# Measuring Performance Across Space & Time in Online Learning: Identifying Structural Patterns to Promote Scalability

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**Abstract:** The relationship between group performance and structure in completely online, large scale CSCL learning environments is examined inconsistently. In this study, we examine a set of eight completely online graduate student learning groups in a large scale, asynchronous, fully distributed CSCL environment. We connect group awareness to performance with a comprehensive analysis of the performance and performance changes in all eight groups, paying particular attention to the three case study groups. We look at actual performance as scored on a rubric by two raters instead of grades, and we also survey the group's regarding their sense of "Group Efficacy". The group awareness of each of the three groups is shown to have a relationship to these two performance measures.

## Introduction

Computer Support for Collaborative Learning (CSCL) research contributes to understanding of small groups in an online context from the perspective of joint knowledge construction (Kimmerle & Cress, 2008), the influence of argumentation scaffolds on group micro-processes (Stegmann, Weinerger, & Fischer, 2007) and the use of technology for reflection (Yukawa, 2006). Alongside CSCL studies in research focused technical environments, a parallel movement toward large scale, open education at the University level is changing the nature of how higher education is delivered (Creelman & Ossiannilsson, 2011). The need for CSCL research to focus on large scale, deployed learning environments is great; and growing. A close examination of small groups, and their role as an intermediate level social construction between large scale communities and individual CSCL participants is warranted.

To address the scalability of CSCL research across space and time with a focus on small groups in completely online university courses new approaches to performance measurement and evolving structure within these groups is necessary. There are several specific gaps in both the measurement of performance and the description and understanding of small groups as a vital, intermediate unit of analysis in scalable CSCL. First, performance is not consistently measured when it is measured at all in studies of online learning. Student grades are frequently used as a method of convenience, but their limited utility as a measure of learning performance is well documented. Further, there is wide variation in the meaning of words like "online" and "computer supported collaborative learning". In some studies *online groups* refers to courses where students meet partially online and partially face to face (Cho, Gay, Davidson, & Ingraffea, 2007; Cress, Barquero, Buder, & Hesse, 2005; Johnson, Suriya, Yoon, Berrett, & Jason, 2002; Michinov & Michinov, 2008; Michinov, Michinov, & Toczek-Capelle, 2004) and in other studies the groups are composed of geographically distributed subgroups where the subgroups meet face to face (Cadima, Ferreira, Monguet, & Ojeda, 2010). Only a few studies look explicitly at the completely online case (Goggins, Mascaro, & Mascaro, 2012; Goggins, Galyen, & Laffey, 2010). Making performance measurements more systematic and being specific about the contexts and interaction patterns examined in CSCL research will enable further, systematic study of scalable CSCL across space and time.

## Identity and Structure Across Eight Groups

### Group Identity

| | | Communication Type | | |
|---|---|---|---|---|
| **Group** | **Posts in** | **Small** | **Inter-** | **Inter-** |
| Barriers | 208 | 58.17% | 40.87% | 0.96% |
| Get-Along | 396 | 83.08% | 15.66% | 1.26% |
| Individualist | 103 | 77.67% | 21.36% | 0.97% |
| Canada | 189 | 89.42% | 3.70% | 6.88% |
| Catskill | 315 | 100.00% | 0.00% | 0.00% |
| Adams | 175 | 97.71% | 2.29% | 0.00% |
| Orange | 246 | 100.00% | 0.00% | 0.00% |
| Police | 14 | 100.00% | 0.00% | 0.00% |

**Table 2. Total posts in each group private discussion area and % communication type by group**

Table two shows some basic trends in these communication practices. It is clear that three groups (Catskill, Orange & Police) only communicate within the group discussion board using group oriented language like "we"

or other references to the group as a whole. It is also clear that three groups (Individualist, Barriers & Get-Along) participate in a combined interpersonal/group oriented communication pattern. Seven of the eight groups we study are composed of three members, and the eighth group (Canada Group) has four members. Canada Group is the only group with a significant amount of interindividual communication (as explained in the literature review, interindividual communication is between individuals, but in a group context such as a side conversation at a party). This may be an artifact of how communication within a completely online group changes when the size of the group changes from three members to four, and warrants examination in future studies.

### Performance

The performance and performance trajectory of each case study group is connected to the identity and structure of the group that emerges from our analysis. Individualist Group and Barriers Group experience declines in performance related to critical events that occurred during the midpoint of the course, module four. Get-Along Group struggles with performance on the task in module four because it is an unstructured design task for which the group's well-established socio-technical practices are ill suited. The most cohesive group adapts slowly, and the least cohesive groups experience difficulty. The relationship between identity, structure and performance in completely online courses appears in these case studies to be a nuanced one.

| | Individualist | Canada | Adams | Police | Orange | Barriers | Catskill | Get-Along | Basis for Color Code |
|---|---|---|---|---|---|---|---|---|---|
| Scenario | 24 | 12 | **30** | 12 | 24 | **33** | 18 | 15 | score group |
| Script | 4 | **28** | 24 | **20** | 24 | 28 | **22** | **20** | trajectory |
| Assessment | *3* | *6* | *0* | *3* | *6* | *3* | *18* | *3* | |
| Total | 31 | 46 | 54 | 35 | 54 | **64** | **58** | 38 | score group |

**Table 3. Module four rubric scores**

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