively late implementation practise can be linked to recommendations by Jonassen, Mayes & McAleese (1993), who stated that initial knowledge acquisition up to college learning should take place using classical instructional design, which mainly involves concepts of transmitting knowledge. They further state that only in the advanced stages of higher education, constructivist approaches—to which we count the process portfolio method—should be used.

Gruber & Vonèche (1977) exemplify on the basis of Piaget's theories that there are two fundamentally different approaches to education: unilateral and reciprocal. Regarding the former, perfectly designed instructional materials are given to the learners, who are then the receivers of that "adult knowledge

and morality" (Gruber & Vonèche, 1977). According to Gruber & Vonèche, this approach fosters the students' obedience rather than autonomy. The unilateral perspective is in line with the processes employed in classical instructional design as proposed by Jonassen et al. (1993) for pre-college knowledge acquisition. The reciprocal approach, on the other hand, views own effort and personal experience as essential parts of learning. If the goal is to foster lifelong learning competences in students, we must implement a pedagogical approach that is oriented on reciprocity from the start.

Recent learning theories as being mainly based on the principles of constructivism and thus reciprocity induce changes in the approaches to learning. These include more learner-centred pedagogic approaches, more flexible program provisions, a greater emphasis on lifelong learning, and a move toward competence-based assessment (Attwell, 2007). The learner is increasingly expected to be the "architect" of his/her own learning process. The use of process portfolio might thus be the appropriate method to underpin this learning paradigm.

The IMS Learning Design specification (Koper, Olivier & Anderson, 2003), providing a standardised modelling language for representing learning processes, takes into account the above mentioned changes in the approaches to learning by regarding the *learning activity* rather than the learning material as its central element. Starting from a learning process description in natural language, the specification proposes a step-wise design procedure resulting in an eXtensible Markup Language (XML) document instance that can be interpreted and "played" by a learning management system. This design process envisages the use of the Unified Modelling Language (UML) as an intermediary step that helps to map the described learning process into an XML structure. Assuming that UML requires extensive technical knowledge for its setup, we developed a less rigid semiformal description structure as an in-between step between the natural language and a highly formal language such as XML for communicating learning processes (Heyer & Oberhuemer, 2007).

In this paper, we propose to extend the purpose of the described intermediary design step, originally intended to support instructional designers in the development of learning and teaching activities, to offer early students a structure to systematically describe and reflect on their own learning processes.

Learning Theory Background in Regard to Changed Learner Role

Self-Regulation and Levels of Processing

Placing students in the role of being their own learning architect demands of them a higher degree of self-regulation than a traditional teacher-centred pedagogic approach would have. Self-regulation refers to "the process whereby learners systematically direct their thoughts, feelings, and actions toward the attainment of their goals" (Schunk & Zimmerman cited in Schunk, 2000, p. 355). Learners, who act self-regulated, rehearse and use learning strategies, monitor their comprehension along with their beliefs about self-efficacy, learning outcomes, and perceived value of learning.

According to Schunk & Zimmerman, individuals go through different levels of development regarding self-regulation (Schunk, 2000). In progressing through these levels, the degree of self-influence steadily increases (cp. Table 1). While in the early stages, the focus is more on influences from the community that the learner is part of, the later stages are characterised by influences that come from the self. These levels are repeatedly visited as learners go through progressive cognitive changes.

Table 1: Social and self influences on self-regulation (Schunk & Zimmerman cited in Schunk, 2000).

Level of Development	**Social Influences**	**Self Influences**
Observational	Modelling, verbal description	
Imitative	Social guidance, feedback	
Self-controlled		Internal standards, self-reinforcement
Self-regulated		Self-regulatory processes, self-efficacy beliefs

Craik & Lockhart (cited in Schunk, 2000) propose in their Levels of Processing theory that learners process information at different levels while the greater the depth of processing during learning the more information learners will retain and remember. According to this theory, learners often perform self-regulatory processes unnoticed and unconsciously. One goal for attaining a learning process at deeper levels must thus be to make the self-regulatory functions of the learners explicit.

Vygotsky's Zone of Proximal Development and Bruner's Instructional Scaffolding

The Social Development Theory by Vygotsky emphasises the importance of social interaction in the development of individuals (Schunk, 2000). According to Vygotsky, mental functions take place on two planes. They start out on a social or interpsychological plane (through the interaction with humans) and then move to an inner or intrapsychological plane, which is personal. Vygotsky's theory resembles the levels of development according to Schunk & Zimmerman introduced in Table 1. There, too, learners are strongly focused on social influences, meaning they are in need of modelling (watching others perform tasks and actions), verbal descriptions of events and processes, social guidance and feedback in the early stages of development. However, as their development level increases, self-influences on the intrapsychological plane increase as well.

Part of Vygotsky's social development theory is the Zone of Proximal Development, which is defined as "the distance between the actual development level as determined by independent problem-solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky cited in Schunk, 2000, p. 243f). It thus relates the learner's potential development to a social aspect of learning, e.g. adult guidance.

As Vygotsky states, working activities in the Zone of Proximal Development requires guided participation. Derived from this is the concept of instructional scaffolding, which was first introduced by Bruner (Schunk, 2000). Scaffolding refers to the controlling of task elements, which are beyond the learner's capabilities in order to reduce the cognitive load. Learners are thus enabled to focus on and master those features of the task they can quickly grasp (Schunk, 2000).

Summary of Requirements for Supporting Process Portfolio Implementation

From the selected learning theories we have described herein, a set of requirements can be derived that should be considered when using process portfolios for learning. These requirements are:

- helping learners to make their conducted self-regulatory processes explicit as according to Craik & Lockhart
- providing modelling and verbal descriptions in early developmental stages of self-regulation as according to Schunk & Zimmerman as well as Vygotsky
- providing social guidance and feedback in early developmental stages of self-regulation as according to Schunk & Zimmerman as well as Vygotsky
- offering guided participation and adequate scaffolding while learners work in the Zone of Proximal Development as according to Vygotsky and Bruner.

The legitimacy of these theoretical requirements can be validated when looking into practise: the ePortfolio study conducted by Tosh et al. (2005) found that besides technology related problems, which represented the main barrier for students to using ePortfolios, the second greatest barrier is a general lack of adequate instruction. The survey moreover specifies that in the beginning students explicitly asked for a structured ePortfolio to support them in the reflection of the learning process. Concern about an increased need for tutor assistance to ePortfolio students has also been expressed by Harland (cited in Healey & Jenkins, 2007), while Niles & Bruneau (1994) reported that their portfolio students were confused about their task; when asked whether more direction would have been helpful in their portfolio usage, the majority of students responded positively. These are signals that additional scaffolding and modelling are needed when implementing ePortfolio. In the following section, we will introduce an instructional aid that aims at fulfilling these requirements.

An Instructional Aid for Learning with Process Portfolios

Taking up the requirement for scaffolding, we first point out the portion of the task that our instructional aid will assist, so that learners can focus on the real task to be mastered: the reflection. Before a learning process can be reflected upon, it needs to be described. As even professional teaching practitioners lack a common language for communicating their practise (Beetham, 2004), it is hard to expect learners to readily describe their encountered learning processes. We thus propose to provide for scaffolding purposes a simple, semiformal description structure (shown in Table 2) to help learners capture their learning situations. The guided participation in this scaffolding process may then be additionally provided by the tutor, who models or supports the description of the learning situation with the help of the structure.

As we have indicated earlier, IMS Learning Design is a serious candidate for providing a modelling and description language for learning processes (McAndrew, 2004), its terminology claiming to be pedagogically neutral to describe any learning approach (Koper et al., 2003). Based on the application of IMS Learning Design, we developed a semiformal description structure for communicating learning processes (refer to Table 2). The advantage of the semiformal description is that necessary elements involved in the learning process, that might get lost in a natural language description, are explicitly captured. The further advantage in our case is to direct the learners' attention towards elements of the learning process that they might not have been noticing as relevant parts before.

Table 2: Structured Description for Learning Processes.

Target Competences	*Describes the intended learning outcomes, which the learner establishes for him- or herself. The competence should be described using a verb for the active part and a noun for the knowledge to be acted upon.* ***Example: Analyse ill-structured problems.***
Entry Competences	*Specifies circumstances or essentials that are present or necessary before the learning process takes place, i.e. what the learner is already able to do before the learning process.* ***Example: Provide constructive feedback.***
Participating Actors in their Roles	*Lists the involved actors in their respective roles within the pedagogical experience.* ***Example: Group Member.***
Performed Learning Activities	*Describes the perceived activities that the learner and other actors perform in their respective roles. For the owner of the ePortfolio, these activities may be observable or unobservable, the latter being cognitive and metacognitive activities. The activities may be referred to by number to indicate a sequence.* ***Example: [Group Member] Think about the case study; then discuss the description of the case with my group members.***
Resource/s used within the activities	*Lists the resources that are used during the performance of the activities. These resources can be people as well as literature or tools. A number in front of the resource indicates for what activity the resource was used.* ***Example: Case Study.***
Annotations	*Contains the actual reflection or any commentaries regarding the described learning process. In this section, the learner may, for instance, evaluate whether the activities employed were able to fulfil the stated goals, what conditions may have hindered the attainment, and whether an adjustment of activities or resources should be done next time around in a similar learning situation.* ***Example: It was good that the mentor gave us adequate time to think our thoughts regarding the case study through. That way I did not feel rushed or unprepared.***

Fulfilment of requirements

We now provide reasoning how the structure is able to fulfil the requirements put forth in the previous section. The requirement of *making processes in learning explicit* can be fulfilled with this structure, since the learners' attention is drawn to the specific activities involved in learning. Learners have to

explicitly think about and formulate the activities, which might have gone unnoticed before. These activities could be obvious and easily observable, or they could be cognitive and thus hidden activities, which only the learner him- or herself knows about. Also, the learning outcomes need to be made explicit which represents one part of self-regulation. It is important in this regard that during the *feedback* sessions with the tutor the learner's activity descriptions are discussed. If necessary, the learner's focus is increasingly shifted from outwardly expressive activities towards the internal processes and strategies of self-regulation within the description.

The *modelling* requirement can also be seen as fulfilled since the structure itself represents a model of how a description for learning processes may look. The modelling aspect could be enhanced even further if the tutor works collaboratively with the students to fill out the structure about a common learning experience, or provides own reflections using the structure. The *verbal description* requirement is also fulfilled since the structure including its filling out instructions comprises a verbal description. For the *scaffolding* requirement, we have pointed out earlier that the description structure in Table 2 provides the necessary elements for the description of the learning process so that learners can more readily focus on the actual task, the reflection.

For the last two requirements, *social guidance* and *feedback*, we rely on the strategies that the tutor employs when implementing the process portfolio method. These strategies need to be facilitated within the instructional setting as they are outside the realm of the semiformal description structure. Social guidance can be attained, for instance, by integrating partner and group work in the instructional setting. We have pointed out earlier, how important feedback is in applying this structure, and will provide further examples in the use case presented in the following section.

Ideally, the description structure in Table 2 helps learners to pay closer attention to and then internalise the specific aspects of their own learning processes such as setting goals for activities and estimating their ability to successfully finish tasks under the given circumstances. This represents an essential brick for developing competence in lifelong learning.

Advantages of Use

One advantage that the structure offers is the overt separation of activities and resources. Having been accustomed to traditional learning environments focusing on knowledge transmission, the learners' focus may lie with the learning object[1] instead of the learning activity. The structure is thus an aid for reflecting the actual learning process in relation to the resources used in this process.

Furthermore, the structure differentiates between the description of the learning process and the reflection thereof contained in the *Annotations* field (cp. Table 2). An advantage resulting from this is that descriptions can be shared with others (peers or tutors) or even transferred to a different type of ePortfolio without having to show the personal reflection. Without the use of the structure, the description and reflection parts are intermingled. Now, learners can make choices about what exactly to share.

Last but not least, using the same structure to describe learning processes facilitates the visibility of longitudinal changes: the continuous style promotes comparisons between earlier and later descriptions. Differences and similarities are quickly identified and changes in perception regarding the engagement in learning activities as well as attainments of increasingly more sophisticated competences become apparent.

Use Case

Exemplarily taking one of the case studies presented by Healey & Jenkins (2007), we demonstrate the application of the herein described semiformal description structure as a scaffolding aid in process portfolio. In this example, the pre-service teacher students at the University at Otago, New Zealand, use ePortfolios to undertake authentic enquiry (Harland cited in Healey & Jenkins, 2007). The main focus of the ePortfolio is placed on the reflections on practise, namely the process rather than the

[1] The IEEE Learning Object Metadata Draft Standard (p. 6) defines a learning object as „any entity, digital or non-digital, that may be used for learning, education or training." [http://ltsc.ieee.org/wg12/files/LOM_1484_12_1_v1_Final_Draft.pdf]

outcome of learning. We may thus refer to this ePortfolio as a process portfolio. During the first stage of use, the ePortfolios were evaluated by the student and tutor in supervisory meetings, while the student decided what parts of the ePortfolio the tutor should actually see and comment on. During the second phase, no evaluations were made; the self-regulatory process is completely up to the learner.

As the students in the study requested more tutor assistance (Healey & Jenkins, 2007), our proposed description structure for learning processes (cp. Table 2) could have been used as an instructional aid to ease their ePortfolio use. For instance, two pre-service teachers pair up and together construct a description of a common learning process. They fill out the structure in Table 2 except for the *Annotations* field. In a second step, they individually write their thoughts and reflections about the previously described learning process.

In a different scenario for this use case, the tutor may choose to direct the learners' attention to a specific aspect of the structure. The tutor would thus use the setup of the language provided by the structure to shift foci in the reflection process. In a first phase, the pre-service teachers may then be directed to reflect on whether their perceived entry competences to a learning situation were adequate to successfully finish the learning tasks and achieve the learning goals, i.e. target competences. In a second phase, the pre-service teachers are then advised to specifically focus on the resources used in this learning process and whether the choice of resources was adequate for goal attainment or the preferences that each learner has.

No matter what strategy is being employed, however, the learners should always be allowed to choose whether they wish to use the structure. The structure is meant as an aid, which can be left aside or only used partially. Since the provision of scaffolding needs to be at just the right level so that learners are still challenged by the learning task, there is no use in providing excess scaffolding. The main goal is to support learners in writing a process portfolio; the level of support, however, is determined by the students.

Conclusion

In this article, we described process portfolio method in the light of several learning theories and the lifelong learning competence development. Self-regulation was pointed out as an important aspect in this regard. To promote an early adoption of process portfolio, we suggest using a semiformal description structure for learning processes as an instructional scaffolding aid. The structure serves as a modelling instrument, whereby modelling proves necessary in earlier developmental stages of self-regulation.

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