

# COMMUNITIES OF PRACTICE: PEDAGOGY AND INTERNET-BASED TECHNOLOGIES TO SUPPORT EDUCATORS' CONTINUING TECHNOLOGY PROFESSIONAL DEVELOPMENT IN HIGHER EDUCATION

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## **Abstract**

Advances in information and communication technologies (ICTs) as well as modern pedagogical perspectives have created new possibilities to facilitate and support learning in higher education (HE). Emerging technologies bring opportunities to reconsider teaching and learning. New ideas and concepts about the educational use of new technologies transform the roles of teachers. In this context the key question of this study is: whether learning as part of a (virtual) community of practice supports teachers' technology professional development. Different learning alternatives such as distance learning, workplace learning as well as blended forms of learning will enhance lifelong learning which forces a rethinking of traditional forms of education. However, most institutions for education foster just-in-case learning while new technologies foster just-in-time learning. As a result of new learning perspectives and the potential pedagogical benefits of ICTs in educational contexts, teachers have to learn how to integrate new technologies in teaching and learning. It is recommended that teacher professional development should be situated in multiple learning settings in which learning is teacher-centred. Next to classroom settings and cross-institutional learning communities, virtual learning communities (VCoPs) are a significant source for learning. There is an overlap between the educational values of internet-based learning and social theories of learning such as Lave & Wenger's situated learning theory and Wenger's theory of communities of practice. Drawing upon these theories, offers a perspective on social learning that emphasizes social processes within (V)CoPs where community participants engage in collective learning and knowledge creation. The data discussed in this paper have been drawn from a cross institutional setting at Fontys University of Applied Sciences, The Netherlands. The data were collected and analysed according to a qualitative approach. The paper concludes that VCoPs are learning environments since these network-based learning communities push learners to take more control of their learning and provide tasks which are more contextualised and meaningful.

Keywords: Emerging technologies, communities of practice, technology professional development.

## **1 INTRODUCTION**

Society and (higher education) have changed rapidly over the past few decades due to the digital revolution. New technologies bring opportunities to reconsider teaching and learning [1]. This development is reinforced by a generation of students that grew up with ICTs and that have become used to the availability of information in a synchronous or a-synchronous way. However, new ideas and concepts about the use of ICTs in the classroom transform the roles of teachers and students. Despite the potential benefits of emerging technologies in HE, efforts to introduce ICTs in the classroom has not yet enjoyed much success [2, 3]. Cuban [4] and Fischer et al. [5] argue that little has changed since the fundamental goals and understandings of education have not changed and teaching and learning continue to be perceived as a matter of information transmission rather than constructing knowledge. Cox [6] supports these findings and claims that effective use of ICTs in education demands a substantial change in pedagogical practices and methods. Coto and Dirckinck-Holmfeld state that "one of the most important factors in any educational change is to change teachers' practices" [1; 54]. Consequently, educators' traditional technology professional development (TPD) needs a qualitative change by providing teachers with new pedagogical practices and methods of using ICTs in order to create a better understanding of its potential pedagogical benefits in HE.

Effective ICTs integration is based on a philosophy of learning that promotes a student-centred approach, in which learners construct rather than receive knowledge. Traditional training and learning approaches are based on a formal delivery of knowledge. These traditional approaches, however,

cannot cope with the increasing demand on educators to use and incorporate emerging technologies in their teaching [7]. To accomplish their new roles, educators need to learn to work with a new set of ICTs skills and knowledge. In order to deal with these challenges, educational institutions are putting efforts into setting up continuing technology professional development (CTPD) programmes which are run by ICT experts who support educators with the integration of technologies in teaching and learning [8, 9]. Unfortunately, most of these efforts often fail due to the fact that one “cannot expect that teachers change their regular practice after one or two courses” [1; 55]. Kanyana et al. [10] add that educators need sustained assistance in their efforts to experiment with ICTs and integrate emerging technologies in their teaching. In other words, educators need multiple opportunities to enhance their professional learning “and to collaborate and exchange experiences and knowledge with colleagues” [1; 55]. McLaughlin & Mitra [11] emphasize in their discussion that communities of practice (CoPs) are important vehicles for introducing new educators into educational reforms. Engaging in communities of practices enhances the learning since, according to Johnson [12; 34], “the learning that evolved from these communities is collaborative, in which the collaborative knowledge of the community is greater than any individual”.

This paper supports the argument that learning as part of a community of practice can support educators’ technology professional development [13] and that ICTs can be used to shift from a more traditional delivery of information towards pedagogy in which knowledge construction through (online) collaboration is the focus of attention.

The main purpose of this paper is to examine the literature pertaining to communities of practice. The key question is: whether learning as part of a (virtual) community of practice supports teachers’ technology professional development.

## **2 CHANGING CONDITIONS: RECONCEPTUALISING EDUCATION FOR THE 21<sup>TH</sup> CENTURY**

Over the past decade, the world of education has and is changing radically – there are more students, more different forms of institutions for higher education and “less resources and increasing debates around ‘standards’ and ‘effectiveness’” [14; 1]. With the advent of a global information economy, the digital revolution has set off a transformation of education. Educators are expected to facilitate learning in a meaningful way and the use of ICTs provides new means and possibilities to bring the new learning to meaningful applications in the 21st century classroom. As emerging technologies have the potential to fundamentally transform how and in what way people learn. It will challenge traditional methods and approaches in education. Resnick [15; 1] states that ICTs in education make it possible to start a “learning revolution” but stresses that emerging technologies certainly do not guarantee it.

Institutions for education, such as universities and colleges as well as the public are increasingly aware of the need for “new [technology] professionalism” [16; 15] in order to “ensure pedagogical sound teaching use in the classroom” [17; 284] and “start to rethink education apart from schooling” [18; 1]. As a result, educators are more and more encouraged to facilitate learning in a meaningful way but they have realised that the use of emerging technologies does not automatically result in innovative educational practices. The rethinking of education should aim at meaningful strategies that provide “access to the new educational resources” and at the same time give educators “the motivation to take advantage of these new resources” [18; 129]. In other words, “The central challenge is whether current schools will be able to adapt and incorporate the new power of technology-driven learning” [18; 1]. To design effective curricula which are supported by effective emerging technologies, “education technologists” as well as curricula designers “must understand the participants, processes and structures that comprise” effective 21<sup>th</sup> century education [19; 207].

Collins and Halverson [18] point out in their study that there are many incompatibilities between schooling and technology. Traditional learning in schools and training is based on a notion of uniform learning which assumes that every learner should learn the same facts, concepts and procedures. Moreover, education is built on the notion that learners truly learn something when information, which is passed on by the teacher, is internalised without being dependent on other resources. However, Collins and Halverson [18; 2] make clear “that the opposite is true of adult life, where technology supports people’s use of outside resources”. In other words, emerging technologies are highly interactive and provide educators and learners with a variety of functional tools “to accomplish meaningful tasks” [18; 3]. New technologies make it possible to customize education to the learners’ needs. Different learning alternatives such as distance learning, workplace learning as well as blended

forms of learning will enhance lifelong learning which forces a rethinking of traditional forms of education.

With information technology, presently seen as one of the most significant challenges in education, educators are deeply affected by technology-related standards and requirements to facilitate rich learning environments. Most educators have specific needs and interests with regard to the learning of these emerging technologies. Consequently, CTPD has become a focus of attention in HE.

Most institutions for education foster just-in-case learning while new technologies foster just-in-time learning [2, 18]. Traditionally, professional developers focus in their training programmes on aspects of technology learning in case these technologies are needed. However, when institutions for education focus on just-in-time learning, there will be no need to imagine whether teachers might apply technology in their classrooms since the emerging technology comes first. In other words, teachers cannot learn every detail of any given educational tool. One can only remember so much information without a specific need for it. In fact the most effective professional development is needs based and delivered by experts at a time and place which is most convenient to the learner. One educator made clear that it is a prerequisite for meaningful learning that adequate professional development programmes should be needs based:

*"I am absolutely sure that without the help of our facilitator we certainly would not have been this far using ICT in our classrooms. He knows what our strengths and weaknesses are. He knows what we need to make it meaningful ... So this is what people mean with just-in-time technologies ... it certainly does work for me, it helps me to support not only my own learning but also my students' learning."*

(educator 1)

As is evident from the example, teachers develop and acquire new skills and knowledge about the use of emerging technologies when learning is situated in meaningful contexts. It shows that meaningful learning gives the teacher the motivation to take advantage of emerging technologies in his own classroom. Moreover, intrinsic motivation will foster teachers to challenge traditional ways of learning and will provide some direction about how to improve student motivation and learning as well as how to invigorate learning content.

### 3 KEYWORDS AND DEFINITIONS

In this paper the following question has been outlined: whether learning as part of a (virtual) community of practice supports teachers' technology professional development. Using ICTs in their classrooms and implementing technologies in their curricula is for most educators a frustrating process. However, looking at CTPD as much more than technology training will "provide teachers with professional development in new pedagogical practices and in methods of using information and communication technology and its potential in education" [1; 54].

Before proceeding, it is necessary to discuss key terms which are used in studies on communities of practice (CoPs) and which are related to the focus of this paper. All of the reviewed studies agree that there is a master of apprentice, learning-by-doing, and social structure to CoPs. One of the main reasons is that virtually every study reviewed cites Wenger's [20] theory about CoPs when addressing the concept what constitutes a community of practice. Wenger describes CoPs as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" [20; 19]. Liedka [21; 5] describes CoPs as "individuals united in action". Wick [22] defines collaborative groups and CoPs in a more concrete way, that is, as groups of professionals or practitioners who have similar task responsibilities. McDermott [23; 4] defines "a community of practice [as] a group of people, who share knowledge, learn together, and create common practices".

On the other hand, as Johnson [12; 52] states, the definition of a virtual learning community of practice (VCoP) is clear: "a group separated by time and space (i.e., geographic location and time zone)". However, the key concept behind a virtual community is that its participants make use of networked technologies to collaborate and communicate synchronously or a-synchronously. Such communication contributes to the development of the knowledge of the individuals within a certain domain or field of interest.

Examining the above mentioned definitions and identifying commonalities and differences what constitutes CoPs and virtual learning communities (VCoPs) suggest the following: CoPs and VCoPs are formed by people who engage in a process of collective learning and who share knowledge so as

to construct new practices. The study of this paper draws on the concepts of CoPs, information and communication technologies and teacher professional development.

#### **4 NEW PERSPECTIVES ON TEACHER LEARNING**

As has been discussed earlier, due to a confluence of forces in education and society, the calls for new professional development programmes for teachers has erupted alongside higher standards for students. In other words, if students need to comply with new standards, “it follows that teachers would need something new as well” [24; 173]. A new perspective on learning implies a new perspective on teaching. Kwakman [25] points out that “as a result of this new perspective on teaching, teachers need to learn new ways of teaching” [25; 150]. If teachers are assumed to learn as students do, teachers also have to construct their own knowledge with regard to content and pedagogy which requires effective professional development programmes.

Although most experts agree about the limitations of traditional professional development programmes [8, 26, 2, 17], “there is less agreement about the way teacher learning has to be organised” [25; 150]. At present, education and research communities are aboil with new educational ideas and theories “about the nature of learning” [27; 4]. Most of these new ideas, theories and their educational implications focus on student learning but less attention has been paid to teacher learning “either to their roles in creating learning experiences consistent with the reform agenda or to how they themselves learn new ways of teaching” [27; 4].

According to Kwakman [25; 150], “opinions and solutions regarding alternative ways to support teacher learning seem to depend on the kind of theoretical perspective taken”. Kwakman notes that in the literature about teacher learning two different theoretical perspectives are prevalent: the cognitive psychological perspective and the professional development perspective.

Early cognitive theories treated the knowing from the learning. Knowing was considered as “the manipulation of symbols inside the mind of the individual, and learning as the acquisition of knowledge and skills” that could be useful in a variety of contexts [27; 4]. However, situative theorists such as Brown, Collins & Duguid [28] or Lave & Wenger [29] challenge the assumption “of a cognitive core independent of context and intention” [27; 4]. They postulate, rather, that the physical and social contexts in which certain activities take place are dependent to each other and therefore become an integral part of the learning process. As a result of this new learning perspective, teachers have to learn new ways in which to learn.

From a professional development perspective, traditional staff development activities tend to be off-site workshops and sessions which fall short of helping teachers to enhance their ICT knowledge and skills. Schrum [2; 84] describes these professional development sessions as being “of the ‘chalk and talk’ or ‘spray and pray’ variety” which emphasizes the traditional, formal way of conveying knowledge to the teacher participant. Kwakman notes that:

Just as in the cognitive psychological perspective, it is stressed that teachers’ learning does not primarily address fact-based knowledge, but that teachers have to learn new conceptions of content and pedagogy [25; 150].

In other words, traditional ways of learning, “which are characterised by transmission of knowledge, are bound to miss the mark” [25; 150]. Moreover, distancing teacher participants from their comfort zone will not foster willingness to experiment and implement new skills and knowledge. Kwakman [25] states that if teachers are assumed to learn in the same way that students do, teachers will construct their own knowledge which implies that they direct their own learning. Putnam & Borko [27; 674] state that due to this active and constructive learning, knowledge construction is “heavily influenced by the individual’s existing knowledge and beliefs and is situated in particular contexts”. Putnam & Borko’s [27] perspective on learning is in vein with Mezirow’s [30] transformative learning theory. Mezirow points out that the process of learning to make meaning is “focused, shaped and delimited by our frames of references” [30; 222] and emphasizes that existing meaning structures are transformed through reflection:

Reflection involves a critique of assumptions to determine whether the belief, often acquired through cultural assimilation in childhood, remains functional for us adults. We do this by critically examining its origins, nature, and consequences.  
[30; 223]

Reflective thinking according to Mezirow's theory of transformative learning can be summarized as a process in which the learner acquires new knowledge by critically examining existing assumptions, beliefs and values. In our context, the rethinking of traditional education will affect teachers' pre-existing knowledge, beliefs and concepts which will encourage them to move away from traditional ways of learning and teaching practices.

## 5 UNDERSTANDING COMMUNITIES OF PRACTICE

The concept of communities of practice (CoPs) has become popular in several academic disciplines such as organisational studies and education [6]. According to Cox [6], however, the term is not used in a uniform way and is sometimes used as "a conceptual lens through which to examine the situated social construction of meaning" and at other moments "it is used to refer to a virtual community" which facilitates a virtual space for "knowledge sharing and learning" [6; 1].

CoPs "embed learning in activity and make deliberate use of social and physical contexts" [28; 40]. The CoP view of learning is based on sociocultural theories since they "address the social and situated nature of learning through joint activity" [31; 3]. As a result, a key concept of CoPs is community knowledge, in which the sum of the community knowledge is greater than the sum of the knowledge of any given participant within the community [32]. This concept is supported by Bielaczyc and Collins [33], who acknowledge in their study that there is a symbiosis by noting that the collective knowledge advances, while simultaneously advancing the individual participant's knowledge. Foulger [31] notes that communities of practice are to be found in many organisations and institutions for education and are crucial to their functioning. In other words, the social system within the community is a key asset because it assists the organisation or institution to exchange and interpret information across organisational boundaries; retain knowledge in authentic ways which makes knowledge meaningful to participants; nurture competencies to keep the organisation at the cutting edge which makes that being a member of the community is useful; provide an identity for its members based on what matters to the members of the community [34]. The following illustrates that learning communities benefit teachers in their profession:

*"I enjoy the tasks and activities which are specific to the setting in which I teach ... I think it is more useful since the training about using certain educational technologies is less episodic compared to what we were offered two years ago. Working together in the learning community with other colleagues inside Fontys as well as outside Fontys makes it meaningful to me. Different views and ideas make me aware of how I teach and should teach. Other colleagues hold up a mirror for me to reflect on my own teaching practice. It enriches my own views and skills in a trusting environment".*  
(educator 2)

As evident from personal interviews, educators' experiences align with Mezirow's [30] transformative learning theory. Mezirow sees personal meaning as being constructed from personal experiences which can be validated through interaction and communication with other people.

Lieberman and Miller [35] observe that learning is situated within the context of authentic, everyday activities in which joint participation within the CoP provides multiple learning opportunities for both novices and experts. Schols [36] states that authenticity is reflected as a key aspect of professional development and that "educators need to identify their needs and interests based on authentic situations and reasons so as to create a certain ownership with regard to their teaching and learning" [36; 1881]. In this context participation is essential to teaching since:

Learning cannot be fully internalised as knowledge structures nor fully externalised as instrumental artefacts or overarching activity structures. Understanding and experience are highly connected. Participation is always based on situated negotiation and renegotiation of meaning in the word. [29; 51]

Wenger [20] notes that a learning process becomes reified when participants "give it form and use it in thinking" [32; 4]. According to Oxford Dictionaries [37], *to reify* is defined as follows: "make (something abstract) more concrete or real". Participation and reification enhance meaning within the CoP. Wenger [20] states that the relationship between participation and reification is one of duality since reification can only occur when community members actively participate. "Reification provides succinctness, portability" [31; 4], which prepares the participant for the practice. Participation and reification are therefore essential ingredients of a learning community. Wenger [20] emphasizes that

“the primary focus must be on the negotiation of meaning rather than on the mechanics of information transmission and acquisition” [20; 265].

## 6 NEW FORMS OF COLLECTIVE LEARNING: VIRTUAL COMMUNITIES OF PRACTICE

As has been stated earlier in this paper, educators need to prepare themselves for new roles. Traditionally, teachers attend courses, workshops or conferences to update knowledge and skills [25]. Yet, the sufficiency and efficacy of these “traditional professional development activities have been debated recently” [25; 150]. As Bransford et al. [38; 192] state “much of what constitutes the typical approaches to formal teacher professional development are attributed to what research findings indicate as promoting effective learning”.

Although most experts agree about the limitations of traditional professional development programmes, there is less agreement about the way TPD has to be organised otherwise [25]. Putnam and Borko [27] recommend that teachers’ professional development should be situated in multiple learning settings in which learning is teacher-centred. According to Hargreaves [39], and Moore and Shaw [40], the working context is considered to be the most suitable learning place “as new competencies can only be acquired in practice” [25; 150]. However, working contexts can be taken in a broader view. Next to classroom settings and cross-institutional learning communities, virtual learning communities (VCoPs) are a significant source for learning.

According to Von Wartburg et al., [41], the continuing proliferation of online collaborative tools such as wikis and electronic learning environments, results in the emergence of new forms of learning communities: virtual communities of practice (VCoPs). Chiu, Hsu and Wang [42] define virtual learning communities as “online social networks in which people with common interests, goals or practices interact to share information and knowledge and engage in social interactions” [42; 1880]. McLure-Wasko and Faraj [43; 30] define VCoPs as “electronic networks of practice” in which “computer-mediated discussion forums focus on problems of practice that enable individuals to exchange advice and ideas with others based on common interest”. McLure-Wasko and Faraj’s [43] definition is in line with Squire and Johnson’s [44] study of VCoPs. Both others note that VCoPs “are organised around an activity” and state that these virtual communities are “formed as need arises” [44; 58]. The interactions within the community focus in most cases around knowledge sharing and mirror Lave and Wenger’s [29] view on situated learning. Both scholars discuss learning as participating in a social world in which community members interact and share knowledge when engaging with real-world problems. However, Gannon-Leary and Fontainha’s [45] view on Lave and Wenger’s work does not produce a new pedagogical approach but provides a different “analytical view of learning” [45; 3]. As Fox [46] states, VCoPs have “as no educational process has had before, the capability to facilitate and enable new forms of imagined community” [46; 108]. VCoPs encompass the concept of providing a learning environment in which the necessary interactions between community participants occur that foster authentic learning. In fact, community members who participate in a VCoP “are assimilated into the sociocultural practices” [46; 108] and are able to gain knowledge and skills which are applicable in their own contexts.

VCoPs such as the TPDWiki project [36] that cross formal institutional boundaries can bring together practitioners facing similar problems or queries so as to learn from each other and find solutions and answers. Collaboration in a VCoP contributes to mastering professional competencies which are not only confined to codified knowledge but foster tacit knowledge as well. Moreover, VCoPs promote meaningful learning which Mezirow [30] sees as “the social process of constructing and appropriating a new or revised interpretation of the meaning of one’s experiences as a guide to action” [30; 222] which “encourage[s] negotiation and knowledge base creation” [36; 1886].

One of the barriers to VCoPs involves the fading back or withdrawal of community participants which Haythornethwaite et al. [47] describe as *being absent*. Haythornethwaite et al. [47] recommend using a variety of integrated communication tools (synchronous and a-synchronous) in order to limit this “ubiquitous problem” [12; 54]. Schols [48; 31] states in his study on multimedia learning that for synchronous learning “meaningful learning requires that the learner engages in substantial cognitive processing during the learning process”. Based on Moreno and Mayer’s [49] generative theory of multimedia learning, “the cognitive capacity remains limited which can have a negative effect on the learning process of some learners” [48; 31]. As a result, this can cause disengagement among community participants. The following quote from an interview with a teacher educator illustrates the above described process of disengagement:

*"Collaborating in the online community was very difficult to me. Using all these new tools ... chat, blogs and other new technologies ... were all new to me ... and using them sometimes at the same time ... is that what they call synchronous working? This did not work for me. First I had to find out how these tools work and when to use which tool. In general I can say that working together and learning became a bit too much for me. Sending an e-mail or using my mobile would have been much easier to me."*  
(educator 3)

It seems reasonable to conclude that reducing a cognitive overload and limiting the use of communication tools will enable learners to intellectually digest chunks of information sequentially rather than simultaneously. This will reduce the number of learners that will withdraw from the learning community.

## 7 CONCLUSIONS AND POINTERS FOR FURTHER RESEARCH

In this paper I argued for a new vision with regard to continuing technology professional development since education has been and is changing radically in a technology world. As education becomes more and more privatised and commercial, the need for education to embrace new educational technologies becomes more and more prominent. However, emerging technologies are being introduced at such rapid rate today that it is difficult for educators to keep up. Moreover, as society and institutions for education realize the potential pedagogical benefits of incorporating emerging technologies in the classroom, the need for adequate CTPD programmes to transform education for the 21st century becomes quintessential.

This paper examined the literature pertaining communities of practice, reviewed the current status, and described efforts to increase educator's use of emerging technologies in adequate ways. Consideration of internet-based technologies to support teacher's CTPD such as VCoPs has grown in recent years [50, 51]. Drawing upon Lave & Wenger's [29] situated learning theory and Wenger's [20] theory about communities of practice offers a perspective on social learning that emphasizes social processes within (V)CoPs where community participants engage in collective learning and knowledge creation. This new perspective on learning stands in contrast to traditional learning, a belief that stipulates that every learner should learn the same. Lave and Wenger's [29] situated learning theory emphasizes the identity of the community participant and how his identity changes over time as a consequence of participating in the community. The central point is that participation is the condition for transformation.

The main conclusion to draw is that VCoPs are learning environments of significant learning since these network-based learning communities push learners to take more control of their learning and provide tasks which are more contextualised and meaningful. However, the literature on VCoPs as a vehicle to improve CTPD programmes is scant. Although the number of empirical studies is increasing, there is still not much known about the strengths and limitations of VCoPs to foster CTPD programmes. In order to gain more insight into the strengths and limitations of VCoPs within the working place of teachers, the work context in relations to VCoPs needs much more attention and even intervention. Studying the ways in which teacher educators and professional development facilitators collaborate together in designing and maintaining VCoPs to support CTPD programmes deserves more attention and research.

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