

The challenge of quality in peer-produced eLearning content

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Summary

Peer production and user-created content is becoming an important element in modern eLearning, supported by the development of the Internet from a one-way information distribution channel to a two-way communication channel. In the peer production of eLearning content, the essential feature is that the learners are also acting as creators of the content and that the separation between an “author” and a “consumer” is blurring. In practice, learners are no longer purely consumers but they actively participate in the learning process and thus influence it. This fundamental feature is also imposing a different view on quality.

Peer production is not only a novel method to produce eLearning content, but it is also an approach to empower a wide variety of professionals to the learning content production. However, the quality management challenge related to this kind of content can undermine the merits of the method.

A number of useful tools and approaches are currently being applied to ensure and improve the quality of peer produced eLearning content. This article introduces QualityScape, a method developed by the European QMPP project, as an important approach in assuring the quality of peer-produced eLearning content. The fundamental finding in our work is that quality is the result of the interplay between peer production of digital content and peer validation processes of digital content. Overall, the key issue in this project is to develop a holistic approach to the peer production, which enables the effective utilization of this unique method of content creation.

Keywords: educational content, quality management, peer production, user-created content, elearning, QualityScape, content creation, peer-to-peer education, QMPP project

1 eLearning content creation and peer production

1.1 Definition of peer production

Peer production as a method in content creation for eLearning can be defined to include the digital content created, edited, enriched and validated by peers, in other words by people on the “same hierarchical level”. The contemporary examples in the Internet of peer-produced digital content include popular sites by e.g. YouTube, Facebook, MySpace, slashdot.org etc. Often “peer” is described as “a person of equal social standing, rank, age, etc.” However, in the context of eLearning content creation, the peers should also be defined by their characteristics. Thus they should also be open-minded, perceptive and aware of their competencies and responsibilities in terms of effort, attention and reaction rate. They can also be expected to possess strong relational and auto-critical skills, exhibit good relationship management and a deep subject matter competence in a specific sector of knowledge. (Fischer & Kretschmer, 2008).

In the context of involving peers in the educational process, some use also the term “peer-to-peer education”. Peer-to-peer is also often linked in the technical sense with the “peer-to-peer

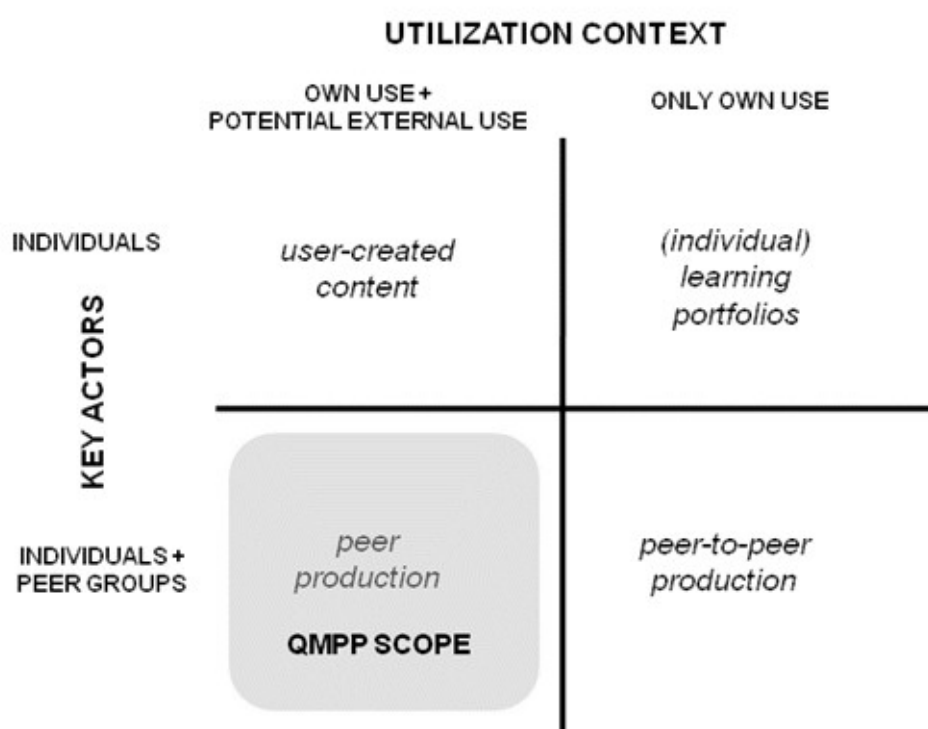
networks”, which describe mainly the technical linking of several computers with another as equals. Some authors claim also that the concept of peer-to-peer networks is increasingly evolving to an expanded usage as the relational dynamic active in distributed networks - not just computer to computer, but human to human. Thus e.g. Yochai Benkler claims that associated with peer production are the concepts of peer governance and peer property in the digital world (Benkler, 2006).

The term of “peer production” in the learning context has similarities with the term “user-created content”. User-created content has no widely accepted single definition, but according to the guidelines published by the OECD in their study, user-created content can be defined with three criteria, which are the following: a. content is made publicly available over the Internet, b. it reflects a “certain amount of creative effort”, and c. it is “created outside of professional routines and practices”. (OECD, 2007).

The research literature on this area has been mainly describing the digital artefacts produced by various individuals. The importance of the peer groups is growing, and in eLearning content area the impact of the peer group is essential, as the members of the peer groups can take different roles and as the members of the peer groups also possess different competences. The peer group members should be willing to share materials, re-edit existing ones and create knowledge and they should have a clear and explicit objective to support each other in order to grow together (Fischer & Kretschmer, 2008). The “group emphasis” is also highlighted in the discussion of “informal learning” - e.g. Jay Cross states that informal learning is strongly fuelled by the communication of peers and that this communication is the critical element in informal learning (Cross, 2006).

In the European project “Quality Management of Peer Production of eLearning” (QMPP) we also emphasized that the communicative element is essential - and the communicative element should be fostered by the strong involvement of the peer group in the eLearning content creation. The focus of the work of the QMPP project according to the different approaches is summarized in picture 1 - QMPP scope.

Picture 1 - QMPP scope



1.2 Growing importance of peer production

The potential peer production and user-created content has been supported by the development of Internet from one-way information distribution to two-way communication - the Internet browsers with their various plug-ins have been becoming essential tools for wide distributed content creation. Many scholars, such as Yochai Benkler, claim that ordinary users will enter the nucleus of digital content production (Benkler, 2006).

In particular, these novel opportunities have been discussed in conjunction with the development of "Web 2.0", which has opened up new opportunities also for peer production. The "Web 2.0" development is enabling the participation of a wide amount of individuals and peer groups to various discussions and development activities. The peer production mechanism has been central e.g. in the development of Linux software and the Wikipedia movement (on Wikipedia, see Lih, 2009). The new working forms and their consequences have been discussed in more detail e.g. by Don Tapscott and Anthony Williams (Tapscott & Williams, 2006).

The peer produced content can also reach through the Internet new users. Thus it can be also described as the "long tail" of learning provision - i.e. providing also such content elements, which are not used by a wide audience, but which might be critically important for certain target groups. The "long tail" idea and its opportunity for endless demand has been discussed in more detail by Chris Anderson (Anderson, 2006).

An elementary discussion linked with the potential of the peer production has been sparked also by the work of James Surowiecki and his notion of the "wisdom of the crowds" (Surowiecki, 2005).. Surowiecki as well as Charles Leadbeater (Leadbetter, 2008) have discussed the theme how "many are wiser than few" and how this knowledge creation and knowledge assessment can be distributed and thus also made more precise and efficient. However, in the contemporary discussion peer production of digital content has also been criticized in promoting "the cult of the amateurs" and thus promoting the content creation of amateurs without appropriate quality approach. This discussion has been initiated in particular by Andrew Keen (Keen, 2007).

Furthermore, in modern management literature the importance of co-creation experiences and their importance to the value creation has been emphasized in particular by C.K.Prahalad and Venkat Ramaswamy (Prahalad & Ramaswamy, 2004). Their main argument is that the market is becoming a forum for conversation and interactions, and that the management and facilitation of this dialogue is the key in value creation process. Their view of the market means that the market is becoming instead of a seller-buyer-market rather the arena for co-creation of value. According to their definition, the key building blocks for the interaction between users and providers of services can be defined as dialogue, access to important information and resources, risk-benefit assessment by the users, and transparency of work and working methods (Prahalad & Ramaswamy, 2004).

The aspect of "dialogue" is the essential element in eLearning content creation by peer production. It is elementary that the dialogue focuses on issues that interest both the users and the providers; that there is a forum in which the dialogue can occur; and that there are clear rules of engagement that make for an orderly, productive interaction. The web-based environments provide usually such a "forum", where not only the users and the providers can meet, but also the users can meet with another. C.K.Prahalad and M.S.Krishnan develop this idea further in claiming that the co-creation of value can also occur on the global level, and that the co created experiences can be even more personalized (Prahalad & Krishnan, 2008).

Thus it can be concluded that the facilitation of peer involvement is seen as one elementary factor in the overall improvement of learning and training provision. However, regarding the quality aspects and quality mechanisms of peer production it can be seen that relatively little

attention has been paid to the quality assurance of this new production mechanism of eLearning content.

2 Peer production of eLearning content in vocational education and training

2.1 Peer production in the work context

In the vocational setting, it is important to understand how work-related knowledge should be managed. The views expressed more than ten years ago by Ikujiro Nonaka and Hirotaka Takeuchi in their work on the knowledge creation in companies, and in particular, on the models and patterns how to alter personal knowledge to corporate knowledge, and how to collect tacit knowledge and convert tacit knowledge to explicit knowledge, are essential also in organizing and utilizing peer production (Nonaka & Takeuchi, 1995). The essential challenge for peer production of eLearning content is to accelerate the transformation of personal knowledge towards corporate or common knowledge.

The essential element in successful knowledge management is that the creation and utilization of knowledge is not limited to some key individuals, but is rather seen as an elementary part of the work of all co-workers. However, it is also important to highlight that effective knowledge management can be an important - if not the most important element - in creating learning resources within a company (Ahmed et al., 2002).

In addition to the general description of the novel opportunities of the “Web 2.0” and its various tools and methods, one of the essential aspects to be discussed is linked with the ownership of jointly created content, which will be an important issue to solve in any organization (see Ghosh, 2005; Hietanen et al., 2007).

The potential of peer production is not only limited to the knowledge creation and distribution by the professionals. For instance in the health care sector, Internet is growing in its importance as a critical resource provider for other non-professional users. In many cases, the critical amount of content in the healthcare area is created by peers - providing their experiences, hints, examples, and providing also space for empathy and camaraderie. Numerous studies show also that an important proportion of the users utilise - in addition to the “clinical content” provided by the official healthcare sector - also these user-created Internet resources (Houston & Ehrenberger, 2001; Demiris, 2006).

The peer production as a production mechanism has been challenging the conventional production metaphor in some interesting areas. The most well-known example is the development of Linux - based on the open-source ideology. As Tapscott et al. note, the creation of Linux illustrates how the Internet has enabled many contributors - all acting independently in their own self-interest, create a highly integrated “good” that provides value for themselves and to others (Tapscott et al., 2000).

It is also interesting to note that the corporate field has taken new technologies and solutions in peer production on board differently. The recent Finnish study showed that the wikis are increasing in various companies as an important method to document and distribute important knowledge (Henriksson & Mikkonen, 2008). However, in the virtual worlds the experience is negative - according to the studies of Gartner Research, the vast majority of virtual world projects launched by businesses fail within 18 months. In addition, fully 90% of business forays into virtual worlds fail because organizations focus on the technology rather than on understanding the needs of the employees using it (see Information Week, 2008).

2.2 Peer production in vocational education and training

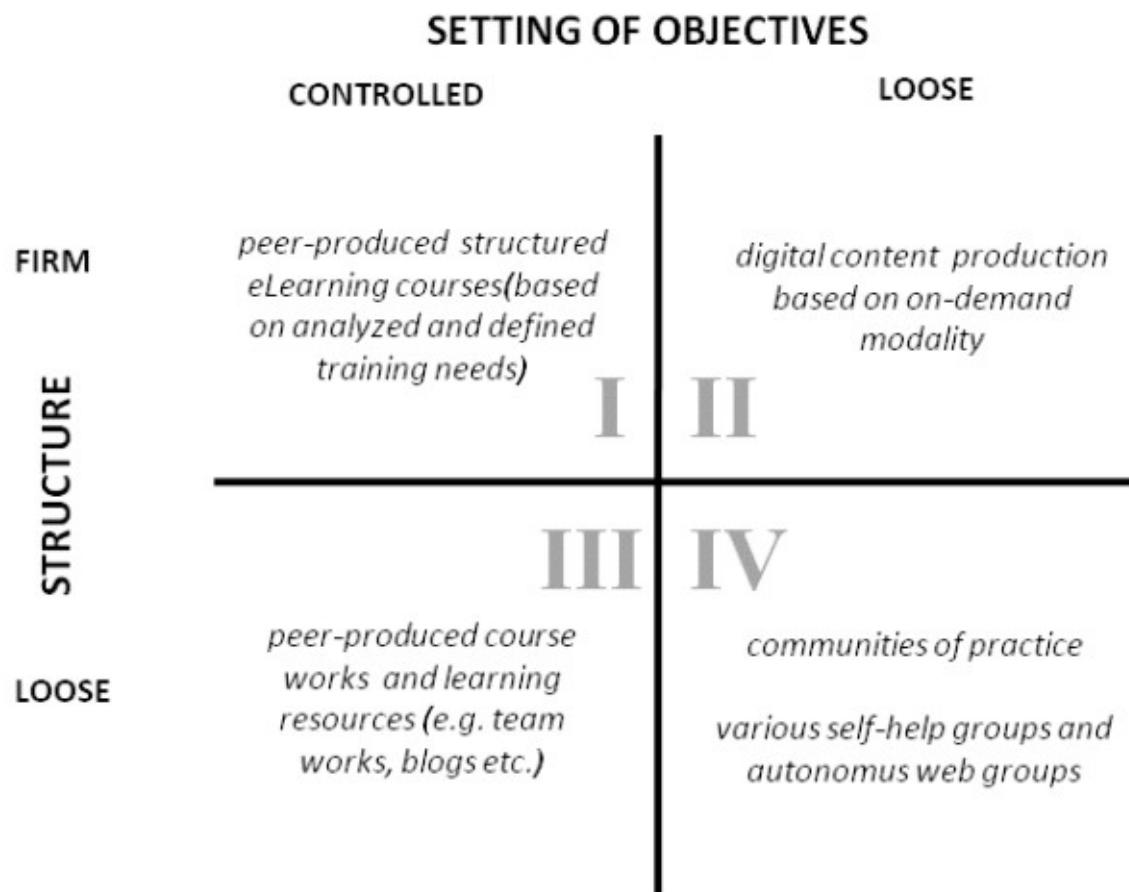
If peer production is an inspiring method in the joint knowledge creation and knowledge refinement, it also has a lot of potential in the area of vocation education and training. As many authors have claimed - and Jay Cross with his concept of "informal learning" (see Cross, 2006) probably with the sharpest edge - the companies and organizations have hugely underutilized in their training and learning activities the potential of the employees with practical experience and thus created learning resources and materials, which do not correspond to the needs and style of the users. In addition, in many organizations much additional work is undertaken due to this "doubling" and "re-authoring" of the same content.

The new opportunities for peers in different organizations have been created by the various professional online communities known as "communities of practice" (see Wenger, 1999). Although already previously the professionals of different areas have been networking and exchanging their experiences, the Internet has opened novel avenues for sharing experiences and insights. As Moore also points out, networking is taking place both between the organizations as well as within the organizations among peers (Moore, 2003).

We came out in the QMPP project with a simple classification of the various critical dimensions of peer production in eLearning content. The two critical (see picture 2 - Structure vs. Setting of objectives) dimensions are

- setting of objectives - who is setting the objectives for the peer-produced content: is it controlled and unified for all potential peer producers (e.g. a framework of a "course") or is it relatively loose (e.g. in Wikipedia authoring an article of my personal interest)
- structure - what structure is given: is the structure firm (e.g. composed of certain elements, tools and requirements) or the structure loose and not pre-defined (e.g. peers can use tools and structure of their own choice).

Picture 2 - Structure vs. Setting of objectives



3 Quality approaches to peer production of eLearning

3.1 Altering focus of quality

The quality of eLearning has been discussed and researched in many European projects as well as in many recent articles. Ehlers and Pawlowski describe that in the discussion on quality of eLearning one can distinguish between three different aspects in the discussion, namely

- different interpretations of quality
- different stakeholders with different perspectives on quality
- different forms of quality (input-quality, process-quality, output-quality).

This discussion has also led to different interpretations of quality - and numerous definitions from various fields are available (Ehlers & Pawlowski, 2006).

In the peer production of eLearning content, the essential feature is that the learners are also acting as creators of the content - in the new learning settings the separation between an “author” and a “consumer” is blurring. In practice, learners are no longer purely consumers but they actively participate in the learning process and thus influence it. As the borders between user and author are blurring, so do the roles of student and teacher.

This fundamental feature is also imposing a different view on quality, as quality is often to be defined and assessed by the same group of actors as the actual creation of the learning content. However, the quality approach to peer production can be more than just an emphasis on self-evaluation and its practices.

Many quality approaches also in eLearning rely on the conventional quality cycle. This quality cycle has included - since the writings of W. Edwards Deming in the 1950s - the steps of PDCA (Plan, Do, Check, Act). This approach has been modified during the last decades in many different ways, and also applied into the area of vocational training. Wirth has presented that in eLearning the essential steps could be to plan, to do, to check, and to compare (Wirth, 2006).

In the development of a quality approach to peer production, the quality approach would mainly address the “process quality” issues - in other words: which processes implemented are assisting the quality of peer produced eLearning content. In addition, in regarding the quality processes, the peer production of the learning materials in their quality assessment can also be linked with benchmarking - or even more precisely, towards “benchlearning”.

3.2 Quality development of peer production

Ehlers discusses the quality development in what he is referring to as “eLearning 2.0”. In describing the phenomenon “eLearning 2.0”, he points out that it describes a number of developments, trends and points of view, which require change from teaching to learning. The new point of view essentially connects e-learning with five characteristics:

1. Learning takes places always and everywhere (ubiquitous) and therefore in many different contexts, not only in the classroom.
2. Learners take on the role of organizers.
3. Learning is a life-long process, has many episodes and is not (only) linked to educational institutions.
4. Learning takes place in communities of learning (so called communities of practice). Learners participate in formal, as well as informal communities.
5. Learning is informal and non-formal, takes place at home, at the work place and during leisure time and is no longer centered on teachers or institutions. (Ehlers, 2008).

Initially it seems paradox to talk about the quality of “eLearning 2.0”, as quality is often linked with checking by externally imposed standards. However, quality can also be understood in a development-oriented way, which means the enabling of learners to develop themselves in

their own learning processes and consequently reach better results as far as quality is concerned. In this view, methods of self-evaluation, reflection and peer-evaluation are seen as more important. This kind of quality methodology does not have anything to do with normative, universally valid, but aims at improving the quality of the learning process. (Ehlers, 2008)

In the “eLearning 2.0” learning approach, the learner has an important role as active constructor of learning materials (co-creator), personal learning environments and initiator of his or her own learning processes. Interestingly, this is a characteristic, which is often felt to be a barrier for integrating eLearning 2.0 into formal educational processes. This is because the competition of learners and teachers and/or other institutional actors during quality assessment seems to be insurmountable and only resolvable through a loss of power for the institution. (Ehlers, 2008)

3.3 Technical tools supporting quality of peer production

The key to the potential to use Internet and its services in vocational education and training stems from the fact that the metaphor for using Internet has changed from information distribution and delivery (which we call the “Web 1.0”) into active participation and information creation by the users (which we call the “Web 2.0”). In particular, with the introduction of “social media” and “social networks”, the peer production has been recognised, not only as a challenge the traditional education and training, but also creating a new valuable approach into education and training - and particularly in the eLearning development.

In education and training development and implementing eLearning we also can claim that there is a move towards “eLearning 2.0” in which different web communication and information flow tools are used in educational and learning purposes. However, the (open) social networks and social media are critical for peer production and its integration to traditional learning approaches. We understand that “social media” is describing the media environment, which enables mutual participation, information production and receiving, handling and providing it for others to use. As discussed in previous chapters, the social media have been essential in the success of user-created content. We see the (open) “social networks” as a prerequisite for successful peer production.

One important feature in the recent development is also that the creative power of the users has been nurtured by the provision of different media for peer production. Thus the users are not limited to text only - they can also produce easily and cheaply their content by other media, such as photos, images, audio clips, video clips etc. Another important feature is also that in addition to the conventional computer networks, also novel networks - such as mobile networks - can be widely used.

At the moment there are already available a number of technical tools (often in the open source environment) supporting the quality of peer production in eLearning include, among others, the following:

- blogs
- wikis and other text based collaboration formats
- tagging and social bookmarking
- media sharing
- podcasting
- social tagging and folksonomies (see e.g. Anderson, 2007).

4 The quality challenge

4.1 The quality challenge of peer production in eLearning

The importance of peer production of eLearning content will grow especially in the sector of vocational education and training as well as in professional continuing education. Many organizations face challenges of shortening life-cycle of learning content as well as operational

challenges in providing required learning content with short lead times and lower costs. However, it is also understood that the learning content produced by peers (based on professional experience) can be more accurate and attracting than “clinically produced” learning content by external eLearning experts.

Peer production has great potential in the area of vocational education and training. The future workforce in Europe in many professions has not only to access and handle great amounts of information and knowledge, but even more importantly to produce various elements of information by themselves as an integral part of their work. Peer production is not only a novel method to produce eLearning content, but it is also an approach to empower a wide variety of professionals to the learning content production. Thus it has also an important democratic element in bringing the work-related learning content production to the actual level of users, tutors and learning supporters.

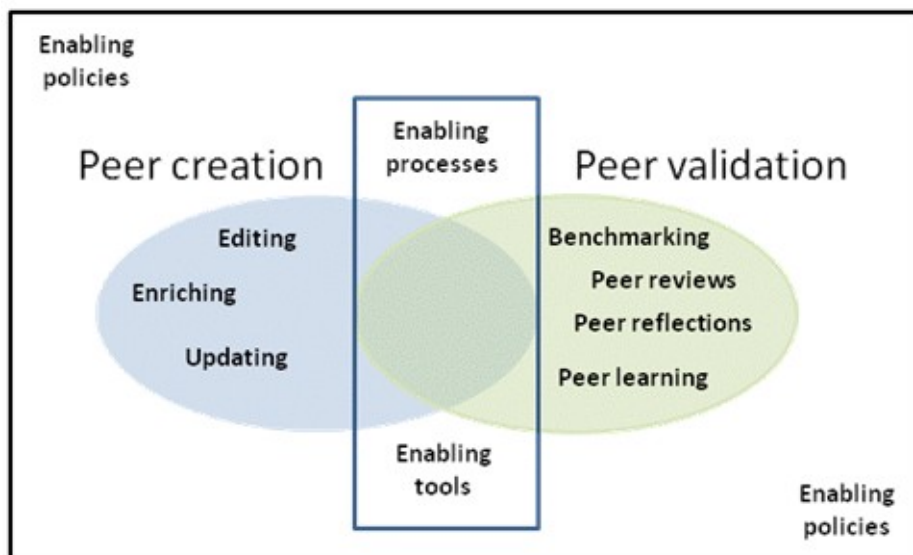
The quality management challenge in eLearning content produced by peer production can, however, undermine the merits of this approach and method. The quality work methodology in peer production is at its best dispersed and fragmented. Often it has also been claimed, that the very nature of peer production is its free flow and thus any formal mechanism (including the quality approach) would be drastically against the creativity factor. At the moment there are already a number of useful tools and approaches used (such as tools for peer reviews, tools for creating own wikis, dictionaries etc.) to ensure and improve the quality of peer produced eLearning content. However, it is important to emphasize that peer production requires also enabling and supporting structures and their effective management. The key issue in this project is to develop a holistic approach to peer production, which enables also the effective utilization of this unique method.

4.2 The QMPP model - QualityScope

The essential work of the QMPP project was to develop a solid approach on how to support the quality management of peer-produced eLearning content, pilot the approach four different VET (vocational education and training) entities, and to produce a joint toolset for the learning providers of quality management of peer-produced eLearning content.

The fundamental finding in our work on quality of peer production is that quality is created as interplay between peer production of digital content and peer validation processes of digital content. Naturally peers have different roles at different times - they can participate in the quality process as creators, but their role is essential also as validators (see picture 3).

Picture 3 - QualityScope of the QMPP project



In peer creation there are different modes of work, which actualize on different times. The creation work can include authoring the content (such as making a new article or video), editing of the digital content (such as proof-reading), enriching the digital content (such as adding new information or new media) or updating the content (such as updating the existing content with contemporary data).

However, the key aspect in the quality management of peer production is the active and thorough peer validation work. The peer validation work can include benchmarking (comparing the produced content with other sources), peer reviews (systematically validating the content with other peers and peer groups), peer reflection (reflecting the content with other peers) and peer learning (joint learning and mutual development through continuous assessment).

In the following table (see table 1) we have summarized some typical activities during in the peer creation - peer validation work.

Table 1 - Various steps in peer creation and peer validation

Peer creation (including peer authoring)	creating digital learning content by authoring, editing, enriching and updating using various media
Authoring	(shared) authoring of texts and other digital resources; creating images, audio materials, video materials; creating content for wikis etc.
Editing	(shared) editing of digital content (from proof-reading to translation), creating alternative navigational routes, creating collages etc.
Enriching	creating additional digital content, publishing individual works and team works, sharing or learning (b)logs, adding library links, social bookmarking etc.
Updating	monitoring existing content, updating existing content, adding specific area content etc
Peer validation	validating digital content with subject matter experts, validating content with peers, rating the validity and usability of the content etc.
Benchmarking	identifying of good cases and practices for comparative purposes, identifying of additional digital resources, identifying areas of lacking content etc.
Peer reviews	providing feedback by peers of learning goals, progress and aims within a learning community
Peer reflection	encouraging the reflection of learning processes by means of own experiences and sharing the reflections within the learning community or between different learning communities
Peer learning	joint learning also by the exchange of learning experiences and learning outcomes, such as e-portfolios

Quality management of peer production of eLearning must also focus on providing enabling processes and enabling tools to foster work phases in which peer-created content shall be peer-validated. The enabling policies for peer creation, peer validation and quality management must thus support the entire process of peer creation and peer validation, by providing enabling tools and suggesting enabling processes.

It is also important to emphasize that the different phases in the QualityScape are not always following each other in a linear order. Rather it can be seen in practical work in peer production that the different phases are intertwined with another. Thus it is obvious, for instance, that the validation phase can trigger additional content creation, which again can be validated.

5 Conclusions

Peer production of eLearning content is a growing trend. Peer production plays an elementary role in creating, validating, enriching, editing, and updating of digital learning content. It is important to pay growing attention to the quality management and support of peer production in

eLearning, as peer production as a content production approach will also enable accelerated new learning material production and also updating of existing learning materials.

The very nature of peer production is its free flow and thus any formal mechanism (including the quality approach) could be seen to be in conflict with the creativity factor. At the moment there are already a number of useful tools and approaches used (such as tools for peer reviews, tools for creating own wikis, dictionaries etc.) to ensure and improve the quality of peer produced eLearning content. The challenge is to increase the understanding of the importance of quality also in the area of peer production; this would also enable to fluent exchange of peer-produced eLearning content.

The European QMPP project developed the "QualityScape" as an approach to the quality assurance of peer-produced eLearning content. The QualityScape emphasizes that quality is created as interplay between peer production of digital content and peer validation processes of digital content. Peers have different roles at different times - they can participate in the quality process as creators, but their role is essential also as validators.

References

- Ahmed, P.K. - Kok, L.K. - Loh, A.Y.E. (2002). Learning through knowledge management. Butterworth Heinemann.
- Anderson, C. (2006). The Long Tail : Why the Future of Business Is Selling Less of More. Hyperion.
- Anderson, P. (2007). What is Web 2.0? - Ideas, technologies and implications for education. JISC Technology and Standards Watch, Feb. 2007, retrieved July 24, 2008 from <http://www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf>
- Benkler, Y. (2006). The Wealth of Networks. Yale University Press.
- Cross, J. (2006). Informal Learning: Rediscovering the Natural Pathways That Inspire Innovation and Performance. Pfeiffer.
- Demiris, G. (2006). The diffusion of virtual communities in healthcare: Concepts and challenges. Patient Education and Counselling 62, 178 - 188.
- Ehlers, U-D. - Pawlowski, J. (2006). Quality in European e-learning: An introduction. In Ehlers, U-D. - Pawlowski, J. (Eds.): Handbook on Quality and Standardisation in E-Learning. Springer.
- Fischer, T. and Kretschmer, T. (2008). Benchmarking Peer Production Mechanisms, Processes & Practices. Deliverable of WP3 of the QMPP project. Retrieved September 23, 2009 from <http://www.qmpp.net>
- Ghosh, R. A. (2005). CODE - Collaborative Ownership and the Digital Economy. The MIT Press.
- Henriksson, J. - Mikkonen, T. (2008). Wiki-kokemuksia suomalaisissa organisaatioissa (Experiences of Wikis in Finnish organizations). Tampereen yliopiston hypermedialaboratorio, Hypermedian verkkojulkaisu 18, 2008.
- Hietanen, H. - Oksanen, V. - Välimäki, M. (2007). Community Created Content. Turre Legal.
- Houston, T.K. - Ehrenberger, H. E. (2001). The Potential of Consumer Health Informatics. Seminars in Oncology Nursing 17 (1), 41 - 47.
- Information Week (2008). Virtual Worlds, retrieved July 17, 2008 from http://www.informationweek.com/news/personal_tech/virtualworlds/showArticle.jhtml?articleID=207800625
- Keen, A. (2007). The Cult of the Amateur: How Today's Internet Is Killing Our Culture and Assaulting Our Economy. Nicholas Brealey Publishing.
- Leadbeater, C. (2008). We-think: The Power of Mass Creativity. Profile Books.
- Lih, A. (2009). The Wikipedia Revolution: How a Bunch of Nobodies Created the World's Greatest Encyclopedia. Hyperion.
- Moore, M.G. (2003). Network Systems: The Emerging Organizational Paradigm. The American Journal of Distance Education, 17 (1), 1-5.
- Nonaka, I. - Takeuchi, H. (1995). The Knowledge-Creating Company. Oxford University Press.

OECD (2007). OECD Working Party on Information Technology: Participative Web: User-created content. DSTI/ICCP/IE(2006)7/FINAL. OECD.

Prahalad, C.K. - Krishnan, M.S. (2008). The New Age of Innovation - Driving Co-created Value through Global Networks. McGraw-Hill.

Prahalad, C.K. - Ramaswamy, V. (2004). The Future of Competition - Co-Creating Unique Value with Customers. Harvard Business School Press.

Surowiecki J. (2005). The Wisdom of Crowds: Why the Many Are Smarter Than the Few. Abacus.

Tapscott, D. - Ticoll, D. - Lowy, A. (2000). Digital Capital - Harnessing the Power of Business Webs. Nicholas Bearley Publishing.

Tapscott, D. - Williams, A.D (2006). Wikinomics. Portfolio.

Wenger, E. (1999). Communities of practice: learning, meaning, and identity. Cambridge University Press.

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