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## Towards Digitally Literate University Teachers

It is challenging for university teachers to adopt constructivist pedagogical practices and to make e-learning interactive. Drawing on this challenge, one possible definition of digital literacy of university teachers could be “*the ability to create online learning communities enabling cognitive and social presence*”. This particular form of digital literacy could be accomplished by creating learning communities of inquiry. This article describes the characteristics of learning communities of inquiry and presents findings from a study depicting current pedagogical practice in university online education. The findings show that many teachers at the examined universities seemed to lack confidence in their role as creators of learning communities and often adopted objectivist instructional design practices. Finally, conclusions and implications for practice in order to achieve learning communities of inquiry are suggested.

### KEYWORDS

Digital literacy • learning communities • higher education • pedagogical practice

### Introduction

The introduction of e-learning has changed the conception of higher education. According to Garrison and Anderson (2003), the essential feature of e-learning “*extends beyond its ability to access information and builds on its communicative and interactive features... This interactivity goes far beyond the one-way transmission of content and extends our thinking regarding communications among human beings engaged in the educational process.*” (p. 3). The challenge of online education is to create an interactive context, a learning community, with appropriate levels of social presence, providing higher-order learning. To make e-learning truly interactive, it is our assumption that teachers will have to rethink their pedagogical practice to move from the traditional notion of objectivist instructional design to a constructivist pedagogical practice by creating virtual learning

communities. To employ such a pedagogical practice, the university teacher must be digitally literate.

The European Union includes digital competence as one of eight key competences of lifelong learning. Digital competence is described as: “*the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet.*” (European Union, 2006, p. 15). As the notion of lifelong learning becomes more and more important, digital competency among teachers and students of higher education is an essential issue. Related to digital competency is the concept of digital literacy. Definitions of digital literacy are mainly of two kinds: conceptual definitions and functional definitions specifying certain skills (Lankshear & Knobel, 2006; Buckingham, 2006). One example of a conceptual definition is “*the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers*” (Pool, 1997, p. 6). Functional definitions of digital literacy typically comprise lists of skills to accomplish, such as to create a folder on the C drive in a file manager or being able to extract information from the Internet by means of a web browser.

There is however an alternative view of the concept of digital literacy. Digital literacies could be regarded as *social practices of reading and writing* (Lankshear & Knobel, 2006). As a result, one kind of digital literacy is needed to create a new folder on the C drive, while another kind of digital literacy is necessary to create or participate in online communities. Seeing digital literacies as social practices also implies that digital literacies are *situated*, and thus will vary according to time and context. Drawing on this notion, one possible definition of digital literacy of university teachers could be “*the ability to create online learning communities enabling cognitive and social presence.*” This particular form of digital literacy could be accomplished by creating so-called communities of inquiry (Garrison & Anderson, 2003), a concept that is discussed more thoroughly below. The aim of this article is to describe the characteristics of learning communities of inquiry and to illustrate current pedagogical practice in university online education by presenting and discussing the findings of an empirical study.

The article is organised in the following way: first, objectivist and constructivist perspectives on pedagogical practice are described; second, the concept of communities of inquiry according to Garrison and Anderson (2003) is put forward; third, the empirical findings of a study of the pedagogical practice of online university education in Sweden, Norway and Lithuania are presented and discussed. Finally, conclusions and implications for practice are presented.

## Objectivism and constructivism in pedagogical practice

### **Objectivism**

A practice is an institutionalised way of performing work (Berger & Luckmann, 1967). According to Buendia (2000), pedagogical practices are socially constructed practices affected by relations of power in the educational context. The traditional way of viewing pedagogical practice is commonly inspired by the objectivist tradition (Jonassen & Land, 2000). Computer-supported learning has traditionally been based on objectivist theories on learning. The objectivist tradition assumes that knowledge is an object that can be absorbed by students (Duffy & Jonassen, 1992). This assumption originates from the psychological school of behaviourism. The key theory of behaviourism was that of stimuli and response, where stimuli, and combinations of stimuli, were argued to determine reactions (Watson, 1925/1997). The aim was “to be able to reproduce [a] reaction at another time (and possibly in other individuals as well)” by determining “what the situation is that causes this particular reaction” (ibid, p. 20). The behaviourist school inspired many decades of research, which aimed to understand and predict human behaviour (e.g., Skinner 1974).

Objectivists believe in the existence of a real world, external to humans and independent of human experience (Lakoff, 1987). “Knowledge consists in correctly conceptualizing and categorising things in the world and grasping the objective connections among those things and those categories.” (ibid, p. 163). Objectivism states that the world is completely and correctly structured in terms of entities, properties and relations. The goal of learning and understanding is to know the entities, properties and relations that exist. Meaning is seen as existing in the world independently of human interpretation. Individuals have different understandings of the world, based on different experiences. But as the goal is to strive for complete and correct understanding of an existing and objective reality, prior experience and interpretations are seen as leading to partial and biased understanding (Duffy & Johansen, 1992).

Traditional objectivistic instruction is often referred to as transmissive instruction, where knowledge is transmitted from a teacher or a technology to a learner. The model is similar to classical communications theory (Shannon & Weaver, 1963) and implies that good teaching is accomplished by better communication (Jonassen & Land, 2000). The communication model of transmissive instruction is described in figure 1.

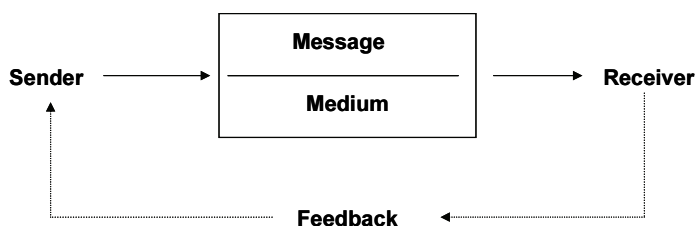


Figure 1. Communications model of transmissive instruction (Jonassen & Land, 2000).

The goal of teaching is to facilitate the transmission of knowledge from the expert to the learner. Teachers structure the world into concepts and representations that can be transferred and then recalled by students. The teacher is argued to be in control of the knowledge transferred and the pace of learning. Errors of understanding are viewed as incomplete knowledge transfer. Enhancing the communication process would thus imply enhancing the possibilities of learning (Leidner & Jarvenpaa, 1995). The objectivistic model may be the most appropriate model in the context of e.g. factual or procedural based learning. The lecture method of teaching is in accordance with this model, as is the assumption of examination as a control of transferred knowledge (Leidner & Jarvenpaa, 1995).

### ***Constructivism***

Constructivism is an alternative model to objectivism. Several philosophers and educators are associated with constructivism, such as Piaget (1970) and Vygotsky (1978). Like objectivists, constructivists hold that there is a real world that is experienced. Constructivism, though, "...claims that reality is more in the mind of the knower, that the knower constructs a reality, or at least interprets it, based upon his or her apperceptions." (Jonassen, 1992, p. 10), Humans are perceivers and interpreters who construct their own reality (Bruner, 1986). There are as many ways of constructing a reality as there are individuals, and there is no correct meaning that individuals should learn. Rather than being transmitted, knowledge is created by each learner (Duffy & Jonassen, 1992). The view of instructions should, on an overall level, be flexible according to students and contexts: "Instruction should provide contexts and assistance that will aid the individual in making sense of the environment as it is encountered." (ibid, p. 5). The context of learning is commonly emphasized. The learning model of *situated cognition* (Brown, Collins & Duguid, 1988; Resnick, 1987) argues that learning is most effective when performed in context and that context is an important part of the knowledge associated with learning. The teacher's role is to be a creative moderator of students' learning processes in the learning context. Learning focuses on discovering conceptual relationships and multiple perspectives, rather than the recollection of facts and procedures. An offspring of the constructivist model is cooperative or collaborative learning. In collaborative learning, learning emerges through interaction between learners. The major goal of collaborative learning is the creation of shared understanding through interaction; an implicit goal is improving communication in the community of learners. Collaborative learning hence assumes that knowledge is created when it is shared (Leidner & Jarvenpaa, 1995).

### ***Learning communities of inquiry***

As noted by Kirschner et al.: "*Constructivism... is neither an approach to nor a model for instructional design. It is a philosophy (of learning) that holds that learners are active in seeking meaning.*" (p. 6). According to Garrison and Anderson (2003), the role of the online

educator is to create a so-called community of inquiry. We regard the concept of community of inquiry to be a facilitator of constructivist learning. The community of inquiry is a learning community composed of teachers and students aiming to facilitate, construct and validate understanding, and to develop capabilities that will lead to learning. Three key elements of a community of inquiry are necessary to reach this aim: cognitive presence, social presence and teaching presence. Figure 2 shows the relationship between these three elements.

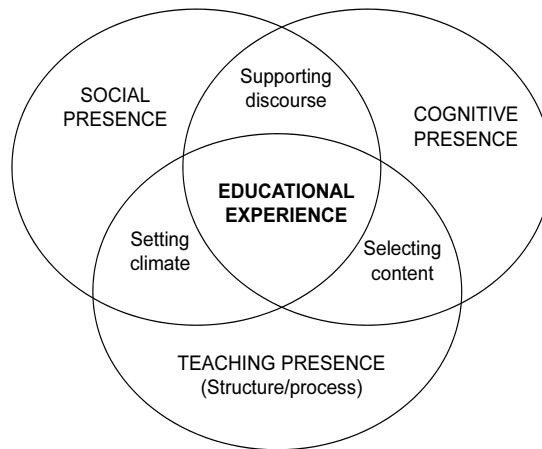


Figure 2. Community of inquiry (Garrison & Anderson, 2003).

Cognitive presence, how the subject matter is treated, is defined as “*the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry*” (Garrison, Anderson & Archer, 2000, p. 11). It means facilitating analysis, construction and confirmation of meaning and understanding within the learning community. Social presence is defined as “*the ability of participants in a community of inquiry to project themselves socially and emotionally, as real people... through the medium of communication being used*” (Garrison, Anderson & Archer, 2000, p. 94). When the medium of communication is purely text-based, establishing social presence can be problematic as written communication lacks the immediacy of face-to-face communication. Teaching presence is defined as “*the design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes*” (Anderson, Rourke, Garrison & Archer, 2001). Teaching presence brings all the elements of the learning community together in a balanced way in accordance with the intended learning outcomes and the needs and capabilities of the learners. To further illustrate the three key elements of the community of inquiry, some examples of categories and indicators of the elements are described in table 1.

*Table 1. Community of inquiry: categories and indicators (Garrison & Anderson, 2003).*

Elements	Categories	Indicators suggested by Garrison and Anderson
Cognitive presence	Triggering event	Sense of puzzlement
	Exploration	Information exchange
	Integration	Connecting ideas
	Resolution	Applying ideas
Social presence	Affective	Expressing emotions
	Open communication	Risk-free expression
	Group cohesion	Encouraging collaboration
Teaching presence	Design and organisation	Setting curriculum and methods
	Facilitating discourse	Sharing personal meaning
	Direct instruction	Focusing discussion

## Empirical findings and discussion

To depict the current pedagogical practice of university online education, qualitative semi-structured interviews were performed at three universities providing public health education in Sweden, Norway and Lithuania. Deans, project managers, course administrators and teachers were asked to describe the pedagogical practice in e-learning environments. In table 2, the data collection at the three research sites is summarised. The interviews were transcribed and the text subsequently categorised into themes by means of content analysis (Krippendorff, 2004).

*Table 2. Overview of data collection at the three research sites.*

Research site	Respondents	Time period
Nordic School of Public Health, Sweden	Dean, project manager and teacher	June and November, 2005
University of Tromsø, Norway	Two deans, project manager, two teachers and two course administrators	June, 2005 and February, 2007
Kaunas University of Medicine, Lithuania	Dean, head of distance education centre and teacher	September, 2004

The findings from the interviews revealed that the e-learning environments of the online university education were mostly used to deliver information and course material from teachers to students, and to submit assignments from students to teachers. The e-learning systems were used to support blended learning, defined as a combination of face-to-face instruction with computer-mediated instruction (Graham, 2006). More specifically, in the blended learning environment, lectures, seminars and group work on campus were

mixed with online web-based course work. The e-learning systems were used in similar ways at the three case universities: for storing, accessing and posting course material and students' assignments.

Text-based asynchronous discussions were used to support group work and discussions on course topics. The e-learning systems were considered to be very useful in information delivery, but not much more: *"The e-learning environment is a good way of delivering information to students. It does not make me a better teacher, though..."* (University teacher, Norwegian university). The respondents stated that it was hard to create lively asynchronous and synchronous discussions in the e-learning system. The interaction quickly wore off and teachers were insecure about how to behave in order to increase the activity. When it came to discussion of matters other than course content, the e-learning system was abandoned in favour of other communication media, such as electronic mail external to the e-learning system or telephone conferencing. As a result, the e-learning system was used for strictly educational, and not social, purposes. Sometimes students were shy and restrictive in sharing knowledge in discussion forums where their postings could be read by everyone: *"We have tried to create student forums, but they [the students] do not seem to dare to talk to each other if they think that we [teachers and course administrators] can observe them."* (Course administrator, Norwegian university). Conversely, some students seemed to be dependent on teachers' postings to maintain the discussion: *"They [the students] answer questions and discuss them promptly, but when the teachers finish adding postings the discussion wears off..."* (University teacher, Lithuanian university).

In contrast, teachers had positive perceptions of the assignment submission feature of the e-learning systems, which was used for student submission and teacher commentary on course assignments. Teachers appreciated the asynchronous, text-based communication which, according to them, provided opportunities for reflection and deep learning of subject matter: *"To be forced to write instead of talk when discussing subject matters enhances the quality of learning. This was a bit of a surprise for me, but I think it is true..."* (University teacher, Norwegian university).

From these empirical findings, it is clear that the university teachers wanted to use media providing interaction (e.g. discussion forums), but were uncertain about how to manage this task successfully. University teachers are to some extent right in being unsure about how to behave in a constructivist pedagogical practice. For example, the question of the relationship between teacher intervention and student participation in online discussions is complex. According to Mazzolini and Maddison (2003; 2007), the way teachers contribute to online discussions influences student participation, but not always in expected ways. On average, frequent contributions by teachers did not lead to more student contributions. However, teachers posting frequently were judged as more enthusiastic and expert teachers than those who did not. Thus, to create a lively learning community allowing student participation is a delicate task.

If teachers lacked confidence in creating communities of inquiry, they felt more confident with the features of the e-learning system providing support in line with objectivist instructional design: information delivery and assignment submission. From the findings, it is also obvious that teachers would like to learn from each other how to create better learning communities of inquiry. Unfortunately, this was not possible due to reasons of information security, as teachers were only able to access their own courses in the e-learning system: “*This is very annoying. It is probably due to a misunderstanding about what information security is. We have to be more open. To be able to study other teachers’ courses would be very instructive.*” (Dean, Norwegian university).

University teachers were in general not successful in creating learning communities of inquiry. For example, the indicators suggested by Garrison and Anderson (2003) of puzzlement, connection and application of new ideas were not present when it came to cognitive presence. No indicators of social presence were found. The example of students not daring to contribute to online discussions when observed by teachers indicated a lack of risk-free expression and of expressing emotions. The finding that students were dependent on teacher contributions to continue the online discussions indicated a lack of encouragement of collaboration. Regarding teaching presence, the sharing of personal opinions and facilitation of discussion were more or less disregarded in favour of correcting students’ assignments. A comparison of the indicators of communities of inquiries and the indicators found in the empirical study is made in table 3.

*Table 3. Community of inquiry indicators found in the empirical study (adaptation of Garrison & Anderson, 2003).*

Elements	Categories	Indicators suggested by Garrison and Anderson	Indicators found in the empirical study
Cognitive presence	Triggering event Exploration Integration Resolution	Sense of puzzlement Information exchange Connecting ideas Applying ideas	Information delivery
Social presence	Affective Open communication Group cohesion	Expressing emotions Risk-free expression Encouraging collaboration	No indicators of social presence were found in the e-learning environment
Teaching presence	Design and organization Facilitating discourse Direct instruction	Setting curriculum and methods Sharing personal opinions Facilitating discussion	Setting curriculum and methods Correction of students’ assignments



With regard to cognitive presence and teaching presence, information delivery was very successful, as was the task of setting curriculum and methods. However, it is apparent that the university teachers felt a higher degree of comfort when using the e-learning systems to instruct than when using them to create learning communities of inquiry. This can be regarded as a failure, since the teachers only seemed to use a fraction of the functionality and pedagogical opportunities offered by the e-learning systems. In contrast, students often extended the boundaries of e-learning systems by using social software and other ways of interacting with their classmates. At the Norwegian university of our study, students interacted frequently by telephone conferencing, thereby extending the boundaries of their learning environment. The Norwegian students did not regard the e-learning environment as a rich means of communication: *“It could never substitute the inspiration and response that you get from meeting teachers/tutors and other students face-to-face. It is aimed at cognitive tasks, not at building relations.”* (Student, Norwegian university). Furthermore, at a Swedish university it was found that a majority of students used instant messaging to support group work (Hrastinski, 2006). As a result, learning could occur by means of social software that is not traditionally considered as being part of the e-learning environments of the university. It is widely acknowledged that most learning occurs outside the classroom (Ramsden, 1992).

## Conclusions and implications for pedagogical practice

The university teachers in our study had most often taught in accordance with objectivist instructional design, even though recent research suggest that they should employ constructivist pedagogical practice in order to improve student learning (e.g., Fredericksen et al., 2000; Hiltz et al., 2000). Thus, they did not fulfil the characteristics of being digitally literate proposed in the introductory section: *The ability to create online learning communities enabling cognitive and social presence*. What could be done in order to assist university teachers in achieving this kind of digital literacy?

As pedagogical practices are socially constructed (Buendia, 2000), they are connected to relations of power and the organisational culture of the educational context. Learning by means of interaction in an e-learning environment could be regarded as an inferior form of teaching compared to traditional on campus lectures and seminars (Keller, 2007). Culture and its impact on the acceptance of a constructivist pedagogical practice including interaction is a crucial issue. The shared values of university teachers must be considered as an influential factor in the creation of digital literacy. To make the use of learning communities in higher education prestigious among university management and colleagues, would probably facilitate the introduction of interactive media and the willingness of university teachers to extend their digital literacy. It is essential that changes in pedagogical practice are supported throughout the whole university organiza-

tion. As the introduction of e-learning might be considered a profound change in practice, it is even more essential to support teachers in creating e-learning courses (Palloff & Pratt, 2001). With the introduction of e-learning, the roles of teachers and students change. It is by no standards a trivial change but one that implies changes in personal teaching styles and pedagogical methods.

The notion of e-learning environments as focusing on providing information seems to be generally acknowledged and appreciated among university teachers. Conversely, the use of e-learning systems to build relationships and create lively discussions was perceived as very challenging. To counteract this notion, it is important to consider the cognitive and relationship-building opportunities provided by synchronous communication and tools combining video, audio and text, inherent in e-learning systems (Hrastinski, 2007). Possibly, the use of synchronous communication could create a more dynamic and lively learning environment, by providing learning in real-time that is more equivalent to talking face-to-face. It is also important to consider that information technology that facilitates interaction without specifying its parameters (e.g. the features of an e-learning system that allows asynchronous and synchronous interaction) demands other kinds of implementation strategies than information technology executing discrete tasks (McAfee, 2006). The use of e.g. chat or videoconferencing might be perceived by university teachers as a new and unknown way of using information technology. As a result, teachers need to become digitally literate regarding how such technologies could be used for pedagogical purposes. In short, when creating e-learning courses, attention should be given to *both* interaction and content, and not just content (Palloff & Pratt, 2001).

Finally, university teachers appreciate learning how to support interaction with e-learning systems from colleagues in an informal manner. As a result, it is important for managers and implementers to provide such opportunities. It is also essential not to prevent colleagues from viewing each other's course material by restricting their access to courses in the e-learning system. In that way, a lively learning community could arise creating a higher level of digital literacy among university teachers.

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