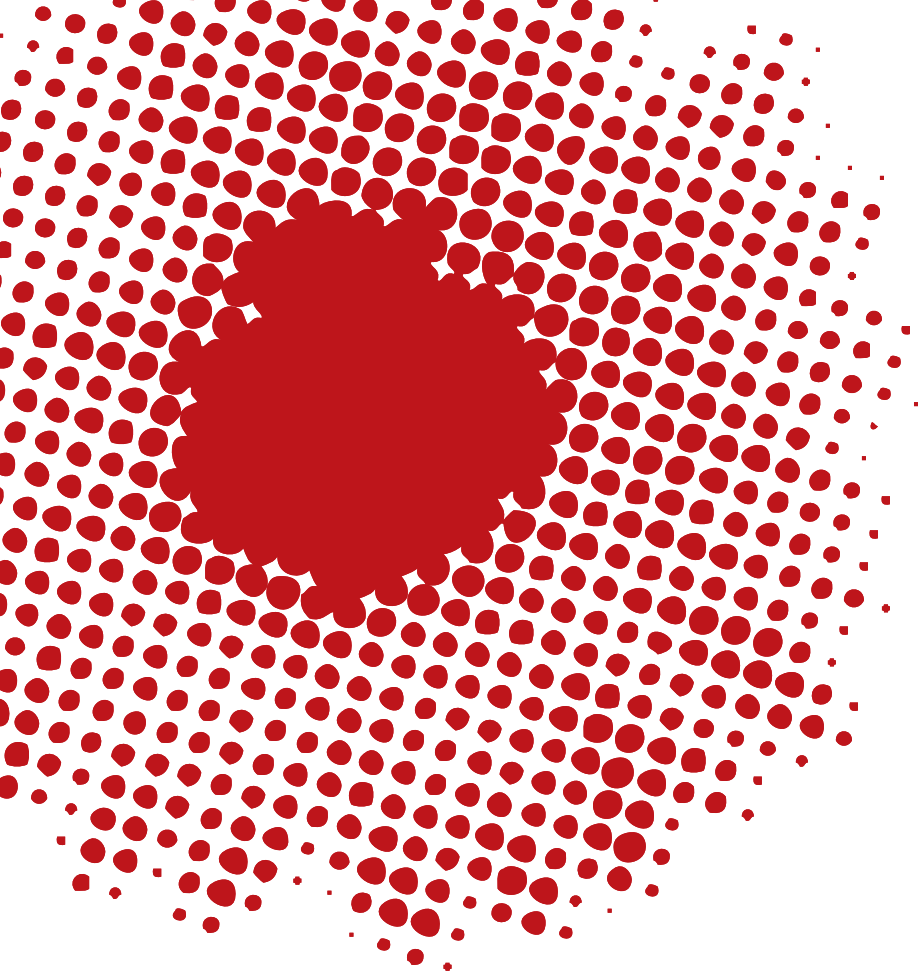

DESIGNS FOR LEARNING

#1-2/10

On the issue of quality of experience in technology supported learning

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Quality in education has been discussed for many decades, and as such the discussion reflects the social accountability to which schools are bound in order to demonstrate the degree to which they fulfill their purpose. What has changed overtime is the way in which quality is perceived and how it is used as both an accountability device as well as a form of change agency (Fredriksson & Snyder, 2004; Power, 2002; Riley & Nutall 1994; Snyder, Acker-Hocevar & Snyder, 2000; 2008). Typical accountability models, such as those found in Great Britain and the U.S. and more recently in the European Union and Sweden as well, focus on student achievement, drop-out rates, student attrition and teacher training as some of the key factors that define "quality" in education (Fredriksson & Snyder, 2004). Presently, international comparison tests such as TIMMS, PEARLS, and PISA are acquiring a greater significance as a "measure of quality". At the same time, many argue that such large scale testing does not consider important factors that relate to learning, and drop-out rates do not necessarily relate to quality education. In contrast to the standard accountability and comparative models of quality, are other systemic models, such as total quality management (Deming, 1986; Juran, 1992) that focus on both process and outcome, and recognize the inter-relationship between the two. Quality, from a systemic model, thus must address a variety of factors in addition to student achievement, including elements in the learning environment, as well as the leadership of the school, the infrastructure and resource allocation, team work, etc. (Murgatroyd & Morgan, 1994; Snyder, Acker-Hocevar & Snyder, 2000).

INTRODUCTION

Considering the concept of quality as an indicator for learning and not just accountability, new questions and dimensions emerge that are stimulated by advances in pedagogy and teaching in a digital age. There is a growing body of research arguing for the need to develop new forms of assessment in a digital age (JISC, 2007). For instance, assessment can include various forms of peer-assessment (e.g. Van der Pol, et al., 2008) and self-assessment (e.g. Leijen, et al., 2009) implying not only that it is important to consider the extent to which a student can "perform" on tests, but also that the social aspects of learning need to be included at the center of the equation of quality in education. Turning to research in the area of technology and media, there is consider-

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able evidence to indicate that, as humans, we are also impacted by the quality of technology, for example in terms of audio, video, and speed of connection (Hestnes, et. al., 2003). Expanding the dialogue on quality in education to also include *quality of experience* with reference to research in the field of technology is essential, we believe, to develop a comprehensive understanding of learning in the digital age. We also perceive that while important, and occurring in small sectors, the concept of quality of experience as an essential ingredient in learning with and through technology has not yet registered loudly enough on the Richter scale to shake the conversations about assessment and quality in the 21st century. It is our hope and intent with this paper to stimulate a dialogue about what is quality in education today. We do not intend to suggest solutions or directions, but rather hope to raise questions and probe the dialogue with some ideas.

THE CHANGING CONTEXT OF LEARNING IN TECHNOLOGY SUPPORTED ENVIRONMENTS

The focus on quality in education originated in a period when classroom learning was the norm, and where the teacher was the dominant source of information. Forms of assessment naturally focused on content and paid less attention to the learning environment. Today, children are no longer confined to their classrooms. More often children are learning actively in groups, within and across schools, and across cultures through the use of technology. They are using the internet as a source of information and they often are co-constructing knowledge using such tools as wikis. Social networking is becoming more acknowledged as a viable skill in the 21st century (Lucas & Moreira, 2009) and digital competence is flagged as essential by educational goals (European Union, 2006; ISTE-NETS, 2007). The conditions for learning are changing, and with this we suggest that so should the dialogue on quality.

In the last decade and half, education has witnessed several paradigm shifts in technology used for learning (Collins & Halvorsen, 2010; Olofsson & Lindberg, forthcoming; Koschmann, 1996). Development has taken place moving from a behavioristic understanding of learning through cognitive theories to social theories of learning (Koschmann, 1996). Now in the fourth paradigm, technology is used to support collaborative learning, including active participation, student-driven learning, dialogue, and community. Learning environments that are created by means of technology have changed from being places only for downloading ready-made educational material to becoming places which make learning with others in a social context possible (Bonk & Cunningham, 1998; Haythornthwaite, 2002; Koschmann, 1996; Stephenson, 2001). Yet, recent studies (Fredriksson, et al., 2008) have demonstrated that most of the innovations related to ICT in schools have not impacted pedagogical or school development. The dominant model based on individual psychology has yet to be replaced with a pedagogy based on socio-cultural aspects. Meanwhile, advancements in the global society have given rise to life-based

competencies that are based on socio-cultural aspects (Wells and Claxton, 2002).

In 2004 and 2006, the European Union Commission on Education identified eight key competencies that should underpin lifelong learning in the twenty-first century, of which "digital competence" is one. The commission's report states that "ICT skills comprise the use of multi-media technology to retrieve, assess, store, produce, present and exchange information, and communicate and participate in networks via the Internet" (European Union, 2006). Included in the equation now is the social dimension, reflecting a pedagogical shift from individual learning to a social-cultural model (Wells & Claxton, 2002). Rychen and Salganik (2003) categorized key competencies for a successful life and a well-functioning society into three broad areas: (1) interacting in social heterogeneous groups, (2) acting autonomously, and (3) using tools interactively. Changes in classroom learning demonstrate that there is an effort to integrate technology in learning, as well as to create social learning models, in which students are active shapers of their own learning with others. This raises the question then about how we assess learning and determine quality in a social learning model in which technology is central to the communication.

MEASURING LEARNING IN A DIGITAL AGE: BACKDROP FOR CONSIDERING QUALITY OF EXPERIENCE

The question of how to measure knowledge and learning has been debated by researchers and educators alike for decades. Deeply seated in questions about what is knowledge and what is learning, debaters claim opposing truths. On the one hand, knowledge is something external, to be acquired, and therefore measureable by studying quantifiable outcomes. Others argue that knowledge is co-created and to measure knowledge requires that one examine not only outcomes but process as well (Borg and Gall, 1989; Guba and Lincoln, 1989). The growing use of technology in learning has challenged this debate even more. In an early conception of computers in education, computers and technology as tools for learning build on a view of learning equal to behaviour, and the assessment practice it spawned was not surprisingly an "instant feedback" practice. Today, however, the social nature of learning combined with the kinds of tools found in Web 2.0, has led to changes in the designs for learning that, in turn, demand that there be changes in the forms of assessment, as well as in what gets measured.

Tuttle (2007) contends that assessment in the 21st century need focus on examining "broader accomplishments of learners" than traditional forms of assessment address. Portfolio, or e-portfolio is one such solution, focusing on the presentation of achievement, including the process of learning over time using different web 2.0 tools (podcast, pictures on Flickr©, video, etc). Sommarville et al. (2008) argue the need for a multi-faceted assessment model that is "scenario, performance and problem based" in order for students to

demonstrate their knowledge, rather than merely play back facts. Their assessment model is web-based, in an attempt to include a learning environment with which both youth and workers in business are already highly familiar. The Australian vocational education and training (VET) system has also adapted their assessment practices to meet the digital age (Clark, 2009). Quality online assessment, according to their model, calls for, among other things, individual, peer and collaborative assessment, monitoring online interaction and contributions, and authentic learning performance.

HASTAC (2009) provides an online discussion forum in which they pose three important questions: 1) how do we better align grading and assessment so that they are more in line with how students are learning today? 2) How can digital media be used to develop new grading and assessment strategies? 3) How can we grade, assess, teach and structure the learning experience for students in the digital age? Their questions suggest that, as a community of educators, we remain deeply challenged to adapt and expand all aspects of learning to match the natural opportunities for learning and work that digital media afford us today. One can abstract from such discussions that measuring knowledge in virtual platforms is more complex than in traditional classroom settings and calls for us to think more deeply and broadly.

The collaborative nature of learning and knowledge development, brought about by web 2.0 tools, creates a need for forms of assessment that address both the pedagogical and the social-communicative aspect of human interaction and experience. Furthermore, human interaction and experience are not only influenced by the tools used but by the presence of technology itself. In this sense, we thus argue for assessment models that also focus on quality of experience in human interaction as it occurs though technology.

In an earlier paper Snyder (2007) stated that, "No longer are we living in an era where "online communication" is a separate phenomenon from our daily lives. It now permeates our organizational walls and human systems to create a digital culture, which is reflected by the integration of technology in everyday life such that our human systems of interaction and work transpire in a physical and virtual space interchangeably". As technology extends opportunities for communication and human interaction, it also challenges the ways in which humans experience the exchange, potentially altering the quality of experience, and the quality of the communication. We suggest that it is in this growing context of a digital culture that it becomes important to consider quality of experience as a central factor in learning. But when it comes to the experience of technology, experience is often taken for granted and assumed to be alike from person to person. In meeting technology of different kinds, the way different humans have access to technology is perhaps something other and more than can be defined by bandwidth for broadband, or skills in terms of digital literary.

Nilsson (2005) provides a framework for discussing access to technology, giving access a wider scope than possession. Access is in Nilsson also a ques-

tion of possibility and use, giving access a framework where the experience of the technology not only lies in its use, or in its presence or non-presence. Nilsson defines five different barriers that have the user of technology and the user's intentions at its centre. The barriers he provides are: have; want; may; able; dare. In this framework, experience from a user perspective can also be positioned. Quality of experience from a user perspective then includes factors such as beliefs, norms, values, as well as intentions, skills and possibilities. We thus argue that, if designs for learning assumes, as part of its goal, the development of a quality learning experience for students, this will necessarily have to include both motivational parameters for learning in virtual environment alongside parameters for the assessment of knowledge development.
More and more we hear stories of teachers who develop an online course with good intentions, and then experience that students do not engage: they lack motivation or they do not or are unable to take advantage of the tools and opportunities afforded by social online learning contexts. In Panichi (2010) building on areas already identified by Salmon (2004), the following variables are identified as playing a key role in learner motivation and participation in virtual worlds: clear course design, the nature of the environment; the scope of student self-determination; strong peer collaboration and appropriate technical initiation. The picture that begins to emerge from the different perspectives regarding both assessment in a digital learning space as well as good designs for learning using technology raises new questions about the quality of experience for the learner.

From a pedagogical perspective, we concur with the vast majority of researchers who promote alternative forms of assessment in the digital age and who argue for the need to analyse the pedagogical event from a broader perspective. Yet, in our own review of the state-of-the-art we see a lack of focus on the need to examine the role of technology in particular in creating conditions for a quality experience. While new models of assessment in the digital age incorporate a focus on the social, there is little attention, at least articulated attention, given to studying the presence of technology and the quality of technology as a definer and shaper of the quality of learning experience. We contend that, as the lines between virtual and real become more blurred, there remains an element of the virtual that superimposes an added dimension to the human interaction, rendering the quality of experience different from a face-to-face exchange. It is critical, we argue, to be able to understand this dimension when considering how to measure learning and knowledge in the digital age.

QUALITY OF EXPERIENCE: EXPANDING THE MEANING FOR EDUCATION

Our growing experience with a variety of technology, in particular social software, has led to a digital literacy through which end users are quick to assess whether the software will meet their needs. We have all experienced the difference between a website that is inviting, as well as those that are unorgan-

ized or messy. We stay for long periods of time interacting with websites that are pleasing and depart rapidly from those that we experience to be chaotic. The quality of our experience is central to our exploration and our learning. In the context of skype© or other teleconferencing or video-conferencing software, we usually have high expectations that we will have an undisturbed human connection. When the bandwidth is slow or the connection is broken, the quality of our experience is diminished, and communication theory would suggest that the quality of our communication is also diminished. If communication is central to learning in online environments, then quality of experience, we argue, is a central ingredient in the equation to measure learning in the digital age. What, though, is "quality of experience"?

Quality is a subjective term, and needs to be operationalized within a given context. As a concept, Quality has two primary meanings (ASQ, 2010) "1. The characteristics of a product or service that bear on its ability to satisfy stated or implied needs; 2. A product or service free of deficiency. Deming (1986) and Juran (1988) gave popularity to the term as they operationalized it in the context of the business community, shifting focus from inspection of product outcomes to improving organizational process through the people who use them. Their premise was that the process and persons who make products and services was the key to successful delivery and both satisfied customers and the quality of the product had a direct relationship to the quality of experience among workers who produced the product.

Quality of experience as a concept is perhaps quite subjective. According to Wikipedia and other online sources, "Quality of Experience" is a subjective measure of a customer's experience with a vendor (Wikipedia, 2010). Within the technological sector, quality of experience is the newest buzzword to watch for and is the "sum of technology and service leading to the delivery of customer satisfaction in a multimedia experience" (Jenkins, 2008). If we were to use the same language in education, we could state that quality of experience is the sum of content and learning situation and social interaction for students. In an online learning environment, it is the sum of interaction, interactive design, social connection, and pedagogy. The question is: How much of this do we understand and take into account when developing measures of learning in technology supported learning environments?

As there is little discussion about quality of experience in technology supported learning environments, we turned to other fields. We found the dominant discussion about quality of experience in virtual settings was driven by researchers in the field of technology development. Their focus and interest has been on the quality of experience with the technology, be it the quality of video, audio, etc. (Hestnes, et. al. 2003). More recent interest has focused the research in the area of "presence" using this factor as a defining variable through which people perceive their quality of experience. Gaggioli et. al. (2003) state that the "largest body of psychological research on virtual experience has focused on the concept of presence, generally defined as a user's

subjective sensation of 'being there'" (p. 122). However, they argue that this is not enough; quality of experience needs to include other affective elements that are experienced in both the virtual and the non-virtual setting. Awareness is growing, according to them, about the complex nature of virtual experience. In other words, it is not enough to consider the quality of technology nor is perceived presence enough to understand the quality of experience among users creating, thus, the need to include the affective dimension of the experience. This finding reminds us of the current dialogue in education about the need for alterative forms of assessment and portfolio assessment in virtual learning environments. At the same time, an examination of the discussions in technology adds greatly to our understanding of the complexity of quality of experience for education.

Gaggioli et al. (2003) presented a model in which they argue the importance of understanding quality of experience as both a psychological and cultural phenomenon. To understand an experience, one has to understand the context, as well as personal challenges and skills possessed by the user. In an online learning environment, learning includes variables other than pedagogy and content and didactics. It includes the cultural, the communicative, the psychological. In the following model, we attempt to interconnect the different dialogues on quality both from education, technology, and business sectors to suggest the need to further explore quality of experience as an essential factor in measuring learning in technology supported learning environments.

In the context of the digital age and networking society, we perceive that models of learning and assessment need to expand beyond the traditional cause and effect to recognize the systemic and complex nature of learning and knowledge development. Therefore, factors that impact quality of experience are presented in a circular form, indicating their dynamic and inter-related nature. The factors that we have identified to date and propose for consideration and dialogue are: access to technology, user friendliness, audio quality, visual quality, reaction time, authenticity, human presence and technology presence, as well as learning style, communication style, learner expectations, experience with digital media, and interactive design. In addition to these factors, one also needs to bear in mind the multiple inter-relations among the different factors themselves. Outcomes are defined by level of participation, collaboration, creativity, and achieved learning goals and outcomes for the learning assignment. While we recognise that this list is not yet exhaustive, we hope that we have begun to shape an investigative framework that gets at the qualitative nature of learning today and helps to generate knowledge about how to measure learning in the digital age. For teachers, it becomes important to recognize that it is not sufficient to put all course materials out on the web and invite students to dialogue around a topic (a simplified example). Teachers need to understand that each student's quality of experience will necessarily be determined by a host of factors within and outside of the teacher's control, and that they will necessarily contribute to their own learning and achievement.

Moreover, we are learning from research on learning management systems (LMS) and computer mediated communication (CMC) the importance that authenticity plays in shaping quality of experience for the end user. LMS, for example offer the end-user a combination of synchronous and asynchronous functions and tools that can be used at users' discretion, providing a quality of experience that addresses psychological and practical dimensions. In response, pedagogical innovation has taken place, represented by a move away from a traditional model of learning environments based on transmission, towards an understanding of learning environments as social arenas for knowledge construction, active participation and collaboration (e.g. Dillenbourg, Baker, Blaye & O'Malley, 1995; Lindberg & Olofsson, 2006), once again impacting quality of learner experience. Moreover, recent developments in CMC (Computer Mediated Communication) pedagogy in virtual worlds shed new light on how we experience and understand learning and communication (e.g. Deutschmann, Panichi & Molka-Danielsen, 2009). Indeed, the degree to which a virtual environment is authentic and reflects the personal interest of its users is an important factor in quality of experience for end-users and its applicability to serve pedagogical innovation and business work processes (Hampel, 2003; Warschauer, 1997).

Quality of experience in a digital media environment, then, one could argue, is multi-dimensional. On the one hand it, refers to the quality of ex-

change between persons. On the other hand, it also includes an aspect regarding the quality of interaction with technology. In a face-to-face setting, the latter dimension is not present. Yet when technology becomes an integrated member of the human communication and exchange, its presence becomes one of the variables of study for understanding quality of experience in human communication, exchange and learning in a digital age. Interpreting the notion of quality within the context of learning in a digital environment one can conceive of the term as it relates to quality of technology, quality of didactics and user interface, quality of human exchange as it occurs via technology. We suggest that the three elements together define the quality of experience for teacher, students, and professionals alike, and that assessment of learning in digital environments should include all three.

CONCLUSION

We set out to stimulate new dimensions in the dialogue on measurement and quality in education. Wanting to update the focus to recognize the impact that technology has on pedagogy and learning today, we borrowed from different fields of study to understand what goes into the notion of quality. As learning is based on experience and exchange, we found it compelling to explore more specifically the notion of quality of experience within the context of technology supported learning environments. Specifically, we want to raise questions about what the term means and how we understand it in relation to measurement of knowledge and achievement. In an accountability dominated sector in which education finds itself, it is quite tempting to select a more simple measurement of quality. We believe, however, that to do so ignores the complex nature of learning, and in particular the nature of collaborative and social learning in a technologically driven society.

There is much research needed to understand fully the context. Furthermore, it is important to recognize that the pedagogical orientation to which one subscribes shapes greatly one's response to what is quality and is it necessary to discuss quality of experience in relation to technology supported learning. The pedagogical orientation from which this paper was written finds its home in the contemporary movement toward collaboration and social learning models. It is within this context that we believe the dialogue regarding quality of experience is essential. Further, we suggest that any such dialogue needs to be multi-disciplinary. Some of the research questions that we began to explore in our own thinking include: what are the factors that underlie examining and understanding quality of experience for the learner? How do they impact on the learner's motivation to participate and engage: technically, psychologically (emotional reaction to learning), cognitively (approach to learning)? The role of technology in life-long and life-wide learning today in formal and informal settings thus expands the scope of our designs for learning, and necessarily the dialogue about measuring learning. Our interest in this question was stimulated initially by a proposed project to study changes in

online communication as a result of enhanced technology. Yet our collective thinking has been charged by the variety of research that we come from including language studies, communication and culture, quality management, and pedagogy. This rich background has led us to look beyond the traditional questions of assessment of learning in education to more fundamental questions about what is happening to humans and learning today as a result of the intense exchange and interaction we have with one another through digital media.

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