Educational Blogging: Developing and Investigating a Students' Community of Inquiry

Sophia Angelaina and Athanassios Jimoyiannis

Introduction

During the last decade, Web 2.0 applications, including blogs, wikis, social networking, social bookmarking, media sharing, podcasting, etc., have received intense and growing educational and research interest (Clark et al. 2009; Ravenscroft 2009; Schroeder et al. 2010). It is widely considered that Web 2.0 applications, while not designed specifically for educational purposes, have a number of affordances that provide multiple opportunities for shared content and resources, self-directed learning, collaborative learning, ubiquitous and lifelong learning. The emerged socially based technologies of the Web 2.0 have the potential to offer enhanced learning opportunities and support students' participation in effective task-oriented personal learning spaces independent of physical, geographic, and institutional boundaries (Hall 2009; McLoughlin and Lee 2010).

Among Web 2.0 tools, blogs constitute a new content sharing and development environment supporting students' engagement, communication, interaction, collaboration, and collective intelligence. During the last years, educational blogs have captured the interest and the imagination of both educators and researchers including diverse learning groups, ranging from primary (Davis 2006; Tse et al. 2010) and secondary education (Angelaina and Jimoyiannis 2009) to higher education (Lin and Yuan 2006; Deng and Yuen 2010; Tan et al. 2010; Xie et al. 2008) and teachers' professional development as well (Loving et al. 2007; Makri and Kynigos 2007).

Literature review on educational blogging revealed a lack of a complete and consistent framework for studying and assessing students' engagement and the impact of blogging on students' learning. Farmer (2004) and Cameron and Anderson (2006) have proposed the application of the Community of Inquiry (CoI) model (Garrison et al. 2000, 2001) to blogging activities by comparing blogs' features with

S. Angelaina • A. Jimoyiannis (✉)
Department of Social and Educational Policy, University of Peloponnese, Korinthos, Greece
e-mail: ajimoyia@uop.gr

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those of threaded discussions. However, there is not sufficient research evidence on the efficacy and the applicability of the CoI model in educational blogs. This study aims to contribute to the literature regarding the qualitative analysis of students' processes that take place in educational blogging and the evaluation of their learning experience using the framework of CoI. Twenty-one students (15 years old), coming from two K-9 classes in Greece, were involved in an educational blog which served as a project-based learning environment. The results showed that the students in the sample were made to participate actively by creating a blog CoI and learning.

Educational Blogging

The common use of blogs is for personal online journals. However, it is their open and user friendly format, and the many features incorporated such as post and commentaries organization, taglines, permanent links, etc., which have largely dominated the discussion about the educational blogs and their potential for teaching and learning. Educational blogs are currently gaining in popularity in schools and higher education institutions and they are widely promoted as collaborative tools supporting students' active learning.

It is widely considered that through well-designed educational blogs, both tutors and learners are becoming empowered, motivated, more reflective, and interactive practitioners in new learning environments. The emerging educational applications of blogs are based on their characteristics, as they are *open*, *interactive,* and *easy to create and use environments* which

- Incorporate *content posts* (often involving text, pictures, graphics, and hyperlinks) with *commentaries* to these posts, usually presented in reverse chronological order; thus a blog can work both as a personal and a group publishing area, in which every participant can exchange and share ideas, insights, comments, and recommendations with fellows.
- Provide *organized links* to recommendations of favorite or suggested websites, blogs, content resources, and events; in other words, a blog can act as a powerful personal learning portal.
- Have strong archival features; posts are automatically archived and the content is easily searchable and retrievable. Moreover, posts are syndicated using a variety of XML based standards (RSS or Atom feeds); readers interested can subscribe and be alerted to new content or discussions that have been added to the blog.

The characteristics above determine the pedagogical affordances of blogs, since they could

- Support enhanced participation and communication opportunities, promoting individual as well as group reflection on learning experiences
- Offer up-to-date information regarding changes in collaborative spaces and extend learning beyond the classroom
- Offer enhanced opportunities for collaborative content creation and, consequently, for collaborative knowledge construction

- Support authentic learning tasks through peer assessment and formative evaluation of student work
- Support blended learning activities by effectively changing the boundaries between school and formal learning; nonformal and informal learning

Since blogging enables users to exchange ideas and to share experiences and content, blogs can be an ideal environment for social constructivist learning. As a result of these communicative and collaborative attributes, blogs have been used in educational settings in many different ways, aiming at various educational objectives. Literature review suggested a growing interest in educational blogs use within the context of open learning environments. Blogs can serve in multiple ways, as an online course management tool, a discussion forum, an e-portfolio, a group blogging space, and a project-based learning environment. However, most applications of blogs in educational practice make worthy more than one of the aspects above.

Blog as Online Course Management Tool

This type of blog aims to support class work in both formal and non formal ways. The instructor posts assignments, announcements, information, and summaries of lessons. For instance, students share their learning experiences and express their thoughts to the instructor and peers through course blogs. Alternatively, a weekly topic is posted and each student posts her/his thoughts on the topic, as an assignment by the instructor. Students post examples and exercises related to course assignments as well as discuss reflections on course materials. In addition, blogs of this format could facilitate extended discussions beyond the classroom sessions. In their study Lin and Yuan (2006) followed a similar approach, where a blog was used as a reflective learning platform by engineering students.

Blog as Discussion Forum

The blog acts as a forum where students discuss and exchange information related to the course's subject, lectures, announces, and readings as well (Makri and Kynigos 2007). In addition, they can share and exchange information, thoughts and ideas on what they are learning. Yang (2009) reports on the use of a blog, created by two instructors, as a discussion forum in Taiwan. English student teachers made use of the blog as a platform to discuss about teaching theories and to critically reflect on their learning processes. In the context of teacher education, Deng and Yuen (2010) have proposed an empirically grounded framework for educational blogging that highlights four areas: self-expression, self-reflection, social interaction, and reflective dialogue. Ebner et al. (2010) investigated the use of microblogs (blogs via web interfaces and mobile devices, which are restricted to posts having up to 140 characters) and concluded that microblogging should be seen as a completely new form of communication that can support informal learning beyond classrooms.

Blog as E-Portfolio

The idea is that students set up their own blog according to the teacher assignments and guidelines; every student posts to the blog his classroom and/or homework writing assignments, tasks, and exercises. The teacher monitors students' progress and development, supports them to overcome cognitive difficulties and problems encountered, and, finally, assess the student submissions into the blog. In addition, students can share their blogs with peers in their class and receive commentaries through the comments section of their blog. Carroll et al. (2006) have developed and used an e-learning system that couples a blog with an e-portfolio component. The evaluation results showed that the integrated blogging application allowed students to assemble, reflect, and publish content for their course tasks and supported reflective learning. Blogs were effectively used in a second year university class of German language to support students' reflection on topical issues and peer-feedback on writing (Dippold 2009). Students needed to complete on their blogs a series of written tasks set by the tutor while some components were commented on by their peers and the tutor. In a case study, Farmer et al. (2008) used a trial blogging as a formative assessment exercise integrated into a first year university subject about cultural studies. The students were asked to maintain a blog throughout the 12 weeks of the semester, to reflect upon and discuss course content and/or issues that arose out of their learning experiences.

Group Blogging

Group blogging is a relatively new form of learning activity where the blog acts more as a collective or collaborative space than as an individual one. In a group blogging activity class students are divided into groups. All students in each group are expected to contribute consistently to their own group blog. The various blogs are connected and students could also post their comments to the other blogs. A case study on higher education students indicated that the incorporation of group blogging and social networking technologies within a well structured, but flexible learning environment, supports group work and creative learning processes (Philip and Nicholls 2009). Another study on group blogging, used a communities of practice philosophy to support peer assisted learning (Ladyshewsky and Gardner 2008).

Blog as a Project-Based Learning Environment

Blogs can be used as collaborative content sharing spaces to support project-based learning activities. Poling (2005) engaged elementary students from different classes

in a cooperative project about natural environment. Through the blog, the students shared their reflections, completed a writing project, read, and commented on other students' posts. In a similar study, secondary education students from two different classes collaborated through a blog to implement a long-term project about the issues of doping and using drugs by athletes to improve their performance in sports (Angelaina and Jimoyiannis 2009). The analysis of students' cognitive presence, ideas sharing and debating showed that educational blogs could be effective tools to support collaborative construction of knowledge.

Blog as a Research Tool

Properly designed blogs can be used as a powerful tool supporting academic research. Blogs can constitute a platform for ongoing literature review for academic purposes (Mejias 2006). Recently, in the context of a large undergraduate lecture course in nutrition, Paulus and Spence (2010) used blogging groups to promote student learning and conceptual change through reflection and interaction in blog conversations. They found that the blog conversations were very useful to the instructors as a source of data on students' understandings and misconceptions of course topics. These misconceptions could then be addressed with further instruction.

Community of Inquiry in Educational Blogs

CoI was initially developed as a conceptual framework to guide the research and practice of collaborative learning in online environments, at first asynchronous discussion forums (Garrison et al. 2000, 2001; Garrison and Anderson 2003). The origin of CoI model was grounded in Vygotsky's theory of social construction of knowledge (1978) and the practical inquiry and critical thinking model of Dewey. The notion was also built on the important work of Henri (1992) who turned attention in online learning research to the cognitive dimension. Combining both the empirical data regarding process evaluation and learning design in online learning environments, the CoI framework could be used to define, identify and measure three constitutional elements (components) in an e-learning experience, namely the *social presence*, *teaching presence,* and *cognitive presence*. In addition, CoI model determines categories and indicators to define, identify and measure each presence in an educational blog community. Figure 1 represents the basic components and the consequent CoI indicators describing the interrelations between social, teaching, and cognitive presence, when educational blogs are used as collaborative learning environments.

The CoI analysis framework of the blogging activities includes

- Three indicators of social presence in educational blogs, e.g., *open communication*, *emotional expression*, and *group cohesion*

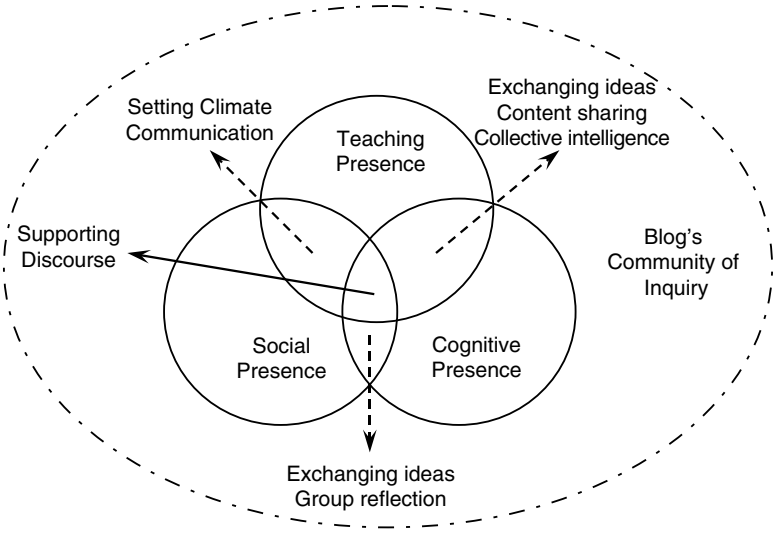

Fig. 1 Community of Inquiry (CoI) in educational blogs (adapted from Garrison et al. 2000)

- Four indicators essential to describe cognitive presence, e.g., *triggering*, *exploration*, *integration* and *resolution*
- Three indicators describing teaching presence, e.g., activities related to *instructional design and organization*, *facilitating discourse* and *direct instruction*

Cameron and Anderson (2006) first suggested the application CoI model to the design of educational blogging activities. Their main idea was to compare the features of blogs with those of threaded discussions. This study reports on the application CoI model as an analysis framework of students' engagement and presence in an educational blog-based project. Our work expands the initial CoI analysis and focuses specifically on comparing the educational affordances of blogs with those of asynchronous discussions, within which the CoI model was developed. The key idea is that an educational blog integrates a *content space* and a *discussion space*, both developed in a collaborative manner. In this paper we build on our earlier work and analysis on the use of blogs as tools to create a CoI (Angelaina and Jimoyiannis 2009).

Methodology

Design of the Educational Blog

The educational blog was designed by the authors and implemented at the first Gymnasium (lower secondary school) of Argos, Greece, in the context of the ICT subject during the year 2009–2010. Using a project-based learning approach, the blog

was designed and evolved for a period of 10 weeks, as an obligatory project according to the K-9 computer science (informatics) curriculum. The main objectives were

- To engage students (15 years old) in a cross-thematic large-scale learning activity
- To integrate content knowledge from different subject areas, e.g., chemistry, biology, environmental and social sciences
- To support collaborative work and reflection between students
- To develop ICT literacy skills, namely information access, managing, integration, evaluation and, communication skills

This blog-based learning activity followed a blended learning philosophy by including classroom sessions and face-to-face discussions between the teacher and the students, individual and collaborative online work in the computer lab, and online homework (information seeking through suggested resources from the Internet, peer communication, exchanging ideas, and content information etc.). The students were independently directed to a theme coming from science education, considering it close to their interests. After debating and exchanging ideas in the classroom, with the guidance of their ICT and chemistry teachers, the students agreed and decided to investigate the "Acid Rain" problem through their class blog.

The students in the sample, though familiar with using computers and the Web, had no previous experience with educational blogs and blogging, in general. The first author was the class instructor, and the discussion facilitator in both cases (classroom and blog). Initially, he presented various types of blogs to help students understand what a blog is, how one can use it and participate in, what are the differences between posts and commentaries etc. The students were asked to reflect upon and discuss about content and/or other themes that would arise into the class blog. They were free to use the blog in any way they wish but they needed to post regularly (at least once a week on average) and to interact with other students' posts through their comments and content posts. They were informed that their active participation in the blog would be graded for the ICT course.

The Procedure

The sample included 21 students (9 boys and 12 girls) of K-9 grade from two different classes participating into the blog. The students were informed of the guidelines and details of the study in the first class meeting. They were also informed that their posts would be transcribed, that individual student identities would not be used in the analysis, that the results of the analysis available would contain no student identification, and that the analysis would have no impact on their grades.

The students were engaged into the blog not only during the ICT sessions, from the computer lab area, but also in time and place outside school, as observed from the posts details (date and time). Complete texts of posts were extracted from the blog. The data under analysis concern a time period of 9 weeks, from February to April 2010. The transcripts were analyzed using the coding scheme described in the next section.

Table 1 Blog's community of inquiry

Elements	Number of publications	Indicators		Number of publications
Social presence	22	Open communication		15
		Emotional expression		3
		Group cohesion		4
Cognitive presence	95	Triggering		14
		Exploration	Personal view	2
			Explanation	36
			Scientific knowledge	18
		Integration	Synthesis	15
			Conclusion	10
Teaching presence	14	Design and organization		1
		Facilitating discourse		7
		Direct instruction		6

Content Analysis

Content analysis was based on existing procedures used in analyzing asynchronous discussions (Gunawardena et al. 1997). Every publication on the blog is considered as the unit of analysis. Students' contributions to the blog were divided into:

(a) *Content posts*, which included content information (e.g., text, photo, visual, audio, video)
(b) *Commentaries*, which typically were publications in text format concerning questions, replies, new ideas, or comments to previous content posts

Presentation of Results

A total of 131 publications were uploaded on the blog during the investigation period; 39 content posts and 92 commentaries. The content posts uploaded were divided as following: 10 in photo format, 16 in text format, 5 in both photo and text format, and 8 in video (most of them were links to YouTube). Every publication was classified in elements and categories according to the CoI model, as shown in Table 1.

The CoI analysis showed that students, in general, were successfully engaged into the blog contributing with content posts and commentaries to their peer posts. There were differences in the number of posts and commentaries each student uploaded and the consequent learning profile into the blog. Table 2 shows the number of posts and commentaries for each member (students and teacher) in the community of blog.

Table 2 Posts and comments for each member in the community of blog

CoI member[a]	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
Posts	12	1	2	1	1	3	2	2	4	–	–
Comments	2	13	3	6	12	1	6	5	6	3	4
CoI member	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	T
Posts	–	1	1	2	–	1	1	1	1	–	3
Comments	2	5	1	6	2	1	8	–	–	–	6

[a]S = Student; T = teacher

Social Presence

Social presence in online learning has been described as the ability of learners to express themselves socially and emotionally (Arbaugh 2007). There were 22 publications attributed in this category. These posts include no content information and were classified in the following categories (indicators): *emotional expression*, *open communication,* and *group cohesion*. The students used expressions similar to that in face-to-face discussions improving group cohesion, and suggested ideas supporting and enhancing dialogue. In Table 3 characteristic transcript examples of students' posts are presented. The collaborative aspects of blogging activities are expected to offer opportunities to the learners for enhanced social presence and sense of online community, which also tends to enhance their satisfaction and improve the socio-emotional climate.

Cognitive Presence

Cognitive presence includes 95 publications in total, describing the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al. 2001). The CoI model defines four phases essential to describe and understand cognitive presence in an educational blog.

The starting-developmental phase of the blog reflects the initiation of critical inquiry and is considered as the triggering event. In *triggering category* were classified 14 publications, which pose either a question or start a dialogue between the students. An issue, question, or problem that emerges from instruction, experience or school life is identified and recognized. In conventional educational contexts, the initial generation of topics is usually directed by the teacher who assigns or communicates learning challenges and tasks. However, most triggering events were purposively or indirectly added from the students to support discourse acting as members of the blog community.

Table 3 Coding scheme for blog's CoI

Elements	Indicators	Transcript examples
Social presence	Open communication	"My friend, it would be better if you had posted a video in Greek, not in German…"
	Emotional expression	"Very nice video. One can easily understand the problem… Congratulations!"
	Group cohesion	"S1 can you explain what is this picture about?"
Cognitive presence	Triggering	"… Why are nitrogen and sulphur oxides responsible for the acid rain since they do not contain hydrogen?"
		"… Since we have analyzed the problem of acid rain it would be better to discuss about solutions. What every one can do about this problem…"
	Exploration	
	Personal view	"…This photo shows that the major factor producing this problem is the gases coming from the industries…"
	Explanation	"Acid rain has negative consequences not only to monuments but to the environment we live as well… In this picture we can see what happens in the river when acid rain falls. It is dying because nitrogen oxide is increased and no plants, animals or fishes can live…"
	Scientific knowledge	"Acid rain is the result of the reaction of sulphur dioxide (SO_2) and nitrogen oxide with carbon hydrogen in the clouds. This reaction creates sulphur and nitrogen acid. Sulphur dioxide comes from metal industries, electric production industries and diesel cars. Nitrogen oxides are produced from the same industries and benzene cars"
	Integration	
	Synthesis	"Some other consequences are: a) reduction of agricultural production, b) increase of temperature during summer (burning heat), c) problems in tourist industry etc."
	Conclusions	"We have already mentioned some solutions regarding the problem of acid rain but I want to summarize: a) placing special filters to the industries chimneys and cars, b) using air and solar energy instead carbon and petroleum"
Teaching presence	Design and organization	"Last decades the phenomenon of acid rain is a serious environmental problem and many governments, organisations and civilians try to find solutions. At first you can explain what acid rain is?"
	Facilitating discourse	"Can you explain why a river dies of the acid rain?"
	Direct instruction	"S7, the last photo you have uploaded is not the Parthenon!"

In *exploration category* 56 publications were classified. Indicative transcripts are given in Table 3. Through these posts the students expressed a personal view, based on pre-existing knowledge, exchanged ideas and information, and gave an explanation or a new approach based on the scientific knowledge they developed. At the end of this phase, students begin to be selective with regard to what is relevant to the issue. The asynchronous nature of blogs allowed students to explore a topic before responding by looking back at archived posts and reflect on posts and commentaries provided by their peers and the instructor.

In *integration category* we have classified 25 publications that represent *synthesis of ideas* or *conclusions* formulated through the dialogue (Table 3). Once students had the opportunity, in the exploratory phase, to investigate and reflect on the topic, they were able to construct meaning through a continually evolving process of reflection and interaction. Integration phase requires active teaching presence to diagnose students' misconceptions, to provide scaffolding and comments, and to effectively support students' cognitive development and critical thinking.

According to the CoI model, the ultimate phase of students' development and progression (*resolution phase*) requires clear expectations and opportunities to apply newly created knowledge (Garrison and Arbaugh 2007). Normally, the results of the resolution phase lead to further problems and new triggering events, thus causing the process to start over. This phase was not easy to be covered since this blog was not designed to cover this particular objective. Previous studies on the CoI model with regards to asynchronous online discussions, showed a relative low rate of the resolution phase and students' difficulties to move toward higher cognitive and inquiry levels, e.g., integration and resolution (Meyer 2003; Luebeck and Bice 2005; Vaughan and Garrison 2005; Garrison and Arbaugh 2007).

Teaching Presence

There were 14 publications in the blog identified as teaching presence posts. Most of them, mainly originated from the teacher, were *direct instructions* and interventions aiming to *facilitate students' discourse*. The teacher facilitation posts appeared on the blog when the students completed dialogue on a specific topic; the aim was to support students' deriving conclusions and movement to the next topic. In a couple of cases the students exhibited a kind of teaching presence by sending specific commentaries (see Table 3).

Teaching presence is not identical to teacher presence while it fundamentally differentiates formal education from online learning environments like blogs. In blogging activities, teacher presence is expected much less tangible, since focus of individual postings may diffuse beyond the topics instigated by the teacher and the challenge of effective aggregation may mean that not all students are following and reading teacher posts and comments to the posts of others (Cameron and Anderson 2006).

Conclusions

The study presented in this paper reported on the investigation of students' engagement in an educational blog established as a project-based learning environment. The findings clearly have shown that integration of ideas and construction of meaning is directly inferred from students' participation in the CoI of the blog. Despite that the students had no previous experience in using blogs; they demonstrated enhanced interest for the project and willingness to participate in the blog activities (content and resources sharing, ideas interchanging, discussion topics, etc.). Students provided one another with social and emotional support which created a CoI continuously growing and evolving through collaboration, dialogue and encouraging students' autonomy as self-directed learners.

A unique feature of blogs is that they enable both individual reflection and peer interaction. Using a blended learning philosophy to design and implement blog-based learning activities seems to be a promising choice resulting in wider use of blogs in the context of secondary and higher education as well. The present study showed evidence that project-based blogs can support online learning groups where students are able to share content and ideas, and construct knowledge within a supportive CoI. Properly designed blogs can extend students' learning space beyond the classroom boundaries to home or personal environments, and combine formal, non formal, and informal learning. It is hoped that the CoI framework of analysis will aid educators and instructional designers to determine best practices on using blogs to enhance students' engagement, communication, and learning.

The investigation presented here has the ambition to deepen existing knowledge and give promising results on the educational affordances of educational blogs. Our future research is directed to the issues of pedagogical design of educational blogs and the consequent teachers' scaffolding strategies in order to support students' engagement, presentation and interchange of ideas, collaborative and reflective thinking.

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