# Chapter 17 Investigating Students' Blogging Activity in Project-Based Learning Settings

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**Abstract** Blogs are increasingly popular Web 2.0 tools in educational settings, being successfully used both for individual and collaborative learning. This study explores the use of blogs as communication and collaboration tools in project-based learning settings. Fifty-three computer science students participated in the study and their learning activity is analyzed from three perspectives: (i) blog posting data recorded by a dedicated learner tracking platform; (ii) content analysis of blog contributions based on Community of Inquiry framework; and (iii) students' perceptions regarding their learning experience, as reported in opinion surveys. Overall findings confirm blogs' affordances for educational settings, and in particular for project-based learning scenarios, fostering collaborative knowledge construction, and boosting student satisfaction.

**Keywords** Blog • Project-based learning • Social learning environment • Collaborative learning • Community of Inquiry

# 17.1 Introduction

Blogs have been successfully used in education during the past several years, for various disciplines of study, in different learning settings and with a variety of pedagogical objectives [1–6]. Indeed, according to the literature [1], blogs can be used to support various instructional scenarios, enhance writing skills, and promote critical and analytical thinking as well as creativity and strengthen social interaction. They also provide opportunities for students to learn from each other and to create connected communities among them. Learner-generated content can be shared not only among classmates but also with a wider external community [7].

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Blogs have been found to increase competitiveness, involvement, and motivation and enable learners to express their unique identity. Finally, they provide an opportunity to make invisible knowledge and learning visible, especially in case of informal and life-wide learning [8].

More specifically, blogs could be used to support a large set of learning activities, such as the following:

- to create a portfolio from a collection of student assignments, essays, and reflections (published as posts) and the corresponding instructor feedback (published as comments);
- to maintain a learning diary, for reflecting on the learning experience and for tracking the learning progress (due to the time-ordered sequence of posts);
- to publish ideas and interesting findings related to the course;
- to share blogs of interest by adding them to the blogroll;
- to reflect on the reading material;
- to introduce oneself to peers in distance-learning settings;
- to document the development of the project/learning activity, reporting each accomplished task;
- to describe problems encountered, ask for help, and receive feedback from peers;
- to write constructive comments;
- to communicate and collaborate with peers working on the same project/assignment and regulate group work; and
- from a teacher's point of view: post course announcements and news, publish lecture resources, and provide feedback to students [1, 7, 9].

Blogs have started to be used also to support communication and collaboration in project-based learning settings (PBL), either alone [10, 11] or in combination with other social media tools [12, 13]. This can be explained by the strong socio-constructivist component of PBL, according to which knowledge is constructed by the individual, through collaborative efforts and social interactions [14]. Therefore, relying on a social media-based learning environment for implementing a PBL scenario appears beneficial [15]. However, systematic analyses regarding blog's affordances for this type of instructional scenario are scarce. The present study adds to the literature by offering a detailed experience report on the use of blogs in PBL, in the context of a computer science course. The novelty of our approach consists in the in-depth investigations performed, relying both on objective data (students' contributions on the blog, analyzed both quantitatively and qualitatively) and subjective data (students' perceptions collected by opinion surveys); a more comprehensive perspective can thus be obtained.

The rest of the chapter is structured as follows: the context of our study is described in the next section. Subsequently, Sect. 17.3 reports on the number and distribution of blog entries, while their content is analyzed in Sect. 17.4. Next, students' perceived learning experience with blog support is explored in Sect. 17.5. Finally, some discussions and conclusions are summarized in Sect. 17.6.

### 17.2 Study Settings

Our study took place during the first semester of the 2014–2015 academic year, at the University of Craiova, Romania. The context is a course on "Web Applications Design" (WAD), taught to 4th year undergraduate students in computer science. A project-based learning approach is used, in which learning is organized around the development of an authentic Web application. Students collaborate in teams of 3–4 peers, in order to build their chosen system (e.g., a virtual bookstore, an online auction Web site, a professional social network, an online travel agency, etc.); each student takes various real-life roles in different stages (e.g., system analyst, database specialist, interface designer, application architect, programmer, tester, and project manager). We have been applying this instructional scenario, with various refinements, for the past 5 years [15, 16].

The PBL scenario is implemented in blended mode, with weekly face-to-face meetings between each team and the instructor, complemented by the use of three social media tools (wiki, blog, and microblogging tool) for online communication and collaboration activities. MediaWiki is intended for collaborative writing tasks among the team members, for gathering and organizing their knowledge and resources, and for clearly documenting the project. Blogger is used for reporting the progress of the project (i.e., a kind of "learning diary"), for publishing ideas and resources, and for providing feedback and solutions to peer problems; each team has its own blog, but inter-team cooperation is encouraged as well. Twitter is meant for staying connected with peers and posting short news, announcements, questions, and status updates regarding the project. These three Web 2.0 tools are integrated in a social learning environment called eMUSE (empowering MashUps for Social E-learning). The platform provides support for both students and teachers: common access point to the social media tools, basic administrative services, learner tracking and data visualization, and evaluation and grading support. The whole range of functionalities provided by eMUSE can be found in [15].

The student assessment takes into account both the final product delivered at the end of the semester and the continuous collaborative work carried out on the Web 2.0 tools. There are also 4 compulsory intermediary presentations, in order to engage students more and discourage the practice of activity peak at the end of the semester.

The study participants are 53 undergraduate students (20 females and 33 males), split in 14 teams (11 with 4 members and 3 with 3 members), who were enrolled in the WAD course. For the current study, we focus on students' activity on the blog, from 3 research perspectives: (i) the quantitative data collected and recorded by eMUSE; (ii) the qualitative analysis of the blog content; and (iii) the subjective perception of the students regarding their learning experience with blogs. Each of these perspectives is addressed in turn in the following 3 sections.

# 17.3 Students' Blogging Activity

As explained in the previous section, students' activity was tracked and monitored throughout the semester by means of the eMUSE platform. The system gathers learner actions from each of the social media tools and stores them in a local database for further processing (together with a description and an associated time stamp). Based on these data, the platform provides a range of statistics and graphical visualizations, which support students and instructors in self-monitoring and evaluation, respectively; in this section, we focus on the blogging part of learners' activity. Figure 17.1 includes a screenshot from the eMUSE dashboard at the end of the semester, illustrating the distribution of students' actions on the blogs throughout the weeks (first 2 charts), as well as the proportion of blog posts versus blog comments (third chart).

As can be seen, the periods with the lowest activity level were at the beginning of the semester (Weeks 1 and 2—before the actual introduction of the project tools and tasks) and during the winter holidays (Weeks 13 and 14). The activity peaks coincided with the intermediary presentations (Weeks 5, 7, 9 and 11) as well as the final presentation (Week 16).

A total of 449 student blog contributions were recorded: 405 posts and 44 comments. This amounts to an average of almost 8 posts and 1 comment per student. While this may not seem like a lot, it should be remembered that the blog was just one of the three social media tools employed by the students for their project. The low number of comments can be explained not necessarily by a lack of interaction, but mostly by the perceived purpose of the blog: a place for sharing experience, organizing knowledge, and finding interesting resources, more than a medium for communication or feedback provisioning; the latter roles were mostly fulfilled by Twitter and face-to-face discussions. A more in-depth analysis of the blog contributions and its perceived roles are provided in the next 2 sections, respectively. Another potential explanation for the low number of comments is that sometimes students answered peers in new posts rather than through comments to the original post; occasionally, they even titled their posts accordingly (e.g., "*RE: Sites Color change*").

Finally, it is worth investigating also the distribution of blog contributions per student: A significant variation among students and teams was recorded, as shown in Fig. 17.2. Two of the teams were virtually inactive (with 1 and 3 blog posts, respectively) and their members eventually dropped out of the course. These disparities between students' work with social media tools are in-line with the previous findings [10, 16, 17] (generally due to social loafing and free-rider issues). Involving students more uniformly in blogging and learning activities in general would be beneficial, and we address this issue in more detail in the Discussion section.



Fig. 17.1 Summary charts provided by eMUSE at the end of the semester

## 17.4 Content Analysis of Blog Contributions

So far we analyzed the blog contributions from a quantitative point of view, based on the data provided by eMUSE; in this section, we introduce also a qualitative analysis, based on the Community of Inquiry framework [18]. The decision to use an existing coding scheme for content analysis rather than develop a new one was



**Fig. 17.2** Excerpt from eMUSE dashboard, illustrating the distribution of blog contributions per student: posts in the *left chart* and comments in the *right chart* (students' names appear as tooltips on each bar and only students with at least one contribution are included)

motivated by the proven validity of the instrument [19], as well as its popularity and widespread adoption [20].

The Community of Inquiry (CoI) model was proposed in [18] and has socio-constructivist roots. It identifies three essential and interdependent elements of an educational experience in an online learning community:

- Cognitive presence (the extent to which learners are able to construct meaning through sustained reflection and discourse);
- Social presence (the ability of learners to identify with the community and develop interpersonal relationships by projecting their personal characteristics into the community); and
- Teaching presence (design, facilitation, and direction of cognitive and social processes to support learning).<sup>1</sup>

While CoI framework was initially introduced for computer conferencing, it was subsequently extended to other asynchronous communication spaces between students. Recently, it was applied also to social media tools, such as blog [10], Twitter [21], or SecondLife [22]. Its suitability for blogs comes from the fact that educational blogs integrate both a content space and a discussion space, which are built collaboratively [10].

For our study, we decided to consider each blog entry (post or comment) as a unit of analysis, following the suggestion in [10]. All 449 blog entries were manually coded using the coding scheme (categories and indicators) proposed in [23]. Since only the student blogs were analyzed (not also the teacher blog), only the first 2 presences (cognitive and social) are considered. The resulted classification is included in Table 17.1.

The results confirm the blog affordances to support both social and cognitive presences. The cognitive components (63 %) outweigh the social components (37 %), which is in-line with students' perceived role of the blog in the current learning scenario (primarily a content space and secondarily a discussion space).

<sup>&</sup>lt;sup>1</sup>Community of Inquiry Model, available at: https://coi.athabascau.ca/coi-model.

Element	Category	Indicators (examples according to [23])	Number of posts and comments
Cognitive presence	Triggering event	Recognize problem; sense of puzzlement	4
	Exploration	Exploration within the online community; exploration within a single message; information exchange; suggestions for consideration; leaps to conclusions	245
	Integration	Integration among group members; integration within a single message; connecting ideas and synthesis; creating solutions	32
	Resolution	Vicarious application to real-world testing solutions; defending solutions	3
Total			284
Social presence	Affective	Expressing emotions; use of humor; self-disclosure; use of unconventional expressions to express emotion; expressing value	11
	Open communication	Continuing a thread; quoting from others' messages; referring explicitly to others' messages; asking questions; complimenting, expressing appreciation; expressing agreement; expressing disagreement; personal advice	106
	Group cohesion	Vocatives; addresses or refers to the group using inclusive pronouns; phatics, salutations and greetings; social sharing; course reflection	48
Total			165

Table 17.1 Classification of blog posts and comments according to CoI framework

More than half of the blog posts belong to the exploration phase of learning, in which students find and share interesting resources (mainly online tutorials), exchange ideas and information, provide explanations, and make suggestions for their team members. The phases of integration and resolution are captured in less than 8 % of the blog posts; this can be explained by the fact that complete solutions are generally lengthy and they are mainly documented on the wiki (the blog records predominantly the progress up to the solution). We can also see that students tend to post when they have some useful resources to share, not when they encounter a problem or puzzlement; hence, the triggering phase of learning is much less documented on the blog. Students are not much inclined to post questions and ask for help, which also explains the low number of comments and feedback messages (as noted in the previous section).

The posts and comments reflecting the social presence accounted mainly for discussions between students, notifications regarding project progress, encouragements, and compliments for peers' activity. Team spirit and group cohesion were also apparent in a significant number of posts. Few off-topic, small-talk posts were recorded, as well as few posts expressing emotions—students preferred to use the blog in a slightly more formal manner.

As a complement to the quantitative and qualitative analysis of students' contributions on the blog, in the next section we investigate students' subjective perceptions on their blogging activity.

## 17.5 Students' Perceptions on Blogging

At the end of the semester, students were asked to fill in a survey regarding various aspects of their learning experience for the WAD project. Forty-one students (about 77 %) chose to answer the questionnaire and in what follows we summarize their opinions related specifically to the use of blogs.

Most respondents (over 70 %) found it easy or very easy to learn how to use the blog as well as actually use it; the vast majority did not encounter any technical problems while using the blog.

The main roles fulfilled by the blog (ordered based on the importance assigned by the students) are (i) learn how to use the tool (73.17 %); (ii) exchange experience (53.66 %); (iii) help organize knowledge (48.78 %); and (iv) find interesting/useful information (46.34 %). (Please note that since students could select more than one role, percentages add up to more than 100 %.) Other important purposes of the blog, mentioned by at least a third of the students, include the following: (i) improve writing skills; (ii) receive feedback; (iii) improve collaborative skills; and (iv) increase competitiveness. The majority of the students reported using the blog because they considered it to be really useful for the project or because it was interesting/fun. However, more than a third of the students reported using it mainly for getting the corresponding grade.

We also investigated the level of interaction between teams and found out that more than 75 % of the respondents read other teams' blogs. The main reasons for referring to peers' blogs are (i) looking for information (finding interesting and useful resources); (ii) curiosity (seeing other teams' progress, level of involvement, and work style); (iii) searching for solutions to problems encountered; and (iv) comparison (checking out competition, in order to transfer ideas and increase own motivation). Conversely, the most common reason for not reading peers' blogs was the lack of time, some students preferring to focus exclusively on their own team work.

Overall, about 95 % of the students were at least moderately satisfied with the use of the social media tools for the WAD project; over 73 % reported a higher

learning satisfaction compared to traditional project settings. Finally, more than 70 % of the students expressed their support for the use of social media tools in education (with only about 7 % being against it) and expressed their desire to use the WAD project approach for other subjects in the future.

### 17.6 Discussion and Conclusion

The study presented in this chapter revealed a successful integration of blogs as PBL support tools for a Web Applications Design course. The analysis included three dimensions (usage data recorded by eMUSE platform, content analysis based on CoI model, and student self-reported data), which helped create a more comprehensive perspective compared to related studies.

Overall findings in CoI framework confirm blogs' affordances for educational settings, and in particular for project-based learning scenarios. They support both social and cognitive presences, promoting knowledge construction in online learning communities, as suggested also in [10]. This is in-line with the results of the opinion surveys as well; according to them, students found the blogs easy to learn and use, and especially helpful for exchanging experience, organizing knowledge, finding interesting information, and following the progress of other teams. The majority of the students reported their overall satisfaction with the blog-based PBL approach.

Nevertheless, the proposed PBL scenario also has some downsides. First, the amount of time necessary for accomplishing the project was deemed too high by some of the participants. This could be partially explained by the fact that the instructional settings were a premiere for the students, so they needed some time to get accustomed with the tasks as well as the new collaborative environment [16]. Peers' low level of involvement was also a problem in some of the teams. Indeed, we have also noted this disparity between students' blog contributions in Sect. 17.3. A potential solution for involving students more uniformly in the blogging activity would be to provide automatic feedback and encouragements to low-level activity students throughout the semester, by including an additional functionality in eMUSE platform.

A further area for improvement is students' reluctance to post questions or problems encountered, to show their learning process, not just the results (hence the low number of posts from the triggering phase of learning, as noted in Sect. 17.4). Learners should be more encouraged to ask peers for help and share their incomplete ideas or puzzlements; students' fear of exposure can be alleviated by ensuring a positive group climate and creating an atmosphere of trust and confidence, as suggested in [24].

As future work, we plan to perform a more detailed analysis of the blog content, by investigating the evolution of social and cognitive presences over time and over the different stages of the project; team-level and student-level investigation would also provide an interesting perspective. An automatic content analysis could also be envisioned, as the one suggested in [25]. Finally, additional coding schemes could be employed (as the ones reviewed in [26]), in order to provide a more in-depth analysis of students' blog contributions.

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