

Chapter 7

Functionalities and Facets of Group Awareness in Collaborative Online Laboratories

Christophe Gravier
Université de Lyon, France

Michael Callaghan
University of Ulster, UK

ABSTRACT

This chapter examines the rationale and motivations for using Computer-Supported Collaborative Learning (CSCL) for Online Laboratories. It explores different classifications, facets and features of virtual, remote and hybrid laboratories (Gomes2009, Gravier2009a) and subsequently introduces and discusses a range of metaphors, which can be used to understand each approach (Kreijns2002, Northrup2001). It also attempts to classify each of these platforms based on how students learn in these environments i.e. working as individuals or collaboratively in peer based groups (Gravier2009). It discusses and defines the concept of “Collaborative Online Laboratories” as Remote, Virtual or Hybrid Laboratories where groups of users work collaboratively in online virtual communities to support and facilitate learning. Two practical examples of Collaborative Online Laboratories, (the OCELOT project, a Collaborative Remote Laboratory from the University of Saint-Etienne and the Engineering Education Island project, a Collaborative Virtual Laboratory from the University of Ulster) will be presented in the context of existing literature, our individual experiences in implementation and the functionality included in each platform to facilitate collaboration between learners. The chapter will conclude with a discussion of the author’s experiences of practical implementation of these projects and the opportunities/barriers to future directions in Collaborative Online Laboratories.

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GROUP AWARENESS IN COLLABORATIVE ONLINE LABORATORIES: A STACK OR TWO TOWERS?

Motivations

One of the first definitions of Group Awareness (GA) was proposed by (Dourish 1992): “Awareness is an understanding of the activities of others, which provides a context for your own activity”. In other words, GA is the “group context”, where the group is the set of individuals, but where the group context is more than the sum of the context of each individual in the group (Lee 2004). Additionally conflicts, group partitioning, recommendations, etc. are new issues brought by the notion of a “group context” in addition the individuals’ contexts.

Until recently online remote and virtual laboratories differed from the student’s campus based experience as they only facilitated single user connections at any given time. This approach has proven successful as a viable alternative to being physically present in the laboratory as clearly evidenced by the number of working remote and virtual laboratories in everyday use (Gustavsson 2007, Lowe 2009, Gravier 2008). However in campus-based laboratories a key element of the learning process is peer facilitated learning through student interaction and the sharing of results/experiences. The concept of “Collaborative Online Laboratories” as Remote, Virtual or Hybrid Laboratories, where groups of users work collaboratively in online virtual communities to support and facilitate learning is a necessary and important development in this area and must seek to replicate the group dynamics of a distributed engineering team (Muller2007). This multi-faceted element of collaboration is important to the development of successful engineers and is an essential pedagogical objective of laboratory-based teaching. In addition, learning to work together remotely as part of an efficient distributed group

of workers is an increasingly necessary skill for the next generation of engineers.

Group Awareness and Open Issues for Collaborative Online Laboratories

Face-to-face interactions, and therefore GA, were taken for granted in traditional laboratories. These are however under-studied interactions in the context of online laboratories, as we only found two synchronous collaborative laboratories to date in the literature. In the meantime, GA studies had shown that GA enhances knowledge sharing and limits the impact of the free ride¹ issue in Computer-Supported Collaborative Learning (CSCL) environments (Kreijns2003). While it is true that GA is difficult to implement in distributed systems (Gutwin2004), the effectiveness of GA for online laboratories situation is therefore unknown due to the lack of empirical studies on this subject, though previous research on its effectiveness in CSCL environments points in this directions.

This raises several issues that we are trying to tackle in our research work which we will focus on in this chapter:

- Is GA possible in Collaborative online Laboratories?
- If so, how can it be built in terms of functionality? What are the possible facets of GA in collaborative online laboratories?
- Does it enhance the Quality of Experience (QoE) of the laboratory session, especially by accurately recreating the traditional laboratories atmosphere and limiting free rides?
- Does it improve the learning experience of the students to the same extent as in single user online laboratories?
- How far can we go to bring the metaphor of the traditional laboratories online in terms of Human-to-Machine Interactions?

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