

# Visualizing Student Participation in a Collaborative Learning Environment

Jordan Barría  
Universidad Austral de Chile  
General Lagos 2086, Valdivia  
jordanbarriap@gmail.com

Eliana Scheihing  
Universidad Austral de Chile  
General Lagos 2086, Valdivia  
escheihi@uach.cl

Denis Parra  
PUC Chile  
Vicuña Mackenna 4860  
dparra@ing.puc.cl

## ABSTRACT

In the search for techniques that support participation in online communities, in this poster we present a visualization tool for a collaborative learning environment which aims at motivating students to engage in online discussions taking place during learning activities. Grounded on social comparison theory, we propose a graph-based visualization that shows communication patterns between users or teams, in a way that it can increase social awareness and enable social comparison about students' level of contribution. This work is in its design phase, so we present the supporting hypotheses of our proposal, expecting to encourage discussion and user feedback in order to proceed with the coming step of conducting a user study over a period of several months.

## Categories and Subject Descriptors

[**Applied Computing** ]: Education — *Collaborative Learning*;  
[**Human-centered Computing**]: Visualization—*Visualization design and evaluation methods*

## Keywords

Social visualization, Social comparison, Collaborative learning

## 1. INTRODUCTION

Promoting participation in online communities is an active research field. From early research [6] to most recent works [8], it has been shown that engaging people to participate is not a simple task, since usually a small proportion contribute actively and the rest of the users, the largest proportion, become *lurkers* who contribute very little or nothing. There are a few existent works on promoting user participation within online learning communities by means of information visualization [9, 3, 5] to reflect students' progress as well as their contribution to the learning activities. This implies that users' participation data are represented in an informative way being accessible to every community member, establishing a social visualization. Social comparison theory [2] is usually cited in support of the successful outcome of these approaches [9, 3], which states that people tend to compare their achievements with people who they think are similar to them, leading to an improved performance. Similarly, in [5] social comparison is mentioned as a result of enabling group awareness, but it focuses on studying the positive influence of raising student participation awareness on their collaborative behavior through a visualization tool. Considering the aforementioned works, we propose the implementation of a social visualization tool focused on increasing awareness on classmates and teachers participating in a b-learning community supported by

the Kelluwen platform. It will emphasize graphically aspects that we hope can act as feedback and activate social comparison among users.

In the rest of this document we provide some context by introducing the Kelluwen learning platform where this tool will be implemented, then we provide details of the visualization design, to finally state our conclusions and expectations on the future work.

## 2. KELLUWEN PROJECT

Kelluwen is a community of students, teachers and researchers focused on building, using and sharing collaborative didactic designs that combine traditional classroom activities and the use of social web tools (the Web 2.0) as didactic resources. This project is supported by a Web platform, which has been used by a large group of vulnerable schools of Southern Chile. The experience we have gained in a couple of years (2010-2012) shows that the pace of students' participation in discussion learning activities decreases remarkably as the weeks go by [1]. This participation is reflected by posting messages, replying those messages and 'liking' them through the Virtual Worklog tool[4]. Another issue identified was the evident lesser rate of interaction established between students belonging to *twin classes* (geographically remote classes who execute the same didactic design at the same time period) compared students in the same class, at the expense of the benefits provided by this source of feedback and opinion sharing. Therefore, we seek for an strategy that increases students' participation in order to support our main project goal: improving socio-communicative skills in students through the use of ICT in their classes [1].

## 3. VISUALIZATION DESIGN

The proposed visualization (Figure 1) aims to represent the students' participation while discussing through the Virtual Worklog tool. It will be accessible to all users who are part of the same didactic design execution –i.e., students that belong to the same and *twin classes*. Each user is depicted as a circular node with her profile photography inside, where its size is proportional to her level of participation along learning activities. As previously said, it is given by the number of written messages in the Virtual Worklog and the number of 'likes' to peers' messages.

Since learning activities are carried out by means of collaborative group-work, users can identify teams – defined by the teacher who supervises the activities– by the border color of each node since each color represents a specific group. Moreover, users can change the view in which nodes are deployed in order to see them clustered into groups, thus allowing a team view of their participation (Figure 1a) instead of the individual view (Figure 1b). Furthermore, users



(a) Class perspective from team view

(b) Self perspective from individual view

Figure 1: The two perspectives (class and self-centered) of visualization from team and individual view respectively. Users can change from team view to individual view (and viceversa) by using the checkbox at the right top corner of the tool (a and b). Users can switch class to self perspective clicking on an specific user node (a), and from self to class perspective clicing outside radial layout displayed (b)

can choose the perspective that summarizes the users' participation: the general *class perspective* (Figure 1a) and the personalized *self perspective* (Figure 1b), which are described next.

### 3.1 Class Perspective

Through the *class perspective*, users access a holistic view of the participation of all their peers on discussions taken place during learning activities (Figure 1a), providing a high-level representation of the class. Here, user nodes are deployed as a social network, where undirected edges connect pairs of nodes if those users had interacted by either replying a message or 'liking' one. The information presented here is very general, since the layout position of a node within a social network can't describe completely the real closeness between users. For that reason, if a user wants to access to a detailed perspective of her own participation data or one of her peers, she can access to the self-centered perspective.

### 3.2 Self Perspective

By choosing the *self perspective* (Figure 1b), users can access detailed data about relationships established among a specific user and all of her peers. Here, the selected user node is depicted at the center of a radial layout, while the other nodes are deployed surrounding it. Like in the *class perspective*, interaction between users is represented by a connecting edge, a directed one: unidirectional when the proportion of interaction from user A to B is higher than from B to A (using a certain threshold); or bidirectional in case that both proportions of interaction be equitably distributed. Finally, the distance that separates peripheral peer nodes from the center user node reflects the frequency of interaction both established over learning activities. Therefore, the more a pair of users interact over time, the closer they will be located.

We hypothesize that the implementation of the proposed social visualization tool in Kelluwen Web platform can raise social awareness and perhaps activate social comparison in order to stimulate users to engage in an active reciprocal behavior.

## 4. CONCLUSIONS AND FUTURE WORK

The contribution of this work is given proposing a visualization supported by a survey of successful experiences about social visualizations within CSCL environments. We will apply our approach in a different cultural context, since existent studies were not applied on teenage students under social risk. Moreover, though visual social network representation has been applied in the analysis of online learning communities [7], we include different perspec-

tives to represent users interaction which can be accessed through the same visualization in a dynamic way. Finally, we will study the effect of this approach on students' participation rather than its usefulness on teachers.

The next phase we pursue is the implementation of this visualization tool on the Kelluwen platform and the design of the experiment that will assess its impact on the overall class behavior. The experiment will consist of incorporating this visualization to certain specific classes, measuring the peer interaction reached throughout the activities in a sample of classrooms having and not having access to the visualization. We also want to explore which view –individual or team– and which perspective –class or self-centered– is perceived as simpler to understand. We are interested in telling whether these perspectives are complementary and enrich social navigation or whether users clearly prefer one over the other to explore their participation.

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