A Practice Scaffolding Interactive Platform

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Abstract. A *Practice Scaffolding Interactive Platform* (PracSIP) is a social learning platform which supports students in collaborative project based learning by simulating a professional practice. A PracSIP puts the core tools of the simulated practice at the students' disposal, it organizes collaboration, structures the students' activity, and interactively supports subject learning. A PracSIP facilitates students' development of complex competencies, and at the same time it supports the students' development of skills defined in the curriculum. The paper introduces the concept, presents the theoretical foundations, and gives an example of a PracSIP.

Epistemic Frames and Epistemic Games: Simulating *Practicum*

In their book *Situated learning* Jean Lave and Etienne Wenger (1991) developed the concept *Community of practice*, which was later to be subjected to further scrutiny by Wenger (2008/1998). A community of practice is a group of individuals participating in communal activity, and continuously creating their shared identity through engaging in and contributing to the practices of their communities and thereby developing a shared repertoire (Wenger, 2008).

David W. Shaffer has worked with the concept in relation to computer based learning. He argues that different communities develop different epistemic frames, that is "[…] different ways of knowing, of deciding what is worth knowing, and of adding to the collective body of knowledge and understanding of community" (Shaffer, 2006, p. 10). Shaffer argues that well established professions like those of doctors, engineers, journalists, etc., each have a particular learning practice, or *practicum*. By simulating such a practicum an *epistemic game* makes it possible for students to learn to *think like* doctors, engineers, journalists, etc. That is, they learn to be a part of a particular community of practice.

Hatfield and Shaffer (2006) define an epistemic game as consisting of "an *activity structure* (the things players do) and a computer-based *epistemic game engine* (the technology players use) which together simulate the process by which adults become fluent in a particular professional practice" (Hatfield & Shaffer, 2006). The examples given of epistemic games are often tools to support a certain subdivision of the practice. To give an example, *Byline* (Hatfield & Shaffer, 2006) supports writing newspaper articles in a certain way, but does not support the interviewing done before writing the article. Nor does the definition imply that an epistemic game engine organizes the collaboration of the players or structures their activities. The organization of the collaboration and activities might be the teachers' challenge; or it might be a task for the students themselves to find out how to act in the game setting.

Practice Scaffolding Interactive Platforms: Simulating *Practice*

A *Practice Scaffolding Interactive Platform* (abbreviated PracSIP) is a game engine or, in my words, an *interactive platform* which is intended to *scaffold* the full *practice*, and therefore includes tools for organizing collaboration and structuring students' activities.

A PracSIP makes students able to simulate (parts of) the community of practice of a professional setting, and thereby helps them develop competencies which are important from an educational point of view. The case presented in this paper is a simulation of (parts of) the community of practice in a newspaper editorial office. *The Editorial Office* (in Danish: *Redaktionen*) is a PracSIP developed by the Danish newspaper *Ekstra Bladet*. The PracSIP builds on a concept paper written by the author of this paper in 2006. It supports many of the activities in a journalist's practice, such as collaboration, planning, research, writing and layout. The students write and layout a newspaper which is then send to a printing office and printed in 4 or 8 pages in color in 1000 copies on real newsprint.

The activity that develops around a PracSIP has a lot in common with project based learning (PBL). PBL is a constructivist pedagogic approach that attaches importance to the student's autonomous interdisciplinary and collaborative work with the subject matter. There is evidence that project based learning can be successful and promote students deep and long-lasting learning (Barron, Schwartz, Vye, Moore, Petrosino, Zech et al., 1998, p. 272f.).

But project based learning is not without problems: "[…] projects offer many attractive promises, but they are often difficult to implement" (Barron et al., 1998, p. 306; cf. Bundsgaard, 2005, ch. 5.3.4.3 and 10.1.4.5). The challenges can be summarized thus: 1) the challenge of chaotic social contexts (organization of collaboration), 2) the challenges of what to do next (structure of activity sequences), and 3) the challenge of promoting subject learning central to curriculum standards (support of subject learning).

Some of the reasons for the challenges can be explained by taking a closer look into the theory of communities of practice. Etienne Wenger states three principles which characterize a community of practice. The members are bound together into a social entity through *mutual engagement*. Members are engaged in actions whose meaning they negotiate continuously. *Joint negotiated enterprise* is the participants' "negotiated response to their situation [which] thus belongs to them in a very profound sense, in spite of all the forces and influences that are beyond their control" (Wenger, 2008, p. 77). The participants have a *shared repertoire of resources*: Words, ways of doing things, routines, actions, artifacts, styles, etc. (Wenger, 2008, p. 83).

The last principle states that the participants have a shared repertoire of rules, steps in a process, knowledge of hierarchies, etc., which are often tacit and inscribed in the practice. Participants in a community of practice know the organization of practice; i.e. they know the rules of *what* shall, must or can be done by *whom*, at *what time*, *where* and *how* in relation to *whom*.

When newcomers are introduced in the community, they get to know the shared repertoire by interacting with more experienced participants as *legitimate peripheral participants* (Lave & Wenger, 1991). But in a community of practice solely consisting of one more or less experienced participant (the teacher) and a number of newcomers, the repertoire of collaboration rules, communication strategies, process steps, etc., has to be introduced in other ways; preferably when it is needed by the individual newcomers, and in a way that makes the process run smoothly. When this fails, the social context is in danger of being chaotic, and the newcomers (the students) have problems finding out what to do next.

For that reason the repertoire has to be more explicit, *reified*, when all participants are newcomers, but it still has to be presented in a way that does not overwhelm the students, making it difficult for them to figure out when to employ which parts of the repertoire. In more complex cases students therefore have to be supported as well in their collaboration as in their individual activity. A PracSIP therefore is an interactive platform that scaffolds both the students' organization of collaboration and helps structure their activity.

Parts of the repertoire (like artifacts, vocabulary, styles) require the students to be capable of doing, knowing, and handling. And some of these activities are central to the curriculum. A PracSIP therefore also integrates support of the students' development of subject related competencies. Shaffer argues that epistemic frames help students see the world in a variety of ways, which are well aligned with the core skills, habits, and understandings of a postindustrial society (Shaffer, 2005). This argument is convincing, but some parts of an epistemic frame might be more relevant in an educational context than others. And some epistemic frames might make it possible to develop more generally relevant competencies. A journalism PracSIP, for instance, can support students in developing their competence of writing, which can be used in many other contexts. The design objectives therefore always have to be double. The developers of a PracSIP must analyze the structure of a reproductive practice (Shaffer, 2005), that is the epistemic frame of a profession, but they must also consider which parts of the profession that demand the most important competencies, and finally they must consider how to support the pedagogical practice to minimize chaos, and support student activity. These triple objectives are equally important, but not necessarily in line with what a professional himself would consider important, when developing a PracSIP.

A central function in *The Editorial Office*, seen from an educational point of view, is the commentary tool which is intended to support and organize commenting on the first draft of the article. The reason for this tool is double. First it is a way of assuring better and more thoroughly revised texts in the final paper. And secondly it is a way of focusing on writing to improve the students writing competence and their reflections on their own and other students' writing. From a journalistic point of view the tool is less important – on a newspaper the practice of giving article critique is often placed after the article has been printed. If the intention of the platform was only to simulate a journalism community of practice, the tool should have been left out. But the central role of writing in the simulated practice as well as in the formal curriculum necessitates focus on students' writing competencies, and makes possible that they practice and reflect on writing in a context where they recognize the importance of producing a well-structured and well-formulated text that lives up to the genre and stylistic demands of a newspaper article.

The core design principles of a PracSIP can be summed up thus: A PracSIP facilitates simulation of dimensions of an authentic community of practice, scaffolds the practice by organizing collaboration, structuring activities, and giving access to the core tools of the community of practice, and it supports development of competencies which can be transfered to other situations.

These design principles appear to be in line with the four principles of design that Barron et al. (1998) propose, and which "can lead to doing with understanding rather than doing for the sake of doing" (Barron et al., 1998, p. 273). These principles are: 1) learning-appropriate goals, 2) scaffolds that support both student and teacher learning, 3) frequent opportunities for formative self-assessment and revision, and 4) social organization that promotes participation and result in a sense of agency (ibid.). The design principles are explicated in the following four sections.

Authentic practice

Shaffer and Resnick (1998) has conducted a meta-analysis of literature on authenticity in education. They found that the term was used in a number of different ways, each describing important aspects of authenticity, but all left out important aspects. Shaffer and Resnick therefore introduce the integrating term *thick authenticity*, which

> [...] refers to activities that are personally meaningful, connected to important and interesting aspects of the world beyond the classroom, grounded in a systematic approach to thinking about problems and issues, and which provide for evaluation that is meaningfully related to the topics and methods being studied (Shaffer & Resnick, 1998, p. 203).

In this paper the term is used in this sense, but the importance of social relations is added as a fifth principle. On the one hand there are internal social relations. Participants in an authentic practice do not do the same work at the same time, but work together by performing different parts of the task, and by being dependent on the work carried out by each other. On the other hand there are external social relations. Engaging in authentic work means to produce something that someone else is supposed to use, consume, or comment on. That is, it is an important aspect of authenticity that it involves social relations between the students and someone outside the classroom, e.g., parents, politicians, peers, etc. *Authenticity is authentic communication situations*.

Scaffolding

The term scaffolding was introduced by Wood, Bruner & Ross in 1976.

> This scaffolding consists essentially of the adult "controlling" those elements of the task that are initially beyond the learner's capacity, thus permitting him to concentrate upon and complete only those elements that are within his range of competence. The task thus proceeds to a successful conclusion (Wood, Bruner & Ross, 1976, p. 90).

In this initial conception the concept was used to describe cooperation on well-defined simple tasks where a parent or a teacher helps a child. The term has been used in a wide area of other contexts, and the extension of the use can be taken even further by talking about scaffolding of collaboration, and scaffolding of individual and collective activity sequences. *The PracSIP thus scaffolds practice*. Below it is argued that it meets the demands of the three components of the scaffolding framework that Roy Pea points out (Pea, 2004, p. 431f.): 1) *Fading*: It must become possible for the learner to do without the scaffold through the use of the scaffold. 2) *Channeling* and *focusing*: The scaffold can consist of reduction of the degrees of freedom for the learner to direct him on the task. And 3) *modeling*: The scaffold can be carried out by modeling more advanced solutions to the task.

Organizing collaboration

In a community of practice mutual engagement among other things find expression through hierarchies, collaboration, and agreements on how to get the job done, how to divide the responsibility, etc. In a simulated community of practice which consists of newcomers, these organizational challenges might be too overwhelming (cf. Bundsgaard, 2005). A PracSIP includes tools to organize the collaboration, e.g. by organizing distribution of roles and responsibilities or by organizing time, deadlines, communication, etc.

In *The Editorial Office* it is done by supporting the distribution of students in different editorial offices, and by a time planning and task distribution tool (producing a simple Gantt chart). The planner (see Figure 1) helps the students decide on which articles to write, who has the responsibility of each subtask (researching, taking photos, writing, layout, etc.), and when each subtask has its deadline. The students are supposed to continuously indicate on the status bar which article and subtask they are working on or have finished.

Thereby the students have the possibility of being aware what their current assignment is, and when they are supposed to be finished. And their teacher has access to an overview of the students' progress.
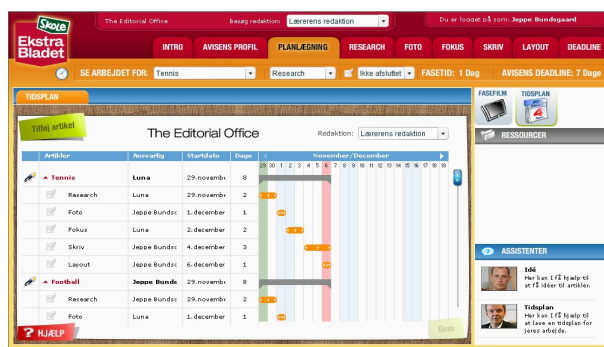

Figure 1. Planner.

Structuring activity sequences

The *shared repertoire of resources* is a cornerstone of a community of practice. One important resource is knowledge of sequences in which activities are supposed to be carried out, and knowledge of dependencies between activities. E.g., you don't layout an article before it is finished and revised.

In *The Editorial Office* a number of activity sequences are *channeled*. The overall sequence of planning, researching, focusing, writing, and layout is reproduced in the order of the menu points. For example when launching their newspaper project, the students start by deciding which kind of newspaper they want. This *profile tool* makes it easier for the students to create a more whole newspaper. When they have decided on the newspaper's profile they proceed to the aforementioned *planning tool*, then they are led further to the research phase, etc. The phases are not cut in stone; the students can jump back and forth between them, but the structure helps the students remember to distribute their tasks, do the research, get the articles revised, etc.

The process of writing and revising an article is also structured by the PracSIP. When the student thinks his article is finished, he saves it and is then asked to change the status of the article by choosing from a list of possible values, the first after 'being prepared' being 'ready for comments' and the last one being 'ready for layout'. The article does not occur in the layout tool before it has been assigned the status 'ready for layout'. The PracSIP thereby impose a certain sequence of activities, but to avoid making the system to in-flexible, it is possible to skip some of the steps in the sequence. This can be seen as a way of *fading* the PracSIP when the students have learned to organize their sequence of activities themselves.

Tools

The *shared repertoire of resources* is much more than the structures of activities. Wenger explains it in this way:

> The repertoire of a community of practice includes routines, words, tools, ways of doing things, stories, gestures, symbols, genres, actions, or concepts that the community has produced or adopted in the course of its existence, and which have become part of its practice (Wenger, 2008, p. 83).

Some of these resources are to hand in a typical school practice (journalists and students use paper, pens, tables, chairs, etc.), others are peripheral to the practice as it is simulated in a school setting, and some must be made available either by the teacher or by the PracSIP.

The Editorial Office includes a wide variety of tools from the world of journalism: photo editor, photo stock, notepad, mind map tool, text editor, and a graphical layout tool, and it includes some tools especially developed for the simulation, such as the aforementioned profile and commentary tools, the planner, and a number of videos and integrated explanations of tools and activities.

Each phase opens with a short video concerning the specific phase. A journalist, an editor, a photographer, etc., talks about the core aspects of the work done in the phase, and communicates some of the core words and concepts to be used in the process. The journalist for example talks about journalistic approaches, the "Hey, You, See and So" model and about objectivity. By working as journalists, photographers, editors, etc., the students immediately use the words, and find themselves in situations like those they have heard about, and thereby the explicit wordings, the roles, and the activities get more embodied and tacit, than if they were just explicitly explained.

Subject learning

Simulating a community of practice is a way of improving motivation and of supporting students' development of multiple epistemic frames. But this might be viewed as secondary to the development of transferable more or less basic skills and knowledge. Often the resources developed in a community of practice build on knowledge and skills which can be seen as very relevant from a curriculum point of view. A PracSIP therefore also supports the students' development of skills and knowledge that are relevant to them.

This can be done through integration of *interactive assistants*, a concept of computer assisted learning which is introduced in Bundsgaard, 2005 (ch. 5.3.3). An interactive assistant is a computer program which guides the students through a complex problem. An interactive assistant builds on a description of an academic area, method or problem, or a core task in the community of practice; it integrates the student's project, sets the scene for the student (and not the computer) to do the thinking, and collects the input of the student in an overview that the student may print and discuss with the teacher and other students, and use in his or her further work. In *The Editorial Office* there are more than 40 such interactive assistants.

To give a short example, the interactive assistant, which helps prepare an interview, starts out by asking the student to write a brain storm on what he wants to find out; then it goes on displaying the students' brain storm, presenting a short explanation of the difference between open and closed questions, and asking him to write up three open questions and three closed questions. On the following page the student's open questions is

displayed, and the student is asked what he imagines the interviewee would answer to the open questions, and he is asked which follow-up questions he could then ask. On the last page the interactive assistant shows a summery of the input, and thereby offers an interview guide to the student, which he can discuss with his teacher, and use when he conducts the interview.

Conclusion

A Practice Scaffolding Interactive Platform (a *PracSIP*) is an artifact, a tool informed by practice, a transformation of resources from tacit structures to explicit structures. It is not a simulator as is a flight simulator, because it does not graphically simulate a world or a person's point of view. It is a tool used by people in *their* simulation of a practice. The PracSIP organizes and structures the participants' practice and thereby scaffolds their learning.

The Editorial Office has been on line one and a half year by now, nearly 8000 students have produced around 600 newspapers, 600.000 copies have been printed. Responses from both teachers and students has been positive and enthusiastic. An electronic survey carried out for *Ekstra Bladet* (Pedersen 2009) showed that 75% of the students (n=182) think that *The Editorial Office* is good or very good (8% find it bad or very bad), and 98% of the teachers (n=97) consider *The Editorial Office* as good or very good. 57% of the students describe them selves as much more or little more active than in 'normal teaching'.

When asked about their judgment of the students' learning outcome, 95% of the teachers (n=96) evaluate their students' academic development as satisfying or very satisfying (42%), and 69% of teachers (n=96) say that the academic level is appropriate. 25% find it hard (1% find it too hard) (Pedersen 2009).

These numbers are very encouraging and clearly support the theoretical deliberations above, but the knowledge of students' learning outcome of working with *The Editorial Office* is still too uncertain. Therefore future research will focus on developing methods to describe the learning outcome of PracSIPs.

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