Informal Learning via Social Media—Preparing for Didactical Designs

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The paper argues that didactical designers, teachers, and researchers can learn from informal learning situations to build a meaningful learning experience in formal education. By illustrating three research projects, five theses will be outlined in order to describe the shift from traditional teaching to "learning to be creative."

Introduction

Informal learning usually takes place when a learner has unsolved issues outside of the formal instruction that is provided by a teacher. Sometimes such informal, unsolved issues are clear problems of which an individual is aware, yet sometimes they are less clear. Imagine that a person who wants to know something starts to search for an answer. Such "unsolved problems" are, for instance, improving a swim style by watching YouTube videos, verifying that information provided by others is correct, observing how a speaker reacts to difficult questions, and so forth. Currently, we also see a change in discussion cultures of daily-life groups: When facts are discussed, at least one person takes her smartphone and googles the information—hence, unplanned learning takes place.

Informal learning makes it clearly visible that the learners are their own pace-makers; they choose the topic and the context, in particular, "learning

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what" (content), "learning how" (pace and style), "learning when" (time), "learning where" (online or a physical location), and "learning with whom" (Shurville et al., 2008). Why is it important to discuss informal learning? Because informal learning can lead to a deeper understanding and a different quality of a learning outcome; it enables the learner to expand her thinking beyond a receptive behavior within formal schooling and beyond the traditional reproduction of existing knowledge.

A combination of both informal learning and formal education might be a win-win situation for learners. The research question is: To what extent is informal learning in formal education designable? Can we create didactical designs for technology-embraced informal-*in*-formal learning? To answer this question, we want to know what informal learning is and what we can learn from it in order to inform and form didactical designs for teaching.

In this article, I will describe informal learning in connection with online groups and social media, and with regard to the understanding of didactical designs. Then I will highlight results from three research projects—InPUD, CSCL@Work, and iPad-Didactics—to illustrate some theses on the way to "learning to be creative."

Emerging Forms of Learning, "Cultures of Participation"

In the past few years, new forms of online communities and new forms of learning have emerged. John S. Brown makes it clear:

> Whatever your particular interest is, there is some niche community, already formed on the network you can join. (…) These resources not only provide facts. They are also tools you can use to build things to tinker with, to play with, to reflect on, and to share with others. And most importantly, you will learn from other people's comments and from what they do with your creations. (Brown, 2009)

The pressure to rethink schooling today is increasing more than ever because the innovation is coming from outside and into the classrooms (Collins & Halverson, 2009). We currently do not know if formal schooling will be replaced or not, but new forms of both formal and informal learning have emerged around the edge of formal schooling (Brown, 2009). Social media affect the relationship between formal education, informal learning out of schools, and at the workplace (Goggins et al., in press). Studies illustrate a transformation in education through innovation in computing (Mørch & Skaanes, 2010; Tuomi-Gröhn & Engeström, 2003). New "cultures of participation" have emerged (Fischer, 2011; Jahnke & Haertel, 2010).

Informal, Non-Formal, Formal Learning

Informal learning is related to incidental learning, "learning en passant" (Reischmann, 1986) and "experiential learning" (Kolb, 1984). According to Kolb's learning cycle, learning occurs in four steps: A learner has a) a concrete experience, b) she observes and reflects, c) she draws conclusions and forms abstract concepts, and d) she tests new concepts in new situations. A person conducts the four steps by contrasting her experiences with the experiences of the others (Schön, 1983; Daudelin, 1996).

Incidental and experiential learning can occur in both planned and unplanned learning situations which are designated as formal, non-formal, and informal learning. The concepts differ in a) the degree of organization; b) formal certificates, credits or a degree; and b) the criterion of "who triggers learning" (Ainsworth & Eaton, 2010). Formal learning is triggered by instructors / teachers and organized by an educational institution. The learner receives credits or a formal degree. Non-formal learning is also a form of planned learning that is organized by an external person, but it occurs outside educational institutions. Informal learning is a self-directed learning situation (or not organized at all) that is triggered by the learner instead of an external teacher. It does not culminate in the conferring of any degree.

The primary difference between the forms of learning is the external organizer. Formal and non-formal learning are related to a teacher and a tutor, who give instructions and rules; informal learning is related to an inspiring environment and supporting structures (Watkins & Marsick, 1992). Online forums, weblogs, and social networking sites (e.g., LinkedIn or Facebook) are just a few examples where informal learning can take place.

Social Media in Academia

In their special issue entitled "Web 2.0 Goes Academia," Jahnke and Kommers (2009) show eight different scenarios for educational workers regarding the ways in which social media can be used in teaching and learning, as well as in research.

Online groups have been studied by many research teams, such as Stahl (2006), Preece and her colleagues (2004), and Wenger et al. (2001). According to Preece's studies, such groups differ in four areas: a) the group size (e.g., groups with 25 members or less to groups with 1,000 or more), b) the primary content (e.g., discussion boards about a stock exchange, online communities on marathon training, and political topics), c) the lifespan (e.g., several years or only for organizing one event), and d) the degree of presence (e.g., online communication, face-to-face communication, or a mixture of

both forms). Online groups (van de Sande, 2010) and social media applications differ in their concepts towards private identity and public accessibility. Private identity means that the users have anonymous nicknames and keep their identity private, whereas the information that they share is public; for instance, in online discussion boards, the content has public access that differs from social networking sites, where a special degree of the private identity is shown.

Didactical Designs for Teaching and Learning

Learning is knowledge construction, and collaborative learning is defined as a form of co-creation of new knowledge among a group of people, that is, "an active process of constructing rather than acquiring knowledge" (Duffy & Cunningham, 1996, p. 171). This represents a shift from teaching, where learning has been seen as information consumption, to a focus on learning as knowledge construction (Barr & Tagg, 1995). The learning paradigm refers to the need for learners to become active agents within the learning process (i.e., prosumers ← producers and consumers). Studies point out the positive relationship between being active and a deeper learning outcome (Chapman, 2003).

Regarding formal schooling, the following questions remain: How to design "active knowledge co-construction," how to design situations where learners are prosumers; what are appropriate didactical designs? The term "didactical design" follows from the German concept of "Didaktik" by Klafki (1963, 1997) and is inspired by Hudson (2008), Fink (2003), and Lund and Hauge (2011), who stress the differences between teaching concepts and learning activities and call them designs for teaching and designs for learning. From this point of view, a didactical design includes teaching objectives (see Figure 1). It also incorporates the plan to achieve those objectives in such a way that the learners are able to develop competencies and skills which the teachers have in mind (design for learning activities). It seeks to transform the teaching aims into learning activities and, finally, it includes different forms of feedback and assessment to assess the learning progress. Process-based, formative assessment seems to be the most effective method to foster learning (Bergström, 2012). The difference from an instructional design is that didactical designs also include the strategy that incorporates the design for social relations (i.e., teacher-student and student-student).

The digital didactical design approach is the advanced model that integrates educational technology. To each of the four design levels, the design-question is: How can information and communication technology, social media or, for instance, iPads support the activity? The benefit from social

media is that it makes learning visible. Mårell-Olsson and Hudson (2008) illustrate in two case studies different ways of compiling digital portfolios in which students develop the ability to "collect, organize, interpret and reflect on their own individual learning and practice and become more active and creative in the development of knowledge" (p. 73).
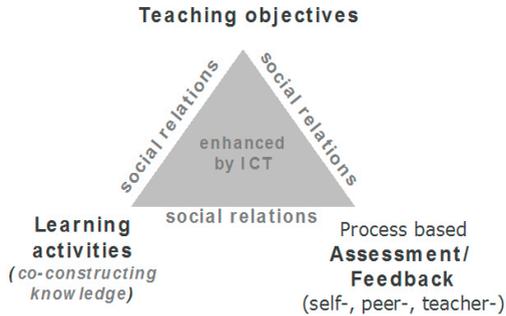

Figure 1. Framework for a digital didactical design

Examples

In the following sections, three projects and derived theses will be described.

InPUD—Informal Learning in Higher Education

InPUD is an example of an informal learning community of approximately 1,500 students that is embedded into higher education. In 2002, an online forum at a computer science program was launched (Jahnke, 2010a). The free and open online forum has been offered to support students in conducting their computer science studies (i.e., the pursuit of B.A. / M.A. degrees). Learning is defined as the co-construction of knowledge among new and senior students, study advisors, and faculty members. The sub-boards exist for a) courses such as lectures and seminars (e.g., to discuss exercises or content of lectures) and b) study organization where, for example, users share knowledge about the computer science study. The decision about the topics mainly depends on what the students want to discuss. InPUD is characterized by a large size and an extended lifespan; it commenced in 2002 and continues today by providing a space for interactions, usually asynchronously. InPUD is a PHP-based technical system. Users need only an Internet access in order to read the contributions. To post, registration with a free chosen username is

required. InPUD supports public communication that is based on the ano-nymity of its users. This is different from traditional learning management systems, which often require the real names of the users.

The data collection, analysis, and redesign were conducted in iterative cy-cles of research and development from 2002 to 2009. The data-gathering process included mixed methods such as open-ended interviews, standardized questionnaires, user statistics, content analysis, and log files. The detailed results about InPUD are illustrated in Jahnke (2012, 2010b, 2006).

One result is that the InPUD community indicates a special feeling of a membership. This ambience is expressed in terms such as "we help each other," "that's the sense of a community" (interviewees). InPUD activates a) the user's perception of having a specific form of social proximity, which is triggered by technology and b) the conative level of learning. The term "co-nation" refers to a concrete action that is conducted by a learner; s/he does not only know, but s/he really acts, s/he is willing to do something and really does (Kolbe, 1990). The concept of conation stresses what a learning out-come really is; the learning outcome is seen by a changed behavior of the learner.

The conative level of learning is often neglected in formal schooling, where the cognitive learning of "what" and textbook knowledge is focused on without supporting the learners' ability to practice such knowledge in action. Traditional teaching neglects the designs for learning as an active process that includes reflective action (i.e., students as prosumers), but also neglects to create designs for social relations among students and between the teacher and the students. To make this gap smaller, solutions such as InPUD can be useful. An online board can be a differentiator that supports the individual needs of the users.

Thesis 1: The addition of informal learning by means of social media ex-pands formal education and leads to an all-embracing learning experience that activates learners on all levels such as the cognitive, affective, and cona-tive levels; this is what we call designing for technology-embraced informal-*in*-formal learning (Jahnke, 2012).

CSCL@Work—Informal Work-Based Learning

Research in the field of organizational learning emerged in 1978 and gained further attention in the 1990s, when challenges centered on the creation of organizational cultures to support existing knowledge sharing. However, the challenge in contemporary companies is the creation of new knowledge, and is driven by a primary question: How do organizations create new knowledge

when the answer to a particular problem is not available within the company; how does one design learning when the answer is not known (Fischer, 2011)?

Within a first workshop at ACM Group 2010 (www.csclatwork.org), it became clear that social media affects collaborative learning at work. The studies by Elizabeth King (2010) and Gurzick and White (2010) pointed out that Facebook, as well as World of Warcraft, play important roles in developing competencies for being successful at work. The resulting book entitled "CSCL@Work, Computer-Supported Collaborative Learning at the Workplace," edited by Goggins et al. (in press), includes thirteen case studies about collaborative learning within the workplace and how it is enhanced by social media.

The results from our meta-analysis indicate that CSCL@Work is a timely challenge for researchers to develop a new, integrated understanding of working and learning as they are embraced by social media. The cases illustrate the following:

a) Learning occurred in unexpected and unusual online learning places through social media: The cases demonstrated unstructured connections to the employee's workplaces in social media.

b) Learning activities by the employees incorporated feedback from diverse people: The successful cases enabled a change of feedback partners and established learning loops.

c) Learning took place across established organizational boundaries: Communication took place with people who were not available within the traditional organizational boundaries.

Thesis 2: Social media enable informal learning at the workplace in unexpected, unusual places and across established boundaries.

iPad-Didactics

The Odder Project began in 2012 in Denmark, where an entire municipality provided iPads to approximately 2,000 students and 180 teachers in seven schools. A qualitative approach, as part of a larger study, was used to explore how teachers used the iPads in the classrooms in Denmark. In April 2012, thirteen classroom observations and ten interviews were conducted in five schools in Odder. The teaching subjects ranged from languages (Danish and English) and arts to mathematics and physics. The classes ranged from preschool (grade 0) to ninth grade. The classroom observations were based on the didactical triangle that included a) the design of "teaching aims," b) "learning activities," and c) "different forms of process-based feedback /

assessment." These three elements are connected by the design of "social relations" and the role of the iPads (Figure 1).

Data from the observations and interviews were analyzed according to each classroom before being open coded (Bryman, 2008). The results from the pilot study show five examples named transformative learning (math, second grade), complex learning (language, grade 0), peer-reflective learning (language, seventh grade), collocated collaborative learning (language and arts combined, eighth grade), and personalized learning (physics, ninth grade), which are illustrated in detail by Jahnke and Kumar (in press). From this study in Denmark, we learned how simple it can be to foster "learning to be creative" by using iPads. The studied classrooms represent active learning that was focused on action where students obtained the assignment to produce something, and while doing so, they reflected and learned. Creativity, which signifies the creation of something new, plays a central role (Jahnke & Haertel, 2010). The teachers did not solely focus on outcomes or exams, nor did they expect students to reproduce the facts. The teachers' designs for teaching and learning included active student participation and student engagement. The teachers had a learner-centered approach. They scaffolded the learning process by providing feedback and personalizing the learning experience for students who experienced difficulties. The iPad served as a "booster" to foster learning as a process.

Thesis 3: When using social media, there is a shift in teaching practices from learning as consumption to a focus on action and a focus on relationships.

What we learned from Odder is that there is a shift from "textbook learning" to a focus on action—when ICT has been implemented in classrooms. Besides the traditional teaching objectives, learning "what" (i.e., information from textbooks), the Odder teachers applied new designs for "learning to be creative" (Jahnke, 2011) adopting the iPads that activated the students to create solutions to problems where no answer was available (i.e., the problem can be part of a task or assignment that is given by the teachers, or the students must find the problem and create tasks.)

Thesis 4: The iPad makes a difference. It is not seen as technology.

When we started our research on iPads in schools and universities, people asked us if there was a difference from laptops. Now, after a first pilot study, we know that iPads differ in many aspects. The most important difference is that the teachers we interviewed said "the iPad works," "you open an iPad

and it works," "you don't waste time like with the laptops where the batteries are out of energy or the software wasn't installed." One teacher's response to our question regarding why there was such hype around the iPads was: "There is no technology in there!" and she pointed her finger to the iPad. Of course, an iPad is made of technical elements and it is a pure technical device. However, with that quote, we understood the teacher's point of view: They perceive the iPad as a device that is easy to use rather than a complex, complicated device. That is one major difference from the laptop.

Informal Learning via Social Media: The Ways in Which It Affects Science

With the emergence of social media applications, online communities, and forums (i.e., Wikipedia, which was launched in 2001; Facebook, which was launched in 2004; YouTube, which was launched in 2005; and Twitter, which was launched in 2006), science has been affected. While collecting and storing significant data each day such as texts, words, videos, numbers, and so forth, the term "big data analytics" has been introduced. The term describes the huge amount of data and the possibilities of analyzing what people do online every second. The concept of big data analytics has been transformed into "learning analytics." The goal of this "booming domain" (Siemens, 2012) is to find appropriate methodologies to analyze big data for specific contexts; for instance, to improve knowledge management in large organizations and to improve learning within the learning sciences and in higher education. Duval and Verbert describe the research area in the following way:

> Learning analytics focuses on collecting traces that learners leave behind and using those traces to improve learning. In this domain, there are two major approaches: 1. Educational Data Mining can process the traces algorithmically and point out patterns or compute indicators. 2. Information visualization can present the traces in ways that help learners or teachers to steer the learning process. (Duval & Verbert, 2012)

A relatively new approach is that of "teaching analytics," which was explored within the first workshop entitled "Towards Theory and Practice of Teaching Analytics," which took place at the Seventh European Conference on Technology Enhanced Learning, Saarbrücken (http://ec-tel.eu/). The motivation for such a new research field is based on high-performance classrooms, which are characterized by 1:1 computers that generate big data. The organizers argued that teachers needed different information in order to make decisions about their teaching plans and practices, and to adjust the decisions

"in a meaningful and actionable format" (Vatrapu et al., 2012). To support the teachers, the researchers want to discuss how to use and analyze the big data using visual analytics methods for reflecting on teaching and learning (Vatrapu et al., 2012).

Thesis 5: Teaching analytics becomes the most important research methodology that complements traditional methods for studying teaching and learning.

However, the question contemplates the purposes for which the data will be used in the future: Is the purpose to improve learning or to control learners? The responsibility and the need for ethical standards in educational work and social sciences are on the increase.

This research is only a cursory example. It shows that traditional research methods such as interviews and surveys, which are mainly based on subjective perception by the respondents (i.e., what they say), will be complemented by more "objective" data (i.e., what they do) by analyzing their logging data. Together, both methods allow the situation—the whole big picture——to become visible.

Conclusion

Berger and Luckmann (1967) explained the social construction of reality. Within the age of social media, this concept has changed into the socio-technically constructed reality; there is no objective reality, but we construct it in complex and often hidden social and socio-technical mechanisms. In this age, emerging forms of informal learning by social media have affected the concepts of learning in companies, in formal teaching, and in higher education. It also affected the socio-technical construction of digital didactical designs.

Is there a gap between the Homo Interneticus (Krotoski, 2011) and the Homo Didacticus? What kind of digital didactical designs for teaching and learning are useful to support meaningful, challenge-based learning in higher education and in schools? What we learned from our studies is that new digital didactical designs include designs for the active co-construction of new knowledge; they have a focus on action and they design the relationships. The approach of "learning to be creative" includes: a) the design of technology-embraced informal-*in*-formal learning that supports the conative level of learning, b) the design for learning in a way that learning at unexpected unusual (online) places across established boundaries will be fostered, and c) the

utilization of social media as a "booster" to intensify learning as a process strengthened through the design for creating social relations.

The approach "learning to be creative" is shifting to a "focus on action," where the social relations among the peers, as well as the teacher-student, are integrated into the didactical designs for a situation that is unknown.

Acknowledgements

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