Investigating Influences Among Individuals and Groups in a Collaborative Learning Setting

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ABSTRACT

The research presented in this paper aims at investigating factors that reflect Individual to Group (I-to-G) and Group to Individual (G-to-I) influences in a collaborative learning setting. An empirical study is described, in which students worked on concept mapping tasks, individually and in groups. Analysing the individual and group concept maps, specific factors were identified that account for G-to-I and I-to-G influences reflecting peer interaction and impact on group and individual achievement during and after collaboration. Dependences were also identified between individual/group characteristics, such as knowledge and style, and individual/group progress. Finally, a discussion about how these factors may inform the learner and group models of the adaptive concept mapping environment COMPASS is given.

Keywords: *Collaborative Learning, Concept Mapping, Group Model, Group to Individual Influence, Individual to Group Influence, Learner Model, Learning Styles, Personalisation*

INTRODUCTION

Individuals come to a collaborative session with diverse strengths, interests, abilities and needs and several factors seem to influence group dynamics, which in turn affect outcomes such as group effectiveness and individual achievement. Much research has been conducted on group effectiveness, focusing on collaboration and investigating (a) the impact of factors such as group characteristics and member traits, e.g., group ability, group structure, prior knowledge, heterogeneity, learning styles (Inaba, Supnithi, Ikeda, Mizoguchi, & Toyoda, 2000; Martin & Paredes, 2004; Muehlenbrock, 2006; Reed & Oughton, 1998; Stoyanova & Kommers, 2002; Webb & Mastergeorge, 2003; Wilkinsona & Fung, 2002), and (b) interactional dynamics among the group (Dimitracopoulou, 2007, 2008; Kirschner, Paas, & Kirschner, 2009). In the latter studies, significant links have been identified between quantitatively coded interactional data and outcomes such as quality of group performance and collaboration.

Much fewer studies have been performed about the impact of groups on individuals' achievement outside the group (Brodbeck & Greitemeyer, 2000; Kerr & Tindale, 2004;

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Olivera & Straus, 2004). Interesting aspects of this individual-centered perspective of collaboration, are: (i) how participating in a group that has particular interactional activity or mode of interaction affects an individual's achievement (Kapur, Voiklis, & Kinzer, 2008; Schellens, Van Keer, Valcke, & De Wever, 2007; Stoyanova & Kommers, 2002), (ii) how an individual's participation rate in a group affects his/her achievement gains, (iii) how group formation affects individual achievement (Papanikolaou, Gouli, & Grigoriadou, 2006), and (iv) how the impact of collaboration on learning effectiveness / achievement may be measured at group and individual level (Khamesan & Hammond, 2004; Stoyanova & Kommers, 2002).

This work focuses on the two latter issues aiming to explore influences of group work on individual and group achievement. We intend to extend our understanding about how the collaboration process is shaped by individuals and the impact a group may have on its members. To this end, an empirical study in which students worked on concept mapping tasks, individually and in groups, was conducted. The aim of this study is twofold: first, to empirically identify factors that account for Individual-to-Group (I-to-G) and Group-to-Individual (G-to-I) influences, and second, to investigate dependences between individual / group characteristics such as knowledge and style, and learning outcomes.

The paper is organised as follows. In the next section the research context and aims are presented. Then, the empirical study that was conducted to investigate factors that reflect Individual-to-Group and Group-to-Individual influences is described. The results of the study follow. Specific influences have been identified among the individual and group products. The factors reflecting these influences as well as the dependences between individual/group characteristics and individual/group progress are described. Following that, we discuss how the identified factors may support individual and group modeling. Conclusions, limitations of the study conducted, and further research directions are discussed in the final section.

RESEARCH AIMS

In the research area of collaborative learning, the impact of group work to individuals remains an important but underresearched area (Kerr & Tindale, 2004; Laughlin, Carey, & Kerr, 2008). Among the few studies that focus on how group work may affect and be affected by individuals, open issues under investigation are how individual to group and group to individual impact can be measured in terms of factors that account for learning effectiveness.

In particular, Olivera and Straus (2004, p. 444) investigate how group collaboration influences subsequent *individual performance*. In this work, factors that are considered important are *group inputs* (e.g., member skills, group structure, and organizational resources) that influence group interaction which in turn affects outcomes (e.g., group performance), and fosters both cognitive and social processes that influence individual knowledge acquisition and subsequent individual performance. Stoyanova and Kommers (2002) investigated three different modes of group interaction (i.e., distributed, moderated, and shared interaction), resulting that learning effectiveness is significantly infuenced by the interaction scenario adopted and that the shared mode is the most effective one. Also, in Laughin, Carey, and Kerr (2008), the *type of task* performed by the group as well as *organizational conditions* are considered important for group to individual transfer. At the same line, in the study of van Boxtel et al. (2000) students performed different types of tasks, i.e., concept mapping and poster preparation, and during the study some students were individually prepared for the collaborative session while others did not, or in the Carter's study (1998) students, at a preparatory session, individually formed propositions that were discussed prior to the collaborative session. van Boxtel et al. (2000), in order to measure learning effectiveness at individual and group level, propose a coding scheme of verbal interaction to evaluate the contribution of each student in the social activity but also to assess