
Online professional development: lessons from the field

Charalambos Vrasidas and
Michalinos Zembylas

The authors

Charalambos Vrasidas and Michalinos Zembylas are based at the Intercollege, Nicosia Cyprus.

Keywords

Distance learning, Education, Teachers

Abstract

This paper discusses the lessons learned from applying a theoretical framework for the professional development of teachers. This framework draws three interrelated theoretical areas: constructivism, situated and distributed cognition, and communities of practice. We first present the theoretical ideas on which this framework is based and discuss two projects that were developed following the framework. We then discuss the lessons learned and present the implications for the design of online professional development. The values of commitment, innovation, assessment, evaluation, communication, and interaction that underpins successful online professional development projects are highlighted. It is argued that using technology by itself does not support professional development; however, using technology in ways that are consistent with constructivist learning, and recognizing that online professional communities of practice can contribute to professional growth is something worthwhile to explore.

Electronic access

The Emerald Research Register for this journal is available at

www.emeraldinsight.com/researchregister

The current issue and full text archive of this journal is available at

www.emeraldinsight.com/0040-0912.htm

Introduction

The discourse on education reform efforts has emphasized teacher professional development and continuing education (McIntyre and Byrd, 1998). Among the factors driving the recent interest in teacher professional development are: the use of technology for teaching and learning; a shift of pedagogical approaches towards constructivism; an emphasis on standards-driven education; and systems thinking as it applies to career-long teacher education (Means, 1994; Sparks and Hirsh, 1997; Vrasidas and Glass, 2004).

Professional development is essential for teachers to develop the content knowledge and skills they need to succeed in their classrooms. By improving their skills and knowledge, teachers become better prepared to make the most effective curriculum and instructional decisions.

Professional development can take a variety of shapes: collective or individual development; continuing education; pre- and in-service education; group work; team curriculum development; peer collaboration; and peer support (Vrasidas and Glass, 2004). Professional development, as Fullan (1991, p. 326) argued, is “the sum total of formal and informal learning experiences throughout one’s career”. Professional development is often cited as a key lever for moving education off dead centre towards a better future. According to the report *How Teaching Matters: Bringing the Classroom Back Into Discussions of Teacher Quality*, “math students whose teachers have received professional development in working with special populations outperform their peers by more than a full grade level, and students whose teachers have received professional development in higher-order thinking skills outperformed their peers by 40 per cent of a grade level” (Wenglinsky, 2000, p. 7).

Online environments are rapidly expanding as a venue for professional development in education, business, and industry. One of the more pressing questions faced by the teaching profession today is whether this idealized vision of professional development can be realized “online”. The demands of work and family life for teachers, many of whom are women, underline the need for professional development activities that can be delivered anytime, anywhere. What seems to be missing from this area of study are solid theoretical frameworks grounded in research and evaluation that can provide some direction to the development and evaluation of e-learning initiatives. Distance education has been predominantly based on approaches which emphasized a linear and objectivist approach to learning and teaching (Vrasidas, 2000). Such

traditional instructional design principles and practices derived from a long tradition of behaviouristic models of teaching and learning (Segrave and Holt, 2003). The use of pre-packaged material did not value interaction among students and tutors. Given that technology increases the opportunities for interaction among tutors, learners, content and technological tools, it is important to design relevant learning environments for rich interaction in the context of e-learning.

As e-learning becomes more widespread in education and training settings, teachers and tutors are asked to develop and teach online modules. However, tutors are often times asked to develop and teach online modules without having the skills or the support needed (Berge, 1998; Reeves, 2002). Recognizing the tremendous need in preparing tutors to teach online modules, over the last ten years, we have been developing, implementing, and evaluating e-learning projects designed to prepare teachers and tutors to overcome some of the above challenges. In this paper, we first discuss the conceptual framework of two of these e-learning projects that we developed. Then we briefly present these two projects and illustrate how the conceptual framework informs the design of our professional development projects as well as how the implementation of the design enriches the conceptual framework. Finally, we describe and analyse some of the implications of this process on the design of online professional development in a variety of settings.

Conceptual framework

In the last ten years we conducted a series of studies to examine the challenges and possibilities in online learning and teaching. The results of those studies and in particular, the contribution of the two projects we discuss later led to the construction and refinement of a professional development framework. Building on our prior research and development exploring the design of education and training online environments (Vrasidas, 2000; Vrasidas and Glass, 2002, 2004; Vrasidas and McIsaac, 1999; Vrasidas and Zembylas, 2003), we propose an interactional framework for professional development.

This conceptual framework draws three interrelated areas: constructivism, situated and distributed cognition, and communities of practice. We briefly discuss each of these components in the sections below and theorize their interconnection and implications for the design of online professional development environments. A fundamental idea that is

embedded in these three components is interaction. Our framework for professional development places interaction at the centre of any educational experience (Dewey, 1938). In the online context, there are multiple kinds of interactions such as teacher-learner, learner-learner, learner-technology, teacher-technology, and learner-content.

The framework consists of three dimensions that illustrate the importance of interaction in which individuals as well as groups engaging in professional development interact. These three dimensions are:

- personal and social constructivism;
- situated and distributed cognition/knowledge; and
- local and non-local communities of practice.

In this framework, interaction takes multiple forms in the three-dimensional space. Each dimension is divided into two components; these components are positioned in a continuum and there is no clear boundary between them. Theoretically, professional development programs can be situated somewhere along these three dimensions-continua. It is important to note that interaction as a process is fundamental for the structure of professional development; a process that is constantly changing and adjusting to the needs of the community and which, although it already has a predefined structure, is constantly emergent, negotiated, and renewed as activities and contexts dictate.

Personal and social constructivism

Over the past two decades, constructivism has been embraced in a variety of fields. Although there are various kinds of constructivism, a fundamental assumption is that knowledge does not exist independent of the learner, i.e. knowledge is constructed. Several philosophers and educators are associated with constructivism (Von Glasersfeld, 1989; Vygotsky, 1978). The two most prominent schools of thought within constructivism are personal constructivism and social or sociocultural constructivism (Cobb, 1994). Their major difference has to do with the locus of knowledge construction. For personal constructivism knowledge is constructed in the head of the learner while s/he is reorganizing his/her experiences and cognitive structures (Piaget, 1970; Von Glasersfeld, 1989). For social constructivism, knowledge is constructed in “communities of practice” through social interaction (Brown *et al.*, 1989; Lave and Wenger, 1991; Vygotsky, 1978). Our view is that the two approaches cannot be separated because both complement each other. Knowledge is constructed through both social interaction and learner’s mind;

there is no clear boundary between these two processes.

Situated and distributed cognition

Salomon (1993) argued that, “with a growing acceptance of a constructivist view of human cognitions comes serious examination of the possibility that cognitions are situated and distributed rather than decontextualized tools and products of mind” (p. xiv). Brown *et al.* (1989) proposed the concept of situated cognition and argued that activities during which knowledge is constructed constitute an integral part of that knowledge. The situation in which knowledge is constructed is an integral part of the learning process, i.e. knowledge and cognition are situated. Learning becomes a process of enculturation as learners are immersed in real life situation and act as experts (Lave and Wenger, 1991). As Lave and Wenger (1991) points out: “Learning is a process that takes place in a participation framework, not in an individual mind. This means, among other things, that it is mediated by the differences of perspective among co-participants. It is the community, or at least those participating in the learning context, who learn under this definition. Learning is, as it were, distributed among co-participants, not a one person act” (p. 15).

Knowledge and cognition are distributed among learners, teachers, and their physical and socio-political and historical worlds (Pea, 1993; Vygotsky, 1978). In other words, the knowledge which we have and need is not all in our head, but to a large extent resides in the world: in artefacts of all kinds and in the minds of other people. Distributed cognition contributes to our theoretical framework, in that it enriches understanding about what individuals can achieve and how artefacts, tools, and socio-technical environments can be designed and evaluated to empower individuals and their learning.

Communities of practice

Wenger (1999) proposed the four dimensions of learning as they are worked out in action from within a communities of practice framework: learning as doing (practice), learning as becoming (identity), learning as experience (meaning), and learning as belonging (community). Communities of practice are groups of individuals bound by what they do together – e.g. from engaging in informal discussions to solving problems – and by what they have learned through their mutual engagement in these activities. Rules of engagement within a community of practice are constantly renegotiated although there is a shared repertoire of communal

activities, routines, discourses and so on that members have developed over time. Thus, communities of practice have been theorized as sites of mutual learning and as important contributors to the success of knowledge-dependent organizations.

In the last decade or so, there is increasing interest in constructing e-learning spaces to support communities of practice (Kim, 2000; Schlanger and Fusco, 2003; Schwen and Hara, 2003). Listservs, bulletin boards, course management systems can offer alternative methods for the construction of communities. What characterizes communities of practice is a shared commitment for a particular practice that creates an interactional network that enables and promotes knowledge sharing and professional development (Hoadley and Pea, 2002; Wenger, 1999; Wenger *et al.*, 2002).

The relationship between technologies and communities is complex. On the one hand, changing technologies of communication and cooperation have facilitated the participation in non-local communities. On the other hand, the role of place remains important, as the *local* environment is a significant place of organizing and coordinating social life. Wenger (1999) has described four dualities that characterize communities: participatory-reification, designed-emergent, identification-negotiation, and local-global. For our work we address the latter one, which we renamed as local versus non-local, since we have criticized elsewhere the notion of global communities as something highly problematic (Vrasidas and Zembylas, 2003; Zembylas *et al.*, 2002). Some aspects regarding the other three dualities are addressed within our discussion regarding distributed-situated cognitions and individual and social constructivism.

In online environments, communities are growing and are developing new ways of using information and communication technologies. The interest in online communities grows day-by-day and corporations and education institutions alike are utilizing the power of online community building for lifelong learning and continuing education. Thus, understanding the challenges for the design of online communities of practice is important (Preece, 2000; Smith and Kollack, 1999). For example, in our studies we have used a variety of means to understand the needs of an online community of practice such as quantitative studies of communication patterns (or social network analysis) and resource usage, and qualitative or ethnographic studies of how individuals and groups conduct their work and their communications, and how they express their needs.

Summary

To summarize the three components of our framework – individual and social constructivism, situated and distributed cognition, local and non-local communities of practice – we focus on three concepts that provide foundations for the interrelations among these components: interaction, meaning, and enculturation. If there is a common core to be claimed for this framework it might be this: a concern for the mediated nature of cognition and knowledge, i.e. the interactional view frames action and meaning-making as something that is mediated. This renders knowledge and cognition as participatory, distributed, and culturally-constructed. In other words, we interact with the world through mobilizing cultural resources into our actions.

We argue that adoption of this perspective has implications for the support of learning and the design of online professional development. We have indicated how the uses of information and communication technologies implicitly or explicitly endorse this interactional view of professional development. In the following sections we discuss the lessons we learned from designing and evaluating online development programs after briefly describing two of our e-learning projects to provide a concrete context within which we have developed our interactional framework.

Description of two e-learning projects

We now briefly describe two projects that were developed following earlier versions of the framework for professional development. These two e-learning projects are Teaching and Learning Online (TLO) and STAR-online.

Teaching and learning online

Responding to the need for preparing teachers to teach online classes, we developed the TLO project. This project was designed with a main goal to prepare teachers and trainers in the design, development, teaching, and evaluation of online modules and courses. Its design draws on the theoretical ideas of constructivism, situated-distributed cognition, and communities of practice. The course consists a ten-week program and it is offered to faculty from higher education institutions, high school teachers, and tutors interested in online teaching and learning. The course is offered online through a secure Web site requiring login and password information to enter. It consists of a course schedule and timetable, online readings, links to Web-based resources, interactive and collaborative activities, peer review

of assignments, and participation and moderation of discussions. In some occasions a face-to-face orientation seminar is offered to help prepare participants for the online environment. The main goal of the project is to provide the participants with the knowledge and skills they need to plan and facilitate online courses. Some of the course topics include designing an online course, facilitating and managing an online course, critical issues in online education, teacher and student roles for the online classroom, preparing and moderating online discussions, and evaluation and monitoring of student progress.

Supporting teachers with anywhere/anytime resources (STAR-online)

STAR-online is a model for continuing education and professional development for teachers, that also draws on the theoretical ideas of constructivism, situated-distributed cognition, and communities of practice. Teachers can access mentors, colleagues, and resources via a Web-based virtual teaching and learning community (VTLC) system, which provides interactive, self-paced, and collaborative development. The VTLC is an online staff development model, which allows teachers to develop knowledge and skills in the applications of educational technology. Through the VTLC teachers can participate in quality online training modules, access resources and an online portfolio as well as network and collaborate with other teachers nationwide.

More than 20,000 teachers have been benefited from this project. One of the major goals of this project is to develop an online learning community which will provide a comprehensive, collaborative communication system with a rich array of individualized training available to teachers anytime, anyplace – thereby building capacity at individual, classroom, regional, state, and national levels. In the following years, STAR-online continues to meet pressing technology needs overcoming geographic isolation, limited resources, diverse cultures, and students at-risk by expanding its content and resources (available at: www.star-online.org)

Lessons learned

In this section, we synthesize the lessons we learnt while working on the above two projects and constantly revise the interactional framework we discussed. These lessons are based on systematic research and evaluation work we conducted over the years, as well as on reflection on our involvement in online education (Vrasidas, 2000; Vrasidas and Glass, 2002, 2004; Vrasidas and

McIsaac, 1999, 2000; Vrasidas and Zembylas, 2003; Vrasidas *et al.*, 2003a). Table I summarizes the lessons learned from applying the framework and presents specific examples for each lesson.

In cases that STAR-online and the TLO projects demonstrated success with regard to building a community, some general characteristics were identified. These characteristics reflect a self-sustaining online community of professionals that supports and enhances the professional growth of its members. Among these include the following.

- Most of the participants shared a common sense of responsibility towards the activities they engaged in over the course of the modules they attended.
- Participants in the projects managed to construct effective connections to offline community activities.
- The technology and communication tools provided a platform via which participants created and sustained a sense of community. A major component of this community had to do with shared responsibilities, activities and outcomes.
- Activities on which participants worked on were clearly defined, coordinated, and evaluated; a rich set of discussion tools, including support for dialog, negotiation, and collaborative problem solving was provided.

- The members of the community valued the constant support by moderators who provided facilitation, help, and guidance.
- There were clear rules governing member participation in the community. Some of these rules were specified ahead of time. However, some of these rules emerged through collective activity and interaction and were negotiated among the members of the group.
- Gradually, a strong sense of community emerged and a joint vision, control, and ownership of the community, its goals, and artefacts were shared among the participants (Harasim, 2002; Palloff and Pratt, 1999; Salmon, 2000; Vrasidas *et al.*, 2003b).

Design issues

A fundamental issue that comes out of applying our framework has to do with the ideas of ownership and commitment. A shared commitment and distributed ownership among developers, facilitators, and participants in the program is important for its success. For example, in the above two projects, we discovered that when professional development programs were developed and facilitated by staff from participating institutions they were more likely to be successful. This is something that highlights the importance of distributed cognition and how this influences the

Table I Lessons learned from online professional development and practical examples illustrating the main ideas

Lessons learned	Practical example
Promote ownership, commitment, and a shared vision among participants	Provide opportunities to participants to shape the structure, goals, and assessment components of the program
Promote interaction by structuring collaboration	Require participants to work in groups to prepare projects or moderate online discussions
Choose the right technology tools	Make sure that the online communication tools you use are usable, reliable, and appropriate for your target audience
Design for cognitive apprenticeship	Pair expert learners with less experienced learners to work on collaborative projects
Choose authentic tasks and activities	Use real world, authentic tasks and activities which will help participants make the direct connection to their professional practice
Provide regular feedback to participant's work	Provide opportunities for feedback to participants that work via a variety of mechanisms such as teacher feedback, automatic grading procedures, and peer reviews
Promote self-reflection	Design activities that encourage participants to act as reflective practitioners and establish connections between the content of their studies and their professional practice
Constantly evaluate and revise	In addition to the yearly project evaluations, use questionnaires to collect evaluation data from learners and moderators at the end of each course/module
Use a variety of assessment methods	Various methods can be used such as the collection of information gathered from participants' work, moderations of online discussions, postings in online conferences, and other artefacts developed and shared within the online community

effectiveness of professional development. An important lesson, as far as design is concerned, then, has to do with program participants having enough opportunities for input and shaping the structure, function, content, policies, and operation of the program. By distributing some of the control of the program, participants are more likely to make it serve their needs.

Another issue that is relevant to the design of online professional development has to do with the nature of chosen tasks and activities. We discovered that a special emphasis should be placed on making sure that activities are authentic and representative of the existing professional culture; in other words, the chosen activities should be situated within specific contexts or distributed across various contexts. In addition, such activities need to have a direct relation to the participants' professional practice. For example, a teacher who was teaching "consumer education" during the semester she was attending the online professional development project, developed a set of online activities requiring students to work in groups, search the Internet to find information about bank accounts, and reach a decision on which account is best for them. Therefore, the online professional development the teacher attended had a direct link to her daily teaching; this teacher had the opportunity to authentically use some of the ideas she was learning.

In general, for both STAR-online and the TLO projects, tasks, activities, and assignments were aspects of a broader scope that tied everything together within a meaningful real-world scenario. For example, an organized discussion on facilitating online discussions in the context of the STAR-online project did not simply ask learners to identify techniques for good online moderation, but asked them to actually facilitate and evaluate a discussion on a topic of their interest. Once the specific learning outcome is identified within a particular context, then ways can be explored on how the design of relevant activities may be done in a meaningful manner.

Facilitation of interaction

As mentioned earlier, there are many different kinds of interactions taking place in an online learning environment. These interactions may be facilitated through various strategies. One such strategy, through which the creation of communities of practice may be promoted, is collaboration. This should not suggest that all online professional development should be based on collaborative activities. However, structuring collaborative projects is a good way to promote interaction among online community participants. Further, collaborative projects allow members of

the community to have access to each other's expertise, as this expertise is distributed across space, individuals, and groups. For example, assigning participants to moderate online discussions, engage in debates, summarize results, and reflect on their postings, are strategies that promote interaction. The use of collaborative designs and activities increases the sense of interdependence among participants. In several occasions during the design and implementation of the above two e-learning projects, we built in collaborative activities that required participants to work in small groups to solve problems, prepare debates, and moderate discussions. In particular, in one of the TLO modules, participants worked in groups of three, to choose a topic, prepare online readings, organize a discussion, post discussion questions, and moderate discussion in turns. At the end of each discussion, participants summarized results and shared them with the community. In this way, we gradually discovered how the development and sustainability of online communities of practice were highly dependent on local factors (e.g. the organizational forms and choices for certain technical solutions) as well as on non-local factors (e.g. strategies that promoted online interaction).

We have already emphasized that e-learning professional development relies on technology-mediated interaction. It is therefore, essential for developers to design and make available the appropriate tools. Such tools need to be usable and offer enough functionality to achieve the goals of the program. Brown and Duguid (2000) have argued for the importance of texts and discourse in forming communities. Communities have been forming around texts and written documents for centuries now. Technology tools used in e-learning programs need to allow participants to easily exchange ideas and share documents. In addition, tools and activities should encourage participants to reflect on their practice and become reflective-practitioners (Schön, 1983). Self-reflection can help professionals recognize the importance and situatedness of their experiences in efforts to improve their daily practice. For example, in the TLO and STAR-online projects teachers were provided with a variety of tools (e.g. online discussions, online conferences, personal e-mail etc.) to reflect both individually and collectively and to identify strategies that improved their professional practice. Self-reflection takes place in the intersection of personal and social construction of knowledge; it also has the potential to contribute to the development of professional communities of practice.

Another strategy that worked well within our framework was cognitive apprenticeship

(Vrasidas, 2000). In other words, we structured the learning environment in such a way that we modelled expert behaviour to students. For example, in an activity about moderating online discussions we modelled this strategy and emphasized the techniques we employed while moderating. Then, we asked the students to reflect on that process and discussed it so that students could have a concrete example of how to moderate discussions. In addition, we asked the students to engage in moderation and reflect on their experiences from doing so. In this manner, they had the opportunity to experience learning as a process of enculturation in situations in which they acted as experts; each individual in his/her area of expertise.

Evaluation and assessment issues

Finally, an important component of our framework has to do with the evaluation and assessment of online professional development – a fundamental aspect of improving the quality of what is being offered. In addition to the yearly evaluations that we have been conducting on the two projects, we designed questionnaires (which learners and moderators were required to complete at the end of each course), conducted online interviews, and collected a variety of other data. E-learning programs require a variety of methods for evaluating and assessing participants' learning (Mason, 2002; Vrasidas and McIsaac, 2000). For example, given that the online facilitator does not have access to facial expressions, voice intonation, or body language, other methods of data collection such as the collection of information gathered from participants' work, participants' moderations of online discussions, their postings in online conferences, self-reflective journals, and other artefacts were developed and used while participating in the online community. Assessment can also be allocated to learners themselves, allowing them to participate in the "community" of assessing online learning and experience the process from a participatory framework of professional development.

Through careful examination of our data, we noted, for example, that feedback was very important in e-learning programs. From past research we identified some fundamental differences between face-to-face and online interaction (Vrasidas and Zembylas, 2003). During face-to-face situations nonverbal gestures and other cues are constantly exchanged thus providing both teacher and learners with feedback. However, in interactions that take place in e-learning programs, contextual cues of communication are lost. Thus, we discovered that

participants need to be provided with immediate and specific feedback on their work.

In general, evaluations were of critical importance and helped us refine the model we developed in the context of these two e-learning projects. A coordinated, systematic study and evaluation of online projects allow designers, developers, researchers, and policymakers to make informed decisions for project development, implementation, as well as for funds allocation. We should also be reminded of the fact that new tools and strategies of evaluation need to be constantly developed, because the context of professional development in online learning is different from face-to-face learning.

Conclusion

The purpose of this paper has been to consider how three interrelated views in learning theories – constructivism, situated and distributed cognition, and communities of practice – may be applied to the design, implementation, and evaluation of online professional development. Based on the use of this framework in the context of two e-learning professional development projects, we have shared evidence that these ideas can be successfully applied in online professional development, under some circumstances. These circumstances have been translated to a number of lessons learned that cover design issues, facilitation of interaction, evaluation, and assessment issues. This paper highlighted the value of commitment, innovation, assessment, evaluation, communication, and interaction that underpins successful online professional development projects.

While this work shows that our framework has the potential to contribute to online professional practice, more research is required to understand the variety of possibilities opened by online professional development. If educators choose to use and support online professional development, a number of issues arise concerning management, pedagogy, and evaluation. On the surface, the most obvious challenges appear to be funding and infrastructure. However, as our work shows, other more complex issues need to be dealt with in order to support this type of intervention. Here we present a few other questions that may be addressed in future research: What are the shared commitments and responsibilities that enable online participants to become a professional community of practice? What kinds of professional development opportunities are effective so that online tutors can adopt new roles demanded by technology-based environments? How can professionals within a working environment become a stronger professional community that

takes advantage of new information and communication technologies?

Some of the most significant challenges to many online professional development programs have to do with the difficulties related to management or the engagement with the types of interaction that promotes professional learning. Certainly, using technology by itself does not support professional development; however, using technology in ways that are consistent with constructivist learning, and recognizing that online professional communities of practice can contribute to professional growth is something worthwhile to explore.

References

- Berge, Z.L. (1998), "Barriers to online teaching in post-secondary institutions: can policy changes fix it?", *Online Journal of Distance Learning Administration*, Vol. 2 No. 1, available at: www.westga.edu/~distance/Berge12.html (accessed 27 May 2004).
- Brown, J.S. and Duguid, P. (2000), *The Social Life of Information*, Harvard University Press, Boston, MA.
- Brown, J.S., Collins, A. and Duguid, P. (1989), "Situated cognition and the culture of learning", *Educational Researcher*, Vol. 18 No. 1, pp. 32-42.
- Cobb, P. (1994), "Where is the mind? Constructivist and sociocultural perspectives on mathematical development", *Educational Researcher*, Vol. 23 No. 7, pp. 13-20.
- Dewey, J. (1938), *Experience and Education*, Collier Macmillan Publishers, New York, NY.
- Fullan, M. (1991), *The New Meaning of Educational Change*, 2nd ed., Teachers College Press, New York, NY.
- Harasim, L. (2002), "What makes online learning communities successful? The role of collaborative learning in social and intellectual development", in Vrasidas, C. and Glass, G. (Eds), *Current Perspectives in Applied Information Technologies: Distance Education and Distributed Learning*, Information Age Publishing, Inc., Greenwich, CT, pp. 181-200.
- Hoadley, C.M. and Pea, R.D. (2002), "Finding the ties that bind: tools in support of a knowledge-building community", in Renninger, K.A. and Shumar, W. (Eds), *Building Virtual Communities: Learning and Change in Cyberspace*, Cambridge University Press, London, pp. 321-54.
- Kim, A. (2000), *Community Building on the Web*, Peachpit Press, Berkeley, CA.
- Lave, J. and Wenger, E. (1991), *Situated Learning: Legitimate Peripheral Participation*, Cambridge University Press, Cambridge, MA.
- McIntyre, D.J. and Byrd, D.M. (Eds) (1998), "Strategies for career-long teacher education", *Teacher Education Yearbook VI*, Corwin Press, Inc., Thousand Oaks, CA.
- Mason, R. (2002), "Rethinking assessment in the online environment", in Vrasidas, C. and Glass, G. (Eds), *Current Perspectives in Applied Information Technologies: Distance Education and Distributed Learning*, Information Age Publishing, Inc., Greenwich, CT, pp. 57-74.
- Means, B. (Ed.) (1994), *Technology and Education Reform*, Jossey-Bass, San Francisco, CA.
- Palloff, R. and Pratt, K. (1999), *Building Learning Communities in Cyberspace: Effective Strategies for the Online Classroom*, Jossey-Bass, San Francisco, CA.
- Pea, R.D. (1993), "Practices of distributed intelligence and designs for education", in Salomon, G. (Ed.), *Distributed Cognitions: Psychological and Educational Considerations*, Cambridge University Press, Cambridge, UK, pp. 47-87.
- Piaget, J. (1970), *Genetic Epistemology*, Columbia University Press, New York, NY.
- Preece, J. (2000), *Online Communities: Designing Usability, Supporting Sociability*, Wiley, Chichester.
- Reeves, T. (2002), "Distance education and the professorate: the issue of productivity", in Vrasidas, C. and Glass, G.V. (Eds), *Current Perspectives in Applied Information Technologies: Distance Education and Distributed Learning*, Information Age Publishing, Inc., Greenwich, CT, pp. 135-56.
- Salmon, G. (2000), *E-Moderating. The Key to Teaching and Learning Online*, Kogan Page, London.
- Salomon, G. (Ed.) (1993), "Editor's introduction", *Distributed Cognitions*, Cambridge University Press, New York, NY, pp. xi-xxi.
- Schlanger, M.S. and Fusco, J. (2003), "Teacher professional development, technology, and communities of practice: are we putting the cart before the horse?", *Information Society*, Vol. 19 No. 3, pp. 203-20.
- Schön, D. (1983), *The Reflective Practitioner*, Basic Books, New York, NY.
- Schwen, T.M. and Hara, N. (2003), "Community of practice: a metaphor for online design?", *The Information Society*, Vol. 19 No. 3, pp. 257-70.
- Segrave, S. and Holt, D. (2003), "Contemporary learning environments: designing e-learning for education in the professions", *Distance Education*, Vol. 24 No. 1, pp. 7-24.
- Smith, M. and Kollack, P. (Eds) (1999), *Communities in Cyberspace*, Routledge, New York, NY.
- Sparks, D. and Hirsh, S. (1997), *A New Vision for Staff Development*, Association for Supervision and Curriculum Development, Alexandria, VA.
- Von Glasersfeld, E. (1989), "Cognition, construction of knowledge, and teaching", *Synthese*, Vol. 80 No. 2, pp. 121-40.
- Vrasidas, C. (2000), "Constructivism versus objectivism: implications for interaction, course design, and evaluation in distance education", *International Journal of Educational Telecommunications*, Vol. 6 No. 4, pp. 339-62.
- Vrasidas, C. and Mclsaac, S.M. (1999), "Factors influencing interaction in an online course", *The American Journal of Distance Education*, Vol. 13 No. 3, pp. 22-36.
- Vrasidas, C. and Mclsaac, M. (2000), "Principles of pedagogy and evaluation of Web-based learning", *Educational Media International*, Vol. 37 No. 2, pp. 105-11.
- Vrasidas, C. and Zembylas, M. (2003), "The nature of technology-mediated interaction in globalized distance education", *International Journal of Training and Development*, Vol. 7 No. 4, pp. 1-16.
- Vrasidas, C. and Glass, G.V. (2002), "A conceptual framework for studying distance education", in Vrasidas, C. and Glass, G.V. (Eds), *Current Perspectives in Applied Information Technologies: Distance Education and Distributed Learning*, Information Age Publishing, Inc., Greenwich, CT, pp. 31-56.
- Vrasidas, C., Zembylas, M. and Chamberlain, R. (2003a), "Complexities in the evaluation of distance education and virtual schooling", *Educational Media International*, Vol. 40 Nos 3/4, pp. 200-8.
- Vrasidas, C., Zembylas, M. and Chamberlain, R. (2003b), *The Design of Online Learning Communities: Critical Issues*, paper presented at the Annual Conference of the International Council of Educational Media, Oslo.
- Vrasidas, C. and Glass, G.V. (Eds) (2004), *Current Perspectives in Applied Information Technologies: Online Professional*

- Development for Teachers*, Information Age Publishing, Inc., Greenwich, CT.
- Vygotsky, L.S. (1978), *Mind in Society*, Harvard University Press, Cambridge, MA.
- Wenger, E. (1999), *Communities of Practice. Learning, Meaning and Identity*, Cambridge University Press, Cambridge.
- Wenger, E., McDermott, R. and Snyder, W.M. (2002), *Cultivating Communities of Practice: A Guide to Managing Knowledge*, Harvard Business School Press, Cambridge, MA.
- Wenglinsky, H. (2000), *How Teaching Matters: Bringing the Classroom Back into Discussions of Teacher Quality*, Educational Testing Service, Princeton, NJ.
- Zembylas, M., Vrasidas, C. and Mclsaac, M.S. (2002), "Of nomads polyglots, and global villagers: globalization, information technologies and critical education online", in Vrasidas, C. and Glass, C.V. (Eds), *Distance Education and Distributed Learning*, Information Age Publishing, Inc., Greenwich, CT, pp. 201-23.
- Dede, C., Whitehouse, P. and Brown L'Bahy, T. (2002), "Designing and studying learning experiences that use multiple interactive media to bridge distance and time", in Vrasidas, C. and Glass, G.V. (Eds), *Current Perspectives in Applied Information Technologies: Distance Education and Distributed Learning*, Information Age Publishing, Inc., Greenwich, CT, pp. 1-29.
- Jonassen, D.H., Campbell, J.P. and Davidson, M.E. (1994), "Learning with media: restructuring the debate", *Educational Technology, Research, and Development*, Vol. 42 No. 2, pp. 31-9.
- Jonassen, D., Davidson, A., Collins, M., Campbell, J. and Haag, B.B. (1995), "Constructivism and computer-mediated communication in distance education", *The American Journal of Distance Education*, Vol. 9 No. 2, pp. 7-26.
- Phillips, D.C. (1995), "The good, the bad, and the ugly: the many faces of constructivism", *Educational Researcher*, Vol. 24 No. 7, pp. 5-12.
- Salomon, G., Perkins, D.N. and Globerson, T. (1991), "Partners in cognition: extending human intelligence with intelligent technologies", *Educational Researcher*, Vol. 20 No. 3, pp. 2-9.
- Swan, K. (2002), "Building learning communities in online courses: the importance of interaction", *Education, Communication & Information*, Vol. 2 No. 1, pp. 23-49.

Further reading

- American Institutes for Research (1999), *Designing Effective Professional Development: Lessons from the Eisenhower Program*, US Department of Education, Washington, DC.