

Distributed e-Portfolios to Recognise Informal Learning

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Abstract: This paper shows how informal learning experiences can be integrated into institutional formal learning processes by using blog-based networked ePortfolios. First, we briefly introduce into the realm of learning in distributed environments like personal learning environments and elaborate on the role of ePortfolios. Second, we show how ePortfolios function as a means to support and evaluate informal learning. We describe a three-staged portfolio approach that encompasses the binding of informal experiences through reflection to assessment. Third, we then illustrate how this approach can technically be implemented by using weblogs as a distributed feed network. Fourth, we exemplify how this approach is used in a co-curricular study programme at the University of Augsburg and in the ICAMP project. Finally, we discuss how the proposed portfolio approach that was explored in the two use-cases cannot be supported by the state of the art in software and briefly outlines current shortcomings and suggestions for future work.

Introduction

As the world gets flat through the use of new technologies and digital media, learning and working are no longer separable, especially in the field of so-called ‘knowledge work’. To account for these developments, institutions of higher education need to recognize informal learning activities occurring close to the workplace (cf. Cross, 2007). Most knowledge work is based on teams that cooperate and collaborate through virtual networks. Since learning in such contexts takes place in a highly distributed environment, new approaches for supporting and assessing these kinds of learning need to be developed. Content and learning management systems that serve as technology-enhanced infrastructures within institutional contexts need to be coupled with more flexible, dynamic, and interactive personal learning environments.

Learning in a Distributed Environment

Learning today is no longer seen to be limited to formal settings, where assignments and assessments map the path towards credits. At least since the advent of constructivist ideas, the creation of a personal learning space is considered to be a key characteristic of the contemporary learner who independently takes decisions about acquiring and transforming knowledge. This characteristic of being self-organised and self-directed reflects especially in terms of choosing the preferred way of communication and in terms of participating in a dispersed learning environment moulded by individual and group learning goals (Väljataga et al., 2007). Such ‘nomadic’ learners not only acquire skills and knowledge vastly outside the formally offered technical infrastructure. They also process information, participate in learning projects, or communicate with peers not linked by any formal ties (cf. Fiedler et al, 2006). Not

surprisingly, informal and incidental learning is more and more considered a crucial part of higher education, especially catalyzed by the advance of social software and dynamic online services.

Such learning environments, however, have very little structure (Marsick & Watkins, 2001): Learners tend to drift away from their learning goals and strategies, and, – what is even more important –, fail to identify their learning outcomes. In such a diverse and complex distributed learning space, the learning itself can be easily overlooked. At the same time it is clear, how this obstacle can be overcome: new means are sought that facilitate recognition and acknowledgement of learning in distributed open learning environments.

As proposed by Attwell (2005), e-portfolio systems can serve the function of recognising learning. E-portfolio applications enable learners to reflect on learning outcomes which occurred in heterogeneous settings and which exceeded the expected goals and objectives. They can contribute greatly to the identification of experience, knowledge, and practices. And in principle they are apt to capture their contexts. E-portfolios can play a key role for the recognition of learning in distributed collaboration on three levels: they can help to map pre-existing skills, knowledge, and abilities (domain-specific as well as technical). They can help to capture the essence of the learning and reflection processes during collaboration, and – finally – they can help to document learning processes and outcomes. Various sources can be fed into these e-portfolios.

When interacting with various applications in a distributed learning environment, learners leave traces of their on-line presence (see Figure 1). Such traces, for example, emerge explicitly from active participation such as writing a blog entry or contributing a text passage to a wiki, but also implicitly from usage data such as log-in or log-file data. These behaviour traces do not necessarily lead to the formally expected outcomes. They can, however, contribute to learners' performance evaluation.

As learners use different tools, they build up digital identities in various situations and applications, by constructing knowledge in online interactions, by collaborating and exchanging ideas, by creating learning communities. To keep track of their digital self, they have the need for a flexible system which gathers information on all these activities in one adaptable and open application (symbolized by the small white dot in Figure 1).

Moreover, e-portfolio systems can even be used to map competencies acquired in face to face learning as long as the evidence can be reflected digitally. Although this transformation may require additional effort or skills, the presentation of starting points, reflective processes, and outcomes can be enhanced with technology.

From the viewpoint of facilitators, acting in a heterogeneous environment is a challenge: teachers, coaches, and tutors have to track the activities distributed across systems and have to assess the outcomes stored in different applications (Nawojczyk & Chrzyszcz, 2007). In this case ePortfolios facilitate setting goals and learning objectives appropriate in a context given and enable to assess learners in order to determine their starting points. On the next stage, ePortfolios support the recognition of progress and achievements, and finally, the assessment of learning outcomes (Becta, 2007).

Learners skills acquired beyond formal settings are then applied in institutional context, which requires certain accreditation procedures. Constructing ePortfolio adds value to their domain-specific research and learning as well as to their technical competences. There is a need then to elicit, acknowledge and map these skills as well as progress for both learner and facilitator's purposes. According to Attwell, learners involved in e-portfolio processes gain greater „ability to recognize his/her learning needs and goals, ability to map learning taking place in remote environments, ability to interact/comment and formulate opinions and reflections with reference, managing multiple tasks in a heterogeneous environment“ (Attwell, 2005). Furthermore, Attwell enumerates particular skills which can be

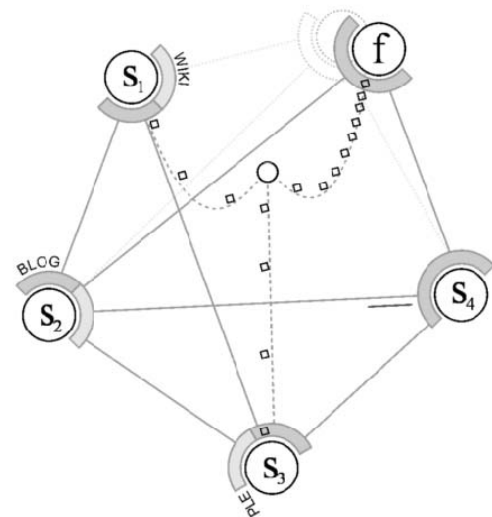


Figure 1. Distributed learning network.

especially important in a higher education context such as the ability to scaffold learning, to access, to search, to manage, and to share information.

One way to utilize e-portfolios is for the integration of informal learning experiences and for the accreditation of extra-curricular learning activities. Such an approach is subsequently described in the following sections.

The rest of this contribution is organized as follows. After this introduction into portfolio stages, the syndication of weblogs (respectively their feeds) as a means to realize these portfolio stages in a distributed setting is introduced and missing capabilities in the standards canon are added in the form of a remoting specification for pro-active networking of feeds called 'FeedBack'. The depicted distributed e-portfolio approach is subsequently validated against two scenarios. The first one describes a within-university setting, the latter sketches a trial situation from the EU IST funded iCamp project that reaches across universities. Finally, a conclusion with an outlook rounds up the article.

Portfolio Stages

By linking the goals, the process and the results of learning via a blended assessment strategy based on the portfolio method, project-oriented learning activities can be integrated into the formal curriculum of higher education (cf. Reinmann, Sporer, & Vohle, 2007). For this integration an approach proposed by Barrett and Wilkerson (2004) was adopted and re-designed as illustrated in Figure 2.

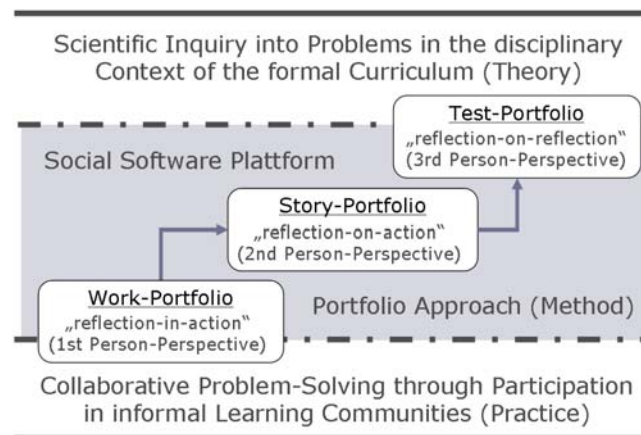


Figure 2. Portfolio Approach to Integrate Theory and Practice in the Study Programme.

This approach combines the facilitation of the learning process (assessment for learning) with the evaluation of the learning outcomes (assessment of learning) through a three staged-portfolio process. It helps to integrate learning experiences derived from the participation in communities of practice by facilitating the assessment for learning through guided reflection within the working-portfolio. The artefacts collected in the working-portfolio then become then re-organized in a chronological order within the story-portfolio in the sense of a learning history. Finally, certain episodes from the story that the students have drafted about their learning history are picked up and handed in for the accreditation in the formal curriculum. To support this scenario we designed a portfolio process that follows a three-step procedure:

- *Work-Portfolio.* With the Work-Portfolio students collect all materializations of knowledge (even very small artefacts) that accumulate during the learning process. In this phase they document their working experiences within their projects which is a form of reflection-in-action (Schön, 1987). Weblogs are used to reflect experiences in a simple manner that doesn't require systematic arrangement. In addition the learner can comment on learning "products" such as text documents, drawings and photographs. This 'private space' is not intended to start a dialogue with others; it therefore reduces the timidity to articulate oneself (1st person perspective).
- *Story-Portfolio.* With the Story-Portfolio students transform personal experiences into shared knowledge within a project group and arrange the collected materializations of knowledge. In this stage of the portfolio process a personal learning story is constructed presenting a form of reflection-on-action (Schön, 1987).

This contextual embedding forces the learner to reflect more intensively and to structure the individual learning process along meaningful dimensions of a coherent story. The social software system underlying the portfolio tool enables reciprocal commenting of the learning stories. This interconnection of the contents of the learners' stories builds a 'shared space'. The stories thus make personal learning experiences understandable for others and initiate dialogue with a real or fictive counterpart (2nd person perspective).

- *Test-Portfolio*. The Test-Portfolio consists of those materializations of knowledge the students choose to be used as indicators for their achievement of defined learning standards. Building on the previously described portfolio phases, this is not a form of reflection-on-action, but rather a form of reflection-on-reflection (Schön, 1987). Thus students make reflective decisions about which artefacts should be subject to evaluation through a third person. In this context one leaves the private as well as the shared space and finally enters a 'public space' that gives a transparent account of one's learning process and the resulting learning outcomes (3rd person perspective).

Weblogs as Distributed Feed Networks

Since their recent bursty evolution (cf. Kumar et al., 2003), blogs may have become the most popular environments for authoring and networking microlearning contents. Inherent in their nature, they bear the potential to realise a degree of distribution before unknown to a world dominated by monolithic learning content management systems, web-based community portals, and even news servers. The dream of emancipated mass publishing seems to be at the verge of coming true. However, when looking more closely at the infrastructure going with these new instruments in the web, maturity of the technology is still to be achieved.

In Wild et al. (2007) we have identified a shortcoming regarding official and de-facto standards for pro-active social networking and group-oriented, collaborative publishing. We have proposed to complement existing protocols and standards with a light-weight remoting protocol for social network management called 'FeedBack' that allows learners as well as facilitators to automatically set up channel structures for feed syndication and to effectively reduce the management efforts thereof through proper system support. FeedBack enables bloggers to advertise feeds to other users, to request subscriptions, and remote procedure calls to notify about changes in the feed contents. Based on this basic management methods, more complex scenarios can be realised such as *group blogs* (consisting out of several individual blogs that have been networked and aggregated) or *analysis channels* such as my-bird-eye offered by the learning contract tool iLogue (Wild et al., 2007).

Looking at the three types of assessment portfolios depicted in Figure 2, the transition from the work portfolio to the story portfolio and – subsequently – to the test portfolio can be realised through intelligent information routing with feed channels, ex post tagging, and restructuring amendments. A selection of the records of action collected throughout the learning process in the work portfolio can be re-purposed into coherent stories in the story portfolio by re-tagging (see Figure 3). It is possible to use external analysis instruments to cognitively offload structuring work to separate, more specialised tools (in this case of course using FeedBack to syndicate tag-feeds in and out of the blogging environment).

Typically, a reflection process on the level of the story portfolio involves a retrospective look at the run of the learning process which has previously been documented in records of action. A selection of mile-stone like postings can be tagged with a common tag that allows to syndicate a collection of records back to the story portfolio. To outline the learning process, this 'digest' of articles is complemented with one or more accommodating postings.

The story portfolio naturally contains information on individual goals and objectives. Not necessarily order, format, and selection are in line with the expectations brought forward by a formally assessing facilitator. To construct a portfolio apt for grading, the contents of the story portfolio are selectively syndicated and amended into a test portfolio which can be offered to the scoring facilitator via FeedBack again (see upper level of the portfolio pyramid of Figure 3). More explicitly, the following cognitive work and tool use happens in the different portfolio stages:

- *Work portfolio*: records of action document situational knowledge in the form of microcontent; they can be turned into evidence by repurposing them into the story portfolio; microcontents can be given a context meaning exemplified by tags.
- *Story portfolio*: here, learning experiences are accommodated into a coherent story; this digital story telling is by nature episodic and puts the meanings of the work into context; a reflective view on past learning experiences is constructed, amended, commented, summarized by arranging, sorting, and filtering.

- *Test portfolio*: arrange documented learning experiences into a coherent outcome; evidence argumentation on why the learner should be credited with a certain competence certification; presentation & argumentation that this episode of learning gives evidence for a particular competence.

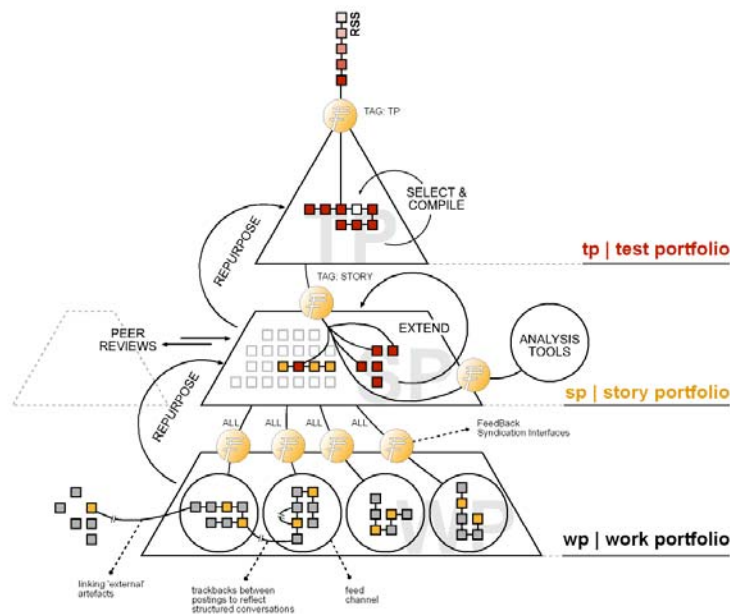


Figure 3. Using FeedBack for Distributed e-Portfolios.

On all three levels, peer interaction takes place horizontally. It is merely a question of organising learning processes in a collaborate way to trigger interaction and consulting with other learners. Peer reviews, e.g., request participants to direct their attention to others' works. Additionally, trackbacks can be used to trace the argument history of conversations. External material can be linked (see lower left of Figure 3).

Tagging can play an important role for the information flow across the levels of the portfolio pyramid: through the use of particular tags or with the help of ex-post tagging, content can be repurposed to play a more vital role on higher portfolio stages. Offering tag-feeds can be used to easily cast feed channels from on stage to another or from one tool to another. One way where this is explicitly used is in the transmission of the final test portfolio selection to the facilitator: here, the desired tag feed that contains all important articles is offered via FeedBack to a facilitator.

Scenarios

When put into practice, the abstract concept of the three portfolio stages can be realized in various ways. By putting a complex set of events and relationships into a story, the problem becomes cognitively manageable and can be better memorized: "Scenarios are devices for improving our perception", as van der Heijden (1997) puts it.

Therefore, the aim of the two use-cases elaborated and collected below is twofold: first of all, we intend to clarify with them the issue of using a work, story, and test portfolio in a real life higher education setting. Thereby, the Augsburg story illustrates how to apply the three portfolio stages within one institution, whereas the ICAMP story serves as a scenario depicting a distributed setting where FeedBack is used for initiating and maintaining the learning network. However, as a secondary goal, the two stories at the same time provide a set of test cases against which any proposed solution can be evaluated to see if it solves all crucial sub-problems: they serve as a 'reality check'.

Within-University Scenario

At the University of Augsburg a portfolio platform is used to support project work within the co-curricular study programme "Problem Solving-Competencies" (cf. Sporer, Heinze, Jenert, Reinmann, 2007). In this programme students are working in self-organized projects (primarily in face-to-face settings). By documenting their working ex-

periences in these projects for their personal learning management, they also construct portfolios that materialize their learning achievements. This makes it possible that such rather informal learning activities can get accredited in the formal curriculum of their studies. The accreditation is based on the three-staged portfolio process described above and will be illustrated by the following example.

A student is participating in a project group of that study programme documents his learning efforts by regularly writing a learning journal and collects evidence for his learning outcomes by aggregating artefacts that are produced within this community of practice. For instance, a student taking part in a group that runs a TV programme live on campus first designs a storyboard, decides to interview an expert at his university, gathers background information, interviews a professor, edits the audio and video material, and finally finishes off the post-production. Each step of this production process is reflected upon in the student's personal weblog. Besides these descriptions of the working activities and the reflections upon them, also documents like the storyboard, the interviews and the progressive versions of the final product are collected. This set of artefacts could be regarded as the working-portfolio in the sense a reflective journal.

The chronological structure of the working-portfolio then is crafted into a story that tells about the student's participation in the project community. Thereby the content of the working-portfolio is re-organized into a coherent story that relates to the lessons learned during the course of personal development. For instance, the student gets involved in the project group that runs the TV programme in her second semester at university. She joins the project group and gradually grows into the practice of that community. In her first semester in the project group she is introduced to the process of producing the programme. Having learned the corresponding basic technical skills, she contributes for another two semesters as a junior member of the community. As she knows the administrative/organizational tasks to manage the project group she takes on the role of 'editor-in-chief'. After another two semesters she decides that she needs to concentrate on her master thesis. She withdraws as an editor and helps her successor to take over her role.

When the student's personal learning history that has been constructed in the story-portfolio is finished it is handed in to the coordinator of the study program. The student then receives a certificate that confirms her participation in the project group and describes the practical, social and scientific skills she has achieved by performing different roles and responsibilities in the project. However, this certificate is not part of her BA-/MA-programme yet. In order to accredit the learning experiences she has achieved in the context of the project group she needs to connect them to the contents of her formal curriculum via the test-portfolio. She picks certain episodes from the story-portfolio and shows how her learning experiences are related to the learning outcomes defined in the modules of her BA-/MA-programme. For this purpose she writes a reflective essay that gives evidence for her learning achievements and arguments how the theory of her major fields of study connects to her experience documented in the working- and story-portfolio.

The technology-enhanced learning part of this use case illustrates how e-portfolios function as a means to integrate learning activities that students experience outside of institutional educational settings and bridges the gap between informal and formal learning contexts by a blended assessment approach.

Across-University Scenario

Within the ICAMP project, a learning design is developed that scaffolds learners into self-directedness, facilitates their cross-cultural distance collaboration, and catalyzes their social networking competence. A typical scenario supported by this model is targeted towards students at several universities in Europe whose facilitators have decided to co-operate their regular courses. Students work collaboratively in multinational distributed project teams on an assignment. In their activities which can be generalized into activity patterns, they rely on tools out of a portfolio of tested tools – tested w.r.t. their affordance to trigger and facilitate this activity in the given situation (cf. Våljataga et al., 2007). Overall, their work is organised into three phases.

Within the *first phase*, each student and each facilitator assembles his/her personal learning environment out of a set of predefined, interoperable tools which are offered in the ICAMP tools portfolio. Typically, this environment consists of a personal weblog, a personal feed aggregator (eventually integrated as a plug-in into the backend of the weblog), a social bookmarking space, and a wiki. Additional to this selection of particular tool types (e.g. a blog) and tool instances (e.g. Fridolin's WordPress powered blog), communication channels need to be established which ensure that every participant reaches the right information at the right time. Again typically, this is achieved by mutually informing each other about the existence of the personal weblog, bookmark feeds, seed project pages in the wiki, and the like using the FeedBack plugin for e.g. the blogging tool WordPress or the social bookmarking application scuttle.

In the *second phase*, students engage in regulation and knowledge work activities pursuing their group assignments. Regulatory activities include, for example, project planning, discussion, and review processes among groups, across groups, and with facilitators. The regulation activities are externalised in regular updates of their individual learning contracts (cf. Harri-Augstein, 1995), thus structuring the conversation. The guiding questions for the learning contracts refer to goals, actions, resources, and criteria. Thereby, the sections on resources not only document which learning artefacts will be used, but also debate the tool selection from the tools portfolio and their proposed use within the joint work. 'Criteria' refers to a specification of the evaluation criteria, how the joint and individual work should be judged in the very end. Typically, regulatory activities take place in the learners' blogs (in the form of comments and in the form of initial contract and contract annex postings that are marked by particular tags). The knowledge work is often documented in a wiki, page by page approaching the size and format of the negotiated project outcome, the 'final artefact'.

The *third phase* finally is dedicated to reflection and evaluation. Here, both – the final contract and the final artefact – are reviewed and judged according to the previously negotiated evaluation criteria resulting in a summarizing blog posting again.

Conclusion & Outlook

Constructing coherent stories out of unprocessed records of action is hard work which is currently only to a limited amount supported by tools. Innovating new tools to develop structure in this raw material is to be investigated in our future work. The aim is to unveil the continuity of learning experience, to discover what became personally significant, and to help building coherence in the learning material. For example, tools to move from tags to a category system, for inspecting versioning histories, for creating different views for different communities could become essential building blocks for future developments.

Compared to traditional monolithic solutions, FeedBack enables systems to distribute the software support of e-portfolio systems, thus liberating them not only regarding the space and time constraints but frees them regarding the choice of their tool landscape supporting them. This lightweight management protocol allows learners to 'pick and choose' in the construction of their personal learning environments. For each purpose, a best-of-breed strategy can be chosen without affecting support choices for the rest of the learning process.

No single portfolio software system (see also Attwell et al., 2007; Sporer et al., in these proceedings) so far combines all the features desired and outlined in this contribution. Only in combination they unfold their power. With FeedBack as proposed enhancement to create interoperability, however, interfacing these applications becomes possible. Additionally, we have already started to investigate mash-up approaches in order to support and ease construction and maintenance of complex distributed learning environments consisting out of various applications and scattering data across many systems. Preliminary results on this are presented in the paper by Mödritscher & Wild in these proceedings.

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