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Perceptions and experiences of, and outcomes for, university students in culturally diversified dyads in a computer-supported collaborative learning environment

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ABSTRACT

The introduction of computer-supported collaborative learning (CSCL), specifically into intercultural learning environments, mirrors the largely internet-based and intercultural workplace of many professionals. This paper utilized a mixed methods approach to examine differences between students' perceptions of collaborative learning, their reported learning experiences, and learning outcomes when they collaborated in a CSCL environment working with a culturally similar or dissimilar partner. Culturally diverse student dyads worked together to perform an online learning task in the domain of life sciences. Our sample of 120 BSc and MSc students was comprised of 56 Dutch and 64 international students, representing 26 countries. The results showed that students from an individualist cultural background had a more negative perception of collaborative learning than did students with a collectivist background, regardless of group composition. For women, working in a culturally similar dyad consisting of students from an individualist cultural background resulted in a more negative perception of collaborative learning than did working in this type of group for men or women working in a culturally similar dyad consisting of students from a collectivist cultural background. Students from an individualist cultural background achieved better learning outcomes than did students with a collectivist background, regardless of group composition. These findings suggest that cultural background adds an important dimension to collaborative learning, which requires students to manage collaboration that is not only virtual but also intercultural.

1. Introduction

International and multidisciplinary group work represents a growing trend in professional environments as workplaces become increasingly global. Advances in computer and information technology have brought new opportunities to connect people across physical distance and time barriers. The introduction of this technology into, specifically intercultural, learning environments allows them to mirror the contemporary internet-based and intercultural workplace of many professionals in a range of fields. For instance, projects in industry, multi-functional design, academia, health care, web design, and international law frequently involve professionals working together in virtual multidisciplinary teams spread across the globe (Sheppard, Dominic, & Aronson, 2004). Therefore, university students should not only be competent in their chosen content domain, but also experienced in working in international and multidisciplinary groups. According to McNair, Paretti, and Kakar (2008) virtual and geographically dispersed teams with members from different fields of expertise are "ubiquitous in the contemporary workplace, but our graduates are ill-prepared for the challenges of such collaborations" (p. 386). In response to this need, many universities are using new collaborative technologies as learning environments to better prepare students for the working world that awaits them after graduation (McDonald & Gibson, 1998).

To address the challenges of the rapidly changing workplace facing students today, educators and instructional designers need to develop learning environments that are responsive to these multidimensional characteristics: teams can be virtual, multidisciplinary, and multicultural. Issues facing virtual teams have become increasingly prominent in education research in the last twenty

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years, and there is a well-documented body of research on computer-supported collaborative learning (CSCL) that has focused on various aspects of group learning processes and outcomes (e.g., Koschmann, 1999; Noroozi, Weinberger, Biemans, Mulder, & Chizari, 2012; Tanis & Postmes 2007). One of the main goals of CSCL is to provide an environment that supports and enhances collaboration between students so as to improve their learning processes (Kreijns, Kirschner, & Jochems, 2003). The multidisciplinary approach to collaboration is increasingly investigated in education research to better understand how teams might create something new by interacting across traditional disciplinary boundaries (Hermann, Rummel, & Spada, 2001). However, there are relatively few studies focusing on multidisciplinary teams working together using collaborative technologies (exceptions include Noroozi, Weinberger, Biemans, Mulder, & Chizari, 2013; Rummel & Spada, 2005). Culture adds another dimension to collaborative learning, requiring students to manage collaboration that is not only virtual and cross-disciplinary, but also intercultural.

The use of technological learning environments does not eliminate cultural influences from collaborative learning, but rather poses new challenges (Chase, Macfadyen, Reeder, & Roche, 2002; Reeder, Macfadyen, Chase, & Roche, 2004). In the present research, we consider culture to be "the collective programming of the mind which distinguishes the members of one human group from another...the interactive aggregate of common characteristics that influence a human group's response to its environment" (Hofstede, 1980, p. 25). According to Cole (1996) each culture has a unique set of mediated learning experiences and the cultural context of cognition influences the way in which a learner attains knowledge. Students coming from different cultural backgrounds can thus differ in terms of cognitive styles, human relations, rules of behavior, communication style, attitudes and belief systems (Hofstede, 1991; Schwartz, 1990; Trompenaars, 1993). In terms of collaborative learning, cultural background can thus influence one's understanding of the required collaborative processes and perceptions of the types of actions that are required and likely to be effective in a given learning situation (e.g., Lal, 2002; Lans, Oganisjana, Täks, & Popov, 2013; Woodrow, 2001).

Previous research suggests that student perception of collaborative learning is a key dependent variable of educational interventions (So & Brush, 2008; Zhu, 2009). Early studies in the field mainly focused on the quality of collaborative learning products or individual learning results, but often overlooked the fact that the outcome is mediated by the quality of group learning processes (Lim & Liu, 2006). Many social and cultural factors that significantly impact the interactional processes are yet to be taken into account in CSCL studies (Lim & Liu, 2006; Weinberger, Clark, Hakkinen, Tamura, & Fischer, 2007). To this end, the present study provides an empirical investigation of differences in university students' perceptions of collaborative learning, reported learning experiences, and learning outcomes when they used a CSCL environment to collaborate with a partner who was either culturally similar or dissimilar.

2. Theoretical background

In CSCL, two or more students, each holding certain patterns of thinking, feeling, and acting on how to engage in a collaborative situation, work together to solve problems or build knowledge supported by specifically designed software (Prinsen, Volman, & Terwel, 2007). Students may differ in the way in which they collaborate and comply with various collaboration activities based on their procedural knowledge (i.e., experiences, feelings, information, strategies, and knowledge on any kind of activity) (Kolodner, 2007) and the conditions influencing group dynamics, such as group composition, group size, collaborative media, and learning task (Dillenbourg, 1999; Rummel & Spada, 2005). In addition, process factors of the online collaboration itself (e.g., turn-taking, managing time, task distribution, giving and receiving feedback) might pose challenges that inhibit successful and productive group work (Cox, Lobel, & McLeod, 1991; Kirschner, Beers, Boshuizen, & Gijselaers, 2008). Building on previous research (e.g., Cox et al., 1991; Lim & Liu, 2006; Weinberger et al., 2007; authors), this study investigated whether culturally diverse CSCL groups of students need to overcome an additional level of complexity due to culture-related differences.

The effects of cultural background can be examined either at an individual level or at a group level. There is growing concern in the CSCL literature that analyses of individual-level data cannot be treated independent of the group-level data. This relates to the data structure that forms the basis for the analyses, specifically the issue of non-independence often associated with group research in general and with CSCL research in particular. In the present research we analyze the effects of individual cultural background in relation to the cultural group composition in a dyadic CSCL setting. The way one person behaves in a social situation at least partially depends on and/or influences the way his or her collaborators behave in that situation. In CSCL research, the data of individuals is necessarily nested in the data of groups and the influence of a specific group and setting on the learning process that emerges can therefore differ from group to group.

Before describing the methodology, the findings from previous research on cultural effects on social behavior and cognitive processes in online collaborative learning will be described.

2.1. Cultural diversity and gender-related differences in CSCL groups: Influences on perception, learning processes, and learning outcomes

Group composition variables, which can include cultural homogeneity/heterogeneity, have been found to be of crucial importance for the functioning and overall success of a collaborative learning group (Liang & McQueen, 2000; Lim & Liu, 2006; Popov, Brinkman, Biemans, Mulder, Kuznetsov & Noroozi, 2012; Smith & Smith, 2000). Cultural background differences can either benefit or disrupt "the web of intra-group dynamics" (Halverson & Tirmizi, 2008, p. 12). Some of the key benefits of culturally diverse CSCL groups include: (1) more equal participation for non-native-speaking students appears to be promoted more by online discussions than by face-to-face discussion (Warschauer (1999); (2) enhancement of intercultural awareness (Amant, 2002); (3) development of the social, cognitive, and perspective-taking abilities of students is stimulated (Bonk, Appelman, & Hay, 1996; Lim & Liu, 2006); (4) sharing of different perspectives, different background knowledge, skills, and decision-making strategies to the task at hand (Maznevski, 1994).

Intercultural CSCL offer benefits but also pose challenges, which likely arise in terms of coordinating different perceptions, reasoning, and communication styles of students from different cultures (Kim & Bonk, 2002; Reeder et al., 2004; Vatrapu, 2008; Wertsch, 1998; Zhu, 2009). Previous research suggests that students' perceptions of collaborative learning may affect their collaborative behavior and learning outcomes (e.g., Dijksterhuis & Knippenberg, 1998; Kim & Bonk, 2002; Lizzio, Wilson, & Simons, 2002; Zhao & McDougall, 2008; Zhu, 2009). While accomplishing a task collaboratively, students from different cultures may have different perceptions of collaborative learning, which can lead to conflict because of the mismatch of their perspectives, feelings, and expectations (Brockner, 2003; Reeder et al., 2004; Zhao & McDougall, 2008; Zhong, Liu, & Lim, 2008). According to a number of theories in the fields of social psychology and cognitive psychology (e.g., dominant theory, group composition theory, similarity-attraction,