# Using CollAnnotator to Analyze a Community of Inquiry Supported by Educational Blogs - Preliminary Results

Elvira Popescu<sup>( $\mathbb{K}$ )</sup> and Gabriel Badea

Computers and Information Technology Department, University of Craiova, Craiova, Romania popescu\_elvira@software.ucv.ro, gabriel.badea@yahoo.com

**Abstract.** Community of Inquiry (CoI) model can be used to describe an online learning community (supported by various communication channels between students) on three interdependent components: cognitive, social and teaching presence. In this paper, we use CoI for investigating the online community formed in a social learning environment, focusing especially on the affordances of blogs. The novelty of our approach consists in the use of a dedicated content analysis tool, specifically built for CoI, called CollAnnotator. The paper provides a preliminary experimental validation of the tool, which was successfully applied in practice for analyzing the content of 479 blog posts, created by 75 students. The context of study, content analysis procedure and a brief overview of the results are reported in the paper.

Keywords: Community of Inquiry · Content analysis · Educational blogging

## 1 Introduction

The *Community of Inquiry (CoI)* model, proposed in [3], addresses the development of online learning communities in terms of three components: (i) *Cognitive presence* (learners' construction of meaning through sustained reflection and discourse); (ii) *Social presence* (learners' identification with the community and development of interpersonal relationships); (iii) *Teaching presence* (design, facilitation, and direction of cognitive and social processes to support learning)<sup>1</sup>. While initially introduced for computer conferencing, the model has been recently applied for other online communication spaces between students, including blog [1], Twitter [7] or Facebook [4].

Despite its widespread use, to the best of our knowledge, there is no support tool available for content analysis according to CoI framework. Therefore, we decided to develop an in-house solution, called CollAnnotator, which was specifically designed to work in conjunction with our eMUSE social learning environment [5] and provide support for tweets and blog posts content analysis [2].

The goal of this paper is to provide a preliminary experimental validation of the tool, illustrating its practical use for investigating a Community of Inquiry supported by educational blogs. The rest of the paper is structured as follows: Sect. 2 describes the context of study, briefly introducing the CollAnnotator tool, the study settings and the

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

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content analysis procedure. Section 3 presents and discusses the results of the content analysis process. Section 4 draws some conclusions and future research directions.

### 2 Context of Study

#### 2.1 CollAnnotator Tool and Study Settings

Given the popularity of the Community of Inquiry model [6], a dedicated platform for supporting content annotation based on CoI would prove useful to the researchers. We therefore developed such a content analysis tool, called *CollAnnotator*, which provides the following functionalities: rich annotation support, possibility to attach more than one code to a message, support for multiple coders and suggestive comparisons between them, support for the negotiation phase, detailed statistics and reports of the coding results, all in an intuitive and easy to use interface. Furthermore, CollAnnotator is adapted to our goal of using CoI for investigating the online community formed in our social learning environment, eMUSE [5]; it directly retrieves student content (blog posts and tweets) from eMUSE database and generates reports and statistics specific to our instructional scenario. More details regarding the tool rationale, functionalities and implementation details can be found in [2].

As an initial experimental validation, we applied CollAnnotator to investigate the affordances of blogs to create and support a community of inquiry. The blog posts of 75 students enrolled in a Web Applications Design course were analyzed. The course took place during the first semester of the 2015-2016 academic year and was taught to 4th year undergraduate students in Computer Science from the University of Craiova, Romania. A project-based learning scenario was implemented, in which students collaborated in teams of 3–4 peers in order to build a relatively complex web application. Students could use three social media tools (blog, wiki and Twitter) for communication and collaboration tasks. All students' contributions on these tools were retrieved and stored in a local database by means of the eMUSE platform [5].

In particular, every team had a blog where each member could contribute and report the progress of the project, share interesting resources, describe problems encountered and potential solutions, ask questions to peers, provide feedback etc. A total of 479 contributions were recorded on students' blogs: 399 posts and 80 comments. These were subsequently analyzed using CollAnnotator, according to the procedure described in the next subsection.

#### 2.2 Content Analysis Procedure

Two researchers performed the content analysis of the 479 student blog posts, using CollAnnotator tool and the coding scheme proposed in [6]. The use of two coders was aimed to increase the reliability and validity of the results [6]. The unit of analysis was the blog post, according to the recommendations in [1]; however, coders were encouraged to use the highlight feature included in CollAnnotator in order to provide annotations at finer levels of granularity. Due to the richness of the blog posts, both a primary (mandatory) and a secondary (optional) category were assigned to each post. In addition,

the coders were asked to add a comment in order to justify or explain their choice (e.g., specify the *indicator* used for the particular category).

Coding took place in two phases: first, the researchers annotated and classified all the posts independently, obtaining an agreement percentage of around 80%. Secondly, they met in order to compare the codes, discuss the disagreements and try to reach a consensus; after negotiation, the agreement between the coders reached 98.33% when considering only the primary category and 96.19% when considering also the secondary category.

## 3 Results and Discussion

Figure 1 presents the frequency counts for blog posts, at category level, as shown by CollAnnotator (including both primary and secondary categories); a brief discussion of the results is provided next.

| Blog Statistics (based on both categories)<br>Agreement percentage between coders: 96.19 %<br>Classification Table for Blog Posts & Comments |                    |     |     |           |                  |                              |                             |
|--|--------------------|-----|-----|-----------|------------------|------------------------------|-----------------------------|
|  |                    |     |     | Presence  | Category         | Count (for coder<br>Gabriel) | Count (for coder<br>Elvira) |
|  |                    |     |     | Cognitive | Triggering event | 19                           | 18                          |
| Exploration  | 101                | 104 |     |           |                  |                              |                             |
| Integration  | 247                | 246 |     |           |                  |                              |                             |
| Resolution   | 0                  | 0   |     |           |                  |                              |                             |
| Social   | Affective          | 38  | 39  |           |                  |                              |                             |
|  | Open communication | 97  | 89  |           |                  |                              |                             |
|  | Group cohesion     | 202 | 210 |           |                  |                              |                             |



First of all, it should be noted that the *teaching presence* was not considered in our analysis; this is due to the fact that the instructor's blog and contributions were not taken into account. While students could also initiate teaching components (e.g., peer instruction), related studies show that most of them originate from the instructor [1].

We could also notice that the largest number of posts belong to the *integration* phase of learning (*cognitive presence*), since students regularly reported on the progress of their project, pointing towards the creation of solutions. The *exploration* phase is also relatively well represented, with many students sharing interesting resources and ideas (information exchange) or providing suggestions for consideration. The *resolution* phase is not documented on the blog, since complete solutions were generally presented and defended on the wiki. The *triggering* phase is also scarcely represented, as students tend to post not when they encounter a problem or puzzlement, but rather when they have a solution to share.

As far as the *social presence* is concerned, most posts account for *group cohesion*, with many students addressing or referring to the group in their posts. *Open communication* is also well represented, including answers to peers' posts, asking questions, complimenting and expressing appreciation. Only few posts express emotions or use humor (*affective* category), as students preferred to use the blog in a slightly more formal manner.

### 4 Conclusion

CollAnnotator tool was successfully applied in practice for analyzing the blog posts of 75 students who used the blog in the context of a project-based learning scenario. A total of 479 posts were annotated and classified by two coders, who found the tool easy to use, effective and efficient; a high level of agreement was obtained after the negotiation phase, leading to a valid and reliable classification. Results indicate blog's support for cognitive and social presences, especially for exploration and integration, group cohesion and open communication.

More in-depth analyses are planned to be performed, relying on the support offered by CollAnnotator. First, students' tweets could be included in the investigation, to give a more comprehensive perspective on the created community of inquiry. Second, teamlevel and student-level analyses could be conducted, to explore their contribution to the community. Third, comparisons between different student cohorts could be performed, given that the instructional scenario has been running for several years.

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# References

- Angelaina, S., Jimoyiannis, A.: Educational blogging: developing and investigating a students' community of inquiry. In: Jimoyiannis, A. (ed.) Research on e-Learning and ICT in education, pp. 169–182. Springer, New York (2012)
- Badea, G., Popescu, E.: CollAnnotator a support tool for content analysis according to Community of Inquiry framework. In: Proceedings ICALT 2017, pp. 212–214 (2017)
- 3. Garrison, D.R., Anderson, T., Archer, W.: Critical inquiry in a text-based environment: computer conferencing in higher education. Internet High. Educ. 2(2–3), 87–105 (2000)
- Lim, J., Richardson, J.C.: Exploring the effects of students' social networking experience on social presence and perceptions of using SNSs for educational purposes. Internet High. Educ. 29, 31–39 (2016)
- 5. Popescu, E.: Providing collaborative learning support with social media in an integrated environment. World Wide Web **17**(2), 199–212 (2014)
- 6. Shea, P., Hayes, S., Vickers, J., et al.: A re-examination of the community of inquiry framework: social network and content analysis. Internet High. Educ. **13**, 10–21 (2010)
- Sinnappan, S., Zutshi, S.: Using microblogging to facilitate community of inquiry: an Australian tertiary experience. In: Proceedings of ASCILITE 2011, pp. 1123–1135 (2011)