FROM NETWORKED LEARNING TO SMART LEARNING ENVIRONMENTS: A POSSIBLE PATH TOWARD A LEARNING ECOLOGY

Beata Godejord
Nord University (NORWAY)

Abstract
This paper is an endeavour to sketch a conceptual bridge between the experience of networked learning and the ideas underlying the pedagogy of smart learning environments. This endeavour is motivated by the question of how learning in online settings can be made more effective, efficient and engaging on a larger and sustainable scale for learners with different levels of prior knowledge, different background and different interests. Presented study is based on theoretical research and empirical evidence. The theoretical research focuses on identifying common features shared by the concepts of networked learning and smart learning. Empirical research focuses on analysing students’ perceptions of networked learning and linking the analysed data to critical characteristics of smart learning environments. For this study, the concept of a smart learning environment was operationalized by indicators such as effectiveness, efficiency, engagement, flexibility, adaptivity and reflectiveness. The participants in the study were students in an online course in Educational use of social media, Nord University, Norway. The objective of the study serves the goal of defining smart education from the perspective of learners and their role within learning ecologies.

Keywords: Networked learning, Smart learning environments, Social media, Social constructivism, Learning ecology.

1 INTRODUCTION
The rapidly changing and increasingly interconnected world brings upon the challenge of changing and complex learning demands, which in turn press the requirement of adequate educational approaches. The question arises of how to define an ‘adequate educational approach’ in the context of ever increasing change and complexity. Taken change as a setting of ‘action’, an ‘adequate approach’ would certainly connote something ‘current’, i.e. ‘something’ belonging to the present time. Complexity, a quality of being intricate, from pragmatic point of view, might call for a counterpart that would neutralize the trait of ‘being complicated’ and consequently provide a so called simple solution. Following this line of thought it may be concluded that adequate educational approaches are the ones that synchronize current educational trends and ensure feasibility of their application, with technological support, though without an elaborate and costly technological architecture.

Current educational trends place emphasis on learning being an active process; learner-centred on the one hand; collaborative and social on the other; and finally, in the long run, life-long and life-wide. At the same time an attention is drawn to the fact that more and more knowledge is acquired and constructed outside of traditional educational institutions, i.e. on the job, at play, and across various and numerous media platforms. The collocation of agency, in the new scenario, is changing as well, with learners taking greater share of responsibility for learning and each other in the learning process ([1], [2], [3]). The question follows how to orchestrate the ‘personalized’ and the ‘social’; the ‘formal’ and ‘informal’, in short, how to make these unions work jointly towards the ultimate educational goal which is a learning mindset for life.

2 NETWORKED LEARNING AND SMART LEARNING
Both concepts, networked learning - in its technology enhanced form, and smart learning belong to the emerging pedagogical approaches that have been conceived with the needs of the 21st century learners in mind. Their conceptual backgrounds stem from the current technological and cultural contexts and form the response to the challenge of changing skills and requirements.
2.1 Networked learning

Networked learning is a paradigm in learning theory that results from the introduction of digital networked technologies. It has emerged as an idea in the context of rapid changes to social, economic and political structures regarding technology [4]. The concept of networked learning represents a response to the new digitally-mediated communication landscape.

Networked Learning is defined as learning in which information and communication technology (ICT) is used to promote connections: between one learner and the other learners, between learners and tutors; between a learning community and its learning resources [5]. Presented definition places emphasis on technology-mediated connections between the elements of the learning process and interactions between human agents (Fig.1). The role of the technology enabled connections is to facilitate learning from each other by collaborative interaction. Human-human interactions mediated by digital technologies are at the centre of networked learning.

Fig. 1. Technology-mediated networked learning.

Due to its dynamic and social nature, networked learning is situated and contextual. This characteristic locates learners in the role of proactive members of a learning community and transfers the outcome of learning from the acquisition metaphor to participation metaphor [6]. The exemplification of how networked learning is understood in this study can be provided by the concept of personal learning networks (PLN).

2.2 Smart learning

As a technology enhanced educational paradigm, smart learning has its foundation in the utilization of smart devices and intelligent technologies. Despite over a decade long attention, there is no clear and unified definition of smart learning [7]. Various definitions underline various aspects and characteristics of the concept. Notably important features of smart learning include mobility, interactivity, personalization and collaborativeness [8]. From pedagogical perspective, personalization appears to be among the central features determining the ‘smartness’ of learning. Paired with adaptation, i.e. personalization and adaptation, make the term smart learning distinct from the term technology enhanced learning (TEL) [9].

The concept of smart learning pinpoints the importance of technological design to enhance learning. Nevertheless, it has been emphasized that technology, though crucial to the concept, is not the cardinal feature, the prominent aspect being rather learners and the content of learning [10].

Smart learning environment, like any other technology enhanced environment, in principle is to be effective, efficient and engaging. In his preliminary framework for smart learning environments, and based on a convergence of advances in epistemology, psychology and technology, Jonathan Michael Spector distinguishes ten indicators of smartness and groups them into three categories:

- Necessary: effectiveness, efficiency, scalable;
- Highly Desirable: engaging, flexible, adaptive;

The intention of this taxonomy is to provide an outline for operationalization of the characteristics of ‘smart’ versus ‘non-smart’. Despite of being meant as a preliminary framework, the suggested
indicators capture accurately the synergy of technological advances and pedagogical aspects of innovative environments for supporting learning and instruction.

2.3 At the crossroads of ‘smart’ and ‘networked’

Both networked and smart learning contain comparable potentialities for improving understanding and performance (Fig.1). Both types of learning can be ubiquitous and seamless. Ubiquitous means that learning activities can take place in a different space and time for each student. Seamless means that learning is a continuous experience that takes place not only across locations and times but also across technologies and social contexts [12]. Both qualities are central to the concept of distributed learning.

Distributed learning experience, by its decentralized nature, creates favorable setting for personalization of learning process. At the same time technologically enabled and enhanced interpersonal connections provide opportunities for communication and collaboration. In such setting learning may be both individual-based and group-based.

There seems to be a common agreement in the matter that personalization and collaboration with others result in desired learning outcomes [11]. Following working definition, personalized learning can be understood as tailoring learning for each student’s strength, needs and interest – including enabling student voice and choice in what, how, when and where they learn [13]. Conversely collaborative learning is an educational approach that involves groups of learners working together to solve a problem, complete a task, or create a product [14]. While personalization connotes liberation form ‘one size fits all’ approach, collaboration connotes togetherness and thus conformity. These are seemingly opposite directions, yet the combination of positive forces of both orientations may be highly beneficial for building internal motivation to learn.

The distinction between ‘smart’ and ‘networked’ becomes more prominent in the situation of comparing networked learning as a concept with a system conceptualized as smart learning environment, particularly when we look upon such system from the perspective of technological architecture. Key features defining smart learning environments, i.e. context-awareness, adaptive support and adaptive interface [15] are not imbedded in the liquid environments of social networks. Social networks do not provide learning support based on learners’ online and real-world status (context-awareness). They are not systems that offer instant and adaptive support to learners based on their individual needs from different perspectives, e.g. learning performance, learning behaviors, personal factors, etc. (adaptive support). Finally, social networks are not the systems that adapt their interface to their users, e.g. ways of presenting information, learning preferences, learning performance, etc. (adaptive interface). On the other hand, pedagogical strategies postulated for smart learning environments, i.e. conversation, reflection, innovation and self-organization [11] are potentially present in networked settings. Networked environments, or rather human agents in networks, can engage learners in a dialog or facilitate group dialog (conversation). They have potential to offer feedback helping self-assessment leading to improvement (reflection). They rely on new
technologies in creative ways (innovation). Finally, networks are emergent and their resources can be subject to rearrangement (self-organization). However, control mechanisms are not a systemic element here as social networks are not systems sensu stricto.

With comparable potentialities in both smart and networked environments, networked learning presses tougher requirements on the agency and self-regulation on the part of learners. Both environments are adaptive and personalized. However, in case of a smart environment it is the technological architecture that provides solution for adaptability and personalization. Conversely, in case of networked learning it is a learner that adapts to the environment and personalizes his/her process of learning. As this process of adaptation and personalization is immanently embedded in social interaction, a change occurring in one learner can trigger changes in other learners. In this dialectical setting, a network of social interactions may play the role comparable to that played by adaptive technologies in smart environments.

3 IS ‘NETWORKED’ ‘SMART’?

This section presents a small-scale research conducted with a group of students realizing an online course in Educational use of social media Nord University, Norway, in the academic year 2016/2017. The course is a part of study program “ICT and Learning” offered to teachers and teacher education students. The sample population consisted of students 20 students: 17 women, 3 men. The objective of the research was to find out if students’ opinions on networked learning imply characteristics that can be shared with smart learning.

3.1 Research design

3.1.1 Data collection

Data were collected from students’ reflection documents. Reflecting on one’s own learning process and learning outcome is a part of each assignment given to students in the online study program “ICT and Learning”. It is a metacognitive element that requires introspection and self-analysis, and in assumption leads to self-regulated learning with a high level of students’ agency. The analysis focused on the parts of documents where students were reflecting on the advantages and disadvantages of networked learning based on their experience with developing their own personal learning networks with the use of three social media environments: a microblog, a social bookmarking tool and a content curation service.

3.1.2 Data analysis

The technique of examination and interpretation applied to the data was qualitative thematic content analysis. Content analysis is typically performed on various forms of human communications including linguistic and non-linguistic texts [16]. Written documents as artefacts of social communication are amenable to content analysis. Conducted analysis was approached from the perspective of constructivist grounded theory and based on the assumption that “we know the empirical world through language” [17].

Collected data were reduced by descriptive codes. Coding allowed to shape analytic frame, i.e. attribute interpreted meaning to data for later purpose of categorisation and defining emerging themes [18]. Data analysis was conducted inductively. The process of coding occurred without pre-existing model, i.e. without forcing the data into preconceived codes and categories. Assumptions were data-driven, i.e. codes were constructed by naming the data. It was crucial to understand participants’ views from their perspective and therefore follow grounded theory mandate of studying the emerging data [19].

The data were coded with help of a computer-assisted qualitative data analysis software (CAQDAS) NVivo 11. Constructed codes were eventually synthetized into three major themes. The assumption was made that the understanding of a theme as a phrase or sentence that identifies what data means, helps producing an account of the data and builds understanding of phenomena under investigation. The focus was on semantic themes.
3.2 Results

Following the assumption that the more the same concept occurred in the data corpus, the more likely it was a theme, the themes were identified from repeatedly referred ideas (topics that occurred and reoccurred). Based on the space within data items, the salient themes that emerged are as follows:

1. Networked learning is educational. The Norwegian word used by students was lærerik, which in direct translations means ‘rich in learning’. This reflection came from 17 sources and 23 references,
2. Networked learning is efficient: 11 sources, 14 references,
3. Networked learning requires critical approach: 10 sources, 10 references.

The number of references and sources is shown in Fig. 3. Nodes compared by the number of coded references are presented in Fig. 4.

Educational qualities of networked learning were referred to by pointing to the benefits of access to practically uncountable sources of information and as well as the possibilities of interaction with people sharing the same or similar professional interests and goals. Efficiency was referred to as an ease of collecting, storing and accessing learning resources as well as an ease of expanding learning connections. Comparably to the similar studies conducted in former years, the “requirement of critical approach” to web resources was indicated as both an advantage and disadvantage; advantage in terms of training participants in critical thinking, disadvantage in terms of introducing a demand of a competence which not everyone may have at the starting point.

Determining whether and to what extent a learning environment can be considered smart involves snags and difficulties. The challenge lies in the lack of unified understanding of what a smart environment is as well as the vagueness of the very term ‘smart’. As J. M. Spector points to, the driving desire behind the smart learning environments movement is to transform learning and instruction in productive and desirable ways. The smartness that educational technologies are designing into learning environments should result in: effectiveness, efficiency, engagement, flexibility, adaptivity and reflectiveness [11]. Following understanding of effectiveness as an ability to achieve goals and objectives, we may infer that what is named by students as ‘educational’ (rich in learning) constitutes an element of effectiveness in terms of providing inspiration and motivation through richness of learning content and opportunities. From qualitative perspective, in the situation where learning is the goal, a context rich in engaging learning content and opportunities contributes to what is defined as effectiveness. Efficiency, i.e. the ability to be effective without extreme costs and effort, was indicated by students directly and literally. Engagement was implied within data codified as ‘educational’. In online environments flexibility is immanently linked to efficiency. Reflectiveness, if approached as critical attention, may be connected to what students named as the requirement of critical approach to online resources. What remains debatable is the presence of adaptivity in networked learning. Adaptivity as the ability to adjust to different situation is not embedded into social networks as an automatic and immediate response. As underlined in the text earlier, it is rather the
learner who adapts to changing environment not the environment adapting to the learner in the instant response.

Fig. 4. Nodes compared by the number of coding references. Hierarchical chart generated by CAQDAS.

4 CONCLUSIONS AND DISCUSSION

Knowledge development cannot be characterized in a one single way. Cognitive processes are affected by a variety of processes and factors. Despite various conceptions on the nature of knowledge construction, there seems to be an agreement on that meaningful discourse with others facilitates knowledge development. Numerous theories emphasize the social and contextualized nature of cognition and meaning ([20], [21], [22], [23], [24], [25]). The concept of distributed cognitions goes beyond the belief that knowledge resides solely within an individual and brings attention to a system that comprises an individual and peers, teachers, and culturally provided tools. Current shift in cognitive science and educational theory is characterized as a move away from ‘acquisition’ of knowledge towards ‘participation’ metaphor, in line with which ‘knowing about’ is considered a situated activity [6]. From this perspective, networked learning comes as a response to the need of solutions for technology enhanced learning through transformed social practices ([26], [27]). So does smart learning, as in both cases collaboration is a central feature. As shown in the analysis above, a networked learning environment is not identical with a smart learning environment. Though both evidently share certain characteristic. The argument in this paper is that to achieve postulated social dimension, smart learning environments need to adopt the practices and pedagogy of the networked learning paradigm. Furthermore, this adoption should ideally translate to continuous application throughout the whole learning process.

According to the learning ecologies framework proposed by Barron, learning takes place across settings and identities, the possible synergies and barriers between them, including the role of technology, in making boundaries more permeable and allowing for new levels of agency in learning [28]. This liquid, albeit most accurately captured nature of learning ecosystem poses challenge of new didactic solutions and new learning skills. Involvement in social interaction imbedded in networked learning may act as a source of inspiration and a propeller for engagement in case of both didactic design and on the level of individual skills, where, nota bene, it is present as a part of natural human ‘equipment’. In his seminal article “Growing Up Digital: How the Web Changes Work, Education, and Ways People Learn”, John Seely Brown describes a learning ecology as a collection of overlapping communities of interest (virtual), cross-pollinating with each other, constantly evolving, and largely self-organizing [29]. In this perspective, the creation and sustaining a genuinely social environment for learning appears to be crucial. The question arises, and remains open, of how to define the balance between the collective agency and the individual agency. How to reach reciprocal advancement of knowledge development in a collective and individual effort. How to maintain the equilibrium where a sense of “we” does not supersedes the sense of “I”?
Interpretative research, as the one presented in this paper, is prone to the biases as the involved researchers can be, and usually are, a participating element of the research process and research results. There may be as many ways of 'seeing' the data as one can invent [30]. This brings about the issue of the verifiability of qualitative data analysis. The results of the presented study are meaningful from the perspective of the purpose statement, however, not generalizable beyond the data sets.

REFERENCES


