

Scripting Intercultural Computer-Supported Collaborative Learning in Higher Education

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Scripting Intercultural Computer-Supported Collaborative Learning in Higher Education

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ABSTRACT

Introduction of computer-supported collaborative learning (CSCL), specifically in an intercultural learning environment, creates both challenges and benefits. Among the challenges are the coordination of different attitudes, styles of communication, and patterns of behaving. Among the benefits are the sharing of culturally diverse knowledge, hands-on preparation for working in an international climate. Five empirical studies reported in this dissertation were conducted to identify and respond to the cultural issues influencing collaborative learning in both face-to-face (F2F) and online modes of communication. The ultimate goal of the five taken together was to develop an instructional script for fostering collaboration and bridging intercultural differences in culturally diverse groups engaged in CSCL. The total sample for the present research included over 500 students representing a total of 55 countries. Both quantitative and qualitative analyses were undertaken in the studies.

The first two studies explored the challenges inherent to multicultural F2F and online collaboration in higher education and the ways in which culturally diverse students perceive these challenges. It was found that culturally diverse students can have conflicting expectations with respect to learning and the behavioral motives of others in groups, and that collaborating with a partner from a different cultural background can negatively affect the reported CSCL experiences. The other three studies involved the design, implementation, and evaluation of collaboration scripts to foster effective intercultural collaboration. The findings of the third study showed that the collaboration of mixed-culture groups to be less than optimal and therefore in need of greater facilitation than the collaboration of same-culture groups. These results thus laid the foundation for the design of an external intercultural enriched collaboration script (IECS) — a script with special attention to the unique cultural backgrounds of the different participants in a CSCL environment. The results obtained from the last two studies showed the IECS with instructions specifically tailored to the individualist or collectivist cultural backgrounds of the various students in the collaborative group to promote greater attitude toward online collaboration, greater engagement in productive debate, and greater convergence on critical collaborative learning activities.

The findings of this dissertation suggest that the scripting approach can foster collaboration and bridge intercultural differences in culturally diverse groups working in a CSCL environment.

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Chapter 1

General introduction

INTRODUCTION

The growing multicultural student population of universities today and the introduction of collaborative technologies in education mirror the contemporary internet-based and intercultural workplace of many professionals in a range of fields today. University students must be competent in not only their chosen content domain but also with working in international and multidisciplinary groups. According to McNair, Paretti, and Kakar (2008), however, university graduates are very often ill-prepared for the challenges of working in geographically dispersed teams with members from different fields and cultural backgrounds collaborating in a virtual environment. In response to this lack, many universities are introducing collaborative technologies and multicultural learning environments to better prepare their students for the world of work (McDonald & Gibson, 1998).

There are several potential benefits of applying new technologies to promote collaborative learning in an often multicultural context. a) Students are prepared to participate in a networked, virtualized society (Belz, 2003). b) Intercultural awareness is enhanced (Amant, 2002). c) Development of the social, cognitive, and perspective-taking abilities of students is stimulated (Bonk, Appelman, & Hay, 1996; Lim & Liu, 2006). And d) experience is gained with the formation of learning communities regardless of physical or temporal distance (Walther, 1997).

Collaborative learning technologies offer benefits but also pose new challenges (Reeder, Macfadyen, Roche, & Chase, 2004). Just how the collaborative technology is implemented and the instructions used to support the collaboration are of critical importance. In the case of multicultural collaboration, moreover, culture adds another dimension and thus requires students to manage a collaboration that is not only virtual but also intercultural. Educators face the challenge of helping culturally diverse students overcome the extra layer of collaborative complexity introduced by culture-related differences.

In this dissertation, five empirical studies were conducted to identify and respond to the cultural issues influencing collaborative learning in both face-to-face (F2F) and online modes of communication. Four of the studies were conducted in authentic learning environments and one in a laboratory setting. The first two studies explored the challenges inherent to multicultural F2F and online collaboration in higher education and the ways in which culturally diverse students perceive these challenges. The other three studies involved the design, implementation, and evaluation of collaboration scripts to foster effective multicultural collaboration. The ultimate goal of the five taken together was to develop an instructional script for fostering collaboration and bridging intercultural differences in culturally heterogeneous groups engaged in online collaborative learning.

PROBLEM STATEMENT

The dynamic and complex nature of intercultural communication has been well documented. The need to collaborate in multicultural teams is nevertheless a reality of 21st century working and academia. And part of the professional competence of today's students is therefore to be able to work effectively in culturally diverse groups. Educators, in turn, must provide learning environments that can help students prepare to work in a world of growing diversity and complexity.

Culture influences *learning* and *thinking* (Cole, Gay, Glick, & Sharp, 1971; Hofstede, 1991; Vygotsky, 1978). 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). Culture combines a set of shared values, beliefs, norms, attitudes, and behaviors inherent in an individual or a community within a particular setting. And according to Cole and colleagues, each culture has a unique set of mediated learning experiences (Cole, 1996) 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, orientation to time, communication style, power distributions, attitudes and belief systems (Hofstede, 1991; Schwartz, 1990; Trompenaars, 1993; Van Oudenhoven & Van der Zee, 2002).

In addition, Hofstede (1991), Nisbett, (2003), and Triandis (1995) have argued that *perception* is influenced by cultural context and the shared attributes, cognitive structures, and knowledge of a group of interconnected individuals (i.e., learned patterns of thinking, feeling, and interacting but also basic assumptions about the nature of the world). On the basis of shared attributes and cultural knowledge, the following two cultural orientations have been distinguished by these authors: collectivism or an orientation toward the collective goal of a group and individualism or an orientation toward individual goals rather than group goals or the goals of others in a group. 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; Woodrow, 2001). Individualists focus on their own intentions and goals, and they tend to have relatively more opinions independent of group members than collectivists. Collectivists, in contrast, focus on shared group goals and tend to conform to the group (i.e., the opinions of their collaborating partners).

Given the close connections between culture and learning (Cole, 1996; Kagan, Zahn, Widaman, Schwarzwald, & Tyrrell, 1985), today's learning environments in general and

online learning environments in particular must be designed and implemented to meet the needs of learners with diverse cultural backgrounds (Smith & Ayers, 2006). Stated differently, educators must design learning environments that can accommodate cultural differences but also call upon these differences to promote learning and awareness. One such approach is the collaborative learning approach to peer interaction and knowledge construction, which can be defined as the engagement of learners in a coordinated effort to jointly solve a problem (Rochelle & Teasley, 1995; Van Amelsvoort, Andriessen, & Kanselaar, 2007). This approach has been widely used in both face-to-face (F2F) (Johnson & Johnson, 1999) and online learning environments (Lemus, Seibold, Flanagan, & Metzger, 2004). And within the context of this dissertation, the collaborative learning experiences of students interacting F2F and online are investigated in order to gain insight into how students can best be helped to work effectively in culturally diverse groups.

Over the last thirty years, multicultural student group work (MCSG) has been called upon in numerous studies and found to produce positive results: a) a more global and less ethnocentric approach is reported to occur with the use of MCSG work in higher education; b) students are reported to achieve learning gains in disciplinary knowledge, intercultural competence, and social growth; and c) the use of MCSG work successfully promotes the sharing of culturally diverse knowledge (De Vita, 2000; Staggers, Garcia, & Nagelhout, 2008; Volet & Ang, 1998; Watson, Johnson, Kumar, & Critelli, 1998). However, some studies have pointed to problems of group ineffectiveness in general (Bacon, Stewart, & Silver, 1999; Smith & Berg, 1997) and multicultural group ineffectiveness in particular (Ledwith & Seymour, 2001; Watson et al., 1998; Williams & O'Reilly, 1998). It is stressed that cultural differences must be taken into consideration when designing and implementing forms of collaborative learning (Zhu, 2009; Cox, Lobel, & McLeod, 1991; Armstrong & Cole, 1995; Lemons, 1997; Vatrappu & Suthers, 2007; Flowerdew, 1997). And while group work has become one of the pillars of higher education today, it continues to pose challenges for both national and international students (Cox et al., 1991; Lal, 2002; Woodrow, 2001; Watson, Cooper, Neri Torres & Boyd, 2008; Sweeney, Weaven, & Herington, 2008; Summers & Volet, 2008). Sufficient knowledge is lacking of the challenges of intercultural exchange within academic learning groups. Scientific insight into the process of cross-cultural cooperation while working in culturally heterogeneous groups is thus needed to improve the design of multicultural learning environments. In particular, we need to identify (1) the challenges inherent to multicultural learning groups in higher education and (2) the extent of differences in the perceptions of the challenges of multicultural learning groups in higher education across culturally diverse students. Gaining insight into MCSG challenges and the perceptions of these challenges among culturally diverse students can help educators manage multicultural group work by

identifying underlying causes of conflict and by intervening on an as-needed basis to get the team back on track and empower its members to deal with future challenges themselves (Brett, Behfar, & Kern, 2006).

Issues facing *online* student work groups have become increasingly apparent over the past twenty years, and a well-documented body of research now exists on the effectiveness of a form of collaborative learning that uses a network of computers, namely computer-supported collaborative learning (CSCL) (e.g., Koschmann, 1999; Noroozi, Weinberger, Biemans, Mulder, & Chizari, 2012). In CSCL, two or more learners collaborate via the computer to solve problems or co-construct knowledge; this entails the articulation and sharing of ideas to be built upon by the collaborating partners (Prinsen, Volman, & Terwel, 2007). And in an effort to understand the impact of cultural diversity on not only MCSG work (i.e., a F2F form of collaborative learning), but also on CSCL (i.e., an online form of collaborative learning), those cultural differences that must be overcome in order to benefit from the online sharing of culturally divergent knowledge have been explored.

Not only theoretical arguments and educational policy demands but also empirical evidence call for a more solid grounding of CSCL in general and the use of CSCL within a multicultural learning environment in particular. From a theoretical perspective, socio-constructivist learning theories (Duit & Treagust, 1998; Vygotsky, 1978) assert that knowledge emerges from the collaborative problem-solving process in learning communities with information distributed among its members. The personal and cultural backgrounds of learners are viewed as particularly important because they influence the manner in which the learner attains knowledge (Vygotsky, 1978; Wertsch, 1998). Piaget's ideas (1926) about socio-cognitive conflicts and Vygotsky's (1978) "zone of proximal development" are also viewed as critical to collaborative learning and thus CSCL as well. Heterogeneous groups and culturally heterogeneous ones in particular can benefit from the sharing of different perspectives and different background knowledge (Weinberger et al., 2007; Lim & Liu, 2006). From an educational policy perspective, moreover, many universities are using collaborative learning technologies to better prepare students for the world of work (McDonald & Gibson, 1998).

Several empirical studies have demonstrated the benefits of student collaboration and the positive role that computer technologies can play in such collaboration (see Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999, for a review). With the help of computer technologies, learning communities can operate independent of physical and temporal boundaries to promote both social and cognitive development (see Fischer, Kollar, Stegmann, & Wecker, 2013, for a review). With regard to cognitive development, studies have found the following for students working in CSCL environments when compared to students working in F2F learning environments: higher levels of learning (Hertz-Lazarowitz

& Bar-Natan, 2002); more equal participation (Janssen, Erkens, Kanselaar, & Jaspers, 2007); and both broader and more challenging discussion (Benbunan-Fich, Hiltz, & Turoff, 2003). With regard to social development, students working in CSCL environments report higher levels of satisfaction compared to students working in F2F groups (Phielix, Prins, Kirschner, Erkens, & Jaspers, 2011; Fjermestad, 2004). The use of CSCL in a multicultural setting also appears to have some benefits. More equal participation for non-native-speaking students appears to be promoted more by online discussions than by face-to-face discussion (Uzuner, 2009). A particularly safe environment can be built for collaboration online because there are fewer chances for intimidation and face-losing situations in online settings than in face-to-face settings (Jarvenpaa & Leidner, 1998). Negotiation strategies are fostered more by online interaction than by face-to-face interaction (Belz, 2003). And finally, student knowledge of other cultures can be broadened more by online collaboration than by face-to-face collaboration and thereby the development of intercultural competence, which can then — in turn — contribute to the cognitive development of students and increase the flexibility of their thinking (Belz, 2003; Lim & Liu, 2006).

The introduction of CSCL has also brought major challenges. Contradictory results with regard to the efficacy of CSCL suggest that additional facilitation may be required to maximally benefit from working in such an environment. To start with, students can differ in how they approach the collaboration learning task and comply with various activities. This has been found to depend on not only their procedural knowledge (i.e., experiences, feelings, information, strategies, and knowledge) (Kolodner, 2007; Kollar, Fischer, & Hasse, 2006) but also conditions that are known to influence group dynamics, such as group composition, group size, collaborative media, and learning task (Dillenbourg, 1999; Rummel & Spada, 2005). 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; Smith & Smith, 2000). Cultural background differences can either benefit or disrupt “the web of intra-group dynamics” (Halverson & Tirmizi, 2008, p. 12). Cultural background differences can influence students’ appreciation of the online collaborative learning process, group behavior, and communication (Cox et al., 1991; Kim & Bonk, 2002; Lal, 2002; Vatrappu, 2008; Weinberger et al., 2007; Wertsch, 1998; Zhu, 2009). According to theories from the fields of social psychology and cognitive psychology (e.g., dominant theory, group composition theory, similarity-attraction theory, and self-categorization theory), culturally homogeneous groups tend to conform more to social behavior norms, given communication styles, and shared perceptions of the learning environment, and this is likely to help build — in turn — effective in-group relationships, strong social bonds, and faster communication but relatively few conflicts or disagreements

and minimal anxiety (Byrne, Griffitt, & Stefaniak, 1967). In contrast, culturally heterogeneous groups “often suffer from process losses in terms of misunderstandings and coordination difficulties when working on tasks together” (Weinberger et al., 2007, p. 69). For example, when Kim and Bonk (2002) investigated the online collaborative behavior of Finnish, American, and Korean students in web-based conferences, they found distinct patterns of collaborative behavior: American and Finish students showed more task-oriented behavior while Korean students showed more relationship-oriented behavior. Similarly, Setlock, Fussell, and Neuwirth (2004) have documented clear differences in the communication strategies of Asians (i.e., individuals from India and East Asia) versus Westerners (i.e., individuals from North America), which can undermine the effectiveness of collaborative learning methods. More specifically, differences in argumentation were revealed with Westerners tending to focus on mostly points of disagreement but Asians discussing each point regardless of whether there was agreement or disagreement. Culturally mixed groups of students may sometimes confront such differences and therefore have to overcome an additional level of complexity stemming from such cultural background differences when collaborating online.

Early studies of the quality of collaborative learning examined mostly the end products or individual learning outcomes; they therefore often overlooked the mediation of outcomes by the quality of the group learning process (Lim & Liu, 2006). And, moreover, several instructional strategies have been developed over the past twenty years to support peer interaction within CSCL environments (e.g., Dillenbourg & Jermann, 2007; Jeong & Juong, 2007; Kollar, Fischer, & Slotta, 2007; Rummel & Spada, 2005) but only a few of these studies provide explicit guidance to facilitate the collaborative interaction between culturally diverse students. These studies have mostly focused on foreign language learning via computer-mediated intercultural interaction (Thorne, 2006), internet-mediated approaches to raise learners’ intercultural awareness (Elola & Oskoz, 2009), and the use of e-tools to promote brainstorming and examination of differing perspectives and background knowledge when working collaboratively online (Wang & Fussell, 2010). Knowledge of the instructional support needed to facilitate the collaborative learning of groups of culturally diverse students working online and thus the instructional support needed to allow them to maximally benefit from the sharing of knowledge and experiences is still needed, however.

In CSCL research (e.g., Fischer et al., 2013; Kollar, Fischer, & Hesse, 2006; Weinberger, Ertl, Fischer, & Mandl, 2005), so-called “scripting” has been found to be of value. Instructional support provided via scripts is intended to “promote productive interactions by designing the environment such that suggestions of different degrees of coercion are made to the collaborating students, engaging them in specific activities that otherwise might not occur” (Weinberger, 2011 p. 190). So-called “collaboration scripts” for use in CSCL environments

can be viewed as a scaffolding technique to guide students on what to do, what roles to play, and what sequences of activities to perform during a learning task (Carmien, Fischer, Fischer, & Kollar, 2007). Such scripts can be communicated explicitly via instruction (e.g., oral presentation by the teacher, handout materials) or implicitly via embedding in the learning environment (e.g., graphic representations, textual cues, response prompts). In both cases, the script is intended to initiate the type of interaction needed for collaborative task performance (Kolodner, 2007).

The question that arises is if a general collaboration script is sufficient to promote intercultural learning or if additional elements are needed to foster effective collaboration between students from different cultures — for example, students with a more individualist orientation versus students with a more collectivist orientation. If additional elements are needed to guide intercultural interaction and learning, the next question that arises is if the *same* interculturally-enriched script can be used with different cultures or each culture or subset of cultures requires a different script for productive collaboration. It has been argued by some that “even though cultures are not homogeneous and can be conceived as disconnected from other cultures, cultures are subject to mutual influence. This mutual influence may lead to integration of value orientations across different cultures” (Weinberger et al., 2007, p. 74). This suggests that individuals from different cultures can understand one another and that collaborating students can thus reach shared procedural knowledge when given same instructional support. However, there are existing arguments for culture-specific scripts in the CSCL literature stating that the same instructional support may play out differently depending on cultural backgrounds of learners (for examples, see differential effects of CSCL script on inducing socio-cognitive conflict in Finnish and German online student groups, Weinberger, Marttunen, Laurinen, & Stegmann, in press; or a number of cross-cultural comparative studies conducted with Chinese and Flemish students on both their preferences and actual behavior in a CSCL environment, Zhu (2009)).

In sum, there is a need for empirical research on the design and implementation of collaboration scripts to stimulate intercultural learning and collaboration. Student perceptions of multicultural group work and the challenges inherent to such work represent a good starting point. The complexity added by collaboration online as opposed to face-to-face can then be considered. And the effects of using a general collaboration script to facilitate intercultural CSCL can next be compared to the effects of using an interculturally-enriched collaboration script that includes elements tailored to specific cultures.

RESEARCH QUESTIONS AND OVERVIEW OF THE DISSERTATION

Although student learning groups have been analyzed from numerous perspectives, knowledge of the challenges specific to multicultural groups and student perceptions of working in such groups is lacking. Insight into the perceptions and challenges of working in multicultural groups is nevertheless needed because culturally diverse group members can have very different expectations and perceptions, which can lead to major misunderstandings and even conflicts. The group interaction may also be less than optimal when expectations and perceptions are so diverse. In response to this need, the first study reported on in this dissertation (see Chapter 2) aimed to 1) identify the challenges inherent to multicultural learning groups in higher education and 2) examine the extent to which culturally diverse students perceive specific challenges as being more or less important during multicultural group work in higher education. In line with the aims of this study, the following research question was posed: RQ1 *What are the most important challenges encountered during multicultural student group work in higher education and how do culturally diverse students differ in their perceptions of those challenges?*

In order to answer this research question, previous studies of the challenges that students face during multicultural group work were first examined and a suitable theoretical framework for understanding the challenges of multicultural group work was then developed. A 19-item survey was next designed and administered to students attending an Academic Consultancy Training (ACT) course at the Wageningen University in the Netherlands. The ACT course was chosen for survey administration because it requires the students to work in multicultural groups to complete a project. The sample of 141 students comprised 66 Dutch and 75 international students. And a total of 40 countries was represented in the sample. The students were asked to rate the importance of a particular challenge along on a five-point Likert scale. The extent of variation in the responding of the students was then examined in addition to whether consistent differences manifested themselves with respect to the cultural backgrounds of the students and Hofstede's individualist-collectivist (I-C) cultural orientations in particular. The results of this study of student perceptions of working in multicultural groups are presented in Chapter 2.

The next study reported in this dissertation (see Chapter 3) was undertaken to gain insight into the influence of cultural diversity when working in a computer-supported collaborative learning (CSCL) environment. We compared student perceptions of the collaborative learning process, their learning experiences, and their actual individual learning outcomes when working with a culturally similar versus culturally dissimilar partner in a CSCL environment. The research question was: RQ2 *How do student perceptions of their collaborative learning, their*

learning experiences, and their learning outcomes differ when they collaborate with a culturally similar versus culturally dissimilar partner in a CSCL environment?

In order to answer this research question, 120 MSc or final-year BSc students were asked to collaborate with an assigned partner in a CSCL environment. Of these 120 students, 56 were Dutch and 64 were non-Dutch. The students were asked to discuss, negotiate, and agree on a proposed solution for a problem (i.e., the design of a program to effectively foster sustainable farming behavior). Following the collaborative group work, 78 of the 120 students completed a questionnaire to share their perceptions of the CSCL experience and 58 of these 78 students agreed to be interviewed with regard to their CSCL experiences as well. The similarities and differences in the perceptions, experiences, and learning outcomes of the students working in a CSCL environment depending on whether they collaborated with a partner who was culturally similar or dissimilar are reported and discussed in Chapter 3.

The findings of the first two studies provided insight into how culturally diverse groups of students work together and the nature of the collaborative discourses that can occur in such groups. The results of the studies show the individualism-collectivism cultural orientations of Hofstede to parallel the reactions of students from different cultural backgrounds when working in culturally diverse groups. A student's cultural background and thus the presence of a more individualist orientation or collectivist orientation can thus predict a student's perception of a particular collaborative situation or collaborative partner and also the student's level of engagement in collaborative activities and use of the available technology. Simply placing students from different cultures together in a group does not, moreover, appear to lead to successful CSCL experiences (Lin & Kinzer, 2003; Weinberger et al., 2007). It is necessary, rather, to make an effort to establish a "high-performing" group — a group that capitalizes on its diversity rather than being constrained by it (McCorkle et al., 1999). Collaborative tasks and systems should be tailored to the specific needs of the students in a group and help facilitate the group interaction process in order to allow the students to reap the benefits of a collaborative learning experience. Such facilitation can be realized with the introduction of a collaboration script (or scripts) into the CSCL environment. By "engaging collaborating students in specific activities that otherwise might not occur" (Weinberger, 2011, p. 190), productive interactions can be fostered and have been found to be fostered in recent CSCL research (for an overview, see Fischer, Kollar, Stegmann, & Wecker, 2013). The subsequent studies in this dissertation were therefore concerned with the design, implementation, and evaluation of collaboration scripts to facilitate student interactions during CSCL in general (Chapter 4) and bridge the differences in culturally diverse groups engaged in CSCL in particular (Chapters 5 and 6).

In Chapter 4, we present a study conducted to gain insight into the facilitative effects of using a general collaboration script for same- versus mixed-culture dyads working in a CSCL

environment. While recent research on CSCL has shown collaboration scripts to effectively support online collaboration, we have little insight into the functioning of such scripts for same- versus mixed-culture groups. We therefore explored the effects of a general collaboration script when used by same- versus mixed-culture dyads of students to organize the interaction during a CSCL task. The coding scheme of Curtis and Lawson (2001) with the following elements was drawn upon for this purpose: planning (organizing work), contributing (explaining each other's positions and sharing knowledge), seeking input (urging others to contribute to the group effort), reflection on the medium of exchange and monitoring of group processes and achievements (comments on technological media and about group processes), and social interaction (off-task discussions and social aspects of interactions). Each of the five elements require specific collaborative behaviors, and all of the elements are necessary for successful group collaboration online (Kim & Bonk, 2002). The general collaboration script that we developed to foster effective collaboration specified a number of steps and sub-steps for collaborative problem-solving and outlined possible communication strategies for use during the collaborative steps and sub-steps. The core research question in this study was then as follows: *RQ3 To what extent do group composition (same- versus mixed-culture dyads) and the use of a general collaboration script (CSCL with vs. CSCL without) affect the online collaborative learning of students in terms of collaborative behaviors displayed and quality of the discussions within the CSCL environment?*

To answer this question, 130 MSc students participated in a 2 x 2 factorial study with group composition (same- versus mixed-culture dyads) and script condition (with vs. without collaboration script) as independent variables. A total of 81 Dutch and 49 non-Dutch students participated with 27 countries represented by the latter. Students worked in dyads on a topic concerned with intercultural communication. Specifically, they were asked to discuss a controversial statement online using a Blackboard Discussion Board across a four-week period of time. The students in the experimental script condition were given a paper-based general collaboration script to help guide the group interaction while the students in the control script condition were not given such a script. The influence of using a collaboration script on the students' online collaborative behavior and the quality of their online discussions was then analyzed and compared for the same- versus mixed-culture dyads working in a CSCL environment. The results are presented and discussed in Chapter 4.

In Chapters 5 and 6, the design and implementation of an interculturally-enriched collaboration script (IECS) are described and tested. Building on previous research on both the use of collaboration scripts as an instructional approach for CSCL (e.g., Rummel & Spada, 2005; Fischer et al., 2013; Kollar, Fischer, & Hesse, 2006) and those factors that contribute to intercultural learning (e.g., Vatrappu & Suthers, 2007; Weinberger et al., 2007; Hofstede,

1991), we identified productive discourse practices and interaction patterns for culturally heterogeneous groups working in a CSCL environment. To increase the frequency of specific behaviors while working collaboratively in a group, the IECS instructions on how to act and approach group member(s) were tailored to students with individualist cultural orientation or a collectivist cultural orientation. The IECS script was either presented via written instructions (i.e., as handout materials in the study described in Chapter 5) or embedded in the learning environment (i.e., included as textual scaffolds in the study described in Chapter 6). The use of an IECS was expected to facilitate mutual understanding among culturally diverse groups of students, engage them in more productive debate, and promote greater adherence to collaborative learning task activities than the use of a general collaborative script (CS). That is, the use of a IECS was expected to help the students collaborating in culturally diverse groups overcome the differences between them and thereby lead to more positive learning experiences for such groups than the use of a general CS. Also addressing the diversity of the students' sociocultural backgrounds, the IECS was expected to promote the mechanisms needed to have students engage in productive debate: explain and elaborate one's point of view but also challenge the contributions of each other. Finally, it was assumed that the IECS would maximize the benefits of having culturally diverse sources of knowledge and thereby produce collaboration that leads to better learning performance than in groups not using the IECS.

In Chapter 5, we report on an exploratory intervention study in which the effectiveness of using an IECS is compared to that of using a general CS. The core research question was: RQ4 *Are there differences in the attitudes of students towards online collaboration, their collaborative behavior, their learning performance, and their learning experiences for culturally heterogeneous groups using an IECS in a CSCL environment versus culturally heterogeneous groups using a general CS in a CSCL environment?*

A randomized, two-group pre-test-post-test research design was used with a sample of 47 BSc students coming from two universities: a university in the Ukraine and a university in the Netherlands. Three students from the Ukrainian university and 3 students from the Dutch university were randomly assigned to one of two conditions (i.e., IECS or CS). One group using CS ended up including 3 Dutch and 2 Ukrainian students. A total of eight groups worked online using the same Adobe Connect program as a Web conferencing tool in synchronous communication mode for a period of one week. Their task was to produce a project plan on the theme of "Radioactivity and nuclear power." The students received either the IECS or CS instructions on paper. And the students in the IECS condition were given three levels of instructions: 1) general instructions on WHAT to do; 2) instructions on HOW a particular subtask should be performed; and 3) instructions on WHY performance of a particular subtask in a specific manner may be important. The students in the CS condition were only given the

general instructions on WHAT to do. The “HOW and WHY” parts of the IECS instructions were aimed at stimulating specific interactions among culturally heterogeneous groups of students, increasing the frequency of specific behaviors, and facilitating the collaboration process in such a manner. Specific IECS instructions were also developed for students coming from a more individualist cultural background (i.e., the Dutch students) and students coming from a more collectivist cultural background (i.e., the Ukrainian students). Information on the attitudes of the students towards online collaboration, their online collaborative behavior, their learning performance, and their learning experiences was collected and compared for those using the IECS and those using the general CS. The results are reported and discussed in Chapter 5.

In Chapter 6, the effects of using an IECS versus a general CS were again examined in a study using a research design similar to that used in the study described in Chapter 5. The only differences were as follows: cultural composition of the groups (i.e., students represented 22 as opposed to just 2 countries), group size (i.e., students worked in dyads as opposed to groups of six), learning platform (i.e., the dyads used for collaboration the groupware program named the Virtual Collaborative Research Institute (VCRI) as opposed to Adobe Connect program; specially designed CSCL platform, a customized VCRI version, was used but without the video conferencing option), and the IECS was embedded in the CSCL environment with a different learning task and different amount of time allocated for completion of the task. Once again, the objective of the study was to compare the effects of using an IECS versus a general CS in a CSCL environment with culturally heterogeneous groups of students on their attitudes towards online collaboration, their collaborative learning behavior, and their learning performance. The research question was: *RQ5 Does the influence of an interculturally-enriched collaboration script (IECS) on the attitudes of students towards online collaboration, their online collaborative behavior, and their learning performance differ from that of a general collaboration script (CS) for culturally heterogeneous groups of students working in a CSCL environment?*

To answer this question, an empirical study was conducted with 74 first year students enrolled in a Master of Environmental Sciences program at Wageningen University (The Netherlands). The students were randomly assigned to one of two conditions (IECS vs. general CS). The students worked in dyads that had one student with an individualist cultural orientation and one student with a collectivist cultural orientation (i.e., dyads that represented Hofstede’s individualist–collectivist orientations). The students worked in a CSCL learning environment on an environmental problem, namely the collapse of biodiversity in tropical forest areas. A randomized, two-group pretest-posttest research design was used to compare the effects of using an IECS versus a general CS on the attitudes of students working in culturally heterogeneous groups within a CSCL environment towards online collaboration, their online collaborative behavior, and their learning performance. The results of this study and the design elements

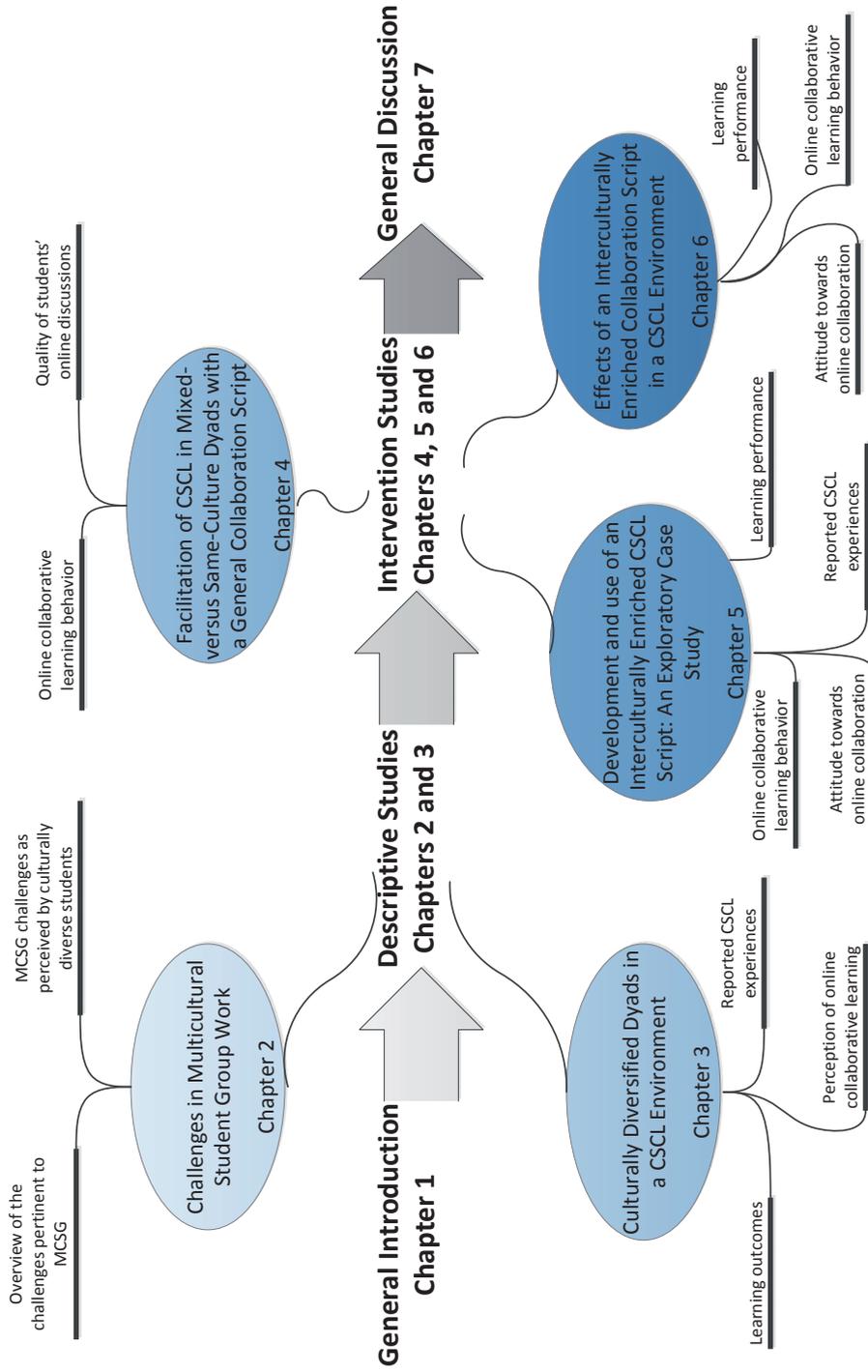


Figure 1.1 Overview of the structure of the dissertation with indication of the key variables and the chapters in which these variables have been studied.

that appear to be critical for the development of IECS to improve collaboration across cultures and educational settings are discussed in Chapter 6.

To close, in Chapter 7 of this dissertation, the findings of the different studies are summarized together with the general conclusions that these allow. In Figure 1.1, an overview is provided of the five empirical studies along with their corresponding variables and the chapters in which these variables are analyzed. Consideration of the empirical results highlights the importance of factors stemming from a more individualist or more collectivist cultural orientation and the interrelations between these factors. Some remaining methodological considerations and possible limitations of the present research are considered next. And last but not least, the theoretical and practical implications of the present results for future educational research and educational practice are discussed. Educational practice must increasingly respond to culturally diverse groups of learners. And several suggestions for future research to address this problem are therefore proposed.

A final note is that synonyms have been used to refer to culturally diverse groups of students (i.e. “multicultural student groups” in Chapter 2; “culturally similar or dissimilar groups” in Chapter 3; “mixed- versus same- culture groups” in Chapter 4; and “culturally heterogeneous groups” in Chapters 5 and 6). This is due to the varying cultural compositions of the different groups and/or the different study designs. The general definition of a “culturally diverse group” used in this research was as follows: two or more individuals who are from different national/cultural backgrounds, who have been assigned interdependent tasks and are jointly responsible for the final results, who see themselves and are also seen by others as forming a collective unit embedded in an academic environment and who manage their relationships within a given educational institution (Marquardt & Horvath, 2001).



Chapter 2

Multicultural student group work in higher education: An explorative case study on challenges as perceived by students*

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ABSTRACT

This paper aims to examine challenges that are inherent in multicultural student group work (MCSG) in higher education and the differences between students from different cultural backgrounds in how they perceive the importance of challenges in MCSG. For this purpose, a 19-item survey was completed by students (N=141) of the 9-EC (European Credits) Academic Consultancy Training (ACT) course of Wageningen University, a university in the Netherlands in the domain of life sciences with a student population consisting of over 30% foreign students from over 100 different countries. Students were required to rate on a Likert scale (from 1-5) the importance of a certain challenge in MCSG. Challenges for students in MCSG were analyzed using scales that centered on cross-cutting challenges and culture-related challenges in multicultural group work identified in exploratory factor analysis. To examine the extent to which culturally diverse students differed with respect to their perceptions of the importance of the challenges, a one-way analysis of variance (ANOVA) was conducted based on Hofstede's individualist-collectivist cultural orientation. Free-riding, insufficient English language skills and students not communicating properly were perceived by all participants of this explorative case study to be the most important challenges in MCSG. The results suggest that students' cultural background (the individualist-collectivist orientation) affects their perceptions of the importance of challenges in MCSG. Explanations for these results and recommendations for future research are provided.

INTRODUCTION

The student populations of universities throughout the world are increasingly multicultural. After graduation a large number of today's students will work in international groups as part of their future professions. Therefore, the ability to work effectively in culturally heterogeneous groups should be an integral part of a student's competence. However, incorporating group work in higher education, specifically in multicultural settings, creates both challenges (in terms of coordinating students' different communication skills, behavioral patterns and intercultural competences) and potential benefits (in terms of sharing culturally diverse knowledge). Previous research indicates that cultural differences should be taken into consideration when designing and implementing collaborative forms of learning (Armstrong, 1995; Cox, Lobel, & McLeod, 1991; Flowerdew, 1997; Lemons, 1997; Vatrappu & Suthers, 2007; Zhu, 2009). While one of the pillars of today's higher education system is group work, which may pose challenges for both national and international students (Cox et al., 1991; Lal, 2002; Summers & Volet, 2008; Sweeney, Weaven, & Herington, 2008; Watson, Cooper, Neri Torres & Boyd, 2008; Woodrow, 2001), knowledge of what challenges are inherent to learning groups in academia and how culturally diverse students perceive those challenges is still lacking.

Over the last thirty years, numerous studies have been aimed at providing valuable insight into multicultural group work as a collaborative approach to learning. In the scientific literature we can find positive research findings about multicultural group work in terms of a) shifting to a more global and less ethnocentric approach in higher education; b) preparing students for working effectively in culturally heterogeneous groups in both academic and professional environments; c) sharing culturally diverse knowledge and development of intercultural competence (De Vita, 2000; Staggers, Garcia, & Nagelhout, 2008; Volet & Ang, 1998; Watson et al., 2008; Cope & Kalantzis, 1997; Watson, Johnson, Kumar, & Critelli, 1998). However, some studies have pointed to the problem of student group ineffectiveness in general (Bacon, Stewart, & Silver, 1999; Smith & Berg, 1997) and multicultural student group work in particular (Ledwith & Seymour, 2001; Watson et al., 1998). Notwithstanding these latter findings, group work of culturally diverse students can be positive and beneficial if the arising differences and similarities are properly managed (Distefano & Maznevski, 2000; Richard, 2000) Therefore, a better scientific understanding of cross-cultural cooperation while working in culturally heterogeneous groups of students is essential. In this context, the present paper aims to explore the challenges which students of different cultural backgrounds face in MCSG in higher education. Gaining insight into these challenges will help educators and instructional designers improve learning environments for culturally heterogeneous groups in higher education. Moreover, to effectively manage multicultural group work we need "to recognize

underlying cultural causes of conflict, and to intervene in ways that both get the team back on track and empower its members to deal with future challenges themselves” (Brett, Behfar, & Kern, 2006, p. 3).

This study has a dual purpose: 1) to identify challenges inherent to multicultural learning groups in higher education and 2) to examine the extent to which culturally diverse students perceive different challenges to be important in MCSG in higher education. The paper is organized as follows: first, challenges that students face in multicultural group work are explored based on previous research studies. Second, this theoretical framework provides the foundation to examine challenges in MCSG in higher education as perceived by students with different cultural backgrounds. Next, results of this study are presented. The last part of the paper outlines conclusions based on the research findings, and consequently offers a set of recommendations for future research on multicultural student groups in higher education.

Theoretical framework

Multicultural student group work can be defined as a collaboration of two or more individuals from different (national) cultural backgrounds, who have been assigned interdependent tasks and are jointly responsible for the final results, who see themselves and are seen by others as a collective unit embedded in an academic environment and who manage their relationships within a certain educational institution (Bailey & Cohen, 1997; Marquardt & Horvath, 2001).

Referring to the notion of culture in this paper we used Hofstede’s definition (1980, p. 25), which states that culture is “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.”

Apart from cultural aspects there are many other elements of diversity that affect group processes (e.g., age, gender, education). Based on the research findings of Behfar, Kern and Brett (2006), it can be argued that some challenges are unique to culturally heterogeneous groups and others occur in groups regardless of their cultural makeup. According to Behfar et al. (2006, p. 258), mono- and multicultural groups share challenges related to planning and task coordination, problem solving and decision making, conflict management, adhering to timelines, and agreeing on acceptable group behavior, “but multicultural groups have to overcome an additional layer of complexity due to culture-related differences”. Following Behfar et al.’s (2006) line of reasoning, students working in multicultural groups have to deal with both challenges that are common for monocultural groups and challenges that are peculiar to multicultural groups. Due to cultural differences that members bring to a group “the web of intra-group dynamics” becomes more complex (Halverson & Tirmizi, 2008, p. 12). For this

reason, a theoretical framework was developed taking into consideration the challenges that appear to affect both mono- and multicultural groups.

Based on the literature, it is worth noting that the majority of studies on group work were conducted in the field of management and organizational research with a focus on the business world. Despite the fact that multicultural student groups in the university setting function according to their own intrinsic nature and special conditions, students still may encounter challenges that are typical for professional environments. Thus, the current study will focus on the challenges in MCSG in the context of higher education, including those that may also occur in a professional setting.

According to Salas, Stagl, Burke and Goodwin (2007), more than 130 conceptual models and frameworks of group work can be found in the literature. Although the phenomenon of group work has been widely viewed from different perspectives, there are mainly three strands of research in the scientific literature about challenges that may occur in multicultural groups. Research studies on group work have focused on: 1) organizational-level factors (e.g., Offermann & Spiros, 2001; Tata & Prasad, 2004; Thomas, Ravlin, & Barry, 2000); 2) group-level factors (e.g., Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; Hackman, 1987; Salas, Stagl, & Burke, 2003; Schermerhorn, Hunt, & Osborn, 1995; Thomas, 1999; Watson et al., 1998; Williams & O'Reilly, 1998), and 3) group climate, group effectiveness criteria, group performance (e.g., Druskat & Wolff, 2001; Thomas et al., 2000; Hackman & Morris, 1975). For example, research studies of BarNira, and Paurb (2005), Watson et al. (1998, 2008), Watson and Kumar (1992) have contributed substantially to the understanding of relationships between personality and group process, age, gender and group heterogeneity. Hackman (1987) was one of the first scholars to study how group size, norms, satisfaction, and task accomplishment correlate with group performance.

Research studies addressing challenges faced particularly in multicultural groups have focused mostly on: 1) how group members' cultural differences affect group work performance (e.g., Behfar et al., 2006; Halverson & Tirmizi, 2008; Janssens & Brett, 1997; Kirkman & Shapiro, 2005; Tang, 1999; Watson et al., 1998), and 2) how group members' cultural dimensions of behavior affect their understanding of a collaborative situation and their actual actions/behaviors in a collaborative situation (e.g., Behfar et al., 2006; Cox et al., 1991; Early & Mosakowski, 2004; Halverson & Tirmizi, 2008; Hofstede, 1980 and 1993; Watson, Johnson, & Zgourides, 2002; Watson, Kumar, & Michaelsen, 1993). Hofstede's cultural dimensions or Hall's cultural factors provide classic analytical frameworks applicable to multicultural group work research. For example, people from collectivistic and high-context cultures prefer indirect communication, while representatives of individualistic and low-context cultures prefer direct modes of communication (Hall & Hall 1990; Hofstede, 1980; Weldon, 1997). Table 2.1 presents

a summary of the MCSG challenges that may affect multicultural student groups in the context of higher education. All these challenges have been previously studied in the literature from various research perspectives. Departing from these theoretically relevant constructs we intend to examine the relative importance of MCSG challenges as perceived by students. The present study emphasizes group-level challenges in terms of the relationship between them and students' cultural backgrounds. Group-level challenges mostly determine group success and most challenges stemming from cultural diversity of group members occur at this level (Halverson & Tirmizi, 2008).

Group-level challenges

Group-level challenges for MCSG can basically be divided into two subcategories associated with group membership and group process (see Table 2.1).

Group membership implies a variation in group members in terms of their experiences and skills, personal characteristics (e.g., age, gender) and qualities, social and cultural backgrounds. In the context of higher education, group members may have diverse educational backgrounds that partly result in differences in their content knowledge; also they may differ in terms of academic attitudes and ambitions (for example, aiming merely to pass with a mark of '6' or striving for a '9' on a ten-point grading system) (Zimmerman et al., 1977). Heterogeneous group composition may help students achieve positive outcomes in at least two ways: first, it promotes a better understanding in a certain knowledge domain because a problem is approached from different perspectives (Van den Bossche et al., 2006) and second, students can broaden their experience by working/studying with individuals who have diverse backgrounds (Sweeney et al., 2008).

Grouping students of a variety of age and gender together in a group might, on the one hand, capitalize on the differences in their experiences, knowledge and abilities. On the other hand, it might cause some problems related to differences in study strategies, priorities, social capital, cultural capital, financial background and other factors (Timmerman, 2000; Pearce & Ravlin, 1987). For example, the research findings of Sweeney and Lee (1999) indicate that female students perceived the cooperation in group work to be more important than the male students perceived it to be. The students' perception of the importance of cooperation is related to group success and synergy development in a group (Pfaff & Huddleston, 2003).

A number of variables concerning group diversity relate specifically to the studying and learning behaviors of students. For example, differences in ambitions may undermine the group working process, as a person with a relatively low level of ambition does not contribute to his/her full potential to the group work (Halverson & Tirmizi, 2008). This might affect

Table 2.1 Summary of the group-level challenges that appear to affect MCSG in higher education

Group-level factor	Description of the challenges that appear to affect MCSG	Authors
Group membership	<p><i>Members' experience and skills</i></p> <p>heterogeneous group composition (grouping students of a variety of age, gender and culture)</p> <p>differences in content knowledge</p> <p>differences in academic attitude</p> <p>difference in ambitions</p> <p>diverse educational backgrounds</p>	<p>Pearce & Ravlin, 1987; Pfaff & Huddleston, 2003; Summers & Volet, 2008; Sweeney et al., 2008; Sweeney & Lee, 1999; Thomas et al., 2000; Timmerman, 2000; Van den Bossche, Gijsselaers, Segers & Kirschner, 2006; Zimmerman, Parks, Gray, Michael, 1977.</p>
Group process	<p><i>Communication</i></p> <p>students not communicating properly with fellow students and a supervisor</p> <p>culturally different standards of interaction (direct vs. indirect communication)</p> <p>insufficient English language skills</p>	<p>Andersen, 1994; Behfar et al., 2006; Brett, 2001; Cox et al., 1991; Davison & Ward, 1999; Gudykunst 1994; Gudykunst & Matsumoto, 1996; Gudykunst & Ting-Toomey, 1988; Gudykunst, Ting-Toomey, & Nishida, 1996; Hall & Hall 1990; Janssens & Brett, 1997; Marks, Zaccaro, Mathieu, 2000; Pitton, Warring, Frank, & Hunter, 1993; Stevens & Campion, 1994.</p>
	<p><i>Problem solving & decision making</i></p> <p>the pressure to defend a group decision whilst not agreeing with it</p> <p>culturally different styles of decision making and problem solving</p> <p>culturally different styles of complying with supervisor's guidelines</p> <p>ineffective group work management</p>	<p>Allik & McCrae, 2004; Cannon-Bowers et al., 1995; Cox & Blake, 1991; Cox et al., 1991; Hofstede, 1991; Kirby & Barger, 2005; Matveev & Milter, 2004; Pope-Davis, Coleman, Liu, & Toporek, 2003; Stevens & Campion, 1994; Watson et al., 2005.</p>
	<p><i>Conflict management</i></p> <p>culturally different styles of conflict management</p> <p>group conflicts</p> <p>attitudinal problems such as dislike, mistrust and lack of cohesion</p>	<p>Doucet & Jehn, 1997; Triandis, 1994; Hall & Hall, 1990; Jehn, 1995; Anderson & Adams, 1992.</p>
	<p><i>Leadership</i></p> <p>free-riding</p> <p>a low level of motivation</p> <p>dominating group members</p>	<p>Dickson, Den Hartog, & Mitchelson, 2003; Earley, 1989; Hofstede, 2001; House, Hanges, Javidan, Dorfman, & Gupta, 2004; Johnson & Johnson, 1984-85; Joyce, 1999; Ingham, Levinger, Graves, & Peckham, 1974; Latane, Williams, & Harkins, 1979; McCorkle, Reardon, Alexander, Kling, Harris, & Iyer, 1999; Pillai & Meindl, 1998; Watson et al., 2002; Wendt, Euwema, & van Emmerik, 2009.</p>

other group members and the final result. Students usually have a certain academic attitude toward group work. While some students in group work are apt to benefit from the academic and social opportunities provided (in terms of developing social skills and attaining a better understanding in a certain knowledge domain through exposure to different perspectives), others prefer working individually and/or seem reluctant to participate in an interactive way of learning (Pfaff & Huddleston, 2003). Culturally diverse group members in a study of Thomas and Ravlin (1995) found both task accomplishment and satisfaction with the group process to be important.

Interdisciplinary group tasks require all members to actively work on synthesis and participate in the formulation of the final product. Previous research (Summers & Volet, 2008; Sweeney et al., 2008;) suggests that diversity in terms of members' educational backgrounds should be taken into account when forming a group. Students educated in one country with particular traditions and characteristics may see group work, as a collaborative form of learning, differently than their counterparts who were trained in different education systems. Differences in content knowledge among group members can be challenging in terms of coordination efforts to reach disciplinary synergy, but advantageous in terms of the group's multiple viewpoints, and greater potential for creativity and innovation. However, according to Clark (1993), "putting people together in groups representing many disciplines does not necessarily guarantee the development of a shared understanding". It is necessary to set up a "high-performing" group which capitalizes on its diversity rather than being constrained by it (McCorkle et al., 1999).

Group processes play an important role in determining group dynamics and overall success of a group. They may pose considerable challenges in terms of communication, problem solving and decision making, conflict management and leadership issues (Halverson & Tirmizi, 2008).

Communication is an essential tool by which group members organize their work and cooperate with one another (Marks et al., 2000). More specifically, communication implies an ability to reach full comprehension among all group members, as well as to collect and disseminate necessary information related to the product of group work (Stevens & Campion, 1994). Both mono- and multicultural groups experience similar challenges associated with interpersonal tension in the communication process. This interpersonal tension may result from a clash of different communication styles, for example, when group members "with a preference for more 'aggressive' communication styles worked with members with a preference for more 'consensus building' in expressing their points of view" (Behfar et al., 2006, p. 239). Apart from a large variability of communication styles among group members, there is also a strong relationship between communication and culture, as communication practices are greatly influenced by culture (Hall & Hall, 1990).

A large body of literature exists on differences in communication styles across cultures (Andersen, 1994; Davison & Ward, 1999; Gudykunst 1994; Gudykunst & Matsumoto, 1996; Gudykunst & Ting-Toomey, 1988; Gudykunst et al., 1996; Hall & Hall, 1990; Pitton et al., 1993). Sometimes collaborative partners with different cultural backgrounds may not benefit from the sharing of “culturally divergent knowledge” because of the lack of shared understanding of discourse rules and norms, underestimation of the role of clarity, etc. (Cox et al., 1991). For example, Western cultures typically have a direct, low-context and explicit communication style (Hall & Hall, 1990). People from these cultures usually act based on certain explicit rules and they have short-term interpersonal connections. While people from cultures that use an indirect and high-context mode of communication prefer less verbally explicit messages and act based on an overall situation, they are usually prone to providing less written and formal information and decisions are taken on the basis of personal relationships (Brett et al., 2006; Hall & Hall, 1990). As English is the lingua franca for almost all multicultural groups, another important factor may be limited comprehension between group members due to different English proficiencies and great variation in accents (Davison & Ward, 1999; Janssens & Brett, 1997). It is worth noting, however, that a group member with insufficient English language skills need not necessarily be incompetent in a particular subject matter (Brett et al., 2006).

Over the last several years, numerous studies have focused on relevant competencies for group work (e.g., Cannon-Bowers et al., 1995; Stevens & Campion, 1994). Researchers identified a number of task- and group-generic competencies, one of which is collaborative problem solving and decision making. Both culturally homogeneous and heterogeneous groups should possess a set of abilities that help them effectively make decisions and solve problems arising in group work processes. However, culturally heterogeneous groups have an additional layer of complexity in that they must overcome cultural barriers caused by different frames of reference, values and norms (Cox & Blake, 1991). According to Behfar et al. (2006), monocultural groups are mostly challenged by procedural issues related to coordination, evaluation of ideas, planning and task division when it comes to decision making at any stage of group development. Multicultural groups need to handle all these issues as well, but they also experience challenges related to “legitimate approaches to problem solving” (Behfar et al., 2006, p. 240) or process legitimacy.

Previous research suggests that an individual’s decision making process depends to a great extent on his/her cognitive style (Myers, 1962). On the other hand, some scholars argue that there are cross-cultural differences in problem solving and decision making processes. For example, Martinsons (2001) found that “American, Japanese and Chinese business leaders each exhibit a distinctive national style of decision making”. Vygotsky’s (1978) social constructivist theory brings together these two viewpoints with a main emphasis on the importance of the

background and culture of the individual, since an individual's cultural context of cognition influences the way he or she attains knowledge and processes information.

Scholars have been divided on a very controversial issue with respect to clustering fixed personality traits across different cultures. Some of them consider that similar cultures show similar personality profiles (Allik & McCrae, 2004), while others state that personality is an unique set of an individual's characteristics shaped by genetics and influenced by his/her environment over time (Kirby & Barger, 2005). According to Matveev and Milter (2004), the personality orientation in multicultural group work "comprises group members' interest toward intercultural interaction, their emotional and physiological reactions toward foreign nationals, and the degree of empathy toward people from different cultures" (p. 106). Despite culture-related differences, individuals need to understand and relate to the feelings, thoughts and behaviors of their group members. Cultural empathy thus plays a significant role in group work, specifically during the collaborative problem solving and decision making processes.

With respect to culturally different styles of complying with a supervisor's guidelines, both supervisors and students need to understand how power differentials may influence the supervision process (Pope-Davis et al., 2003). As Hofstede (2001) explains, "the less powerful members of institutions and organizations expect and accept that power is distributed unequally" (p. 98), which implies that students from cultures with a high power distance may comply with a supervisor's guidelines differently than students from cultures with a low power distance. Thus, culturally different styles of complying with a supervisor's guidelines may pose challenges as teaching/learning styles vary across higher educational institutions in the world (Anderson & Adams, 1992).

One of the crucial aspects in group work management is the ability of all group members to effectively undertake and stimulate activities aimed at the final product of the group, and to uphold the group work process. Each group usually prepares a work plan that should at least address the mission/vision of the group. When a group establishes norms to proceed with work, this mostly corresponds with group goals. To function successfully, the group thus needs explicit goals (Avery, 2001). Mutual understanding and common ground with respect to group goals play a key role in a multicultural group's success. Watson et al. (2005) examined the extent to which a group member tends to work with others or prefers working individually by using team-oriented and self-oriented behavior approaches. Different expectations and prevailing individual goals may cause serious problems in group work (Gardenswartz & Rowe, 2003). For example, one group member may prioritize his/her personal goals, while other members are working more toward a common group goal.

Multicultural group work may lead to conflicts within the group due to differences in members' social norms, values, interests and opinions. According to Doucet and Jehn (1997), conflict is a culturally defined phenomenon, and what is viewed as a conflict in one culture

can be seen as a 'normal' situation in another. Triandis (1994) explains that in collectivistic cultures individuals tend to avoid open conflict since it might obstruct group cohesion and negatively influence relationships within the group. Thus, culturally different styles of conflict management may be applied to handle problems/conflicts arising in group work processes.

Jehn (1995) defined two kinds of conflicts: relationship-related conflict and task-related conflict. Relationship-related conflict may arise due to attitudinal problems such as dislike, mistrust and lack of cohesion. The second kind of conflict may occur because of a clash of opinions with respect to the task (for example: a group member may feel pressured to comply with a group decision he or she does not agree with). Such a conflict may stem from adhering to timelines or different attitudes towards deadlines (some students may want to complete assignments directly, while others prefer to wait for the deadline) (Hall & Hall, 1990).

Research on leadership in a cross-cultural context shows that the perception of leadership behaviors and attributes varies across cultures (Wendt et al., 2009; House et al., 2004; Hofstede, 2001; Dickson et al., 2003). According to Hofstede (2001, p. 388), "ideas about leadership reflect the dominant culture of a country. Asking people to describe the qualities of a good leader is in fact another way of asking them to describe their culture". Pillai and Meindl (1998) argue that group members from collectivistic cultures are more in favor of charismatic leadership behavior (a leader is regarded as the foremost authority in a group), whereas people from individualistic cultures prefer task-oriented leaders.

In contrast to the group leader's role, some persons in the group may not contribute to the group work to their full potential or may undermine the group working process. This can affect other group members and the final results. Many researchers studying group work (e.g., Ingham et al., 1974; Johnson & Johnson, 1984-85; Joyce, 1999; Latane et al., 1979; McCorkle et al., 1999 and many others) have focused their attention on this issue of so-called free-riding or "social loafing". Based on the definition given by Latane et al. (1979), it is "a decrease in individual effort due to the social presence of the other persons" (p. 823). This free-riding phenomenon correlates closely with the cultural backgrounds of group members. Earley (1989) argues that people from collectivistic cultures see their individual contributions as very important in order to achieve common goals of the group. From this perspective every group member should work to the extent of his or her abilities for the sake of group success and free-riding behavior is not acceptable. In contrast, people from other, individualist, cultures prioritize their own interests. As a result, individualists tend to benefit themselves first and are more likely to "loaf" if their individual contributions to the group's final results go unnoticed or there is no reward system for individual effort (Earley, 1989). A low level of motivation among group members may influence overall group performance, as a group represents a collective unit of individuals who influence one another in the process of achieving group goals (Katzenbach & Smith, 1994).

Cultural background

The issue of the impact of cultural diversity on group work processes is of utmost interest for this paper and we need to examine it in more detail. Since the early sixties, many studies have aimed at providing valuable insight into various cultural values frameworks (Hall & Hall, 1990; Hofstede, 1980 and 1991; House et al., 2004; Kluckhohn & Strodtbeck, 1961; Schwartz, 1994; Trompenaars & Hampden-Turner 1998).

Despite strong evidence in the scientific literature about the impact of culture on the functioning of an individual or a community (Geertz, 1973; Schwartz, 1994; Triandis, 1994), there is not yet a determined and comprehensive conceptual model which establishes ground rules for applying the existing cultural values frameworks and their dimensions to multicultural group work. For this reason, on the basis of reviews of the literature, we examined some cultural values frameworks that might be relevant for better understanding general and culture-related challenges faced in MCSG. We screened the frameworks based on two principles: their theoretical significance in the scientific literature and practical relevance to multicultural groups in higher education.

In most of the examined cultural values frameworks the individualist-collectivist orientation has proved to be one of the most robust concepts. Research replicating and supporting the robustness and validity of Hofstede's cultural framework is large in scope and number, exceeding more than 1500 published studies (Metcalf & Bird, 2004). This dimension is relevant and has implications for group processes (Gelfand, Erez, & Aycan, 2007).

Many studies on the individualist-collectivist orientations have focused on group-work-related attitudes and behaviors. Scholars in the field of cultural studies, such as Trompenaars (1994), Hofstede (1980, 1991 and 1993), Triandis (1994), and Triandis, Chen, and Chan (1998) researched the differences between individualist and collectivist cultures. Specifically, the research of Geert Hofstede has contributed enormously to our understanding of culture across more than fifty nations. Hofstede (1993) stated that some differences between individuals of collectivist and individualistic cultures are related to attitudes towards group work. Representatives of collectivist and individualistic cultures have different attitudes towards diversity among group members: 1) collectivists are apt to believe that diverse groups are unable to function effectively due to their divergence of interests and lack of shared values, while individualists believe that group work can be advantageous because it is considered as a place of confrontation between different perspectives in the pursuit of knowledge and problem solution (Sosik & Jung, 2002); 2) individualists are geared specifically to personal goals while collectivists tend to contribute substantially to group success and their behavioral motives are impelled by the common group identity (Shamir, 1990; Triandis, 1994); 3) individualists do not

tend to work in groups as group work is commonly attributed to working together for common goals rather than individual ones, and it can be difficult to discern individual contributions by judging the final result of group work (Cox et al., 1991; Early, 1989); 4) as mentioned above, people from individualist cultures are more likely to “loaf” because of their greater willingness to work individually than in a group (Earley, 1989).

Research questions

In line with the aims of this study, this paper addresses two research questions:

RQ1 What, according to students, are the most important challenges encountered during multicultural student group work in higher education?

RQ2 To what extent do students of individualistic and collectivistic cultures differ in their perceptions of the importance of challenges that may occur in multicultural student group work in higher education?

METHOD

Research setting

The Academic Consultancy Training (ACT) course of Wageningen University was chosen as a case study for this research because this course requires students to work in multicultural groups to carry out a project. This course trains students in the application of Master-level academic skills in a simulated professional setting of a small consultancy group working for a commissioner on a real work assignment. The small consultancy groups of 4 to 7 students are assigned a design type project for a client. This may be design of new technologies, policy papers, business plans, communication plans or draft research plans for integrated research programs. The ACT organizing staff forms these student groups on the basis of required disciplinary students' background, students' interests and their cultural background. Each group member works full time (i.e., 42 hours per week) on the project of the group during four weeks and half time (i.e., 21 hours) during the remaining four weeks. Students are members of groups only at times of the ACT course and work in these groups until they complete the project together. To strengthen the professional skills needed for such group work, brief training sessions on working in projects and on communication and self-reflection are integrated in the course. These additional brief training sessions focus on project planning, communication skills, argumentation skills, management skills, group dynamics, self-reflection, student group

building exercises, and multicultural communication skills. Teachers use various teaching and training methods, such as: lectures, group discussions, case studies, role plays, audio visual methods, games and icebreakers.

Each student group should complete the following activities while being involved in the ACT course: regular group meetings, development of project proposal, assignment of group members' functions, development of work plan, project execution, formulation of the final product and recommendations to the client, deliverables reporting. Regular group meeting is organized to reflect on the functioning of the group and of individual members. At the start of the project each student group has to establish a project proposal where students should indicate a project description and a detailed planning with individual tasks. Concerning the assignment of group members' functions, prior to starting, the students are assigned functions with a clear task description. Also, students develop a work plan where they indicate all the necessary activities to be completed within a certain time-line. During project execution stage all group members actively work on synthesis and participate in the formulation of the final product and recommendations to the client. By the end of the ACT project, every group member is expected to prepare a self-assessment dossier (including application letter, expectation paper and final reflection paper). All group members present their final project paper and prepare an oral presentation in order to defend and sell their viewpoints and conclusions.

After the ACT course, students are expected to be able to: 1) determine the goals of a project and formulate tasks and a project plan on the basis of their disciplines; 2) recognize the challenges and benefits of working in multicultural groups; 3) assess the contribution of other group members on group functioning and execution of project tasks and give feedback in written and oral form; 4) successfully solve problems caused by different standards of interaction, styles of thinking and styles of problem solving in multicultural group; 5) recognize and develop their personal styles of communicating during meetings and conflicts (Study Handbook of Wageningen University 2009-2010).

Participants

The survey was conducted among students of the ACT course in the study year 2009-2010. Participants in this explorative case study were students enrolled in different educational programs in the life sciences and they were in the first year of their Master program. Our sample of 141 students comprised 66 Dutch and 75 international students; 60% of whom are women. Of the international students, 26 come from Europe (outside the Netherlands), 21 from Africa, 14 from Asia, 6 from Oceania, 5 from South America and 3 from North America. The total number of countries represented in our study was forty. The age group of the respondents

ranged from 20 to 48 years, with a mean age of 25.71, and 96.7% of respondents were below the age of thirty. Well over half (63.7%) of the respondents stated that they had at least 2 years of prior experience working in student multicultural teams (the mean was 2.5 years).

Instrument

A questionnaire was developed to examine whether the students' cultural backgrounds affected their perceptions of the importance of challenges in MCSG. The instrument was divided into two sections: Section 1 was intended to register characteristics of the respondents such as country of origin, gender, age, student multicultural group work experience and educational program. Section 2 asked students to rate the importance of specific challenges that may occur in the group work process (see Table 2.1). A 5-point Likert-type scale format was employed to rate all items of the instrument (the perceived importance of challenges: 1 = very unimportant; 2 = unimportant; 3 = neutral; 4 = important; 5 = very important).

Five questions related to membership of a multicultural group. These were prompted mostly by the works of Van den Bossche et al. (2006) and Sweeney et al. (2008), who suggested that grouping students of a variety of age, gender and cultural backgrounds into one group may cause problems related to differences in study strategies, priorities, social capital, cultural capital and financial background.

The research studies of Gudykunst et al. (1996), Hall (1990) and Brett et al. (2006) gave an impetus to formulate three questions regarding communication challenges, including English proficiency. These authors suggested that differences in communication style across cultures may influence the interaction process due to a possible lack of shared understanding of discourse rules and norms, differences in expectations, and underestimation of the role of clarity.

Four questions related to problem solving and decision making processes in MCSG were prompted by the works of Martinsons (2001), Cox and Blake (1991), Matveev and Milter (2004). These scholars argued that there are cross-cultural differences in problem solving and decision making processes.

Four questions that focused on conflict management in MCSG stemmed from the works of Doucet and Jehn (1997), Triandis (1994) and Jehn (1995). These researchers stated that conflict is a culturally defined phenomenon and culturally diverse group members can exhibit culturally distinctive styles of conflict management when problems/conflicts arise in group work.

Three questions addressed the issue of roles of group members (namely, free-riding, dominating group members and a low level of motivation). According to Earley (1989) and Hofstede (2001), there are differences between people from collectivistic and individualistic cultures with respect to leadership and free-riding behaviors in group work.

It is important to mention that respondents were provided with a brief definition of some items to facilitate interpretation. For example, dominating group member was defined as “one group member imposes his/her own visions and ideas on the other members” and free-riding was defined as “some persons in a group do not contribute to the group work to their full potential or undermine the group working process”. Also, the questionnaire included a space for the respondents where they could indicate other issue(s) that are not mentioned in the list of challenges and give their comments.

Procedure

Participants of this study were involved in MCSG for about eight weeks full-time. At the end of the finalizing stage of the ACT course participants completed a questionnaire. The questionnaire was available on a secure website and e-mails containing a link to this website were sent to each participant to minimize the time and effort involved in completing it. The questionnaire was anonymous. The information participants gave us was treated confidentially and no one was identified on any of the forms of the answers.

Analyses

An exploratory factor analysis (EFA) with principal component extraction was used to discern the factor structure of all measured variables related to challenges as defined in this research and to examine their internal reliability (Table 2.2). The internal reliability of the scales resulting from the EFA was verified by computing the Cronbach's alpha. According to Nunnally (1978), a minimum alpha of 0.7 suffices for an early stage of research. Cronbach's alpha reliability coefficients were computed for each of the scales with respect to challenges in MCSG and ranged from .83 for a “cross-cutting challenges in multicultural group work” scale to .85 for “culture-related challenges in multicultural group work” scale. Other scales extracted from the EFA reached only .66 and .58 levels, so they have been omitted because of their low reliability coefficients. To establish validity of the survey measures, the questionnaire was pilot tested with a small number of students and developed for readability and consistency of meaning. Peer feedback from ten teachers in the field of education with extended experience in multicultural student group work provided corrections with respect to wording and order of the survey.

As stated above, differences in the students' perceptions of the importance of group-level challenges were measured with a 19-item instrument which describes challenges that most often occur in MCSG in higher education. Descriptive statistics were used to determine what challenges are perceived to be the most important by students in MCSG.

Table 2.2 Results of exploratory factor analysis of challenges in multicultural group work items

Reliability analysis and loadings of extracted factors	Factor 1	Factor 2
Cross-cutting challenges ($\alpha=.83$)		
students not communicating properly	0.84	0.22
free-riding	0.78	0.03
insufficient English language skills	0.75	0.07
group conflicts	0.70	0.09
a low level of motivation	0.66	0.20
Culture- related challenges ($\alpha=.85$)		
culturally different styles of decision making and problem solving	0.19	0.89
culturally different ways of interacting	0.13	0.86
culturally different styles of complying with supervisor's guidelines	0.12	0.72
culturally different styles of conflict management	0.12	0.69
Eigenvalue	6.31	2.32
% Variance explained	33.21	12.22

Extraction method: Principal Component Analysis.

Rotation method: Varimax with Kaiser Normalization.

Rotation converged in 7 iterations.

In order to examine the extent to which culturally diverse students, based on Hofstede's individualist-collectivist cultural orientations, differed with respect to how they rated the importance of MCSG challenges, one-way analysis of variance (ANOVA) was conducted. Cultural background was determined by asking group members to indicate their countries of origin in the first section of the questionnaire, which focused on socio-demographic information. Countries of origin were coded according to Hofstede's individualist-collectivist orientations. Using Hofstede's (2001, Exhibits A5.1, A5.2, and A5.3; 2009) individualism index we positioned all countries that were relevant in our survey (see Figure 2.1). Although Hofstede's (1980, 2001) individualism index was identified in his study conducted among IBM employees and not based on student body statistics, this cultural orientation was an appropriate tool for examining cultural differences. As mentioned above, there are culture-related differences between individuals representing collectivist and individualistic cultures which are related to attitudes towards group work. Hofstede's individualism index was standardized and set into a range between 0 (most collectivistic) and 100 (most individualistic). Due to varying levels of accuracy of the individualism index, further analysis in this study was based on the responses of students from countries in two selected categories: low (with a score less or equal to 40) and high (with a score between 60 and 80). Students from countries that represent the middle category based on the individualism index (i.e., with a score between 41 and 59, in total 15

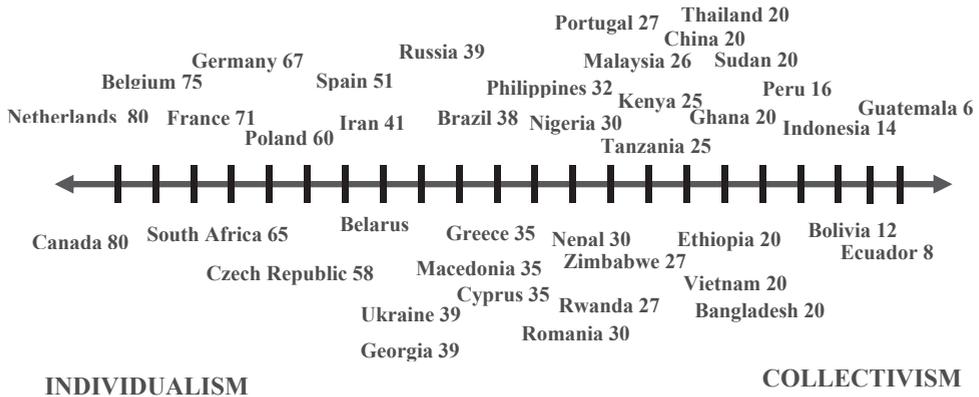


Figure 2.1 Individualism values for countries in sample, using Hofstede’s (2001, Exhibits A5.1, A5.2, and A5.3; 2009) individualism index (<http://www.geert-hofstede.com/>, downloaded September 25th, 2010).

students representing 11 countries) were removed from the analysis of the second research question. For example, Gouveia, Clemente, and Espinosa (2003, p. 59) suggest that Spain (individualism index 51) is “half way between collectivism and individualism [...], that is, between Latin America and Europe”. Leaving out the middle group, so that cultural orientation can be used as a fixed factor, has been done previously in studies investigating possible effects of culture (e.g., Liu, 1998; Murray-Johnson, Witte, Liu, Hubbell, Sampson, & Morrison, 2001). This allowed us to clearly demonstrate the cultural differences between two select groups with respect to how they rate the importance of challenges in MCSG.

RESULTS

The exploratory factor analysis on the challenges in multicultural student group work resulted in two factors with satisfactory Cronbach’s alpha-levels. Table 2.2 shows the final loading of items on each factor. The first scale is labeled “Cross-cutting challenges in multicultural group work” because all corresponding items within this scale are laid down in the group work process, which is binding for most multicultural student groups taking into account the additional level of complexity due to culture-related differences that members bring to a group. The second scale is labelled “Culture-related challenges in multicultural group work” and is determined by the challenges which are unique for culturally heterogeneous groups.

The first research question asked what, according to students, are the most important challenges in multicultural student group work. Descriptive statistics were used to determine what challenges are perceived to be the most important by students in MCSG (Table 2.3). All challenges were considered to be at least of some importance by the whole group of students. According to the students, free-riding ($M=3.9$, $SD=1.27$), insufficient English language skills ($M=3.87$, $SD=1.13$) and students not communicating properly ($M=3.74$, $SD=1.03$) were the most challenging aspects in MCSG. Dominating group members ($M=3.17$, $SD=1.13$) and the pressure to defend group decisions whilst not agreeing with them ($M=2.97$, $SD=1.08$) were among the challenges considered less important.

To answer our second research question, we examined the extent to which culturally diverse students - as classified according to Hofstede's cultural orientation - differed on the scales identified in the EFA and on the corresponding items. One-way analyses of variance (ANOVA) were conducted, and the results indicated that there were statistically significant differences based on students' cultural backgrounds with respect to two scales: cross-cutting challenges ($F=5.10$, $p<0.05$) and culture-related challenges in multicultural group work ($F=7.57$, $p<0.01$) (Table 2.4). The analysis showed that students from individualist cultures ($M=3.94$,

Table 2.3 Means and standard deviations for the most important challenges

Challenges	Mean	SD
free - riding	3.90	1.27
insufficient English language skills	3.87	1.13
students not communicating properly	3.74	1.03
a low level of motivation	3.71	1.17
ineffective group management	3.71	1.23
group conflicts	3.66	1.14
diverse disciplinary backgrounds of members in one group	3.59	1.14
attitudinal problems such as dislike, mistrust and lack of cohesion	3.56	1.29
heterogeneous group composition	3.49	1.29
difference in academic attitude	3.47	1.18
differences in ambitions (e.g., aiming for a '6' or a '9')	3.46	1.17
culturally different styles of decision making and problem solving	3.44	1.16
different attitudes towards deadlines	3.43	1.12
culturally different styles of conflict management	3.43	0.98
culturally different ways of interacting	3.42	1.11
difference in content knowledge	3.39	1.05
culturally different styles of complying with supervisor's guidelines	3.17	1.13
dominating group members	3.17	1.13
the pressure to defend group decisions whilst not agreeing with them	2.97	1.08

Table 2.4 Means and standard deviations for group challenges and univariate tests of significance based on Hofstede's individualist-collectivist cultural orientation

Factor	Individualists		Collectivists		F	Sig.
	Mean	SD	Mean	SD		
Cross-cutting challenges	3.94	0.73	3.56	0.99	5.10*	.026
free-riding	4.13	1.08	3.46	1.47	8.73**	.004
insufficient English language skills	4.07	1.08	3.58	1.14	5.26*	.024
a low level of motivation	3.74	1.17	3.52	1.25	.86	.356
group conflicts	3.68	1.07	3.55	1.25	.36	.551
students not communicating properly	3.77	.92	3.72	1.22	.074	.787
Culture- related challenges	3.16	0.92	3.64	0.73	7.57**	.007
culturally different ways of interacting	3.17	1.16	3.81	.86	9.39**	.003
culturally different styles of decision making and problem solving	3.24	1.09	3.76	1.02	5.97*	.016
culturally different styles of complying with supervisor's guidelines	3.04	1.19	3.43	.96	2.96*	.089
culturally different styles of conflict management	3.31	.96	3.50	.93	.98	.325

* Significant at $p < .05$.

** Significant at $p < .01$.

$SD=0.73$) scored significantly higher than students from collectivist cultures ($M=3.56$, $SD=0.99$) with respect to cross-cutting challenges in MCSG. Also, the results of the analyses revealed that students from collectivistic cultures ($M=3.64$, $SD=0.73$) scored significantly higher than students from individualist cultures ($M=3.16$, $SD=0.92$) regarding culture-related challenges in MCSG. Furthermore, the differences in the perceived importance of cross-cutting and culture-related challenges in a multicultural group are more pronounced for students from individualist cultures ($M=3.94$, $SD=0.73$, and $M=3.16$, $SD=0.92$, respectively) than students from collectivist cultures ($M=3.56$, $SD=0.99$, and $M=3.64$, $SD=0.73$, respectively).

DISCUSSION

In an effort to better understand the influence of cultural diversity in MCSG in the context of higher education, this study explored challenges that students face in multicultural group work. Expanding on previous research, the present study showed that certain challenges in MCSG in higher education are perceived differently by students with diverse cultural backgrounds. When the survey data were analyzed, the following significant findings emerged. First, almost all challenges were considered to be at least of some importance by all respondents (scores higher

than 3 within 5-point Likert-type scale). Second, free-riding, insufficient English language skills and students not communicating properly were perceived by all participants of this study to be the greatest challenges in MCSG. Third, the research results showed that students' cultural background (the individualist-collectivist orientations) affects their perceptions of the importance of challenges in MCSG. Students from individualist cultures perceived cross-cutting challenges in MCSG to be more important in comparison with students from collectivist cultures. Students with more collectivist values tend to emphasize culture-related challenges in MCSG more than students from individualist cultures. Also, the differences in the perceived importance of cross-cutting and culture-related challenges in a multicultural group are more prominent for students from individualist cultures than students from collectivist cultures. All of the main research findings will now be discussed in turn.

Addressing the first research question allowed us to reveal the most important challenges in multicultural student group work according to the students. The list of challenges in MCSG used for this study was derived from earlier research on group work. The existence of these challenges was validated in this study, as almost all challenges derived from the literature were considered to be at least of some importance by all respondents.

According to the students, free-riding, insufficient English language skills and students not communicating properly are the most challenging aspects in MCSG. Previous research studies have confirmed that free riding is one of the most important challenges associated with group work (Brook & Ammons, 2003; Weldon et al., 2000). Indeed, when any group member does not contribute to the group work to his or her full potential, it negatively influences group climate, group participation and overall group performance. Free-riding violates the whole idea of group work and our study shows that students are aware of this fact. Also, the existence of free-riding in MCSG and students' perception of this challenge as being the most important are likely to be related to the other variables, such as communication problems and lack of English proficiency. This is consistent with the research studies of Clark, Baker, and Li (2007), Johnson and Johnson (1999), and Wong (2004) which showed that language difficulties may pose challenges for international students. The fact that English is a lingua franca, rather than the native language of all participants, may result in problems with comprehension between group members with different knowledge levels and great variation in accents. It is known from the literature that ability to communicate successfully across cultures is vitally important for intercultural cooperation (Schneider & Barsoux, 1997). Our research findings are consistent with Fox's work (1997) stating that the issue of intercultural communication intersects in many ways with group climate. According to her, "authentic discourse is not just a matter of using the correct words, or matching discourse norms, or even matching cultural backgrounds. [...] Meaning is mutually created, through trust, sincerity and a willingness to acknowledge

differences of cultural background” (Fox, p. 93). The following quotations from the current study illustrate the attitudes of Dutch students toward students who do not communicate properly during teamwork:

“I prefer a Dutch group because many international students have difficulties expressing themselves, knowing what to do. In other words they are not used to group work.”. “The problem with Asian people’s communication is they don’t say much, which is a problem in teamwork!”

Thus, providing students with training on developing communication skills may help to coordinate and harmonize group members’ culturally different methods of communication. If students know how to act and what to expect from their counterparts in particular situations, they can potentially benefit from “sharing culturally divergent knowledge”. Particularly in relation to the English language, it is important to encourage all group members to actively listen to one another and promote the idea that a lack of English proficiency does not indicate a lack of competence in a subject matter.

The students themselves stressed the need for facilitation of communication skills in MCSG:

Dutch student: “...some people are too silent in group work, and facilitation skills are needed to allow those voices to be heard. So, as students, we need to be aware of those skills and be coached to use them”.

Further analysis and investigation of the most challenging aspects in MCSG are required to determine if and how these challenges can be tackled. What strategies can be used by both teachers and students when facing these challenges in MCSG? Further elaboration on these challenges is necessary, paying specific attention to culture-related differences. Therefore, we suggest that follow up research address these questions by using various research methods (e.g., interviews, observations, self-reports) to improve our understanding of them.

The second research question addressed the influence of students’ cultural backgrounds on how they rate the importance of challenges that may occur in MCSG in higher education. The results suggest that students from individualistic cultures found it more problematic to deal with cross-cutting challenges in multicultural group work (such as students not communicating properly, free-riding, insufficient English language skills, group conflicts, a low level of motivation) than students from collectivistic cultures. It may be that the perceived importance of cross-cutting challenges is related to the respondents’ learning goals. Mutual understanding and finding common ground with respect to group goals play a key role in multicultural groups because of the different expectations, individual goals and backgrounds

that members bring to the group. Individualists are geared specifically to the personal goals while collectivists tend to contribute substantially to group success and their behavioral motives are impelled by the common group identity, group cohesion and task interdependence (Hofstede, 1993). Challenges can be caused by misinterpretation of the ultimate group work goals and the levels of commitments.

Students from individualist cultures considered that free-riding results in more problems in group work, while students from collectivist cultures consider free-riding to be less important for group performance (Table 2.4). Early's research (1989) based on cross-cultural studies comparing American managers (individualistic values) to Chinese managers (collectivistic values) suggested that free-riding is more likely to occur in individualistic cultures. People from individualist cultures are more likely to "loaf" because of their higher willingness to work individually compared to working in a group and a low level of involvement in a group (Earley, 1989). Early's research was performed in two different cultural settings in the professional environment. But if we consider the free-riding phenomenon in the context of multicultural student groups in higher education it might be seen differently by all group members. Furthermore, Earley (1989) investigated the impact of differences arising from individualistic and collectivistic cultural orientations on the occurrence of free-riding rather than on perceptions of this phenomenon in two cultural contexts. The results of this study showed that students from collectivistic cultures were less likely than students from individualistic cultures to consider free-riding as an important challenge.

Also, it may be that reward structure imposed on the ACT groups influenced how students perceived free-riding in MCSG. Previous research studies provided some insight into the relationship between reward structure and cooperative learning. Scholars stated that students' performance and preference depends on group competitive (Chapman, 2001), individual criterion (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981), or group criterion reward structures (Qin, Johnson, & Johnson, 1995). The reward structure applied in the ACT course included a combination of individual and group rewards. The contribution of each student during the MCSG process was individually assessed by both the group members and the ACT personal. The product grade was assigned by the ACT personal based on an average for the group. Thus, the effect of social loafing in this study can be partly explained by the relationship with the reward structure imposed on the groups. Probably some students did not feel that his or her contributions were rewarded individually for efforts and overall performance in comparison with other group mates. Or, rewarding the whole group's performance was not sufficient in a way that students did not feel that they worked toward a common goal. Further exploration of this challenge is needed, especially in the context of multicultural student groups in higher education with a focus on students' perceptions of free-riding.

According to Economides (2008), in individualistic cultures “group work is a place of confrontation in a search for solutions” (p. 250). People from individualistic cultures tend to value personal identity and different characteristics, knowledge and skills among group members, whereas people from collectivistic cultures prefer working with group members who have many commonalities and shared values (Early & Gibson, 1998). Collectivists may see the ultimate goals and the main function of group work differently than individualists who were trained in other education systems and cultural conditions. This observation helps explain the fact that students with different cultural backgrounds view the same challenges, which may occur in multicultural group work, differently, more specifically in relation to differences in communication, free-riding and group conflicts. For this reason problems can arise with respect to the process of information circulation and credibility establishment (Sosik & Jung, 2002; Shamir, 1990; Triandis, 1994).

Our analyses also showed that the differences in the perceived importance of cross-cutting and culture-related challenges in a multicultural group are more prominent for students from individualist cultures in comparison with students from collectivist cultures. Individualists tend to emphasize the importance of cross-cutting challenges, whereas collectivists perceive cross-cutting and culture-related challenges in a multicultural group as nearly equal in importance. It may be that students with individualist values are more sensitive about challenges that hinder them in achieving their individual-oriented goals and they are less concerned about cultural diversity in a group.

The results of this study showed that students from collectivist cultures are likely to perceive cultural diversity among group members as more problematic than students from individualistic countries. More specifically, students from individualistic cultures consider different ways of interaction and dealing with problems in group work as culture-driven aspects that are of less importance. This finding is consistent with the research study of Sosik and Jung (2002) in terms of the different perceptions of group diversity between collectivists and individualists. Based on others’ research (Earley & Gardner, 2005; Kirkman & Shapiro, 2005), we may note that “national and cultural diversity generates conflicts that may reduce the ability of a group to maintain itself over time and to provide satisfying experiences for its members” (Earley & Gardner, 2005, p. 18). In order to address these kinds of conflicts in multicultural groups in a constructive way or avoid them at best, group members should first acknowledge diverse cultural perspectives and then explicitly state the conditions of cooperation including organizational, communication and time management aspects (Smith & Mraz, 2001). Consequently, this highlights the need for the development of educational methods and techniques that specifically address these culture-related differences.

The student groups of the present study were not examined in terms of their cultural compositions at group level and the effects of group composition on the perceived challenges. Further research should carefully examine each group's composition. Some MCSG challenges may stem from group formation in terms of the cultural backgrounds of the group members. The following response reflects an opinion of one of the international students regarding this issue:

International student: "You should try to change the ACT course rules. You should divide the Dutch students or at least try to make some equal division within the teams of international and Dutch students. Working with only Dutch students is not very pleasant. Very often they speak in Dutch about our project and the international students cannot understand anything!"

Some students thus felt they were not as effective as they could have been due to group composition issues. This highlights the need for further exploration, specifically of how the cultural composition of a group may affect students' perceptions of MCSG challenges. Future research should examine the group composition variable with a variety in the number of culturally diverse members in one group.

The second research question intersects with the first research question in terms of items within the scale of cross-cutting challenges that correspond with those challenges that were perceived by all participants of this study to be the most important in MCSG (see Tables 2.3 and 2.4). It may be that the students in this study were mostly concerned with this set of challenges. Although, the findings of this study showed that perceived importance of these challenges differed between students with individualist and collectivist values. Further research studies would be useful to explore these challenges in more detail, paying specific attention to the reasons for this discrepancy in perception and possible ways to reconcile cultural differences between students working in groups.

Development of external collaboration scripts is one of the research trends that may be directly relevant for this topic. These scripts are intended to help collaborative learners by sequencing their learning activities and by organizing their interactional process (Dillenbourg & Jermann, 2007; Weinberger, Clark, Hakkinen, Tamura, & Fischer, 2007; Kollar, Fischer, & Slotta, 2007). A shared script can reconcile differences between learners and minimize the effort required to coordinate their learning activity. Quoting from Weinberger et al. (2007, p. 74), "collaborative students from different cultures may thus particularly benefit from following external script prescriptions". If they know how to act and what to expect from their counterparts in particular situations, they can potentially benefit from "sharing culturally divergent knowledge" (Cox et al., 1991; Weinberger et al., 2007). The potential of external collaboration scripts in this regard should be examined in future research.

This study has a few limitations that need to be acknowledged and addressed. Although challenges that appear to affect MCSG were examined from different perspectives, effects of intervening variables were not included within the scope of our analysis, e.g., group size, group evaluation and group development over time. With respect to the group size variable, the size of all ACT groups in this study varied from 4 to 6 members per group. Examination of the effects of group size on students' perceptions in MCSG would require a wider variation in group size within the research survey sample. Concerning group evaluation, participants in this study completed the questionnaire before they received grades for the ACT course. With respect to group development over time, all ACT groups in this study had equal periods of time to work together. Further research should examine this variable by looking at a variety of different time spans for group work, paying specific attention to how the period of time allocated for MCSG affects students' perceptions of challenges faced in group work.

The second limitation concerns Hofstede's individualist-collectivist orientation, which was applied in this study to examine the differences between students from different cultural backgrounds in how they perceived the importance of challenges in MCSG. Despite the fact that an individual student, coming from collectivistic country, holds collectivistic values and norms, he/she may exhibit certain individualistic behavioral patterns due to his/her personal travel experiences. Thus, the cultural differences between the two groups might be not as big as suggested by Hofstede's dimensions. Apart from Hofstede's framework, other cultural values frameworks could be relevant (e.g., Hofstede/Triandis' combined index of individualism-collectivism, see Diener, Gohm, Suh, & Oishi, 2000). Therefore, to ensure reliability, future research should apply multiple cultural values frameworks and their dimensions to multicultural group work.

The third limitation is the extent to which the findings can be generalized. Again to ensure reliability, the number of countries represented in two cultural groups (individualists and collectivists) could be increased. This is especially important with respect to students from individualistic cultures, since more than half of the respondents in this study representing individualistic culture were from the Netherlands. Therefore, further empirical investigations are needed to replicate the findings in a more culturally diverse body of students.

CONCLUSION

To meet the challenges of the 21st century, university graduates should not only be professionally competent, but also experienced in working in culturally heterogeneous groups within professional domains, as international group work is becoming an increasingly important way

of organizing work in professional and academic environments. This highlights the need for successful cross-cultural professional cooperation that implies the application of collaborative learning. The latter may facilitate the solving of problems arising in the process of joint work and may advance the success of groups in both university and professional settings.

This study aimed to achieve a better understanding of group dynamics in a multicultural setting in higher education through examining students' perceptions of challenges in MCSG. It was proposed that further research and educational programs should be developed to improve multicultural group work in higher education so that it will respond to the intercultural context, build-up components of collaborative learning and harness educational methods, techniques and assessment tools.

One of the main conclusions of this study is that perceptions of challenges in multicultural student group work differ across cultures. It therefore contributes to a better understanding of the importance of cultural differences in student group work. Culturally diverse group members may have completely different expectations with respect to learning in groups and the behavioral motives of others, which may result in misunderstandings and conflicts. If educators and instructional designers manage to take advantage of the positive intercultural experiences in multicultural group work while downplaying the negative aspects, multicultural groups can develop the ability to be more successful and productive as a result of the merger of cultures.



Chapter 3

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

*This chapter is based on:

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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 study 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 collaborating with a partner of a culturally dissimilar background had a negative effect on students' perceptions of the collaborative learning experience. For women, working in a culturally dissimilar dyad resulted in a much more negative perception of collaborative learning than did working in this type of group for men. 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.

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, Dominick, & 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, Paretto 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 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). 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, Redeer & Roche, 2002; Reeder, Macfadyen, Roche, & Chase, 2004). Students from various cultures differ in terms of their perspectives on group work and their procedural knowledge about how to collaborate and learn together (Cox, Lobel, & McLeod, 1991; Weinberger, Clark, Hakkinen, Tamura, & Fischer, 2007). Previous research suggests that student perception of collaborative learning is a key dependent variable of educational interventions (So & Busch, 2009; 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 et al., 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.

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 et al., 1991; Kirschner, Beers, Boshuizen, & Gijsselaers, 2008). Building on previous research (e.g., Cox et al., 1991; Lim & Liu, 2006; Popov, Brinkman, Biemans, Mulder, Kuznetsov, & Noroozi, 2012; Weinberger et al., 2007), this study investigated whether culturally diverse CSCL groups of students need to overcome an additional level of complexity due to culture-related differences. 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.

Cultural diversity in CSCL groups: influences on perception, learning processes, and learning outcomes

Group composition variables, including cultural heterogeneity, are of crucial importance for functioning and overall success in collaborative learning (Liang & McQueen, 2000; Lim & Liu, 2006; Smith & Smith, 2000). Culture is considered here as “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). Culture combines a set of shared values, beliefs, norms, attitudes, and behaviors inherent in an individual or a community within one’s cultural setting. In the context of online collaborative learning, culture influences students’ understanding and appreciation of collaborative processes and their behavior in group communication (Cox et al., 1991; Lal, 2002; Vatrapu, 2008; Weinberger et al., 2007; 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, 2006; 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, and self-categorization theory), culturally similar groups tend to conform to social behavioral norms, communication styles, and perception of the learning environment, which encourage effective in-group relationships, stronger social bonds, and faster communication, while minimizing conflict, anxiety, and disagreements (Byrne, Griffitt, & Stefaniak, 1967; Lim & Liu, 2006). In contrast, culturally dissimilar groups “often suffer from process losses in terms of misunderstandings and coordination difficulties when working on tasks together” (Weinberger et al., 2007, p. 69). A number of studies have demonstrated that group dynamics in culturally dissimilar groups might differ to a large extent from those in culturally similar groups (for an overview, see Williams & O’Reilly, 1998).

Students in culturally dissimilar CSCL groups may feel uncertain and anxious about each other, and seek ways to predict their partner’s behavior and correctly interpret his/her feedback. Several aspects of online communication (e.g., reduced social presence, lack of nonverbal and social cues) might further hinder mutual understanding between collaborative partners (Anderson & Hiltz, 2001; Berger & Gudykunst, 1991), especially when they do not know each other and are collaborating for the first time (Janssen, Erkens, Kirschner, & Kanselaar, 2009).

This may be particularly true for culturally dissimilar CSCL groups when even awareness of the difference in backgrounds between members in a group may result in a certain bias, faulty assumptions, and misinterpretations.

Gender differences also have an effect on an individual's behavior when working in groups (Gabrenya Wang, & Latané, 1985; Kugihara 1999). Men tend to be more individualistic and women relational (collectivistic), regardless of cultural values (Tsaw, Murphy, & Detgen, 2011). As an example of the effects of gender and culture on behavior in groups, Gabrenya, Wang, and Latané (1985) found differences between men and women across cultures with regards to social loafing. Chinese students displayed less social loafing than American students and women displayed less social loafing than men across cultures (Tsaw, Murphy, & Detgen, 2011). Social loafing violates the whole idea of collaborative learning and negatively influences group climate, group participation and overall group performance (Latane, Williams, & Harkins, 1979).

In the context of CSCL research, few studies focus on the effects of gender and very little research has been done on the joint effects of gender and culture on learning processes and outcomes. A study conducted by Wolfe (2000) suggests that gender and students' ethnic backgrounds tended to affect their participation in computer-mediated environments. Specifically, Wolfe (2000) found that the relative participation of white women increased by over 50% in the computer-mediated environment compared to face-to-face classroom discussion, whereas this was not the case for the Hispanic women, who strongly preferred the face-to-face discussion environment. Other researchers have found that women communicated differently than men in CSCL systems. Specifically, women used more responsive and argumentative dialog acts, while men used more informative and imperative dialog acts (Erkens & Janssen, 2008). Taken together, previous research findings indicate that an examination of gender effects in conjunction with the importance of cultural background of group members may prove useful in explaining the dynamics of culturally diversified groups working in a CSCL environment.

The next section presents a research review of conceptual models for understanding culturally diverse CSCL student groups.

Conceptual models for operationalizing culture

There are three primary areas of research regarding the relationship between students' cultural backgrounds and learning in online collaborative learning environments. These studies have focused mostly on: (1) differences in how students from different cultural backgrounds perceive online group processes (e.g., Al-Harathi, 2005; Anakwe & Christensen, 1999; Thompson & Ku, 2005); (2) how the linguistic and cultural backgrounds of collaborative partners impact their actual actions/behaviors/engagement in online collaborative situations (e.g., Lim & Liu, 2006;

Oetzel, 2001); and (3) differences in students' motivation with respect to online collaborative learning environments (Wang, 2007). The majority of these studies operationalized culture either by connecting culture to nationality and/or ethnic origin (usually in cross-cultural comparison studies), or by applying various classifications of culture.

Over the last sixty years, a number of cultural models have been developed to characterize the differences in cultures. Salas, Burke, Wilson-Donnelly, and Fowlkes (2004) identified over 64 cultural dimensions represented in the scientific literature. The most widely accepted cultural dimensions focus on differences in human relations, rules of behavior, cognitive style, orientation to time, communication style, power distributions, attitudes and belief systems across cultures (Hofstede, 1991; Salas et al., 2004; Schwartz, 1990).

In spite of strong evidence about the impact of culture on individuals' social behavior, communication, and cognition, there is no established framework for applying the existing body of knowledge on culture to culturally diverse groups in online collaborative learning. In most of the general cultural models, Hofstede's (1991) Individualist - Collectivist (I-C) cultural orientation has proved to be one of the most robust concepts. The I-C cultural orientation defines the extent to which a culture shapes an individual's (1) dependence on the self (individualists) or the group (collectivists); (2) attitude towards goals - individualists are geared specifically to personal goals while collectivists tend to contribute to group success; (3) behavioral motives - collectivists are more impelled by the common group identity, social norms and commitments, whereas individualists tend to act based on their own values, beliefs and personal motives (Hofstede, 1991; Triandis, 1994).

Research replicating and supporting the robustness and validity of Hofstede's (1991) cultural value framework is large in scope and quantity, exceeding 1500 published studies (Metcalf & Bird, 2004) and Hofstede's cultural orientation framework has more than 5000 citations in the Web of Science (Taras, Roney, & Steel, 2009). However, this framework has been challenged in recent years by a number of researchers. The critiques of Hofstede's framework are mainly related to Hofstede's original research database/sample and its generalizations regarding national cultures (for a review of these critiques, see McSweeney, 2002 or Ess & Sudweeks, 2005). Despite these critiques, Hofstede's framework remains the dominant approach to classify and compare national cultures.

The I-C cultural orientation has been widely used in educational research to describe differences in culturally-based learning styles, specifically for studying group collaboration (e.g., Cox, 1991; Goncale & Staw, 2006; Oetzel, 2001). A number of studies utilized the I-C orientation to investigate the differences among culturally diverse students in online learning environments (e.g., Anakwe & Christensen, 1999; Oetzel, 2001; Tapanes, Smith, & White, 2009). For instance, Anakwe and Christensen (1999) examined differences stemming from individualistic and

collectivistic cultural orientations in terms of students' perceptions of distance learning in two American universities. Their research findings suggest that individualistic students' motives, their styles of interaction and ways of performing are more compatible with features of distance learning in comparison with collectivistic students. Another study, conducted by Tapanes, Smith, and White (2009), had similar findings stating that collectivistic students are less motivated to participate in asynchronous learning networks compared to individualistic students.

The influence of the I-C cultural orientation on group work processes and collaboration dynamics has been studied at both individual and national levels. The present research investigated the effects of the I-C orientation on perceptions of collaborative learning, reported experiences, and learning outcomes of students who were members of a collectivist or individualist culture as determined by Hofstede's country-level ratings. Hofstede's I-C orientation is used here only at the level of national differences across cultures and not at individual level within cultures. Consequently, we focus on the variance in perception patterns that result from inter-cultural rather than inter-individual differences. According to Rosé, Fischer, and Chang (2007) "because of the important role of social processes, in particular processes of communication that are heavily influenced by culturally based expectations and norms, the area of computer-supported collaborative learning is an ideal field in which to begin investigations of multinational experimental studies" (p. 2).

Research questions

This paper addresses several research questions:

When paired in similar or dissimilar dyads (in terms of the members' individualistic or collectivistic cultural backgrounds) in a computer-supported collaborative learning environment, to what extent do students:

RQ1. ...differ in their perceptions of collaborative learning?

RQ2. ...differ in their reported learning experiences?

RQ3. ...differ in their learning outcomes?

RQ4. Do the effects of cultural background and dyad composition on students' perceptions of collaborative learning, reported experiences, and learning outcomes in the computer-supported collaborative learning environment differ by gender and educational background?

METHOD

Participants

The participants were 120 MSc or final-year BSc students enrolled at a university in the domain of life sciences in the Netherlands. In our sample, 56 were Dutch and 64 were international. Of the international students: 29 came from Europe (outside the Netherlands), 16 from Africa, 8 from Asia, 3 from Oceania, 6 from South America, 1 from Central America, and 1 from North America. Our study's international participants represented a total of 26 countries. The mean age of the students was 24.7 ($SD=3.4$) years, and 57% were female. Before participating in this study, the international students had been living in the Netherlands for an average of six to eight months, and all students, regardless of cultural background, had some short-term previous travel experience, including internships and traveling for work outside of their home countries for both academic and non-academic purposes. All study participants were required to demonstrate English language proficiency when enrolling at the university where this research was conducted. The students interacted with the study personnel and with each other in English.

Students' cultural backgrounds were determined by asking them to indicate their countries of origin during the introductory session. Countries of origin were coded according to Hofstede's individualist-collectivist orientation (individualism (IDV) index, see Hofstede, Hofstede, & Minkov, 2010), standardized and set into a range from 0 (most collectivistic) to 100 (most individualistic). Further analysis in this study was based on the responses of students from countries in two selected categories: low IDV (scores less than or equal to 51) and high IDV (scores higher than or equal to 60). Thus, students from countries that represent the middle category of the IDV index (i.e., scores between 51 and 59, in total one student and his collaborative partner) were removed from the analysis. The use of Hofstede's cultural value scores as a suitable proxy is a widely adopted approach to quantify cultural differences between countries (Murray-Johnson, Witte, Liu, Hubbell, Sampson, &, 2001; Popov et al., 2012; Tihanyi, Griffith, & Russell, 2005).

Design

The study participants were students from two disciplinary backgrounds: 1) international land and water management studies ($N=60$), and 2) international development studies ($N=60$). These two complementary domains of expertise were required to successfully accomplish the learning task in this study. The concepts to be learned were community-based social marketing (CBSM) and its application in sustainable agricultural water management (SAWM). The students' task

was to apply these concepts in fostering sustainable behavior among wheat farmers in a province of Iran (see Noroozi et al., 2013; Noroozi, Teasley, Biemans, Weinberger, & Mulder, 2012, for further description of the learning task, the CSCL platform, and the concepts of the SAWM and CBSM). Upon completion of the task, each student was expected to deliver an individual solution plan for designing an effective program that fosters sustainable farmer behavior. The students were compensated €15 per hour for their participation in the initial experiment, but not in the subsequent interview.

All students were randomly assigned to dyads based on their disciplinary backgrounds, such that every dyad included one student with a water management disciplinary background and one student with an international development disciplinary background. Students did not know each other before the study.

After the experiment, 78 out of 120 students filled in a questionnaire about their perceptions of collaborative learning in the CSCL environment, and 58 out of those 78 students agreed to be interviewed about their CSCL experiences as well. The remaining students did not complete the questionnaire or interview and therefore were excluded from the analysis. As for the questionnaire data, in total there were 76 students, after removing one dyad representing the middle category of the IDV index as described above. With respect to cultural backgrounds of the remaining 76 students: 28 students worked in culturally similar dyads consisting of two individualistic members (II), 17 students worked in culturally similar dyads consisting of two collectivistic members (CC), and 31 students worked in culturally dissimilar dyads consisting of one individualistic and one collectivistic member (CI or IC). Both orders (CI and IC) were used to investigate the extent to which cultural background and group composition are related to students' perceptions of the collaborative learning experience.

Interview data were collected for 58 students, i.e., 18 students who worked in culturally similar dyads consisting of individualistic members, 14 students who worked in culturally similar dyads consisting of collectivistic members, and 26 students who worked in culturally dissimilar dyads consisting of one individualistic and one collectivistic member.

Procedure

In a pilot study with eight students we first ensured adequate levels of task difficulty, comprehensibility of the learning material, and the technical functioning of the learning environment.

The experimental session took about four hours and consisted of five phases (Figure 3.1) during which students were seated at individual computers and had face-to-face contact with the study personnel. During phase 1, individual students received an introduction to the study

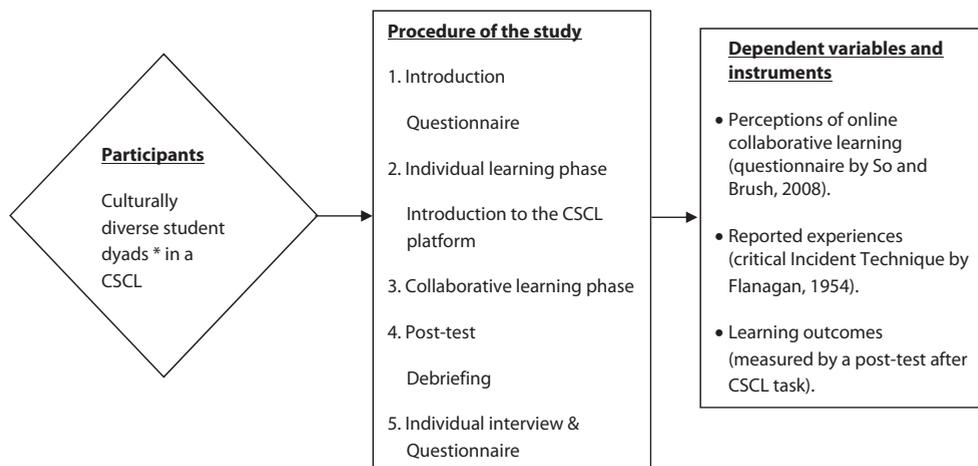


Figure 3.1 Design of the empirical study. * Each dyad consisted of one student with water management disciplinary background and one student with international development disciplinary background.

(5 min.). They were then asked to complete several questionnaires on demographic variables, computer literacy, and prior experience with collaboration (30 minutes).

During phase 2, the individual learning phase, students first received introductory explanations on how to analyze the case (5 min.). They were then given 5 minutes to read the problem case and 10 minutes to study a three-page summary of the theoretical text regarding SAWM and CBSM, the demographic characteristics of the farmers, and the location of the case study. Students were allowed to make notes, and to consult the text and their notes during the experiment. Students were next asked to design an effective program for fostering sustainable behavior on the basis of their own domain of expertise (20 min.). After phase 2, students were allowed a 10-minute break.

In phase 3, the collaborative learning phase, students were oriented to the CSCL platform and introduced to the procedure of the collaboration task (10 min). For the following 90 minutes, students were asked to collaborate, discuss, negotiate with their assigned partners to develop possible solutions for the task (i.e., designing an effective program for fostering sustainable farmer behavior), and to ultimately reach an agreement about a solution.

During phase 4, the post-test and debriefing phase, students were asked to work on a comparable case-based assignment individually (20 minutes) using what they had learned in the collaboration phase. They were asked to analyze and design an effective plan for fostering sustainable behavior among Nahavand, a province in Iran, wheat farmers in terms of irrigation methods that could be applied for fostering SAWM as a CBSM advisor. This comparable case-

based assignment was used as a transfer task when students needed to apply specific skills, knowledge, and/or attitudes that were learned in one situation to another learning situation (Perkins & Salomon, 1992). Finally, the students got a short debriefing for about 5 min.

Within two days of the experiment, all students were contacted to participate in phase 5, an individual interview on their CSCL experiences (30 min.). As described above, 58 students agreed to be interviewed and filled out the questionnaire on their perceptions of collaborative learning in CSCL. Twenty more students completed the questionnaire only.

Learning platform

An asynchronous text-based discussion board called SharePoint was customized for the purpose of our study for the collaboration phase. Immediate (chat-like) answers were not enabled in the learning environment (Figure 3.2). Instead, the interactions were asynchronous, resembling e-mail communication to exchange the text messages. Each message sent to a partner consisted of a subject line, date, time, and the message body. While the SharePoint platform set author, date, time, and subject line automatically, the students had to enter the content of the message as in any typical discussion board (see Noroozi & Weinberger et al., 2013 for a further description of the learning environment and also screenshots of the platform).

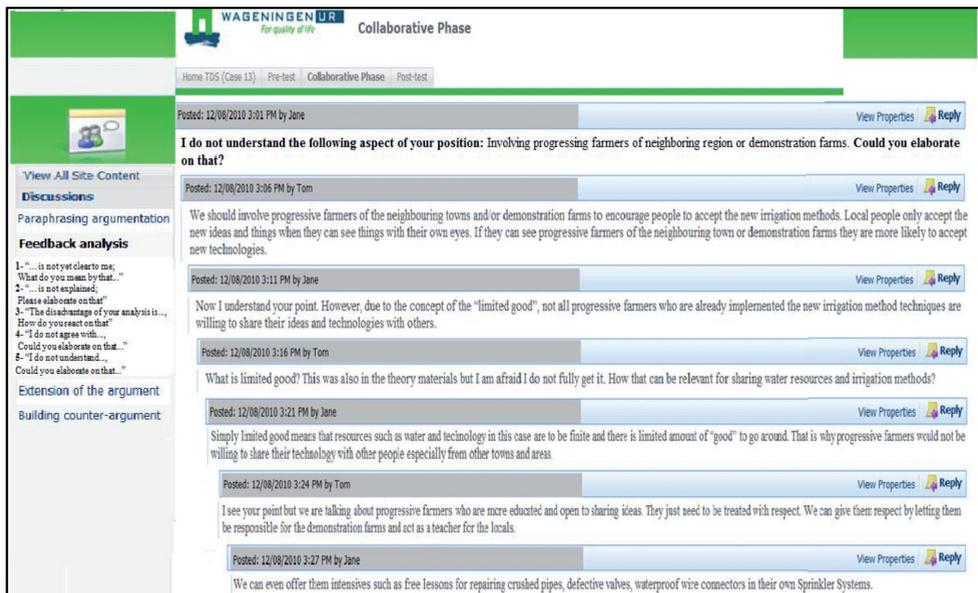


Figure 3.2 Screenshot of the customized SharePoint CSCL platform.

Instruments

Perceptions of collaborative learning in a CSCL environment

To answer the first research question about students' perceptions of collaborative learning in the CSCL environment, the data collected in phase 5 was analyzed utilizing a post-collaboration questionnaire about students' perceptions of collaborative learning developed by So and Brush (2008). The questionnaire used a Likert-scale to rate agreement or disagreement for eight items using a 5-point scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree). The questionnaire items were:

- “My collaborative learning experience in the computer-mediated communication environment was better than in a face-to-face learning environment.”
- “I felt that I was part of a learning community in my group.”
- “I actively exchanged my ideas with my collaborative partner.”
- “I was able to develop new skills and knowledge with the help of my collaborative partner.”
- “I was able to develop problem-solving skills through peer collaboration.”
- “Collaborative learning in my group was effective.”
- “Collaborative learning in my group was time consuming”(reverse-coded).
- “Overall, I am satisfied with my collaborative learning experience in this study.”

The Cronbach's alpha coefficient was .72 for the Collaborative Learning Scale in So and Brush's research (2008). We computed the Cronbach's alpha reliability coefficient for this scale in our research study and it was also acceptable (.79). The range of the total scale scores was 8–40. Higher scores reflect a more positive perception of collaborative learning in the CSCL environment.

Students' reported CSCL experiences

Instances of students' positive and negative collaborative experiences in the CSCL environment were collected using Critical Incident Technique (CIT). Using semi-structured interviews, the CIT fosters recall of critical events or incidents, including the actions and decisions made by interviewees and others (Flanagan, 1954). The CIT asks individuals to describe how they actually behaved in particular situations and to give reasons for decisions they made. While there have been some reliability concerns when using this method related to evidence of memory degradation and correlation between recalled events with performance, it is widely used in a variety of social science research settings, including performance appraisal, industrial psychology, competency management, health, and education, (e.g., Klein & Armstrong, 2004;

Wiersma, Van den Berg, & Latham, 1995) and in cross-cultural studies (Dekker, Rutte, & Van den Berg, 2008). The four-step CIT protocol was developed by Flanagan (1954) and adapted for this study. The interview questions addressed students' opinions, values, and feelings with respect to their most successful and most challenging collaborative experiences during the study. Students were told that a particular collaborative situation was considered to be positive or negative if an interviewee believed that the observed behavior contributed significantly to the outcome. The study students were asked to answer interview questions fully, giving specific examples and spending some time thinking about their answers before they started to verbalize their thoughts.

The first author conducted all interviews. At the beginning of each interview, the interviewer informed the student that the conversation and their identity would be kept confidential, and asked for permission to record the interview. A standardized, semi-structured interview format was used for this study because it was not known in advance what categories would emerge for data analysis.

Learning outcomes

Building on Noroozi, Teasley, Biemans, Weinberger, & Mulder (2012), the measure of individual performance was operationalized as the quality of the individual problem solution plan produced by each student in the post-test. The quantitative strategy adopted for measuring the quality of individual problem solution plans was to focus on the extent to which individual students were able to support their theoretical assumptions in relation to the case with justifiable arguments, discussions, and sound interpretations. Two expert coders independently rated individual problem solution plans using a 5-point scale ranging from "inadequate problem solution plan" to "high-quality problem solution plan." Both the inter-rater agreement between two coders (Cohen's kappa = .84) and the intra-coder test-retest reliability for each coder for 10% of the data (89% identical scores) were sufficiently high. We then assigned 0 points for inadequate problem solution plan, 1 point for low quality, 2 points for rather low quality, 3 points for rather high quality, and 4 points for a high-quality problem solution plan. Based on these points, we calculated the mean quality score for the individual problem solution plans.

Analyses

OLS regression analysis was used to examine relationships between students' cultural backgrounds, culturally similar or dissimilar dyad composition, and their perceptions of collaborative learning and learning outcomes (the first and third research questions). This

analytical technique has been used extensively across social and behavioral sciences, and allows for a straightforward assessment of the relationship between a dependent variable and several quantitative and qualitative independent variables (Neter, Kutner, Nachtsheim, & Wasserman, 1996). In this case, the primary relationship of interest was the effect of individuals' cultural backgrounds and the similarity or dissimilarity of the cultural backgrounds of their partners on perceptions of learning in the CSCL environment. Gender and disciplinary background were included as control variables. These variables were measured and analyzed at the individual level. As the data were clustered in student dyads, the standard errors in the regression models presented have been adjusted for intragroup correlation using robust variance estimation (Rogers, 1993; Williams, 2000).

To address the fourth research question, building upon the regression models described above for predicting their perceptions of collaborative learning and learning outcomes, we examined possible interactions between the key independent variables (students' cultural background and type of group composition, i.e., cultural similarity/dissimilarity of partner) and gender and educational background.

To answer the second research question on the students' reported learning experiences in the CSCL environment, the recordings of the interviews were transcribed and coded using the inductive thematic analytical technique described by Hayes (2000). Atlas.ti was used to organize and analyze transcript data (for a more detailed description of this software, see Friese, 2012). To begin analyzing the interview data, an open coding approach was used to identify shared meaningful themes among interviews. First, all interview transcripts were read carefully to identify meaningful units of the interviewees' responses to all interview questions. Second, those selections of text addressing the same issue were grouped together in analytic categories and given tentative definitions. An instance of a theme usually consisted of a whole paragraph or a sentence. Codes were assigned to a text chunk of any size (usually a single response to an interview question), as long as that chunk represented an issue of relevance. The same unit of text could be included in more than one code. Third, the data were systematically reviewed to refine the coding scheme. The initial coding scheme was reviewed and refined through conversations among authors. The inductive thematic analysis resulted in 86 categories, which were grouped into 10 overarching categories. Afterwards, these 10 categories were classified into 4 key large themes (see Table 3.1 for a full list of themes). We applied Patton's (1990) dual criteria for judging categories in terms of internal homogeneity and external heterogeneity, i.e., data pertaining to a theme must cohere together meaningfully, while the themes should be distinct from each other. Using an iterative process, the 3rd author acted as a second coder, assigning preliminary codes at the level of the 10 umbrella categories to a selection of the transcripts, followed by a final refinement of the coding scheme. Using the final coding scheme,

Table 3.1 Themes and categories identified from the interviews and percentages in each category of mentions of a certain aspect, calculated for each dyad type

Main themes	Theme categories	IC (n=13)	II (n=18)	CC (n=14)	CI (n=13)
1. Exposure to online collaborative learning	1.1. Lack of nonverbal, visual and social context cues (.85)*	①** 92%	④ 44%	③ 57%	② 77%
	1.2. Advantages of text-based communication format (.83)	① 77%	② 72%	④ 43%	③ 54%
	1.3. Important elements and strategies for successful online collaborative learning (.79)	① 92%	③ 61%	④ 29%	② 62%
2. Technical issues	2.1. Technical issues (.84)	① 92%	④ 33%	② 57%	③ 46%
3. Interaction issues between collaboration partners	3.1. Use of specific disciplinary terminology (.73)	① 100%	④ 39%	③ 43%	② 76%
	3.2. Feedback/reaching an agreement (.72)	① 100%	① 100%	④ 36%	③ 54%
	3.3. Perceived disparity in contributions between the partners (.77)	① 46%	④ 17%	③ 29%	② 39%
4. Peer perception: perceived similarities and differences between partners	4.1. Trust in terms of expertise (.83)	① 69%	② 33%	④ 28%	③ 31%
	4.2. Combination of disciplinary backgrounds (.82)	① 92%	③ 67%	④ 57%	② 69%
	4.3. Creation of cultural identity (.79)	① 46%	③ 28%	④ 21%	② 39%

* Cohen's kappa coefficient.

** ①②③④ rank-ordered score, based on the highest percentages of the reported experiences per each coding category (① is the highest rank).

II= culturally similar dyads consisting of two individualistic members.

CC= culturally similar dyads consisting of two collectivistic members.

IC and CI= culturally dissimilar dyads consisting of one individualistic and one collectivistic member.

all transcripts were coded a second time by both coders to ensure the coherence and replicability of the themes. To assess inter-rater reliability, Cohen's kappa was calculated for each of the 10 categories. For each theme, the resulting kappa indicated good or very good agreement between the two coders (see Landis and Koch, 1977), ranging from .72 to .85.

Subsequently, we calculated what percentage of the instances in each coding category referred to a certain aspect of that issue. This was done for each dyad type to examine the relative importance students attributed to these various aspects of CSCL experiences and to examine how these experiences varied across the four types of dyads. To demonstrate these variations we arranged the calculated percentages for each coding category in a rank order (see Table 3.1).

RESULTS

Perceptions of collaborative learning in the CSCL environment

OLS regression was used to examine the extent to which students of individualistic and collectivistic cultures, when paired in culturally similar or dissimilar dyads, differed in their perceptions of collaborative learning in the CSCL environment. Table 3.2 reports results of the descriptive statistics for independent and dependent model variables, and Table 3.3 reports results on the mean perception score by dyad type. Model 1 (see Table 3.4) shows a significant negative relationship between individualist cultural background and perception of collaborative learning in the CSCL environment. Compared to students with a collectivist background, those with an individualist cultural background reported less positive perceptions, scoring 3.09 points lower on average on the So and Brush (2008) perception scale ($p < .05$). Collaborating with a partner of a different cultural background also had a negative effect on overall perception ($\beta = -2.26$), which was marginally significant ($p < .1$). Students' cultural backgrounds and their group composition type (culturally similar/dissimilar) explained approximately 8% of the variation in perception scores (Adjusted $R^2 = .08$).

Table 3.2 Descriptive statistics for independent and dependent model variables

Independent and dependent model variables (N=76)	Percentage or mean	Standard deviation
Perception	27.28	5.59
Grade	2.63	0.86
Individualist culture	56.58%	
Culturally dissimilar dyad composition	40.79%	
Female	51.32%	
Water background	43.42%	

Table 3.3 Mean perception score by dyad type

Dyad type	Mean perception score	Standard deviation
II (n=28)	27.18	4.41
IC (n=15)	24.00	5.07
CC (n=17)	29.41	4.70
CI (n=16)	28.25	7.53

Table 3.4 OLS regression models for factors predicting students' perception of collaborative learning

Independent variables	Model 1	Model 2	Model 3	Model 4
Cultural background				
collectivist (ref)	0	0	0	0
individualist	-3.09 * (1.29)	-3.13 * (1.23)	-3.36 ** (1.18)	-1.40 (1.80)
Group composition				
culturally similar (ref)	0	0	0	0
culturally dissimilar	-2.26 † (1.18)	-2.38 † (1.21)	2.05 (1.53)	-5.03 * (2.06)
Gender				
male (ref)		0	0	--
female		-0.08 (1.22)	2.59 * (1.26)	--
Educational background				
social science (ref)		0	--	0
water		1.62 (1.31)	--	1.59 (2.08)
Female * Cul. dissimilar dyad			-7.80 ** (2.61)	--
Water background * Indiv. culture				-4.36 † (2.29)
Water background * Cul. dissimilar dyad				6.06 * (2.60)
<i>N</i>	76	76	76	76
Adjusted <i>R</i> ²	0.08	0.07	0.17	0.19

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$

Notes: Ref = reference category. Standard errors presented in parentheses.

The interaction between cultural background and group composition type was tested in an ancillary OLS regression analysis but found not to be statistically significant, indicating no significant difference in the impact of group type for individualists, compared to collectivists. However, further OLS analyses using dummy variables to compare the four types of dyad composition revealed that individualists collaborating with collectivists scored significantly lower on perception of collaborative learning than individualists collaborating with other individualists, while collectivists in the two types of pairs were not significantly different from each other.

Students' reported CSCL experiences

In addition to the quantitative analyses describe above, we conducted a qualitative analysis of interview data to help us further uncover students' underlying ideas behind the differences in their perceptions of the collaborative learning experiences found in the questionnaire data. The following four main themes emerged from our interview data: (a) exposure to online collaborative learning, (b) technical issues, (c) interaction issues between collaboration partners, (d) peer-perception: perceived similarities and differences between partners (Table 3.1). Each theme includes several sub-categories. The rank ordering of the calculated percentages to each category revealed that students who worked in culturally dissimilar dyads mentioned more frequently various aspects of their learning experiences than did the students who worked in culturally similar dyads. Particularly, individualists who collaborated in dyads with collectivists more frequently reported positive or negative experiences in all categories compared to the other three dyad types. Students who worked in culturally similar dyads (II and CC) tended to show a comparable frequency of the reported CSCL experiences, based on the calculated percentages of the instances in each coding category (see rank-ordered scores in Table 3.1).

Students' experiences relating to several of the categories played out differently depending on their cultural backgrounds and cultural dyad composition. These differences along with the interview excerpts are described below to summarize the students' reported experiences in the CSCL environment.

While many students felt constrained by the limitations of the CSCL system due to the lack of nonverbal, visual and social context cues, most students from individualist cultures in all types of dyads reported that it was sometimes difficult to get one's messages across successfully and to be sure that a collaborative partner understood without having direct contact with him or her. In contrast to individualists' focus on the messages sent, most students from collectivist cultures tended to talk about a lack of visual cues in the context of their own difficulty understanding their partners' perspectives. They reported that they could not orient themselves to what their partners' thoughts and prepare their responses accordingly:

Chris (male, collectivist, culturally similar dyad)¹: *You have to think something standing on other's shoes so that I can feel what other is saying. So I couldn't see him and I couldn't understand his position. I need to learn my partner of what that I'm talking to, what kind of background he has and I need to learn the way he acts to me, reacts to me, direct, indirect.*

¹ Here, and in all subsequent interview excerpts, the student's alias (giving no obvious indication of a student's country of origin) appears next to the excerpt, his/her gender, I-C cultural orientation, and type of group composition. All interview excerpts are direct quotes. Some of them are grammatically incorrect, since the students were non-native English speakers.

While the difficulty of giving and receiving feedback was an issue common for most students, almost two-thirds of the students from individualist cultures – regardless of the dyad type – reported that differences in opinions between collaborative partners was something that could eventually improve the quality of work, and that easily compromising or agreeing too quickly might reduce the value of the discussion. In contrast, just over half of the students from collectivist cultures across all dyad types reported that strongly opposing opinions or disagreements were counterproductive in collaboration. They saw the major source of disagreements as distinct disciplinary backgrounds and difficulties in convincing or making the collaborative partner understand their point of view:

Debbie (female, collectivist, culturally dissimilar dyad): *But if we see things differently. If we both don't agree on an issue. Then it would mean that you to drag, drag, drag, drag. You might not arrive at a consensus. Only if he is asking it in a very polite way and then, so yeah, so no one is offending anybody.*

Almost one-third of the students from collectivist cultures across dyad types reported that they tried to get their messages across with more care by choosing polite words and phrases so the collaborative partner would feel at ease, not threatened, and comfortable:

Joe (male, collectivist, culturally similar dyad): *By asking direct questions – you might hurt feelings of another person. I think language use was very, very difficult. And you know, this texting, chatting... You know chatting can really mess up people's ways of writing. I felt like she was getting more aggressive when she was responding.*

Students with an individualist cultural orientation found it challenging to express themselves in the CSCL system, they believed that to be understood one needs to be direct and as specific as possible. The following was a typical expression of this:

Jarl (male, individualist, culturally similar dyad): *You have to be able to control the English language and also you really have to put all the information in all these letters so that you type on your screen. What you're trying to say, you really have to be specific and direct.*

Since the two types of complementary expertise were necessary for accomplishing the learning task, most students noticed that a lack of trust in a partner's expertise could be one of the serious barriers to collaboration:

Pittie (female, individualist, culturally similar dyad): *I have to know that the person who is saying something to me has the knowledge and expert experience and that I can rely on the information he is giving there.*

About one-third of students from collectivist cultures from both culturally similar and dissimilar dyads expressed their concerns about learning from a peer. They had some doubts about the trustworthiness of their partners' contributions:

Omar (male, collectivist, culturally similar dyad): *My partner may be wrong, like for example a teacher and a student there is also communication and a teacher is in quite higher level than a student. But the way teacher communicates with the student, I think it's their ability, it's their experience, it is not compared to novices like us.*

Students explicitly talked about their cultural backgrounds (e.g., my culture versus my partner's culture). They often were concerned about a collaborative partner's cultural background (which they could identify based on his/her full name available in the CSCL program). According to more than half of the students from culturally dissimilar groups, culture and the use of the English language as the lingua franca may have influenced the communication dynamic of a dyad.

Maddy (male, collectivist, culturally dissimilar dyad): *I'm from South America and he was Dutch. So we look at things completely different. So sometimes when I was writing something, I know that he translated it into Dutch in his head and then it came out very wrong then. But I couldn't do anything about that.*

While a substantial number of students admitted that dealing with the language and culture issues in a computer-mediated system was very challenging, students from culturally dissimilar dyads were more likely to associate different ways of interaction and dealing with group problems as culture-driven aspects.

Magal (male, collectivist, culturally dissimilar dyad): *He was straightforward and... Yeah. I knew he was not from Africa. If I were him... I wouldn't want to say it in a way that made the person feel uncomfortable. For me I'm like going like around, but he's quite straightforward. So it's just like a bit shocking. Okay, how come he asked me that direct question?*

Sara (female, individualist, culturally dissimilar dyad): *If I were communicating with another Dutch person in Dutch, then it would have gone ten times faster.*

Learning outcomes in the CSCL environment

To examine the relationships between type of group composition, we used OLS regression, predicting students' learning outcomes in the CSCL environment. In Table 3.5, we used OLS regression to predict the final grade assessed for the assignment. Model 1 (see Table 3.5)

Table 3.5 OLS regression predicting learning outcomes

Independent variables	Model 1	Model 2
Cultural background		
Collectivist (ref)	0	0
Individualist	0.53 **	0.52 **
	(0.20)	(0.19)
Group composition		
Culturally similar (ref)	0	0
Culturally dissimilar	-0.01	-0.02
	(0.23)	(0.23)
Gender		
Male (ref)		0
Female		0.12
		(0.19)
Educational background		
Social science (ref)		0
Water		-0.13
		(0.16)
<i>N</i>	76	76
Adjusted <i>R</i> ²	0.07	0.06

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$

Notes: Ref = reference category. Standard errors presented in parentheses.

introduces cultural background and type of group composition, the two key independent variables of interest. Here, individualist cultural background was associated with a .53 point higher grade than collectivist background, on average ($p < .01$). Table 3.6 reports results of the descriptive statistics on mean grade by dyad type. There was no significant relationship between dyad cultural composition and overall grade. Further, the interaction between cultural background and group type was tested in ancillary regression analyses, but was not significant.

Interaction effects of students' gender, educational backgrounds, cultural backgrounds, and group composition on students' perceptions of collaborative learning and learning outcomes in the CSCL environment

OLS regression was utilized to examine the students' cultural backgrounds and types of group composition for interaction effects with gender and educational backgrounds in terms of predicting their perceptions of collaborative learning and learning outcomes in the CSCL environment.

Table 3.6 Mean grade by dyad type

Dyad type	Mean grade	Standard deviation
II ($n=28$)	2.86	.85
IC ($n=15$)	2.87	.99
CC ($n=17$)	2.35	.79
CI ($n=16$)	2.31	.70

Perception of collaborative learning. Model 2 (see Table 3.4) introduces gender and educational background, both of which were nonsignificant. Models 3 and 4 (see Table 3.4) tested all interactions between gender, educational background, cultural background, and type of dyad composition, revealing significant interactions between gender and dyad type and between educational background and both cultural variables.

In Model 3, we present the interaction between gender and dyad type. For women, working in a culturally dissimilar dyad had a much more negative effect on overall perception than did working in this type of group for men ($\beta=-7.80, p<.01$). In contrast to the result for women, men working in culturally dissimilar dyads did not have significantly different perception scores from men working in culturally similar dyads. After adding this interaction term, the adjusted R^2 increased to .17, indicating that approximately 17% of the variation in perception of collaborative learning was explained by taking into account cultural background, type of dyad composition, gender, and the interaction between gender and type of dyad composition (included in Model 3, Table 3.4). Model 4 displays the interactions with educational background. We found a marginally significant interaction between educational and cultural background, indicating that the negative effect of individualist culture on overall perception of the learning experience was stronger for those from a water background than for those from a social science background. Further, the significant interaction between educational background and group type indicated divergent effects on perception of working in a culturally dissimilar dyad, depending on educational background. A negative effect of working in a culturally dissimilar dyad was observed only for those with a social science background. Overall, the independent variables included in Model 4 explain approximately 19% of the variation in perception score (Adjusted $R^2=0.19$).

Learning outcomes. In Model 2 (see Table 3.5), we introduce controls for gender and educational background, which were not found to be significant. As in Table 3.4, all interactions between gender, educational background, cultural background, and type of group composition were tested in ancillary regression analyses. These interactions were not statistically significant at the $p<.05$ level.

DISCUSSION

This study aimed to examine differences between students working in a CSCL environment with a partner who was culturally similar or dissimilar (using Hofstede's I-C cultural orientation), looking specifically at differences in their perceptions of collaborative learning, reported experiences, and learning outcomes in the CSCL environment. Qualitative analysis of in-depth interviews in combination with the quantitative questionnaire data helped reveal underlying links between socio-cultural factors and learning processes in the CSCL environment. The results showed that collaborating with a partner of a different cultural background had a negative effect on overall perception of the online collaborative learning experience. The students with an individualist cultural background also had a significantly less-positive perception of collaborative learning and achieved better learning outcomes than the students with a collectivist background. Working in a culturally dissimilar dyad had a much more negative effect on women's overall perceptions of collaborative learning in the CSCL environment than did working in this type of group for men. All of the main research findings will now be discussed in turn.

Differences in students' perceptions of collaborative learning

Findings related to the first research question suggest that individualists perceived their online collaborative learning experience less positively than did the collectivists. In addition, individualists collaborating with collectivists had significantly less-positive perceptions of collaborative learning than individualists collaborating with other individualists, while collectivists in the two types of dyads were not significantly different from each other. These findings are consistent with prior research studies (Chan & Watkins, 1994; Phuong-Mai, Terlouw, & Pilot, 2006; Zhong, Liu, & Lim, 2008) in terms of the effects of I-C cultural orientation on students' perceptions in online collaborative learning. Students with a collectivistic cultural orientation seem to prefer working in groups and feel they perform better in groups, and they tend to share more knowledge and exhibit less conflict-oriented behavior (Phuong-Mai et al., 2006). The student interviews backed up these explanations. It is more likely that in culturally dissimilar dyads, culture-related differences may eventually create uncertainty in predicting others' feedback and an uneasy atmosphere for socializing and building working relationships between partners, which in turn, may prevent them from active participation and lead to less-positive perceptions of collaborative learning.

Differences in the students' reported learning experiences

Addressing the second research question on differences in the students' reported learning experiences in the CSCL environment, interview analyses provided a further understanding of the issues that could not be captured solely through the questionnaire. All of the main research findings based on the interview data will now be discussed in turn.

Lack of nonverbal, visual, and social context cues in the CSCL environment

One of the most interesting findings was that all members of both culturally similar and dissimilar dyads complained about the absence of nonverbal, visual, and social context cues in the CSCL environment. There were, however, major differences between students from collectivist and individualist cultural backgrounds in the issues they mentioned regarding the lack of these various cues, and the impact of these issues. A substantial number of students from collectivist cultures noted that the lack of tone of voice and facial expressions in text-based communication made it harder for them to interpret the partner's intent. Without knowing the partner's intent, they found it very problematic to make inferences and respond back in an appropriate way. By contrast, most of the students from individualist cultures talked about how text-based communication created an uncertainty about whether what they posted was understood correctly. For this reason, they often had to ask clarifying questions and repeat the main point in other words, to make sure that they were understood correctly. This finding corroborates studies by Salas et al. (2004), and Gudykunst et al. (1996), which suggested that individualistic cultures prioritize clarity in conversation, tend to use low-context, direct and explicit messages, and focus on the task-related information, while collectivists are more likely to use high-context, indirect and implicit messages, and to emphasize contextual information to interpret others' communication. In face-to-face communication, there are multiple channels for communication, such as direct feedback, nonverbal cues, and other audio/ visual senses, that are important for communication. But in a computer-mediated situation, culturally diverse students reacted differently to the absence of these cues. Particularly, individualists were primarily concerned with feedback from their partner to make sure that the sent message was construed as intended, while collectivists lacked contextual information to interpret their partner's message.

Advantages of text-based communication format

Our data also showed that despite the fact that all students concurred that text messages are limited in expression and prone to misunderstandings, they believed that written communication makes thinking visible and provides time to reflect on what was already posted

by both parties. Students from collectivist cultures characterized the computer medium as a safe environment where one can freely express opinions without directly confronting another person involved in a dialogue. Individualists preferred online communication because it gives an opportunity, especially in the initial stage, to convey one's ideas without being interrupted or judged prematurely. Indeed, text-based communication is generally parallel rather than serial, i.e., 'I listen while you talk, then I read.' This finding is consistent with Massey, Hung, Montoya-Weiss, & Ramesh's (2001) findings, which showed that collectivists are more prone to use an asynchronous format (as it gives time to compose messages and they prefer indirect communication), whereas individualists tend to communicate through synchronous media (as they prefer direct requests and prompt reciprocal discussions as the best way to accomplish goals).

Peer perception and perceived equal participation in a dyad

Our analyses also showed that perception of the CSCL experience was dependent on the working relationships and group dynamics between collaborators. Perceptions of the learning experience can vary widely among culturally distinct individuals exposed to the same collaborative situation. For instance, one person might perceive a straightforward collaborative partner as aggressive and rude, while another would perceive the same partner as efficient and honest. The results of this study indicate that students from collectivist cultures are likely to attribute overall perceived satisfaction with the study to positive or negative impressions about their collaborative partners, whereas most students from individualistic cultures based satisfaction with their collaborative work on the perceived equal participation and degree of involvement of both partners. These findings suggest that individuals from collectivistic cultures tend to be more concerned with social relationships in a group process than the task, and by contrast, individualists emphasize the importance of working on a task over relationship building. Also, equal participation and productivity are expected to be of more importance for individualists compared to collectivists. Furthermore, collectivists are more likely to overrate their collaborative peers "due to situational attributions explaining any perceived unpleasant performance" (Vatrapu & Suthers, 2007, p. 269; see also Gomez, Kirkman & Shapiro, 2000), while individualists are often dissatisfied with collaborative tasks requiring a great deal of effort and interdependency among group members (Lam, 1997).

Students' beliefs about important elements and strategies for successful collaborative learning

All of the students in this study found it challenging to collaborate with an unfamiliar group member and to use text-based communication as the only means to interact with each other. However, we observed various strategies that students suggested to overcome these challenges in the culturally diverse dyads. More specifically, in order to reach out and communicate successfully under these conditions (i.e., limitations of the medium and lack of familiarity between group members), individualists emphasized the importance of being direct and specific and of communicating exactly what is meant in an explicit manner. In addition, individualists believed that a better group performance could be achieved by directly exploring their partners' experience and task-related knowledge. In contrast, collectivists believed that maintaining a positive relationship between group members is essential and online messages should be written with care to ensure that nobody is inadvertently offended. Moreover, in addition to acquiring knowledge about their partners' backgrounds relevant to the task, collectivists would also like to know something about their partners' personal backgrounds (e.g., hobbies, interests, character, etc.) to develop a better impression of them, which may help the collectivists' adapt their communication to their partners' individual traits. These factors may explain the anxiety and uncertainty developed between partners who worked in culturally dissimilar dyads. Particularly, students from individualist cultures might have unintentionally hurt the feelings of their collaborative partners because they rushed into taking actions to solve the task and did not take time to learn more about their partners. On the other hand, collectivists were concerned with maintaining the group relationships and trying to avoid conflict situations.

Differences in the learning outcomes

The results of this study show that students with an individualist cultural background achieved better learning outcomes than students with a collectivist background regardless of group composition. According to Phuong-Mai et al. (2006) and Weinberger et al. (2007) collaborative online learning tasks that focus on conflict-oriented behavior between equal students may not be appropriate for collectivistic cultures. As the learning task in this study required a high level of collaboration between two people with different fields of expertise, it was likely to induce a clash of opinions or viewpoints. Individuals from individualistic cultures value uniqueness and creativity and see group work as a place of confrontation and the exchange of diverse ideas in a search for solutions. By contrast, collectivists are more likely to avoid confrontations and to prefer working with someone who shares similar interests or opinions. This finding

is supported by the interview data. Specifically, students from collectivistic cultures reported that they could have been more effective and had fewer misunderstandings if they had more in common with their partners. This sentiment is captured by one of the students who said, “Look, of course, people have different opinions. If I can choose, I choose for someone who has the same attitude to, you know, something like each other.” By contrast, individualists said that by bringing together two complementary disciplines they were able to gain new insights by looking at the problem from different perspectives: “I think the most positive part was that we both had different backgrounds and you’re not as much overlapped with knowledge and the discussion is broad. I think that’s the most positive”.

Interaction effects between gender and group type on students’ perceptions of collaborative learning

Another important finding was that women working in culturally dissimilar dyads had a much more negative overall perception of the CSCL experience than did the men who also worked in this type of group. By contrast, men, regardless of a group type (culturally similar or dissimilar), reported similar perceptions of the CSCL experience. According to Tsaw, Murphy, and Detgen (2011) women are more relational than men, regardless of cultural values. The women may have reacted more sensitively to the challenges posed by culture-related differences in online collaborative learning than did the men. From the interview data, almost 60% of those who indicated that they were concerned about a distinct collaborative partner’s cultural background were women. Although there is a large and growing body of literature that investigated gender-related differences in language use and communication behavior, more research needs to be undertaken before the association between individual characteristics such as gender and culture is clearly understood in the context of CSCL.

LIMITATIONS OF THE STUDY

One of the limitations of this study is that it applied a single I-C cultural orientation to determine cultural composition of the CSCL learner dyads. Although a student coming from a collectivistic country is more likely to hold collectivistic values and norms, he/she may exhibit certain individualistic behavioral patterns due to his/her prior learning or travel experiences. Further, it might be possible that only the more individualist persons from these countries choose to study abroad in the Netherlands. Thus, the differences between the two cultural groups might not be as big as suggested by Hofstede’s cultural framework. Generalizations about collectivist populations based on a sample consisting of international students should

be interpreted with caution, as the findings might not be completely transferable to their counterparts residing in their “native” cultures. Also, it can be argued that the similarity between international students based on Hofstede’s I-C orientation (for example between some Asian and South American students) could be relatively small compared to large differences among their cultures on other dimensions. Therefore, in future studies the findings should be verified with a larger sample as well as investigated with application of other cultural dimensions (e.g., analytic/holistic reasoning, see Choi & Nisbett, 2000; high-low context, see Hall & Hall, 1990). Accounting for all cultural factors is very desirable, but it was not feasible within the scope of this study.

A second limitation concerns the impact of unbalanced diversity in the current study. This problem was described by Vijver and Leung (1997), who stated “cross-cultural studies often involve highly dissimilar groups. Consequently, groups can differ in many background characteristics, only some of which are relevant to the topic studied” (p. 32). Further, there are studies on the prevalence of personal features over ethnic characteristics in influencing the efficiency of intercultural collaboration (Ting-Toomey, Oetzel, & Yee-Jung, 2001). Although it has been argued by a number of scholars that cultural differences are not always reducible to individual differences (see Na, Grossmann, Varnum, Kitayama, Gonzalez, and Nisbett, 2010 for a review).

Third, the current investigation was limited by the time period allocated to collaborate and perform the task. Students were recruited to work in an assigned dyad for a single session (about four hours); future studies with application of longitudinal design and an implementation of an authentic learning environment might give new insights into influences of social-cultural factors on the learning processes and the learning outcomes of culturally diverse groups in CSCL.

Fourth, the sample included for the final analyses in this study was not fully representative of all study participants. The number of participants in the phase of data collection after the actual study decreased to two-thirds ($n=78$) of its starting size ($n=120$) for the questionnaire data and one half ($n=58$) for the interview data due to inability of the data collector to interview all students and failure to make contact with some sample units. Therefore, the loss of part of the sample may impact the validity of the study.

CONCLUSIONS AND IMPLICATIONS

The introduction of computer-supported collaborative learning, specifically in an intercultural learning environment, creates both challenges and potential benefits for students. Likely challenges arise in terms of coordinating different perceptions, reasoning, and communication

styles of students from different cultures, while key benefits involve sharing culturally diverse knowledge and preparing students for working effectively in culturally heterogeneous dyads. In this context, it is important for educators to have access to learning environments that accentuate the positive aspects of such collaborative learning and reduce the potentially negative aspects. This study has provided valuable insight into our understanding of differences in the ways culturally similar and dissimilar student dyads proceed in collaborative discourse in the CSCL environment.

Educators and instructional designers can utilize these findings to inform the design and implementation of learning environments that will be responsive to the intercultural context of collaborative learning. Paying attention to cultural differences can help educators further improve learning experiences in multicultural settings. Particularly, the results of this study indicate that Hofstede's I-C cultural orientations may give some indications of what student reactions can be expected given their cultural backgrounds. A student's perception of a certain collaborative situation or partner can be a good predictor of his/her level of engagement in collaborative activities and use of a technology. In this regard, collaborative systems should tailor interventions to facilitate students' interaction processes in order to achieve the potential rewards of collaborative learning. Such facilitations can be realized by the students themselves, the educators/educational designer, or even with the application of machine-learning techniques, which can automatically identify and prevent problems that might occur in a conversation between students with different cultural backgrounds. For example, the design of collaborative systems should offer an opportunity for students to choose the level of synchronicity for the communication medium. Having online students regulate themselves in the extent of anonymity in collaboration might also facilitate student participation in the online environment. Fostering activities for social interaction (e.g., informal meeting or exchange of personal profiles) in the early stage of online collaboration may improve active collaboration of the students, especially those from collectivist cultures. Adding nonverbal content in the CSCL system (e.g., a real time video connection) may improve the effectiveness of information exchange in culturally diverse groups. Increasing the collaborators' awareness of the existing differences in communication styles between them can be done either by using special features of CSCL tools (e.g., adaptive scripting developed by Gweon, Rosé, Zaiss, & Carey, 2006) or by providing prior examples or case transcripts indicating specific cultural differences (Kim & Bonk, 2002). The present study also provides some insights into designing external collaboration scripts for the CSCL environments, paying specific attention to students' cultural background. These scripts can be viewed in terms of instructional design as a specified sequence of events that students are asked to follow during a training session (Kollar, Fischer, & Hesse, 2006). Thus, such collaboration scripts can help

collaborating students overcome differences and minimize the amount of effort required to coordinate their learning activity. Taken as a whole, the findings of this study will enable researchers and educators to construct collaborative learning environments where cultural differences will, at the very least, be accommodated and perhaps even leveraged effectively to promote learning.



Chapter 4

Facilitation of computer-supported collaborative learning in mixed- versus same-culture dyads: Does a general collaboration script help?*

*This chapter is based on:

Popov, V., Biemans, H. J. A., Brinkman, D., Kuznetsov, A., & Mulder, M. (in press). Facilitation of Computer-Supported Collaborative Learning in Mixed- versus Same-Culture Dyads: Does a Collaboration Script Help?. *The Internet and Higher Education*. doi: 10.1016/j.iheduc.2013.08.002.

ABSTRACT

To foster collaboration and improve the quality of students' discussions in mixed- and same-culture learner groups engaged in computer-supported collaborative learning (CSCL), a collaboration script was introduced. A 2×2-factorial design was used to examine the effects of using this collaboration script on students' online collaborative behavior and the quality of their discussions. A total of 130 university students worked in dyads on a topic concerned with intercultural communication. Culturally mixed dyads working with the script showed a higher frequency of Seeking input and Social interaction activities than culturally mixed dyads not working with the script. Same-culture dyads working with the script showed a lower frequency of Planning activity than same-culture dyads not working with the script. Independent of script condition, the same-culture dyads showed a higher quality of online discussion than the mixed-culture dyads. Collaboration in culturally mixed groups is less than optimal and may therefore require extra facilitation.

INTRODUCTION

Today's information and communication technologies make it possible for schools to: (a) prepare learners for participation in a networked, virtualized society (Belz, 2003; O'Dowd, 2003); (b) form learning communities regardless of physical and temporal barriers (Rovai, 2002); and (c) stimulate both cognitive and social development via, for example, online discussions of cases (Weinberger, Ertl, Fischer, & Mandl, 2005), reflection on social behavior in groups with the help of computer tools (Phielix, Prins, Kirschner, Erkens, & Jaspers, 2011), or web-inquiry online learning (Kollar, Fischer, & Slotta, 2007). Over the past two decades, experimentation with internet usage in education and the adoption of learning management systems have provided insight into the use of online discussion forums to encourage collaborative learning among students (Nandi, Hamilton, Chang, & Balbo, 2012; Warschauer, 1997). In particular the research on computer-supported collaborative learning (CSCL), positive effects of online collaboration on student learning have been widely documented (see Lehtinen (2003) for a review). In CSCL, the collaboration of two or more learners to solve a problem is supported with not only computer technology (Prinsen, Volman, & Terwel, 2007) but also the provision of an environment that promotes collaboration between students and thereby learning processes (Kreijns, Kirschner, & Jochems, 2003).

In multicultural settings, however, the introduction of CSCL has been found to bring not only benefits but also major challenges. Students can differ on how they view a collaborative task and their compliance with task requirements, for example. Such matters depend upon, among other things, the students' procedural knowledge (i.e., experiences, feelings, information, strategies, and knowledge related to the activities) (Fischer, Kollar, Stegmann, & Wecker, 2013; Kollar, Fischer, & Hesse, 2006; Rummel & Spada, 2005). Group dynamics can also be affected by the composition of the group, the size of the group, the collaborative media being used, and the specific learning task (Dillenbourg, 1999). The cultural composition of the collaborative learning group has been shown to play a critical role in the functioning and success of the group (Cox, Lobel, & McLeod, 1991; Liang & McQueen, 2000; Lim & Liu, 2006). Same-culture groups share similar socio-behavioral norms, communication styles, and perceptions of the learning environment — which are all likely to encourage the building of effective in-group relationships, social bonds, and efficient communication processes while minimizing anxiety, disagreement, and conflicts (Byrne, Griffitt, & Stefaniak, 1967; Lim & Liu, 2006). In contrast, mixed-culture groups often suffer from process losses in terms of misunderstandings and coordination difficulties when working on tasks together (Anderson & Hiltz, 2001; Weinberger, Clark, Hakkinen, Tamura, & Fischer, 2007). Other factors such as insufficient turn-taking, inadequate time management, little or no distribution of subtasks, reduced social presence, lack

of nonverbal cues, and limited insight into other social cues can then become major stumbling blocks, particularly when the students do not know each other and collaborate for the first time together (Chen, Hsu, & Caropreso, 2006; Kim & Bonk, 2002; Uzuner, 2009). In other words, learners working in multicultural groups may not overcome the challenges of CSCL to achieve the potential rewards of such collaboration without additional facilitation.

The use of various kinds of scripts has been found to be very valuable in recent CSCL research (see Fischer et al., 2013 for an overview; Kollar et al., 2006; Weinberger et al., 2005). Scripts have been used to “promote productive interactions by designing the environment such that suggestions of different degrees of coercion are made to the collaborating students, engaging them in specific activities that otherwise might not occur” (Weinberger, 2011 p. 190). And while recent research has shown collaboration scripts to effectively support online collaboration, we have little insight into the functioning of such scripts for same- versus mixed-culture groups. In the present study, we therefore explored the effects of a designed collaboration script when used by same- versus mixed-culture collaborative learning dyads.

Theoretical background

Culture and online collaborative learning

We investigated collaborative learning from a social constructivist perspective in which the importance of the backgrounds and cultures of learners are recognized as factors that can influence the manner in which they learn and acquire knowledge (Vygotsky, 1978; Wertsch, 1998; Zhu, 2009). We adopted Hofstede’s definition of culture, namely: “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” (1980, p. 25). And within the context of online collaborative learning, we took culture to be one of the factors that shapes students’ perceptions of the collaborative process, communication, and behavior in the group (Cox et al., 1991; Shi, Frederiksen, & Muis, 2013).

Three primary areas of research on the relationship between the cultural backgrounds of students and their learning within online collaborative learning environments can be distinguished: (1) studies of cultural differences in *perceptions* of online group processes (e.g., Anakwe & Christensen, 1999; Thompson & Ku, 2005); (2) studies of how the linguistic and cultural backgrounds of collaborative partners affect their *actions*, *behaviors*, and *engagement* in the online collaborative environment (e.g., Kim & Bonk, 2002; Lim & Liu, 2006; Oetzel, 2001); and (3) studies of the differences in the *motivation* of students to work within an online collaborative learning environment (Wang, 2007).

Cultural differences can be both beneficial and disruptive for “intra-group dynamics” (Halverson & Tirmizi, 2008, p. 12). Key benefits involve the sharing of culturally diverse knowledge and the preparation of students for working in culturally heterogeneous groups. Likely challenges are the coordination of different, culture-specific perceptions and communicative behaviors.

Students from different cultures can display different patterns of behavior in their online collaborative interactions. When Kim and Bonk (2002) investigated American, Finnish, and Korean students conducting asynchronous web-based conferences, they found American and Finnish students to show more *task-oriented behavior* than Korean students while the Korean students showed more *relationship-oriented behavior* than American and Finnish students. Similarly, Setlock, Fussell, and Neuwirth (2004) found differences in the communication strategies employed by Asians (i.e., individuals from India and East Asia) versus Westerners (i.e., individuals from North America) in terms of argumentation, Westerners tended to focus on *mostly points of disagreement* while Asians tended to discuss each point regardless of whether there was disagreement on the point or not.

In other research, Wresch, Arbaugh, and Rebstock (2005) examined the patterns of participation in a discussion by American and Germany university students collaborating together in an interactive online learning environment. The German students showed lower levels of participation relative to the American students, and the *differences in participation* could be traced to differences in the *perceptions* and *expectations* of the students with regard to the international online course. These results were explained by the authors as “in the U.S., teachers seem to be more involved in the learning process, continually steering the learning efforts of the students, so continual interaction between students and faculty is the norm. For the German students, regular interaction is the exception, so while their participation in the online class was often spotty or even non-existent, it was consistent with their usual learning behaviors”. In later research, Tapanes, Smith, and White (2009) showed differences in student perceptions of an online course at two American universities to reflect the individualist versus collectivist cultural orientations of the students: students with a collectivist cultural background were less motivated to participate in an asynchronous learning network (i.e., networks for anytime and anywhere learning via computer communications technologies, Hiltz & Goldman, 2005) than students with an individualist cultural background. The Individualist - Collectivist cultural orientation as put forth by Hofstede (1991) has been widely used to describe what appear to be culturally-based differences in collaborative group processes including online learning environments (e.g., Cox et al., 1991; Goncale & Staw 2006; Oetzel, 2001).

In a number of studies, the following *aspects of communication* have been reported to pose problems for culturally diverse students collaborating online: (1) inability to understand specific

cultural references in online discussions; (2) reliance on non-linguistic cues; (3) difficulties in expressing disagreement; (4) communicative constraints resulting in fewer intellectual postings; and (5) communication patterns that are short and content driven as opposed to long and relationship/emotion driven (see Uzuner, 2009 for a review).

Earlier studies of the quality of collaborative learning have focused on the individual learning results or final group products and therefore often overlooked the fact that the collaborative learning outcome is mediated by the quality of the group discussions (Garrison et al., 2001; Lim & Liu, 2006). Assessment of the *quality of online discussions* is thus crucial for the successful use of technological learning environments (Hawkes & Dennis, 2003) and the following themes have been identified along the way: *content* in terms of clarification, justification, elaboration, and application of theories and information related to the subject matter or discipline area; *participation* in terms of consistency and frequency of students' involvement; and *interaction* in terms of whether online contributions are made in substantive communication? (e.g., Henri, 1992; Nandi, Chang, & Balbo, 2009). In addition to these themes, cultural factors have been shown to play a role in what individual students and groups of students share, expand, deepen, and gain from a collaborative process (e.g., Kim & Bonk, 2006; Zhao & McDougall, 2008; Zhu, 2009). Nevertheless, many social and cultural factors have yet to be taken into account in the study of online collaborative learning (Cox et al., 1991; Vatrappu & Suthers, 2010; Weinberger et al., 2007). And there is very little research which empirically examines the quality of the online discussion between students from different cultures (exceptions are Shi et al., 2013; Vatrappu, 2008; Zhu, Valcke, Schellens, & Li, 2009).

Although CSCL offers students opportunities to connect across time and distance, its successful use can be hard to achieve because an online environment on its own cannot solve the challenges of online collaboration and learning. Critical factors are just how the collaborative technology is implemented and what instructional approaches are used to support the online collaboration. In the case of cross-cultural collaboration, educators must provide support for more culturally diverse students than is usually the case in the classroom and thereby overcome the extra layer of complexity created by cross-cultural differences.

Use of collaboration scripts to support online collaboration

Several instructional approaches have been developed over the past twenty years to support peer interaction within a CSCL environment (e.g., Dillenbourg & Jermann, 2007; Jeong & Juong, 2007; Kollar, Fischer, & Slotta, 2007; Rummel & Spada, 2005). Once again, however, only a few efforts have been made to facilitate the interaction between culturally diverse students via computer-mediated communication (CMC). The focus of these studies has been

largely on the following, moreover: intercultural foreign language education (Thorne, 2006), raising intercultural awareness (Elola & Oskoz, 2009), and using e-tools to promote cultural diversity in brainstorming and the consideration of alternative perspectives (Wang & Fussell, 2010). Knowledge is still lacking of what instructional support is needed to help culturally diverse learners benefit maximally from the sharing of experiences and the co-construction of knowledge within a CSCL environment.

What we do know is that the use of collaboration scripts can facilitate CSCL (see Fischer et al., 2013, for an overview; Kollar et al., 2006; Weinberger et al., 2005). Collaboration scripts provide a scaffolding technique that can be used to guide students with regard to what to do during a learning task, the roles to be played, and the sequence of activities (Carmien, Kollar, Fischer, & Fischer). The use of a collaborative script can stimulate the type of interaction that is known to benefit collaborative task performance (Kolodner, 2007). And a collaborative script can be communicated either directly via explicit instruction (e.g., oral presentation by the teacher, distribution of handouts) or indirectly via embedding in the learning environment (e.g., graphic representations, textual cues, hints, prompts). It is possible, for example, that students are required to prioritize the potential solutions identified for a problem but do not know how to do this; a collaborative script may provide them with a suitable strategy or guide them to this (Rummel & Spada, 2005). With regard to the collaboration between the students itself, a collaborative script can scaffold the interaction by providing cues but also prompting students to adopt different roles at times — for example serve as the presenter on one occasion but the reviewer on another (see, for an overview, Weinberger et al., 2005).

Collaborative learning in same-culture learner groups can be expected to be easier than in mixed-culture groups as there are fewer chances of misunderstandings due to shared values, norms, and customs in same-culture groups. However, the anonymity, reduced social presence, and absence of many nonverbal and social context cues within a CSCL environment can hinder mutual understanding, the exchange of information, and — in the end — successful performance (Jarvenpaa & Leidner, 1998). A collaboration script to help students get “on the same page,” agree on a particular course of action, and reach a shared understanding might be welcome during both same- and mixed-culture collaborative activities.

Back in 2001, Curtis and Lawson developed a coding scheme to analyze behaviors of students associated with collaborative learning activities. Curtis and Lawson (2001) coding scheme was developed to describe collaboration among participants in an asynchronous discussion forum offered through the Blackboard learning system (the Discussion Board of the Blackboard was used in the present study as well). This coding scheme was previously used to analyze the online collaborative behaviors of students in cross-cultural research (e.g., Kim & Bonk, 2002; Swigger, Hoyt, Serçe, Victor, & Alpaslan, 2012). The coding scheme

subsumes five categories of behavior previously identified by Johnson and Johnson (1996) as prerequisites for successful face-to-face collaborative learning: planning (organizing work), contributing (explaining positions and sharing knowledge), seeking input (urging others to contribute), reflection on medium and monitoring of group processes and achievements (comments about technological media or about the group's processes), and social interaction (off-task discussions or comments for socializing). Each of the five categories indicates a specific collaborative behavior (i.e., social, cognitive, or coordinating behaviors) and all of the categories are necessary for successful online group collaboration (Kim & Bonk, 2002). The literature search revealed that the coding scheme of Curtis and Lawson (2001) has been well-cited and has been shown to provide valid and useful insights into online collaborative learning. Different scholars operationalized various elements as constituting online collaborative learning. The five main behavioral categories and their respective subcategories identified by Curtis and Lawson (2001) largely covers the key types of collaborative interaction, such as interaction with peers, with resources and, in an online environment, with an interface.

The present study

The present study was undertaken to gain insight into the facilitative effects of using a collaboration script for same- versus mixed-culture dyads working in a CSCL environment. A collaboration script was developed on the basis of the coding scheme of Curtis and Lawson (2001). Same- versus mixed-culture dyads were randomly assigned to one of two conditions (i.e., a condition with versus without use of the collaboration script). And the dyads were asked to jointly discuss materials concerned with intercultural communication. The quality of their CSCL was then evaluated in terms of online collaborative behaviors and quality of the group discussion. We answered the following two research questions in doing this:

1. RQ1 Do group composition (same- versus mixed-culture dyads) and the use of a specially designed collaboration script (with vs. without) affect students' online collaborative behavior in a computer-supported collaborative learning environment?
2. RQ2 Do group composition (same- versus mixed-culture dyads) and the use of a specially designed collaboration script (with vs. without) affect the quality of the students' discussions in a computer-supported collaborative learning environment?

METHOD

Participants

Participants were 130 students enrolled in various Master's programs at a university in the Netherlands in the study years 2009-2010 and 2010-2011. There were 81 Dutch and 49 international students; 53% of the students were women. Of the international students, 19 were from Europe (i.e., outside the Netherlands), 5 from Africa, 19 from Asia, 2 from South America, and 4 from North America. A total of 27 countries was represented in the study. The age of the respondents ranged from 20 to 43 years, with a mean of 24 years ($SD=2.9$); 96.9% of the students were under 30. Before participating in the study, the international students had been living in the Netherlands for an average of 8 to 12 months. All of the students — regardless of cultural background — had at least some short-term travel experience, which could include internships, travel outside the home country for other academic purposes (e.g., study visits, work). All of the study participants had previously demonstrated their English language proficiency to enroll at the university where the students also interacted with the study personnel and each other in English.

Study design

A 2 x 2-factorial research design was used. The Collaboration Script (with vs. without) and Group Composition (same- vs. mixed-culture) were independent variables. The dependent variables were the students' online collaborative behavior and the quality of their online discussions. The cultural backgrounds of the students were first determined by asking them to indicate their country of origin during the introductory university seminar. The students were then randomly assigned to a same- or mixed-culture dyad based on their cultural backgrounds. Every dyad was formed from either two students coming from the same country (in this case students from the Netherlands) or students coming from two different countries (in this case one Dutch and one international student; only 12 dyads consisted of both international students). This resulted in 29 same-culture (Dutch only) and 36 mixed-culture dyads. The students in each dyad did not know each other beforehand.

Next the dyads were randomly assigned to one of the Collaboration Script conditions. In doing this, we checked to see that each condition had about the same number of same- versus mixed culture dyads. An overview of the composition of the groups is presented in Table 4.1.

Table 4.1 Design of the empirical study

	Group composition	
	Same-culture (Dutch only)	Mixed- culture
Collaboration script		
with	N=15 dyads	N=17 dyads*
without	N=14 dyads	N=19 dyads**

* Mixed-culture with the collaboration script: 12 dyads with one Dutch and one international student, and 5 dyads with both international students.

** Mixed-culture without the collaboration script: 11 dyads with one Dutch and one international student, and 8 dyads with both international students.

Discussion assignment and CSCL procedure

The assignment used in this study was part of an ongoing Intercultural Communication Skills (ICS) course. The aim of the course was to introduce the fundamental principles and issues of intercultural communication. Students participated in the present study as part of the regular study program, which meant that they had all the prerequisite knowledge and skills needed to undertake the learning task.

The task presented to the participants was to conduct an online discussion of the following proposition: “Nowadays, multicultural and globally dispersed teams are becoming the norm in both academic life and the business world. Multicultural teams are always more creative and effective than mono-cultural teams.” The proposition was intentionally left open to interpretation in order to call for clarification prompt discussion.

To conduct the task and fulfill their assignment, the students were asked to analyze and discuss the proposition via the exchange of online messages with their partner in the dyad. This was done in a threaded discussion on the Discussion Board of the university’s Blackboard. The students were told that they had four weeks to complete the assignment; that they needed to be as responsive as possible within this time frame; that their contributions to the online discussion would be assessed; and that this assessment would contribute to whether they passed or failed the course.

Upon completion of the task, the students were expected to be able to: (a) expand their exploration and understanding of the topic; (b) apply the knowledge acquired of intercultural communication theories; and (c) actively participate in an online working group.

The CSCL procedure consisted of two stages. In the first stage, all of the students followed an introductory session in which the collaborative learning task was explained and

the Discussion Board within the Blackboard learning environment was introduced. In the collaboration script condition, the paper-based collaboration script was also introduced (see Table 4.2). The instructions for the discussion of the proposition presented to the students were as follows: (a) all of the students were strongly encouraged to use any available sources of relevant information including the internet, posters, videos, and specialized journals in their discussions; (b) all of the students were asked to look at information from alternative points of view in order to consider and possibly develop alternative perspectives on the problem at hand; (c) all of the students were required to act according to an assumed role (i.e., “in favor” or “against” the proposition presented to them). This was done in order to stimulate discussion and avoid simple agreement with the proposition. The roles assumed by the students did not necessarily coincide with their personal opinions; (d) after assignment of the discussion task, all of the students were instructed to use only the online Discussion Board for discussion of the proposition and to avoid any face-to-face discussion. This was done to ensure the purity of the intervention and the validity of the CSCL experiment. Following the introduction of the task, the students were also asked to complete a questionnaire; this asked for demographic background information and information on some other control variables (e.g., age, gender, computer skills, prior online collaboration experiences).

In the second stage of the CSCL procedure, the researchers formed dyads of students in such a manner that two groups of students and thus the conditions required for the research design were created (see Table 4.1). Students were then expected to post online messages on an asynchronous electronic platform via the Discussion Board of Blackboard. Upon completion of the assignment, use of the collaboration script was checked via administration of a short questionnaire; all students in the experimental condition reported trying to use the collaborative script as much as possible.

Online learning environment

The Blackboard Discussion Board allows users to communicate with each other via the posting of online messages in an asynchronous electronic format. All of the conversations/discussions on Discussion Board are saved and recorded chronologically (see Figure 4.1). When a conversation/discussion is initiated, it is organized as a “thread,” which includes the main posting and all related replies. Each dyad has its own electronic space for discussion. The students could access their unique virtual discussion space in the Discussion Board, entering a password, reading posts from their partners, and posting replies.

Table 4.2 External collaboration script

Steps of collaboration process	Substeps of collaboration process	Examples of communication strategies
<p>Planning</p> <p><i>Establishing group:</i> encouraging group collaboration and cohesiveness. If you wish to establish a good working relationship with your collaborative partner.</p> <p><i>Organizing work:</i> creating shared tasks and deadlines. If you wish to make suggestions to organize group work.</p> <p><i>Initiating activities:</i> scheduling activities to discuss progress and organization of group work. If you wish to initiate activities regarding the task.</p>		<p><i>I know, you must be under a lot of stress due to work load. I'll do my best to help.</i></p> <p><i>Due to time constraints, I would like to set a timeline for our collaboration... I think it might be good idea to start with...</i></p> <p><i>It seems to me that we could present our positions first and then respond to each other's ideas. ... I suppose we could do a literature search first.</i></p>
<p>Contributing</p> <p><i>Help giving:</i> responding to questions and requests from others. If you wish to respond to requests or help your collaborative partner understand the assignment or technical issues.</p> <p><i>Feedback giving:</i> reflecting on partner's contributions and providing feedback on partner's proposals. If you wish to give feedback, agree with his/her contributions or state that you have a different perspective</p> <p><i>Exchanging resources:</i> sharing of resources and information to assist each other in a collaborative group. If you wish to exchange some information, articles, videos, books.</p> <p><i>Sharing knowledge:</i> sharing existing knowledge and information. If you wish to share some knowledge with a collaborative group member.</p>		<p><i>Yes, we can use any available sources of information including internet, scientific papers, videos. If you want to create a new thread in the Discussion Board, you need to ...</i></p> <p><i>Well, you have a point there, but... I see what you mean, but... I'm afraid I can't agree with you on that, because...</i></p> <p><i>Could you please provide more information about...? The information provided in this article supports my point, because it explains... Could you please help me find the source that you posted? Both theory and experience show... Data prove... Based on the article...</i></p> <p><i>To support my idea, I would like to refer to... The key problem with this explanation is that... A possible explanation for some of these results may be...</i></p>

<p><i>Explaining or elaborating:</i> supporting one's position. If you want to extend your opinion/argument or emphasize your point of view.</p> <p><i>Challenge:</i> challenging the contributions of collaborative partner(s) and seeking to engage in debate. If you wish to provide a critical assessment of a contribution or object to a statement.</p>	<p><i>This is not convincing, because.... I find it hard to believe... I doubt if it is possible...</i></p> <p><i>One of the limitations with this explanation is that it does not explain why... However, such explanations tend to overlook the fact that...</i></p>
<p>Seeking Input</p> <p><i>Feedback seeking:</i> seeking feedback to a position advanced. If you wish to receive feedback or ask questions in order to clarify or specify something.</p> <p><i>Advocating efforts:</i> urging a collaborative partner to contribute to the group effort. If you wish to ask/urge your collaborative partner to contribute to a group discussion.</p> <p><i>Help seeking:</i> asking assistance from a collaborative partner. If you wish to ask for help with — for example — understanding of an assignment or technical issues.</p>	<p><i>I look forward to hearing your feedback... We have not reached consensus on these aspects... I hope to hear from you soon... Regarding our difference of opinion...</i></p> <p><i>Haven't heard from you for a while... What are your views on this? Due to time constraints, I would like to receive your feedback on...</i></p> <p><i>Could you please help me find the paper that you referred to in your last post?</i></p> <p><i>The program seems to work okay for me... It is easy to navigate...</i></p>
<p>Reflection/Monitoring</p> <p><i>Reflecting on medium:</i> comments about the effectiveness of the medium for supporting activities of the group. If you wish to comment about your experiences with the Discussion Board</p> <p><i>Monitoring group effort:</i> comments about the group's process and achievements. If you wish to reflect on the group process.</p>	<p><i>We have not reached consensus on these aspects... I think this is the best short-term solution... We still have time to write a good summary....</i></p>
<p>Social interaction: maintaining the group cohesiveness</p>	<p><i>I should not be so pushy, I know you are doing the best that you can... I could not reply to you sooner because... My weekend was great... I did my Bachelor degree in... If there is anything you don't understand or need help, feel free to ask.</i></p>

The screenshot shows a Blackboard interface for a course titled "N#13 Sil & Anna". The main content is a discussion board with the following table of posts:

	Date	Thread	Author	Status	Unread Posts	Total Posts
<input type="checkbox"/>	1/30/11 12:59 PM	last argument for	Anna Wegner a	Published	1	1
<input type="checkbox"/>	1/28/11 8:20 PM	Last argument against	Sil Nieuwhof s	Published	1	1
<input type="checkbox"/>	1/24/11 11:01 PM	fourth argument for	Anna Wegner a	Published	1	1
<input type="checkbox"/>	1/24/11 5:52 PM	4th aroument against	Sil Nieuwhof s	Published	1	1
<input type="checkbox"/>	1/21/11 11:56 PM	third argument for	Anna Wegner a	Published	1	1
<input type="checkbox"/>	1/21/11 6:11 PM	3rd argument against	Sil Nieuwhof s	Published	1	1
<input type="checkbox"/>	1/19/11 2:40 PM	second argument for	Anna Wegner a	Published	0	1
<input type="checkbox"/>	1/18/11 10:06 PM	2nd argument against	Sil Nieuwhof s	Published	1	1
<input type="checkbox"/>	1/17/11 6:16 PM	first statement for	Anna Wegner a	Published	1	1
<input type="checkbox"/>	1/12/11 8:39 PM	hello sil	Anna Wegner a	Published	1	4

Figure 4.1 Screenshot of online interaction using Discussion Board.

Design and use of a collaboration script

All of the students in the two conditions discussed the same proposition, the only difference between the two conditions was the use of the collaboration script in the experimental condition.

The collaboration script (see Table 4.2) encompassed several elements deemed necessary for joint problem-solving (i.e., planning, contributing, seeking input, reflection/ monitoring, and social interaction) and relevant communication strategies for the students to call upon during the collaboration. The communication strategies included discussion strategies, interaction prompts, and sentence openers that followed culturally-neutral rules of net etiquette as recommended by Shapiro and Anderson (1985) (e.g., in sending messages: “create single-subject messages whenever possible”, “have in mind a model of your intended audience”; in receiving and responding to messages: “try to separate opinion from non-opinion while reading a message, so you can respond appropriately”, “avoid responding while emotional”, assume the honesty and competence of the sender”, “avoid irrelevancies”).

The students were encouraged to refer to the communication strategies whenever they experienced problems getting their message across. One of the reasons for giving the students communication strategies to refer to was that many of the problems that can occur in online discussions between culturally diverse students concern communication. In the following, the five elements judged to be necessary for joint problem-solving are discussed in greater detail.

Planning (1) subsumes three categories of activity related to the organization of work, initiation of activities, and establishment of the dyad/group. When group members fail to

coordinate their joint activities or establish a good working relationship in a group, they are essentially experiencing difficulties with mutual understanding and process losses, the result of which may be a poor quality learning experience (Lim & Liu, 2006). It is therefore important that students be given support for not only the planning of activities (e.g., distribution of tasks, organization of work) but also the development of the group during the initial stages of the collaboration.

Contributing (2) encompasses activities such as exchanging resources, giving help, providing feedback, explaining each other's positions, sharing knowledge, and challenging each other's positions. Group collaboration presumably provides collaborative partners with opportunities to engage more deeply and actively in the learning process (Davis, 1993). However, successful collaboration can be constrained by a lack of "high-level" collaboration process when students negotiate meaning and narrow opinion gaps among them. It is therefore important that students be given support on how best to present one's ideas, ask for feedback or clarifying questions, explain one's viewpoint, or provide extra resources. If students know how to act in a collaborative learning situation, know what linguistic forms to use for their arguments, and know what they can expect from their collaborative partners, then they can maximally benefit from the sharing of knowledge and presumably conduct a high quality discourse (Weinberger et al., 2007).

Seeking input (3) includes urging others to contribute to the group effort, eliciting comments on the ongoing group process, and gathering feedback on group achievement/progress. The absence of nonverbal cues and social context cues during online discussion can hamper reciprocal understanding and the exchange of information (Walther, 1997). The provision of a collaboration script can therefore foster good communication and an adequate flow of information within the collaborative group.

Reflection/monitoring (4) can concern the media being used but also group processes and achievements. Discussion of the work situation is important to identify the preferences of the collaborative partners (Curtis & Lawson, 2001).

Social interaction (5) covers off-task comments and discussions that can nevertheless serve to strengthen the relationships within the group, encourage group activity, and maintain group cohesion. Conversations concerned with social matters can be particularly important for online collaboration due to the otherwise loosely bound nature of the group (Lim & Liu, 2006; Morse, 2003). According to Curtis and Lawson (2001) online courses should be designed to encourage more social interactions, because a lack of familiarity among group members may constrain successful collaboration.

Measures and sources of data

Table 4.3 presents an overview of the independent, dependent, and control variables used in this study. The relevant categories of data and how the data were collected are also summarized in the table. The specific variables and just how they were measured are described in relation to the two research questions below.

Measures of online collaborative behavior (RQ1)

In the present study, the framework of Curtis and Lawson (2001) was used as both an intervention and assessment tool. The framework supplied the foundation for the design of the collaboration script and it was also used to analyze the occurrence of collaborative behavior in the transcripts of the students' online discussions (i.e., measure the effects of the collaborative script on students' online behavior). Other studies have similarly used this coding scheme to analyze the behavior of students engaged in online collaborative learning, examine their

Table 4.3 Independent, dependent, and control variables

	Variables	Categories	Instruments	Data source
Control variables	Age, gender, computer skills, and prior online collaboration experiences	N/A	Self-made questionnaire developed for this study on the demographic information, computer skills, prior online collaboration experiences	Questionnaire
Dependent variables	Quality of students' discussions in CSCL environment	Breadth of discussion; depth of discussion; justification and reasoning (quality levels)	Qualitative content analysis of chat protocols, based on Noroozi et al. (2011), and coding of chat protocols using Clark and Sampson's framework (2008)	Chat protocols
	Students' online collaborative behavior in CSCL environment	Planning; contributing; seeking input; reflection/monitoring; social interaction	Coding of chat protocols using Curtis and Lawson's scheme (2001)	Chat protocols
Independent variables	Cultural group composition	Same- vs. mixed-culture dyads	N/A	Student report of country of origin
	Collaboration script	Collaboration with vs. without collaboration script	Based on Curtis and Lawson (2001)	N/A

contributions to a Blackboard Discussion Board, and perform cross-cultural comparisons (Curtis & Lawson, 2001; Kim & Bonk, 2002; Swigger et al., 2012).

The online contributions (i.e., “utterances”) of the students in the present study were examined for collaborative behaviors falling into the five categories of planning, contributing, seeking input, reflection/monitoring, and social interaction. The occurrence of a number of subcategories was also assessed (for examples of the subcategories, see Table 4.2). Pilot testing of the coding scheme showed it to be clearly applicable to the data collected in this study. Each utterance consisting of mainly phrases and sentences posted by the student and reflecting a specific collaborative behavior was coded. The coding subcategory was mutually exclusive – i.e., only one subcategory was assigned to an utterance. Salutory and closing utterances were ignored in the coding of the data. Before coding the data, two coders discussed and reached consensus on the definition of each category and its subcategories based on the descriptions and examples presented in Curtis and Lawson (2001). Subsequently, each chat protocol was coded by two coders. Both the inter-rater agreement between the two trained coders (Cohen’s $k=0.76$) (Landis & Koch, 1977) and the intra-coder test-retest reliability for each of the coders for 10 % of the data (85% identical codes) were sufficiently high.

The dependent variables in subsequent analyses were then the absolute total scores calculated for every dyad for a particular category of behavior and its respective subcategories.

Measures of discussion quality (RQ2)

To analyze the quality of the students’ online discussions, a qualitative content analysis of the transcripts was conducted using a coding scheme that drew upon two existing coding schemes (Clark & Sampson, 2008; Noroozi, Biemans, Busstra, Mulder, & Chizari, 2011). The existing coding schemes have been used to analyze online discourses in the past and shown to meet the criteria of completeness, clarity, accuracy, objectivity, reliability, and validity.

We initially evaluated the applicability of the coding categories developed by Noroozi et al. (2011) to the contributions directly related to the content of the task for a subsample of 10 discussion transcripts in the present study. Only three of the five categories from this scheme were judged to be of use for determining the quality of the students’ discussions within the context of our study: *justification and reasoning*, *breadth of discussion*, and *depth of discussion*. We did not code the online discussions in terms of the original Noroozi et al. categories of *relevance* or *correctness* because it proved difficult, if not impossible, to evaluate the degree of relevance and the accuracy of the contributions occurring as part of an open-ended discussion (i.e., the assignment in the present study).

When the coding of the discussion transcripts for *justification and reasoning* drawing upon just the system of Noroozi et al. (2011) proved difficult, it was decided to draw upon the

coding system of Clark and Sampson (2008) as well. This was done to analyze the structure of the dialogic argumentation for the same subsample of 10 discussion transcripts. In their work, Clark and Sampson present a flowchart for coding the grounds (i.e., use of evidence) for individual comments (see below in this section for more detailed description of this coding scheme). All of the postings from the subsample of 10 discussion transcripts were first classified as being part of one of three possible types of units: a task coordination unit (i.e., contributions regarding planning of joint work, distribution of tasks, division of roles); a task content-oriented unit (i.e., contributions directly related to the content of the task and thus the discussion within the context of the present study); or a non-task related unit (i.e., all posts that were social — including salutatory and closing posts — or concerned with technical aspects of the collaboration). Following Veldhuis-Diermanse (2002), a content-oriented unit was further defined as a unit that represents “an idea, argument chain or discussion topic” (p. 46). Following both Clark and Sampson (2008) and Noroozi et al. (2011), it was then decided to only code the content-oriented units further as only these types of units were perceived to be of relevance for evaluating the quality of the students’ discussions.

Two coders found task content-oriented units to be clearly evident in the subsample of 10 discussion transcripts and clearly distinguishable from the other two types of units (i.e., task coordination units and non-task related units). Complete agreement was found between the two coders on the identification and subsequent classification of the task content-oriented units. It was therefore decided to have only one coder select the task content-oriented units for further coding from the remainder of the discussion transcripts.

In the end, a total of 553 content-oriented units were coded: 121 for same-culture dyads using a collaboration script; 124 for same-culture dyads not using a collaboration script; 140 for mixed-culture dyads using a collaboration script; and 168 for mixed-culture dyads not using a collaboration script. All of the content-oriented units were coded for (1) justification and reasoning, (2) breadth of discussion, and (3) depth of discussion. The inter-rater agreement between the two trained coders (Cohen’s $k = .82$) and intra-coder test-retest reliability for each of the coders for 10% of the data (86% identical scores) were calculated. Both were found to be sufficiently high. The three assessment criteria are further described below.

Justification and reasoning are the degree to which arguments are supported and motivated by examples, evidence, or some other form of proof related to essential aspects of the topic being discussed. Within the framework developed by Clark and Sampson (2008), each comment or — in our case — content-oriented unit can be coded as offering no grounds (quality level = 0) (i.e., a content-oriented unit does not include any attempt to justify the position of the poster), offering only an assertion without evidence (quality level = 1), offering only evidence that is not backed by reasons for it (quality level = 2) (i.e., a content-oriented unit that includes a reference to a source of information such as a personal experience, a reference

book, or an example of a situation suggesting that the assertion is correct), or offering multiple sources of evidence with specific interpretation of the data (quality level = 3).

To obtain a mean score for the justification and reasoning quality criterion per dyad, the ratings of the content-oriented messages were summed for each dyad. A content-oriented unit with a quality level of 0 was assigned a score of 1; a content-unit with a quality level of 1 was assigned a score of 2, and so forth. The scores for each level of quality were then summed per dyad and divided by the total number of content-oriented units for that dyad to produce a mean quality score for justification and reasoning in the student discussions for each dyad.

Breadth of discussion is the degree to which substantial elements of clear relevance to the discussion topic are broadly discussed and elaborated upon. The coding of the content-oriented units for “justification and reasoning” was used to determine the breadth of the dyad’s discussion as follows. *Inadequate breadth* was judged to be less than three content-oriented discussion units assigned a score of 2 for providing evidence of arguments (breadth score = 1). *Partly adequate breadth* was judged to be three or four content-oriented discussion units assigned a score of 2 for providing evidence of arguments (breadth score = 2). *Adequate breadth* was judged to be five or more content-oriented discussion units assigned a score of 2 or 3 for providing evidence of arguments (breadth score = 3).

Depth of discussion is the degree to which theories and more detailed information related to essential aspects of the discussion topic are presented. A score of 1 to 3 could be obtained for the depth of discussion per dyad. This was determined by counting all of the examples drawn from personal experiences or literature sources for all of a dyad’s content-oriented discussion units. *Superficial depth* of discussion meant that the discussion topic was not elaborated upon to a significant extent and thus had zero to three examples drawn from personal experiences and/or literature sources (depth score = 1). *Simple depth* of discussion meant that the discussion topic was elaborated upon but only with simple explanation or interpretation and thus had four to six examples (depth score = 2). *Elaborate depth* of discussion meant that the discussion topic was sufficiently elaborated upon with detailed and clearly developed explanations; there were more than six examples drawn from personal experiences and/or literature sources (depth score = 3).

Control measures

Prior to study conduct, a demographic questionnaire was administered to all of the students to obtain information on age, gender, and country of origin. The students were also asked to rate their amount of experience with online group work along a five-point scale (1 = “hardly any”; 5 = “very much”). In addition, to assess the students’ mastery of the computer skills necessary to work with the Blackboard Discussion Board, they were presented five multiple-choice questions

concerned with the use of “internet web browsers”, MS Word (word processing program), MS Excel (database program), and other programs used for online communication like discussion boards, email, and chat applications.

Analyses

Analyses of variance were conducted to compare the control measures for the two conditions (i.e., a condition with versus without use of the collaboration script). Chi-square tests were used to test whether the distribution of males and females were similar for the different groups of students.

The online collaborative behaviors and quality of discussions were analyzed at the level of the dyad. As the data were clustered within dyads (i.e., the individual scores within a dyad did not constitute independent observations due to collaboration; Kapur, 2008; Stahl, 2010), combined individual scores for the dyad were used in the analyses.

To answer our first research question (RQ1), a number of two-way multivariate analyses of variance (MANOVA) were conducted with collaboration script (with vs. without) and group composition (same- vs. mixed-culture dyads) as the independent variables and the mean frequency scores per dyad for the five categories of collaborative behavior and their respective subcategories as the dependent variables (planning, contributing, seeking input, reflection/monitoring, and social interaction). Follow-up univariate analyses of variance (ANOVAs) were conducted when the MANOVA results showed a significant interaction between the independent variables (i.e., collaboration script condition with same- vs. mixed-culture condition).

To answer our second research question (RQ2), a two-way MANOVA was conducted with collaboration script (with vs. without) and group composition (same- vs. mixed-culture dyads) as the independent variables and the mean quality scores per dyad for the three categories of quality of online discussion as the dependent variables (justification and reasoning, breadth of discussion, and depth of discussion). Follow-up ANOVAs were conducted only when the MANOVA results showed a significant interaction between the independent variables (i.e., collaboration script condition with same- vs. mixed-culture condition).

RESULTS

Analysis of control measures in two conditions

No significant differences were found when separate ANOVAs were conducted on age, computer skills, and experience with online group work: age, $F(3, 126)=2.3, p=.08$; computer skills, $F(3, 126)=.24, p=.87$; and prior experience with online group work, $F(3, 126)=1.5, p=.22$. This

means that the subgroups of students in the script and group composition conditions did not differ significantly from each other with regard to age, computer skills, or experience with online group work.

The distribution of males and females within the four subgroups of students also did not differ significantly ($\text{Chi-square}=.763$, $df=3$, $p=.85$).

Online collaborative behavior (RQ1)

For the frequency of utterances reflecting the Planning category of collaborative behavior (i.e., the subcategories Group, Organizing work, Initiating activity), a significant interaction effect between script condition and group composition was found, *Wilks' Lambda*, $\lambda=.84$, $F(3, 59)=3.52$, $p<.05$, $\eta^2=.15$. In addition, a significant main effect of script condition was found (*Wilks' Lambda*, $\lambda=.87$, $F(3, 59)=2.96$, $p<.05$, $\eta^2=.13$) but no significant effect of group composition (*Wilks' Lambda*, $\lambda=.97$, $F(3, 59)=.83$, $p=.48$, $\eta^2=.04$). Since the interaction effect was significant, univariate analyses (post-hoc Scheffe comparisons) of the respective subcategories showed the same-culture dyads not using the collaboration script displayed a significantly higher frequency of Organizing work and Initiating Activities than the same-culture dyads using the collaboration script. The descriptive statistics for the online collaborative behavior of the same- and mixed-culture dyads with and without use of the collaboration script are presented in Table 4.4.

For the Contributing subcategories (i.e., Help giving, Feedback giving, Exchange resources, Sharing knowledge, Challenging, and Explaining), a significant main effect of group composition was found, *Wilks' Lambda*, $\lambda=.71$, $F(6, 56)=3.23$, $p<.01$, $\eta^2=.26$. There were no significant main effect of script condition ($F(6, 56)=.52$, $p=.79$, $\eta^2=.06$) and interaction effect between script condition and group composition ($F(6, 56)=.69$, $p=.65$, $\eta^2=.07$). Independent of script condition, the same-culture dyads showed a significantly higher frequency of Contributing activity than the mixed-culture dyads.

For the frequency of utterances reflecting the Seeking input category of collaborative behavior (i.e., the subcategories Feedback seeking, Advocating effort, Help seeking), a significant interaction effect between script condition and group composition was found, *Wilks' Lambda*, $\lambda=.85$, $F(3, 59)=3.02$, $p<.05$, $\eta^2=.14$. In addition, a significant main effect of script condition was found (*Wilks' Lambda*, $\lambda=.82$, $F(3, 59)=3.63$, $p<.05$, $\eta^2=.14$) but no significant effect of group composition (*Wilks' Lambda*, $\lambda=.97$, $F(3, 59)=.46$, $p=.71$, $\eta^2=.17$). Since the interaction effect was significant, univariate analyses (post-hoc Scheffe comparisons) of the respective subcategories showed the mixed-culture dyads using the collaboration script to Seek more feedback than the other three types of dyads (see Table 4.4).

Table 4.4 Mean online collaborative behavior according to cultural composition of group and use of collaboration script

Group composition	Category of behavior	Collaboration script					
		Collaboration script				Total	
		With script		Without script		Mean	SD
		Mean	SD	Mean	SD	Mean	SD
Mixed culture	Planning	3.00	1.79	2.68	1.57	2.83	1.66
	Establishing group	.07	.26	.12	.34	.10	.31
	Organizing work	1.64	1.27	1.31	.70	1.46	1.00
	Initiating activities	1.28	.91	1.25	.85	1.26	.86
	Contributing	15.35	5.75	12.87	3.24	14.03	4.67
	Help giving	.14	.36	.18	.40	.16	.38
	Feedback giving	5.58	2.65	4.31	1.49	4.90	2.17
	Exchanging resources	.21	.42	.12	.34	.16	.38
	Sharing knowledge	2.00	.39	1.68	.60	1.83	.53
	Challenging	.78	.57	.43	.51	.60	.56
	Explaining	6.64	2.84	6.12	1.66	6.36	2.26
	Seeking input	4.47	2.52	1.93	1.18	3.23	2.35
	Help seeking	.14	.36	.00	.00	.06	.25
	Feedback seeking	3.92	1.73	1.50	.81	2.63	1.79
	Advocating effort	.64	.63	.43	.62	.53	.62
	Reflecting/Monitoring	1.36	1.33	.93	1.18	1.13	1.25
	Monitoring group effort	.86	.77	.81	1.04	.83	.91
Reflecting on medium	.50	.75	.13	.34	.30	.59	
Social Interaction	1.92	2.05	.50	.89	1.16	1.68	
Same culture	Planning	1.66	1.04	3.78	.97	2.68	1.46
	Establishing group	.00	.00	.28	.46	.13	.35
	Organizing work	1.00	.84	2.03	.67	1.48	.91
	Initiating activities	.66	.48	1.5	.51	1.06	.65
	Contributing	14.80	7.27	16.21	6.22	15.48	6.70
	Help giving	.26	.45	.43	.64	.34	.55
	Feedback giving	4.26	3.23	5.07	2.73	4.65	2.97
	Exchanging resources	.13	.35	.28	.61	.20	.49
	Sharing knowledge	2.06	1.03	2.14	.77	2.10	.90
	Challenging	.46	.83	.35	.49	.41	.68
	Explaining	7.60	2.79	7.92	2.97	7.75	2.83
	Seeking input	2.20	2.42	2.35	2.40	2.27	2.37
	Help seeking	.13	.35	.07	.26	.10	.31
	Feedback seeking	1.60	2.22	1.71	1.63	1.65	1.93
	Advocating effort	.46	.51	.57	.75	.51	.63
	Reflecting/Monitoring	1.26	1.94	1.00	1.10	1.14	1.57
	Monitoring group effort	.87	1.24	.79	.80	.83	1.03
Reflecting on medium	.40	.73	.21	.42	.31	.60	
Social Interaction	.60	1.12	.71	1.13	.65	1.11	

There were no significant main or interaction effects for the collaborative behavior category of Reflection/Monitoring, which included the subcategories Reflecting on medium and Monitoring group effort.

For the Social interaction category of collaborative behavior, which was composed of only comments on social matters, there was only significant interaction effect of script condition and group composition, $F(1, 59)=4.74, p<.05, \eta^2=.08$). The mixed-culture dyads using the collaboration script showed a significantly higher frequency of Social interaction ($F(3, 61)=3.51, p<.05, \eta^2=.14$) than the mixed-culture dyads not using the collaboration script.

Quality of students' discussions (RQ2)

The results of a MANOVA with the collaboration script (with vs. without) and group composition (same- vs. mixed-culture) as the independent variables and the quality of the students' online discussions (i.e., Justification and reasoning, Breadth of discussion, and Depth of discussion) as the dependent variables revealed a significant main effect of group composition (*Wilks' Lambda*, $\lambda=.86, F(3, 59)=2.86, p<.05, \eta^2=.14$). There was no significant main effect of script condition (*Wilks' Lambda*, $\lambda=.89, F(3, 59)=2.12, p=.10, \eta^2=.11$) and no significant interaction between script condition and group composition (*Wilks' Lambda*, $\lambda=.95, F(3, 59)=.90, p=.44, \eta^2=.05$). Independent of script condition, the same-culture dyads showed a higher quality of online discussion than the mixed-culture dyads. In Table 4.5, the descriptive statistics for the quality of the students' discussions are reported.

Table 4.5 Means quality of online discussion according to cultural composition of group and use of collaboration script

Group composition	Measure of discussion quality	Collaboration script					
						Total	
		With script		Without script		Mean	SD
		Mean	SD	Mean	SD	Mean	SD
Mixed culture	Breadth of discussion	1.71	.82	1.62	.80	1.66	.80
	Depth of discussion	1.64	.84	1.31	.60	1.46	.73
	Justification and Reasoning	2.38	.33	2.34	.31	2.36	.32
Same culture	Breadth of discussion	2.46	.64	2.07	.83	2.27	.75
	Depth of discussion	2.06	.70	1.71	.91	1.89	.81
	Justification and Reasoning	2.51	.31	2.58	.46	2.54	.38
Total	Breadth of discussion	2.10	.82	1.83	.83	1.96	.83
	Depth of discussion	1.86	.78	1.50	.77	1.67	.79
	Justification and Reasoning	2.44	.32	2.45	.40	2.44	.36

DISCUSSION

To develop a deeper understanding of how socio-cultural factors and aspects of a CSCL environment can affect students working collaboratively online, we designed and implemented a collaboration script for students to use in same- versus mixed-culture dyads working in a CSCL environment. Their interactions were then analyzed in terms of online collaborative behaviors and the quality of the group discussion. We found:

- the culturally mixed dyads using the collaboration script to show more Seeking input and Social interaction than the culturally mixed dyads not using the collaboration script;
- the same culture dyads using the collaboration script to show less Planning activity than the same culture dyads not using the collaboration script;
- independent of script condition, the same-culture dyads to show more Contributing activity than the mixed-culture dyads; and
- independent of script condition, the same culture dyads to produce a higher quality of online discussion than the culturally mixed dyads.

With regard to our first research question, namely *Do group composition (same- versus mixed-culture dyads) and the use of a specially designed collaboration script (with vs. without) affect students' online collaborative behavior in a computer-supported collaborative learning environment?*, the absence of nonverbal cues and reduced social presence in online discussions appear to make it especially challenging for culturally mixed dyads of students to reach a shared understanding. This is reflected in our finding that the mixed-culture dyads using the collaboration script sought more input and produced more social interaction than the mixed-culture dyads not using the collaboration script. It appears that the collaboration script that was intended to foster five categories of collaborative behavior (see Table 4.4) effectively did this. The interaction dynamics and cohesion of particularly the mixed-culture dyads of students improved with the use of the collaboration script.

Mixed-culture groups are more likely to experience misunderstandings and coordination difficulties when working on a task together than same-culture groups. These difficulties often result in decentralized thinking, divergence in the collaborative learning activities, and lack of agreement on the general course of action. In the present study, the collaboration script effectively fostered more frequent questioning, requests for feedback, requests for information, feedback seeking to resolve conflicts/misunderstandings, and checks to make sure that the collaborating partners are “on the same page.”

In the present study, the culturally mixed dyads using the collaboration script also showed a statistically higher frequency of Social interaction than the culturally mixed dyads *not* using the script. The collaboration script instructed the students to do this and the students did it when necessary (i.e., more frequently in the mixed-culture group than in the same-culture group). The culturally mixed dyads using the collaborative script exhibited a greater exchange of utterances for social interaction throughout the collaborative task. This finding is in line with the research of Lim and Liu who state that “social-emotional priority is given to self-protection rather than positive articulations such as solidarity building in culturally mixed groups in CSCL” (2006, p. 149). In this context, the use of the collaboration script helped the culturally mixed dyads work on rapport and build a good working relationship during the collaboration process. In contrast, the culturally mixed dyads not using the collaboration script appeared to communicate their messages very carefully to ensure that the collaborative partner would understand the message as intended. This sentiment is captured by utterances that the students frequently added at the end of their messages, e.g., “Please let me know, if what I wrote is clear to you”, “Do you understand my point?”, “I’d like to double check whether you understood my message”.

Our results also show the *same-culture dyads using* the collaboration script to produce a relatively lower frequency of behavior concerned with planning (e.g., the organization of the work, the initiation of activities) than the *same-culture dyads not using* the collaboration script. Use of the collaborative script fulfilled many of the planning functions (i.e., prompted quick agreement on a specific course of action, clear articulation of how to proceed). Working with the collaboration script in a same-culture dyad thus required less attention to planning functions than not working with the collaboration script in a same-culture dyad while this difference was not found for the cultural mixed dyads who devoted equal amounts of time to planning. The students in the culturally mixed dyads in our study were presumably aware of the differences in their backgrounds right from the beginning of their collaboration and had to devote more exchanges to establishment of the collaboration, understanding the assignment, and agreeing upon a course of action.

Further with regard to the contributing collaborative behavior, independent of script condition, the same-culture dyads tended to exhibit more Contributing activity (i.e., providing feedback, exchanging resources, sharing knowledge, challenging one’s contributions and explaining/elaborating one’s position) than the mixed-culture dyads. It may be possible that the students working in the same-culture dyads did not experience the same challenges or barriers as the students encountered in the mixed-culture dyads. It appears that in the same-culture dyads, once the dyad is established and some initial planning has been made, most students in the same-culture dyads focused on task completion and contributions aimed at

this. They discussed and resolved quickly differences of opinions between them with a high frequency of “explaining” interactions. In contrast, the mixed-culture dyads had spent more time to work on rapport and had less time to exchange new information and demonstrated less Explaining behavior.

With regard to our second research question concerned with the quality of the students’ online discussions, namely *Do group composition (same- versus mixed-culture dyads) and the use of a specially designed collaboration script (with vs. without) affect the quality of the students’ discussions in a computer-supported collaborative learning environment?*, the results showed — independent of script condition — the same-culture dyads to not surprisingly produce higher quality discussions than the mixed-learner dyads. This result can be attributed to various socio-cultural and technological factors. Same-culture dyads share similar values, customs, and social structures, which can minimize the effort needed to reach a shared understanding and facilitate task performance (Cho & Lee, 2008; Shi et al., 2013). The lack of visual cues and nonverbal information in an online environment, can complicate the flow of communication and mutual understanding resulting in impaired coordination of processes, the inefficient exchange of information, and less fruitful discussion — no matter what the composition of a collaborative group. When the need for effective communication becomes larger, however, this can create discussion problems for mixed-culture dyads in particular. In keeping with this, the mixed-culture dyads relative to the same-culture dyads in our study exhibited a lower level of content-oriented interactions during the discussion task. In other words, the students collaborating in same-culture dyads probably did not experience the same barriers and challenges as the students collaborating in mixed-culture dyads. The collaboration script could not bridge this gap and, as a result, the same-culture dyads produced better quality discussions online than the mixed-culture dyads across the board and thus irrespective of collaboration script condition.

POSSIBLE LIMITATIONS ON THE PRESENT STUDY, STRENGTHS, AND SUGGESTIONS FOR FUTURE RESEARCH

Some possible limitations on the present study are the following. First, generalizations based on a population of international students should be interpreted with caution. The findings may not be completely transferable to students living in their “native” cultures, for example. Long-term residence in a foreign country can be assumed to create at least some cultural assimilation towards the host culture. The cultural differences between two students in a mixed-culture dyad in otherwise the same country may therefore not be as big as for two students working

together from their home countries.

Second, the influence of individual, personal characteristics in addition to cultural background characteristics on the intercultural collaboration measured in our study cannot be ruled out (Ting-Toomey, Oetzel, & Yee-Jung, 2001). Cultural differences certainly cannot always be reduced to individual differences (see Na, Grossmann, Varnum, Kitayama, Gonzalez, & Nisbett (2010) for a review) but, conversely, the possible influence of individual differences cannot be excluded by attention to cultural differences. It is suggested that the possible influence of individual differences, which can be handled by using larger sample sizes and/or undertaking qualitative case studies is investigated in future studies.

A third possible limitation is the degree to which the findings can be generalized in light of the collaboration task employed in the present study. The assignment of a task with intercultural communication as the topic for online discussion probably imposed demands that were particularly salient for the students in the culturally mixed dyads. The generalizability of the present findings to situations where intercultural communication is not a relevant topic or to situations with a different topic may thus be limited. Future studies involving the use of a learning/discussion task that is not about intercultural communication are therefore recommended. Research involving other types of tasks but also assignments that require students to transfer what they have learned should also be conducted in the future.

A final possible limitation on the present study is that the students collaborated for only a brief period of time. The effects of cultural diversity and the use of collaboration scripts can presumably change over time — as students become familiar with each other and familiar with recommended procedures. Prior research suggests that the internalization of external scripts by learners requires a relatively long period of exposure and drilling in repeated collaborative learning situations (Kollar et al., 2007). It is therefore recommended that further research be undertaken to replicate the present findings in studies spanning a longer period of time and studies using a variety of online discussion assignments.

The present study provides insight into the ways in which same- versus mixed-culture dyads interact in a CSCL environment. The findings can guide instructional designers and educators for the optimal design and implementation of learning environments within an intercultural collaborative learning context. Paying specific attention to cultural differences can help educators improve the learning experiences of students in multicultural settings. A learner's behavior in a collaborative situation and reactions to a collaborative partner can be used to predict their level of engagement in collaborative activities and their usage of technology in the future. Interventions can be tailored to stimulate interaction and guide this in an online collaborative learning environment. This can be done by the learners themselves, educators, or even machine learning techniques that can identify potential problems and prevent their

occurrence during an exchange. For example, social interaction can be encouraged during the early stages of online collaboration in the form of — for instance — the exchange of personal profiles and introductory exchanges. The addition of nonverbal content to a CSCL system (e.g., a real time video connection, audio information) can facilitate the effective exchange of information. And students' awareness of different styles of communication can be heightened using special features of CSCL tools to provide adaptive scripting approach as developed by Gweon, Rosé, Zaiss, and Carey (2006) and illustrative examples/transcripts (Kim & Bonk 2002). Adaptive scripting approaches focused on matching students with learning partners who would produce the optimal conditions for learning and/or introducing adaptive prompts both to encourage deep explanation and teaching behavior to manipulate student behavior.

The present study lays the foundation for the design of external collaboration scripts that pay specific attention to the cultural backgrounds of students for use in CSCL environments. With the integration of the present findings and previous findings on the use of collaboration scripts to facilitate CSCL but also intercultural learning (e.g., Cox et al., 1991; Vatrappu & Suthers 2007; Weinberger et al., 2007), collaboration scripts that incorporate cultural enrichment elements can be developed for specific groups of students. The enrichment elements can be derived from cross-cultural psychology, among other fields (e.g., Hofstede, 1991; Nisbett, 2003). For example, students from Western countries have been shown to focus their communication on the task at hand and not on relationships during the early stages of collaborative work. In contrast, students from East-Asian countries have been showing to give priority to the establishment and maintenance of harmonious relationships within a collaborative group as opposed to task accomplishment (Hofstede, 1991; Vatrappu & Suthers, 2007). This means that group members coming from Western countries with a focus on task accomplishment and more or less neglect of social relations may unintentionally offend group members coming from East-Asian countries at times. A potential solution is to introduce a socialization protocol that encourages collaborators to first get to know each other and build the group dynamics that are needed to accomplish tasks in mixed-culture groups, for instance. Collaborative partners should be encouraged to identify individual and cultural similarities and differences. And this can be realized via the exchange of not only personal profiles as part of the introduction process but also both personal and other experiences related to the task at hand. A socialization protocol can thus help fulfill the needs of culturally distinct groups during the initial stages of a collaboration enterprise.

To conclude, the findings of this study enable researchers and educators to construct collaborative learning environments in which cultural differences can at least be accommodated and even put to work to promote effective cross-cultural interaction and learning within a CSCL environment.



Chapter 5

Development and use of an interculturally-enriched CSCL script: An exploratory case study of student attitudes, behavior, performance, and experiences

ABSTRACT

Collaborative technologies are increasingly being used in intercultural learning environments, which is bringing both challenges and benefits. Culture-related differences must be overcome to welcome the benefits of sharing culturally divergent knowledge. In an exploratory study, we introduced an Interculturally-Enriched Collaboration Script (IECS) for working in culturally diverse groups within a computer-supported collaborative learning (CSCL) environment and then assessed student attitudes towards online collaboration, online collaborative behavior, learning performance, and experiences. The question was if and how these variables differed for the groups that used an IECS versus groups that used a general Collaboration Script (CS) that did not include intercultural elements. Using a Web conferencing tool, 47 students from a university in the Ukraine and a university in the Netherlands worked together in groups to develop project plans on the environmental problem of nuclear power and radioactivity. Attitudes towards online collaboration increased using the IECS and decreased following using the CS. The groups in the IECS condition showed a higher frequency of so-called contributing behavior but a lower frequency of planning behavior, seeking input, and social interaction than the groups in the CS condition. The IECS groups also produced better project plans than the CS groups. Interview data further showed the CSCL experiences of the students varied between the groups using the IECS and the CS. Future study using a similar experimental set up but with larger samples is recommended to see if the present results can be replicated.

INTRODUCTION

In many academic subject areas, there has been a vast and rapid expansion of knowledge and thus an increased diversity of knowledge. The result is a growing demand for collaboration between professionals from different fields of expertise around the world for various professional, personal, and academic purposes.

Today's information and communication technologies (ICT) have made it possible for universities to enlarge their international student communities, advance and enhance the attractiveness of their courses by offering distance learning programs, make both teachers and students mobile, and — last but not least — enhance intercultural awareness. However, the use of ICT in learning environments involving students collaborating from different cultural backgrounds brings both benefits and challenges. Different perceptions, modes of thinking, and communication styles must be coordinated in an online learning environment. But when these differences are sufficiently articulated and integrated, students can work effectively in culturally heterogeneous groups.

Culture-related factors can impede the online group interaction process (Cox, Lobel, & McLeod, 1991; Lim & Liu, 2006). The impediments may be: 1) an inability to understand culture-specific information in online discussions; 2) a reliance on nonlinguistic cues, which are often not available in online interaction environments; 3) difficulties expressing disagreement; 4) difficulties communicating particularly complicated or subtle points); and 5) overuse of communication patterns that are abrupt and largely content-driven rather than extended and more relationship/emotion-oriented (see Uzuner, 2009, for an overview). It has, moreover, been suggested that the bigger the cultural gap between learners in a group, the greater the probability of miscommunication in general (Triandis, 1994) and in an online learning environment in particular (Reeder, Macfadyen, Roche, & Chase, 2004).

In addition to culture-related factors, a number of learner-specific factors can affect learner interactions and collaborative online processes:

- *attitudes towards online collaboration* or the perspectives of students on online collaboration, which will obviously influence their behavior;
- *actual online collaborative behavior* or the performance of activities needed for joint problem-solving and collaborative learning;
- *learning performance* or the extent to which learners achieve specific goals in the form of individual learning gains and/or final group products; and
- *collaborative learning experiences* or the ways in which collaborative interactions have been made sense of by students.

Numerous studies have provided insight into computer-supported collaborative learning (CSCL), which can be defined as the negotiation of meaning and the shared construction of knowledge among students interacting with the help of technology (Kreijns, Kirschner, & Jochems, 2003; Stahl, Koschmann, & Suthers, 2006). CSCL does not eliminate the influences of culture on the collaborative learning process, however, and introduces some challenges of its own (Reeder et al., 2004). Despite significant progress in the field of CSCL research, little is known about the support that is needed to help culturally diverse groups of students collaborate and thereby benefit from the sharing of knowledge and experiences. Based on previous research showing the effectiveness of using collaboration scripts to support online collaboration (e.g., Fischer, Kollar, Stegmann, & Wecker, 2013; Kollar, Fischer, & Hesse, 2006; Rummel & Spada, 2005; Schellens, Van Keer, De Wever, & Valcke, 2007; Vatrappu & Suthers, 2007; Weinberger, Clark, Hakkinen, Tamura, & Fischer, 2007), we assumed that students collaborating from different cultural backgrounds could benefit from the use of an interculturally-enriched collaboration script (IECS) — that is, a collaboration script that serves to structure a group's interaction, coordinate learning activities, and articulate culture-related differences in perspectives and behavior. We developed an IECS to foster intercultural collaboration in general and to bridge differences when working in a CSCL environment in particular. We then compared the effectiveness of using an IECS versus a general collaboration script (CS) for culturally heterogeneous groups of students working in a CSCL environment. We did this in terms of the learner-specific factors mentioned above (i.e., attitudes towards online collaboration, collaborative behavior, learning performance, and experiences with CSCL).

Issues of culture within a computer-supported collaborative learning environment

In the present research, we investigated collaborative learning from a social constructivist perspective. Viewed from this perspective, the backgrounds and cultures of learners can be assumed to shape a collaboration process and the acquisition of knowledge (Vygotsky, 1978; Wertsch, 1998; Zhu, 2009). Culture can be defined as “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). And within the context of online collaborative learning, culture can be assumed to be among the factors that shape the individual student's understanding of the collaborative learning tasks, communication, and behavior (Brockner, 2003; Cox et al., 1991; Zhu, 2009).

The Individualist - Collectivist (I-C) cultural orientations as put forth by Hofstede (1991) has been widely used to describe culturally-based differences in collaborative group processes (e.g., Cox, 1991; Goncale & Staw, 2006; Oetzel, 2001). The I-C cultural orientation has been shown to be valid in more than 1500 published studies (Metcalf & Bird, 2004) and to identify: (1) the degree of dependence on the self (individualists) versus the group (collectivists); (2) attitudes towards goals with individualists geared more towards personal goals and collectivists geared more towards group success; and (3) the motives underlying behavior with collectivists acting more on the basis of shared group identity, social norms, and commitment to the group while individualists act more on the basis of own values, beliefs, and motives (Hofstede, 1991; Shamir, 1990; Triandis, 1994).

Educational research has made widespread use of the I-C cultural orientations to describe culturally-based variation in learning styles (e.g., Cox et al., 1991; Oetzel, 2001). In Table 5.1, the findings of studies that have applied the I-C cultural orientation to collaborative learning processes are summarized.

The I-C cultural orientations has also been used to investigate the functioning of culturally diverse students in an environment that involves CSCL. In recent research, Vatrapsu and Suthers (2007) claimed that students from individualist cultures are more likely to see the collaborative learning environment as a medium to jointly identify problems and discuss conflicts in knowledge beliefs while students from collectivist cultures are more likely to view the collaborative learning environment as a place to share information and explanations. When Anakwe and Christensen (1999) examined the differences between students with individualist versus collectivist cultural orientations for long-distance collaborative learning at two American universities, they found distance learning to be more compatible with the individualists' learning motives.

In a similar vein, Tapanes, Smith, and White (2009) showed differences in student perceptions of an online course at two American universities to reflect the individualist versus collectivist cultural orientations of the students: students with a collectivist cultural background were less motivated to participate in an asynchronous learning network than students with an individualist cultural background. In still other research, collectivists have been shown to display more cooperative relationship-oriented behavior when learning together while individualists show more competitive task-oriented behavior with a focus on individual achievement despite working in a collaborative learning environment (Kim & Bonk, 2002; Weinberger et al., 2007).

Finally, the benefits of CSCL have been widely documented in terms of the social and cognitive development of students (for overviews, see Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999; Salovaara, 2005), but the mediation of learning outcomes by the quality of the collaborative group process and thus cultural factors has been overlooked.

Table 5.1 Summary of Individualist and Collectivist orientations towards collaborative learning

Individualists	Collectivists	Literature sources
Nature of task-related behavior		
<i>Task oriented</i> Individualists tend to exhibit more task-oriented activities and focus on content-related background of group members.	<i>Relationship oriented</i> Collectivists tend to focus on group norms and group interrelations.	Brislin, 1990; Economides, 2008; Cox et al., 1991; Chan & Watkins, 1994; Oetzel, 1999; Phuong-Mai et al., 2005, 2006; Shi et al., 2013; Tapanes et al., 2009; Weinberger et al., 2007.
Nature of conflict-related behavior		
<i>Competitive behavior</i> Individualists are more likely to exhibit competitive behavior focused on personal achievement.	<i>Cooperative behavior</i> Collectivists are more likely to avoid conflicts and demonstrate predominantly cooperative behavior.	
Nature of social and cognitive behavior		
<i>Open to disagreement</i> Individualists are more inclined to identify and discuss conflicts in knowledge and beliefs. They tend to express more opinions independent of group members.	<i>Preference for consensus</i> Collectivists are more inclined to identify and discuss points of consensus. They tend to adapt their personal intentions and goals to those of the group, conform to expectations of their group members.	Chang et al., 2002; Gudykunst et al., 1996; Gunawardena et al., 2001; Hall & Hall, 1990; Phuong-Mai et al., 2005, 2006; Salili, 1996; Setlock et al., 2004; Shi et al., 2013; Tapanes et al., 2009; Vatrappu & Suthers 2007.
Type of communication style		
<i>Direct</i> Individualists tend to structure their online contributions in an explicit, direct manner with a focus on main points. They also tend to be more literal.	<i>Indirect</i> Collectivists tend to be indirect and implicit. They place greater emphasis on context and details than on main issues and explicitness.	
Nature of reason-giving		
<i>Analytic</i> Individualists tend to argue for a more differentiated, analytic solution that also seems most logically viable.	<i>Holistic</i> Collectivists prefer a final solution that is highly inclusive.	Nisbett, 2003; Salas et al., 2004; Vatrappu, 2008.

This is because the focus of most of the early studies of CSCL was on the *collaborative learning product* and *individual learning outcomes* (Lim & Liu, 2006). Greater attention is thus needed to the influence of culture on CSCL and the support that is needed to help culturally diverse groups to collaborate and benefit from the sharing of experiences.

The use of collaboration scripts to promote effective collaboration

In recent years, a range of methods have been shown to promote productive CSCL (for an overview, see Noroozi, Weinberger, Biemans, Mulder, & Chizari, 2012). Once again, however,

only a few studies provide guidance for online collaboration between culturally diverse students and the focus of these studies has been mostly on the following: foreign language education via computer-mediated communication (Thorne, 2006), use of the internet to raise intercultural awareness (Elola & Oskoz, 2009), and the use of e-tools to support brainstorming and sharing of culturally diverse perspectives and knowledge (Wang & Fussell, 2010).

In a different body of research, the use of collaboration scripts within a CSCL environment has been found to provide particularly effective support (for overviews, see Fischer et al., 2013; Kollar, Fischer, & Hesse, 2006; Weinberger, Ertl, Fischer, & Mandl, 2005). Collaboration scripts can be used to scaffold the interactions and learning of students working in a CSCL environment by clarifying the roles to be played and spelling out the required sequence of activities (Carmien, Kollar, Fischer, & Fischer, 2007). Collaboration scripts can initiate the types of interactions that are needed for productive task performance (Kolodner, 2007). And collaboration scripts can be conveyed via explicit instruction (e.g., oral presentation by the teacher, written presentation/handout) or embedded in the learning environment itself (e.g., graphic representations, textual cues, response prompts).

In 2005, Rummel and Spada (2005) integrated the empirical findings from research on communication and computer-mediated collaboration to create a cyclic model of online collaboration that encompasses the processes necessary for successful collaborative problem-solving. There are three phases in the model: the initial, main, and final phases. In the initial phase, the collaborating students orient themselves towards the learning task, become aware of each other's backgrounds, and establish a shared understanding of the problem at hand. In the main phase, the collaborating students articulate their points of view, discuss their points of view, reflect upon contributions, and address all topics of relevance to the learning task. In the final phase, the students strive to find the most viable solution to the problem by weighing all options using a particular system of evaluation (e.g., making calculations, fitting data to a model) or specific criteria.

The main phase in the model includes three subphases: (a) elicitation or individual work that encourages collaborative partners to contribute their own knowledge and ideas; (b) explication or the discussion of individual contributions with an eye to the exchange of unshared information; and (c) integration or the combining of the individual proposals to the extent that this is possible. Each of the three phases in the collaboration model and the relevant subphases point to a particular collaborative behavior for use during online interaction. All of the phases are intended to structure the collaboration process and thereby make it more efficient and effective (Ploetzner, Fehse, Kneser, & Spada, 1999; Slof, Erkens, Kirschner, Jaspers, & Janssen, 2010). The cyclic model of Rummel and Spada has been shown to effectively promote online collaboration and is therefore drawn upon in the present research.

The present research and specific questions

In order to promote effective collaboration and bridge the cultural gap between learners collaborating online, we developed an interculturally-enriched collaborate script (IECS) that includes exactly the same collaboration steps and instructions as a general collaborative script (CS) but is supplemented with elements developed specifically for culturally distinct groups. Building on previous research on intercultural differences (see Table 5.1), we identified specific discourse practices and interaction patterns that were likely to emerge in culturally heterogeneous CSCL groups. We then tailored our IECS to students with an individualist orientation (i.e., Dutch students) and students with a collectivist orientation (i.e., Ukrainian students) for purposes of the present research. We then compared the effects of using an IECS versus a general CS for students working in a CSCL environment. In doing this, we asked ourselves the following questions:

RQ1 Do differences emerge in *the attitudes towards online collaboration* for students working in culturally heterogeneous groups using an interculturally-enriched collaboration script versus a general collaboration script in a CSCL environment?

RQ2 Do differences occur in *the online collaborative behavior* of students working in culturally heterogeneous groups using an interculturally-enriched collaboration script versus a general collaboration script in a CSCL environment?

RQ3 Do differences in *learning performance* manifest themselves for students working in culturally heterogeneous groups using an interculturally-enriched collaboration script versus a general collaboration script in a CSCL environment?

RQ4 What do students think about their *CSCL experiences* and the usefulness of an interculturally-enriched collaboration script relative to a general collaboration script?

METHOD

Participants

Participants were second year Bachelor students enrolled in educational programs in the field of life and environmental sciences in either the Netherlands or the Ukraine. Of the 47 students, 23 were enrolled in the Netherlands (19 from the Netherlands, 3 from Germany, 1 from Curacao)

and 24 in the Ukraine; 65% were women. The students from Germany and Curacao had been living in the Netherlands for an average of 2 years, spoke fluent Dutch, and had most of their university education in Dutch. The age of the participants ranged from 18 to 23 years, with a mean of 19.6 ($SD=1.2$). The majority of the students from both universities had at least some cross-cultural interaction experience (e.g., vacation travel, internship, and academic or non-academic exchange, such as au pair/nanny work). All of the study participants had proven English language proficiency when they enrolled at the university.

Research setting and assignment

The International Study Visits Environmental Sciences course was chosen for a case study because the course requires students from the Netherlands and the Ukraine to collaborate on a two-week project. During this course, the students studied two major environmental disasters, Chernobyl and Fukushima, in connection with the theme of “radioactivity and nuclear power.” During the first week, the students interacted online to prepare for the projects at their home institutions. During the second week, the Dutch students visited the Ukraine (Kyiv) to complete the project on a face-to-face basis. Given our interest in the students’ online collaboration for purposes of the present study, only their group work during the first week of the project and thus their online interactions were analyzed.

As a group, the students had to determine the focus of their study by posing a specific research question that related to the following four subthemes: measurements of radioactivity, impact of radioactivity on humans and ecosystems, public opinion and policy on nuclear power, and technological aspects of nuclear power. After the first week of the project, the students were expected to be able to: 1) develop a project plan to study an environmental problem; 2) actively participate in online group work in consultation with faculty and students; and 3) apply knowledge of environmental sciences to a project together with foreign students. The main output from the first week was a group presentation of the plan developed to study the environmental problem. For both the Dutch and Ukrainian students, the course was mandatory. And to pass the course, the students had to actively collaborate in their groups and present their final results.

Study design and procedure

A randomized, two group, pretest-posttest research design was used to explore the differences between culturally heterogeneous groups of students working in a CSCL environment using a culturally enriched collaboration script versus a general collaboration script (see Figure 5.1).

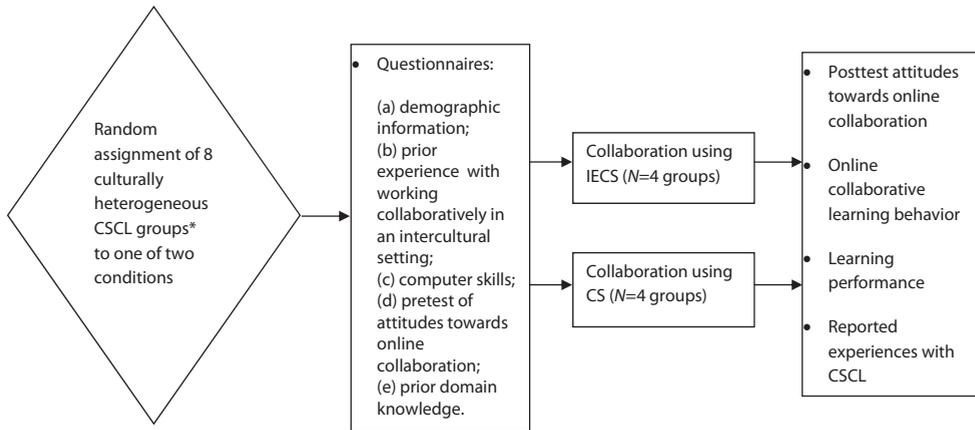


Figure 5.1 Outline of research design. * Each group consisted of 3 students from the Ukraine and 3 students from the Netherlands; one group using CS ended up including 3 Dutch and 2 Ukrainian students. IECS = Interculturally-Enriched Collaboration Script; CS = general Collaboration Script.

Three students from the Ukrainian university and 3 students from the Dutch university were randomly assigned to one of two conditions (i.e., IECS or CS). One group using CS ended up including 3 Dutch and 2 Ukrainian students. A total of seven groups of 6 and one group of 5 worked online in sessions of 1.5 to 2 hours on average across a period of three days. The students interacted with the study personnel and with each other in English. Prior to the actual study, several questionnaires were sent to the study participants to gather information on: (a) demographic background, (b) prior experience with working collaboratively in an intercultural setting, (c) computer skills, (d) attitudes towards online collaboration, and (e) prior domain knowledge.

The collaborative work on the development of a project plan during the first of the two project weeks consisted of an initial, main, and final phase. During the initial phase, the students were introduced to the Adobe Connect program, the assignment, and the collaboration procedures. Each student received paper-based instructions for either the IECS or CS and was specifically asked to follow the script instructions. The initial phase consisted of two consecutive online group sessions with a one-hour break for lunch in between and occurred on the first day of the project.

On the second day, the main phase of the collaborative work to develop a project plan was conducted. It was composed of three subtasks: 1) discussion of the background literature; 2) definition of the focus, scope, and research question for the project; and 3) outline of a strategy to collect the data needed to answer the research question. The main phase consisted of two consecutive online group sessions with a one-hour break for lunch in between.

On the third day, the final phase of the collaborative work to develop a project plan was conducted. The students had to finalize their project plan and present it in a maximum of 10 minutes via videoconferencing. The final phase consisted of one online group session and one plenary session for the group presentations.

After the final phase of the preparatory work, each student again completed a questionnaire to gather information on their attitudes towards collaboration. The participants also received a short debriefing, which included informal discussion of both content and process issues confronted during the group work.

Within two days of completion of the first week of the project, 20 students (5 Dutch and 5 Ukrainian from the CS condition plus 5 Dutch and 5 Ukrainian from the IECS condition) were randomly selected for an individual interview to find about (a) their CSCL experiences and (b) script adherence. The semi-structured interview was conducted by allowing the student to describe his or her most positive and negative collaborative experiences as well as the usefulness of the IECS and CS within the CSCL environment and had a duration of 30 minutes on average.

Learning platform

The students were seated at individual computers in separate classrooms, which were located in the Netherlands and Ukraine for all experimental sessions. Their only contact was via a web-conferencing tool, Adobe Connect. On the starting page, the students could see the so-called “pods” of Camera, Chat, and Share (Figure 5.2). All group members could see and hear each other using the Camera with Voice pod. The Chat pod was an ordinary chat facility. The Share pod allowed the students to share documents. Students could also prepare a presentation together using this pod. Each online group session was recorded with the help of provided for this purpose Adobe Connect features.

Design of the CS and IECS

The general CS provided instructions on WHAT to do during each step of the online collaboration part of the project. The IECS provided three types of instructions for each step: (1) general instructions on WHAT to do, which is the same as in the CS; (2) instructions on HOW to proceed with a particular subtask; and (3) explanation of WHY that particular subtask was important.

The “WHAT to do” script instructions helped coordinate learning activities by giving step-by-step guidelines and timelines for the subtasks. An example is: “Please use the following 25 minutes to take individual notes while answering the questions. These questions will help

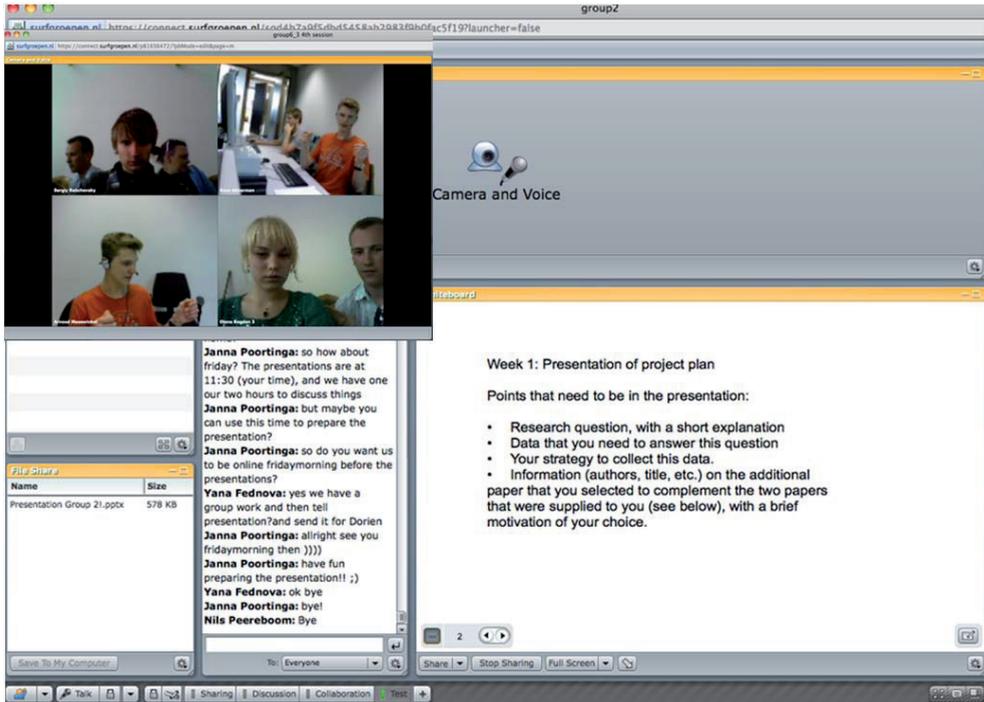


Figure 5.2 Screenshot from the Web conferencing tool, Adobe Connect.

you to formulate the focus of your project plan”. These instructions were then followed by those for the next subtask. For instance, “Please use the following 60 minutes to exchange individual answers and ideas. Identify and discuss differences and similarities between the different answers and try to reach an agreement on the focus of your project plan”. Table 5.2 provides an overview of the general CS used in this study.

The “HOW to proceed” and “WHY” parts of the IECS instructions were aimed at stimulating specific interactions among culturally heterogeneous groups of students, increasing the frequency of specific behaviors, and thereby facilitating the collaboration process. The IECS instructions were tailored to students with a more individualist orientation (i.e., Dutch students) and students with a more collectivist orientation (i.e., Ukrainian students) (see Table 5.1). The specially tailored instructions for how to approach group members and how to engage in a collaborative discourse were expected to enhance mutual understanding, engagement in debate, and convergence on the steps to be taken to complete the collaborative learning activities.

In the following, we describe the sequence of activities to be performed by the students. In Table 5.3, we present an excerpt of the IECS pertaining to collaboration steps 2.1–2.3.

Table 5.2 An overview of the general Collaboration Script

Initial phase		1.1. Establishing the group: Introduce yourself to your group members
		1.2. Task introduction: Read the description of the assignment and the collaboration guideline thoroughly
		1.3. Short initial coordination of the group work to complete the assignment
Main phase		2.1. Individual work on questions related to the learning task
		2.2. Exchange and discussion of individual ideas with the group about the focus of your project plan.
		2.3. Making preliminary slides for the presentation
		3.1. Individual work to identify possible research question for project plan
		3.2. Exchange and discussion of proposed research questions and support for them
		3.3. Integration of individual input and selection of research question by members of group
		4.1. Formulation of possible strategies to answer research question
		4.2. Exchange of identified strategies and group discussion to select a strategy to answer research question
		4.3. Integration of individual input and report of selected strategy to answer research question.
Final phase		5. Conclusion

Initial phase. In the initial phase of the collaboration process (Table 5.2, step 1.1-1.3), the students were asked to create personal profiles, orient themselves towards the learning task, and establish a shared understanding of the problem. Given that group members with

Table 5.3 Excerpt of steps 2.1–2.3 from the Interculturally-Enriched Collaboration Script

Main phase	General instructions	Cultural instructions tailored specifically to Ukrainian students	Cultural instructions tailored specifically to Dutch students
 <p>2.1 <i>Individually answer questions on group specific papers</i></p>	<p>Please use the following 25 minutes to take individual notes while answering the questions. These questions will help you to formulate the focus of your project plan. Questions can be found on page 5 of the group assignment.</p>	<p>A. Try to be as specific as possible when answering the questions. Provide sound argumentation for your choice.</p> <p>B. Why this is important: The purpose of this step is to individually identify an approach to answer the research question that you defined.</p>	<p>A. Try to give more context information when preparing your answers (i.e., what is your research behind your potential research question): Try not to rush with taking actions.</p> <p>B. Why this is important: The purpose of this step is to individually answer questions on group specific papers.</p>
 <p>2.2. <i>Exchange of individual ideas with the group</i></p>	<p>Please use the following 60 minutes to exchange individual answers and ideas. Identify and discuss differences and similarities between the different answers and try to reach an agreement on the focus of your project plan.</p>	<p>A. Feel free to disagree with your group members and be direct and specific as much as possible.</p> <p>There is no right or wrong answer for solving this task as long as you can prove your point.</p> <p>Try to support your ideas by providing additional support, explanation, evidence (i.e., examples or reference to some literature) and elaboration of an argument. Try to spell things out exactly when talking about your point.</p> <p>B. Why this is important: The purpose of this step is to exchange notes, discuss the individual ideas, and share knowledge and information with your group. The best way to do this is by asking your fellow students to share their ideas about how to solve the task.</p>	<p>A. Allow adequate time for communication. This means taking time to fully understand the message and giving your group members time to think of a response. Try to see this online communication as a way of exchanging information, ideas, and opinions but also as a form of engaging your group members. Try to share, as much as you can, with your fellow students about information/ideas that you can think of on how to solve the task.</p> <p>B. Why this is important: The purpose of this step is to exchange notes, discuss the individual ideas, and share existing knowledge and information with your group. The best way to do this is by giving information and by asking your group members to share their ideas about how to solve the task.</p>

<p data-bbox="327 182 507 611">Together with your group members you need to come up with a list of similarities and differences in your answers and corresponding argumentation. <u>Your task is to identify similarities.</u> Try to reach an agreement with your group members on the focus of your project plan.</p>	<p data-bbox="327 644 507 1084">Together with your group members you need to come up with a list of similarities and differences in your answers and corresponding argumentation. <u>Your task is to identify differences.</u> Try to resolve these differences and reach an agreement with your group members on the focus of your project plan.</p>	<p data-bbox="327 1117 507 1648">Together with your group members you need to come up with a list of similarities and differences in your answers and corresponding argumentation. <u>Your task is to identify similarities.</u> Try to reach an agreement with your group members on the focus of your project plan.</p>
<p data-bbox="533 182 610 611">2.3. Make preliminary slides for presentation</p>  <p data-bbox="533 1117 816 1648">Based on your group discussion, please use the following 20 minutes to make a few preliminary slides for the presentation. Prepare PowerPoint presentation and put it in the "shared documents"(on the left side of the screen of Adobe Connect). It can be opened in the plenary room.</p>	<p data-bbox="533 644 687 1084">A. Try to be analytic and logical while formulating a research topic to work on. Try to focus on research questions that seem the most logical and viable for this particular case/task. Try to reach an agreement with your group members in this regard.</p> <p data-bbox="713 644 945 1084">B. Why this is important: The purpose of this step is to formulate a research topic that you will be working on based on previous group discussion. Try to make your research question as specific as possible. Provide a summary of the discussed ideas/possible solutions by combining all contributions and integrating them into a single PowerPoint slide single.</p>	<p data-bbox="533 1117 687 1648">A. Try to be inclusive while formulating a research topic to work on. There is no concrete answer to this task; therefore be open to see the approaches to the task in very diverse ways. Try to reach an agreement with your group members in this regard.</p> <p data-bbox="713 1117 945 1648">B. Why this is important: The purpose of this step is to formulate a research topic that you will be working on based on previous group discussion. Provide a summary of the discussed ideas/possible solutions by combining all contributions and integrating them into a single PowerPoint slide single.</p>

a largely individualist orientation can unintentionally offend individuals from a collectivist¹ orientation by omitting aspects of social interaction due to a focus on the task at hand (Brislin, 1990; Hofstede, 1991), we intentionally had the students create personal profiles during the initial phase of the collaboration process. The IECS but not the CS thus included questions that addressed the personal backgrounds of the students in addition to their previous content- and task-related experiences. The group members were asked to exchange their personal profiles and discuss the similarities and differences between them. The *Ukrainian students* were further instructed via the IECS to construct a concrete idea of themselves and the other members of the group on the basis of the knowledge and experiences shared with regard to the content of the assignment; the *Dutch students* were further instructed via the IECS to get to know the other members of the group in terms of their personal backgrounds and build a relationship of trust for solving the task together.

It was also explicitly stated in the script instructions for *all students* at the very beginning of the collaboration process that the task was aimed at collaborative learning with no teacher control and that the learning problem was an open-ended problem with no single right or wrong solution. In addition, it was emphasized that underlying argumentation was crucial. The collaborating students were instructed to be open and to consider the learning platform as a safe environment for the exchange of ideas and joint development of a project plan.

Main phase. In the main phase of the preparatory collaboration process (Table 5.2, steps 2.2, 3.2, and 4.2), the students were instructed to exchange and discuss their individual ideas with regard to the assignment (step 2.2), the question to be answered (step 3.2), and the strategy to be followed to answer the question (step 4.2).

The *Ukrainian students* were specifically instructed via the IECS to feel free to disagree with their partner and to be as direct and specific in their feedback as possible (e.g., “Feel free to disagree with your group members. There is no right or wrong answer for solving this task as long as you can justify your point. Support your points of view by providing examples or references to the literature”). The *Dutch students* were not only instructed via the IECS to share information and ideas on how to solve the task but also that the best way to do this was to ask their partner to share information and ideas as well (e.g., “Allow adequate time for communication. This means taking time to fully understand the contributions of others to questions and giving group members time to think of how to respond. Try to share as much as you can about ideas and how to solve the task with your fellow students.”).

¹ Since Hofstede (Hofstede, 1991; Hofstede, Hofstede, & Minkov, 2010) did not investigate Ukraine in his studies, scores for cultural orientations here were used from a study conducted by Panchenko (2002) (i.e., for the individualism/collectivism index the Ukrainian score is 13, whereas the score for the Netherlands is 80; higher scores indicate a greater level of individualism).

All students were also told the following: “Try to see this online communication as both a way of exchanging information, ideas/opinions but also as a forum for discussing these with the members of the group. Try to share as much as you can with your fellow students and thus all the information/ideas that you can think of on how to solve the task.” The cultural communicative styles of the participants were expected to affect the extent to which they would present information, reflect upon this, and elaborate upon it. The *Ukrainian students* were therefore explicitly instructed via the IECS to be as direct and specific as possible; to spell things out when talking about a point; and to provide information to support their points of view (e.g., “Speak your mind and focus on the main points when discussing with your group.”). The *Dutch students* were instructed to try to give contextual information when presenting their ideas and to explain the reasoning behind their ideas in order to facilitate the understanding of the presented information.

Final phase. During the final phase of the preparatory collaborative process (Table 5.2, steps 2.3, 3.3, 4.3, and 5), the students were instructed to summarize and synthesize their contributions and discussion to come up with a joint plan to gather the information needed to answer the agreed upon research question and thus complete the group assignment.

Cultural differences might influence how the group members want to reach decisions and conclusions (Nisbett, 2003). The *Dutch students* were therefore instructed via the IECS to be as open as possible while working on the solution to the problem and to consider alternative viewpoints (e.g., “It is possible that there is no concrete answer to this task; be open to see the approaches to the learning task in very diverse ways.”). The *Ukrainian students* were instructed via the IECS to be as specific as possible while integrating ideas to come up with a joint solution to the problem (e.g., “Try to be logical while formulating your joint project plan. Focus on approaches that seem logical and viable for the particular problem when answering the research question”).

All of the students in the group receiving the IECS were further instructed that, even though they may have opinions that differ from each other, assignment success depends on how well these differences are resolved to reach agreement on a project plan.

Measures

Pre- and post-test measures of student attitudes towards online collaboration

A 17 item questionnaire (Thompson & Ku, 2006) was used to measure the attitudes of the students towards online collaboration both before and after the study. The original questionnaire consisted of 18 items, but one item was judged to be irrelevant for the present study and therefore

omitted. Students were asked to indicate the extent to which they agreed or disagreed with statements such as the following (1=Strongly Disagree, 5=Strongly Agree):

- *I feel comfortable providing feedback to my peers.*
- *I really like working in online collaborative groups.*
- *I like to share information and ideas with other learners.*

The Cronbach's alpha coefficients for the reliability of the questionnaire were sufficiently high: .83 at pre-test and .80 at post-test.

Attitudes towards online collaboration were analyzed at the group level. That is, the attitude scores for all members of the group were summed and then divided by the number of members in the group to obtain mean pre- and post-test scores.

Online collaborative behavior

All of the online chats, including text and audio information, were analyzed using the coding scheme of Curtis and Lawson (2001), which has been widely used in studies of computer-mediated collaboration and cross-cultural collaboration (also see Kim & Bonk, 2002; Swigger, Hoyt, Serçe, Victor, & Alpaslan, 2012). Five main categories of online collaborative behavior were identified: planning, contributing, seeking input, reflection/monitoring of medium, and social interaction. Each category of collaborative behavior had several subcategories, which are illustrated in Table 5.4.

Pilot testing of the coding scheme showed it to be applicable to the data collected in this study. Each utterance consisting of mainly phrases and sentences posted by the student and reflecting a specific collaborative behavior was coded. The coding subcategory was mutually exclusive – i.e., only one subcategory was assigned to an utterance. Salutatory and closing utterances were ignored in the coding of the data. Before coding the data, two coders discussed and reached consensus on the definition of each category and its subcategories based on the descriptions and examples presented in Curtis and Lawson (2001). Both the inter-rater agreement between two independent coders (Cohen's $k=0.82$) (Landis & Koch, 1977) and the intra-coder reliability for each coder independently for 10% of the data (90% identical scores) were sufficiently high.

The absolute total scores were determined for each group for every subcategory of collaborative behavior and then divided by the number of members to obtain a mean subcategory score.

Learning performance

At the end of the first week of collaborative work, each group had to give a Power Point presentation of the developed project plan; two or three members of the group did this with always a mix of Dutch and Ukrainian students for each group. Assessment concerned the quality of the students' project plans and not the quality of the presentations per se. Quantitative assessment criteria were developed for this purpose by two environmental science experts: one from each university. The 10 assessment criteria are summarized in Table 5.5.

Each criterion was scored as follows: 1 point = *criterion not met*; 2 points = *criterion partly met*; and 3 points = *criterion met*. Each group's project proposal was immediately assessed following its presentation by a total of four experts, two from each university. The mean score for the 10 criteria was calculated per expert and the mean project score was the mean of the scores from the four experts. A group's project plan was thus assigned a quality score of 1, 2, or 3.

The Cronbach's alpha for the reliability of the coding by the four experts was calculated for the 10 assessment criteria and found to be reasonably good (0.77).

Experiences with CSCL

The so-called Critical Incident Technique (CIT) was used to elicit information on the students' most positive and negative collaborative experiences as well as their use of the IECS and CS within the CSCL environment. In semi-structured interviews, the CIT asks individuals to describe how they behaved in a particular situation and to give reasons for the decisions that they made then. The four-step CIT protocol as developed by Flanagan (1954) was adapted to probe the students' opinions and feelings about their most successful and most challenging collaborative experiences during the online group work in the present study. Students were told that a particular collaborative experience could be considered positive or negative when the interviewee believed that the CSCL experience or a specific aspect of the experience contributed significantly to the project outcome.

To investigate script adherence and the utility of the IECS and the CS, the students were also asked during the interviews if they had indeed followed the instructions and, if so, just how frequently. They were asked what they found particularly useful in the instructions and what they might do differently if they were given a second chance to collaborate in an otherwise similar situation. The students were instructed to fully answer the interview questions, provide specific examples whenever possible, and to take time to think about their responses before stating them.

The first author conducted all of the interviews. At the beginning of each interview, he informed the student that the conversation and their identity would be kept confidential; he also requested permission to record the interview.

Table 5.4 Collaborative behavior coding scheme of Curtis and Lawson (2001) with examples obtained from chat protocols in present study

Main collaborative behavior categories	Subcategories	Examples obtained from chat protocols
Planning	<p><i>Establishing group:</i> encouraging group collaboration and cohesiveness</p> <p><i>Organizing work:</i> creating shared tasks and deadlines; making suggestions</p> <p><i>Initiating activities:</i> scheduling activities to discuss progress and organization of group work.</p>	<p>- We will be working together for two weeks, so let's get the best out of it. Let me know if you do not understand what I say.</p> <p>- We can make a task division with the questions I think. We can do half and you do the other half? There are 1, 2, so 6 for us and 6 for you, 2 per person. Then we exchange. Is this ok with you?</p> <p>- I will prepare a draft of the PowerPoint and upload it so you guys can give feedback and we can do the presentation together on Friday.</p>
Contributing	<p><i>Help giving:</i> responding to questions and requests from others</p> <p><i>Feedback giving:</i> reflecting on partner's contributions and providing feedback on group member's proposals</p> <p><i>Exchanging resources:</i> sharing of resources and information to assist each other in a group</p> <p><i>Sharing knowledge:</i> sharing existing knowledge and information with other group members</p> <p><i>Explaining or elaborating:</i> supporting one's position</p> <p><i>Challenging:</i> challenging the contributions of group members and seeking to engage in debate</p>	<p>- To change the name of the PowerPoint, you need to click on the assignment menu.</p> <p>- I think your idea about policy changes after a nuclear disaster is interesting. Then we have to look closer to the role of the stakeholders in the policymaking</p> <p>- I found a very good website document. It is 245 pages, but we only need chapter 6.2 It is about Management of radioactive waste from the accident in Chernobyl. So it may be handy I think</p> <p>- According to the two articles that I read, we need to focus on the impact of nuclear disasters like Chernobyl and Fukushima for the disposal of nuclear waste.</p> <p>- We need to change the date to 1990-2010 because, in pre-1990 Ukraine, it was not a matter, so it should be considered on the scale of the USSR.</p> <p>- I disagree with you about the reactor type thing because we have to take into account that there are more types of reactors, and thus more types of nuclear waste. What do you think?</p>

Seeking Input	<p>Help seeking: request for assistance from group member(s)</p> <p>Feedback seeking: seeking feedback on a position advanced</p> <p>Advocating efforts: urging others to contribute to the group effort; requesting information</p>	<p>- Do you know how to upload a Word document in this program? I can't find a chapter on the effects of different levels of radiation on plants in the Hinton article.</p> <p>- Do you agree with the first subquestion? - because then in the Netherlands there was a lot of protest. I don't know how that was in the Ukraine..?</p> <p>- When do you think that you can get the information on policies? We need to know if it is possible, and which plant we can use to compare.</p>
Reflection/ Monitoring	<p>Monitoring group effort: comments about group process and achievements</p> <p>Reflecting on medium: comments on the effectiveness of the medium for supporting group activities</p>	<p>- We are almost done; we only need to add a report on the environmental impact of Chernobyl, and it also needs to contain information on pine trees.</p> <p>- Yes, but I hear some echo. Maybe you can increase the volume of your microphone so we can hear you better.</p>
Social interaction	<p>Off-task comments: conversation about social matters unrelated to group task; this type of activity may help to "break the ice"</p>	<p>- I don't understand how it is possible — to be an environmental scientist but also afraid of insects - studying is sometimes nice and fun... but not always... - the weather now is +35 C.</p>

Table 5.5 Quantitative criteria for assessment of group learning performance

Criteria	Criteria met (1 point = <i>criterion not met</i> ; 2 points = <i>criterion partly met</i> ; and 3 points = <i>criterion met</i>)
Development of research question	
1	Clearly defined the specific niche/focus within the group's topic
2	Research question is specific and answerable
3	Research question includes elements from lectures and literature provided
4	Regarding space, research will focus on a specific location, country.
5	Regarding time, research will address a specific event or developments across a year, decade, or century
6	Good development of the research question shown in arguments that are based on theory or literature and lecture materials
Development of strategy (data plus approach) to answer research question	
7	Feasible plan to answer the research question
8	Clearly defined source to provide information to support group's arguments
9	Clear explanation of how to find additional information needed by the group
10	Elaboration of questions to ask expert

The recordings of the interviews were transcribed, and their content further coded using the inductive thematic analytical technique as described by Hayes (2000). Meaningful units in the interviewees' responses to the interview questions were identified, and those selections of text addressing the same meaningful units were then grouped together to identify important themes. The relative importance of various aspects of the students' CSCL experiences could be identified in such a manner and compared across groups. The inductive thematic analysis resulted in 7 categories. These 7 categories largely corresponded to the topic areas in the interview schedule and they were the following: (1) the most successful intercultural CSCL experience, (2) miscommunication, (3) technical problems, (4) level of English proficiency, (5) coordination difficulties, (6) script adherence and the utility of using the IECS or the CS, and (7) students' beliefs about strategies for successful collaborative learning. All transcripts were coded by two coders to ensure the coherence and replicability of the themes. To assess inter-

rater reliability, Cohen's kappa was calculated for each of the 7 categories. For each category, the resulting kappa indicated good or very good agreement between the two coders (Landis and Koch, 1977), ranging from .74 to .88.

Control information

The online technologies self-efficacy scale (OTSES), which has been shown to have good construct validity and internal consistency, was used to assess the technical/computer skills necessary for working with the Web conferencing system (Miltiadou & Yu, 2000). Some of the items were slightly updated from 12 years ago (e.g., "I would feel confident opening a Web browser such as Mozilla Firefox or Explorer" instead of the Netscape). In the present study, the Cronbach's alpha reliability coefficient was .79 for the 30-item instrument. The OTSES scale scores can range from 30–120. The minimum OTSES score in the present study was 63; the maximum was 120 ($M=101.65$, $SD=14.62$).

To gain insight into the prior experiences of the students with working together in person, collaborating online, and intercultural collaboration, they were asked to rate the extent of their experience along a five-point scale (1 = *very little*; 5 = *very much*). They were asked what the collaborations involved (e.g., joint problem solution, peer learning, attaining a shared goal. They were asked about prior international experience (e.g., previous travel experiences, internships, travel outside the home country for academic or non-academic purposes).

The level of the students' prior domain knowledge was assessed by asking which courses they had attended. Researchers were aware of the contents of the courses, it was possible to assess students' level of relevant domain knowledge at least indirectly. Both the Dutch students and the Ukrainian students followed courses concerned with Ecology and the Biosphere, and Sustainability Transitions but none of the students had previously followed a course directly related to radioactivity and nuclear power theme.

Analyses

Analyses of variance were conducted to compare the control measures for the two conditions. Chi-square tests were used to test whether the distributions of males and females within the two conditions were equivalent.

Due to the small sample sizes per condition, further inferential statistics could not be applied. The descriptive statistics for attitudes towards online collaboration, online collaborative behavior, and performance were compared across conditions. In addition, the results of the qualitative content analysis of the interview transcripts revealed several key themes for comparison.

The individual was adopted as the unit of analysis for the control variables to show comparable compositions of the groups with regard to age, gender, and prior collaboration experience. Student attitudes towards online collaboration, online collaborative behavior, and performance clustered within groups and were therefore analyzed at the level of the group (Kapur, 2008; Stahl, 2010).

RESULTS

Control measures

No significant differences were found between the IECS and CS conditions with respect to age, $F(1, 45)=.69, p=.41$, computer skills, $F(1, 45)=.29, p=.59$, or prior collaboration experience, $F(1, 45)=.36, p=.54$. The distribution of males and females was also similar across the two conditions (Chi-square=2.65, $df=1, p=.13$).

Attitudes towards online collaboration

At post-test, the students who had used the IECS were more positive towards online collaboration (pretest $M=3.68, SD=.13$; posttest $M=3.77, SD=.11$) while the students who has used the CS were less positive than at pre-test (pretest $M=3.58, SD=.20$; posttest $M=3.38, SD=.14$).

Online collaborative behavior

For the frequency of utterances reflecting the Planning category of collaborative behavior (i.e., the subcategories of Group, Organizing work, and Initiating activity), there were noticeable differences between the culturally heterogeneous groups of students using the IECS ($M=8.89, SD=7.98$) versus those using just the CS ($M=11.13, SD=5.61$). Specifically, the groups in the IECS condition showed a lower frequency of Initiating activities and Organizing behavior than the groups in the CS condition (see Table 5.6).

There were also differences in the frequencies of utterances indicative of the Contributing category of collaborative behavior ($M=20.24, SD=5.43$ for IECS; $M=11.91, SD=7.05$ for CS). The groups in the IECS condition demonstrated a higher frequency of the Feedback giving, Sharing knowledge, and Explaining than the groups in the CS condition (see Table 5.6).

For the Seeking input category of collaborative behavior, the groups in the IECS condition ($M=12.06, SD=5.13$) exhibited a lower frequency than the groups in the CS condition ($M=14.36,$

Table 5.6 Means and standard deviations for frequencies of collaborative behavior categories and subcategories according to condition

Collaborative behavior main categories and subcategories	IECS		CS		Total	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Planning	8.89	7.98	11.13	5.61	9.97	6.50
Group	.08	.16	0.07	.14	.07	.13
Organizing Work	6.18	5.25	7.74	2.99	6.96	4.05
Initiating Activities	2.63	2.94	3.32	2.59	2.97	2.59
Contributing	20.24	5.43	11.91	7.05	16.08	7.33
Help Giving	2.41	2.84	2.16	2.39	2.28	2.43
Feedback Giving	6.91	6.06	5.19	3.01	6.05	4.54
Exchanging Resources	.74	.87	.25	.31	.49	.66
Sharing Knowledge	2.46	1.85	1.41	1.96	1.93	1.85
Challenging	1.68	1.84	.49	.43	1.08	1.39
Explaining	6.04	3.44	2.41	2.11	4.22	3.28
Seeking Input	12.06	5.13	14.36	7.32	13.21	5.98
Help seeking	1.83	1.97	1.16	1.49	1.49	1.66
Feedback seeking	7.66	1.78	9.11	6.71	8.38	4.61
Advocating efforts	2.57	2.00	4.09	1.66	3.33	1.88
Reflection/Monitoring	3.15	1.12	3.74	.83	3.45	.97
Monitoring group effort	.41	.62	.35	.47	.38	.51
Reflecting on medium	2.74	1.10	3.39	.95	3.07	1.01
Social Interaction	7.42	3.71	9.27	7.72	8.34	5.69

IECS = Intercultural Enriched Collaboration Script; CS = general Collaboration Script.

$SD=7.32$). Lower frequencies of Feedback seeking and Advocating effort were apparent for the groups in the IECS condition compared to the groups in the CS condition (see Table 5.6).

Comparable patterns were found for the groups in the IECS condition and the CS condition on the collaborative behavior category of Reflection/Monitoring.

For the Social interaction category of collaborative behavior, the groups in the IECS condition ($M=7.42$, $SD=3.71$) showed a lower frequency of occurrence than the groups in the CS condition ($M=9.27$, $SD=7.72$) (see Table 5.6).

Learning performance

Higher scores were obtained for the project plans in the IECS condition ($M=2.55$, $SD=.31$) than in the CS condition ($M=1.89$, $SD=.22$).

Reported CSCL experiences

In addition to the quantitative analyses, we conducted a qualitative analysis of the interview data to gain insight into the experiences of the students with the use of the IECS versus the CS in a CSCL environment.

With regard to the students' opinions and feelings about the — in their opinion — most successful intercultural collaborative work experiences, 16 out of 20 interviewed students reported that they liked the idea of being able to interact at a distance and learn from international peers with different perspectives on subject matter. They also reported that one of the most successful experiences was the discussion part and working through misunderstandings to create a joint project plan that combines different viewpoints and pieces of information.

With regard to the students' opinions and feelings about the most challenging experiences, the following categories emerged from the interview data: (a) miscommunication, (b) technical problems, (c) level of English proficiency, and (d) coordination difficulties. Out of 20 interviewed students, 12 (i.e., 4 in the IECS condition and 8 in the CS condition) mentioned situations in which the intended meanings of online postings were misinterpreted or could not be understood. The following misunderstanding is illustrative.

Dine (Dutch student from the CS condition)²: *Sometimes what they wrote had a different meaning. For example, to measure the level of radioactivity in some food products, they asked us to bring cucumbers for the second week, 200 grams of dry weight. But a cucumber consists of 96% water. So, we thought we needed to bring like 20 kilograms of cucumbers, which was not possible. But what they actually meant is 200 grams of dry, fresh, in good condition cucumbers; a total of 2 or 3.*

More than half of the interviewed students expressed technical frustrations concerned with the quality of the video and audio, the time lag between responses from group members, and people speaking at the same time.

Predominantly the students from the Netherlands (3 in the IECS condition and 5 in the CS condition) mentioned that the other members of the group (i.e., the Ukrainian members) provided overly short responses because, in their opinion, the Ukrainian students were not comfortable speaking English.

Jack (Dutch student in the IECS condition): *A language barrier was an issue for the Ukrainians. Maybe they are afraid of making mistakes when speaking a*

² Here and in all subsequent interview excerpts, we present the student's alias, cultural background, and script condition prior to the excerpt. All of the interview excerpts are direct quotes.

foreign language. Once I asked one of my Ukrainian teammates if she wanted to add something to the presentation. She replied: “50/50.” She could have said “Yes” or “No,” but not 50/50; it was confusing for me.

While miscommunication and technical problems were themes raised by almost all of the interviewed students, 8 of the students the CS condition and 2 in the IECS condition noted coordination difficulties as well:

Olga (Ukrainian student in the CS condition): Different perceptions of how to deal with the task. It was hard to come to an agreement on who will do what. Also, it took us some time to figure out what is important and what aspect would be interesting to research.

With regard to script adherence and the utility of using the IECS or the CS for CSCL, 4 Dutch and 3 Ukrainian students in the CS condition said that the script was useful because it provided an overview of the collaboration and helped the members of the group agree upon a course of action. A typical response was:

Victor (Ukrainian student in the CS condition): It was very handy to have a clear understanding the order in which we were going to do things. In the discussion, it was important to make sure that we were on the same level. If we had not had a guideline, it would have been even harder to get on the same level.

In contrast, 1 Dutch and 2 Ukrainian students from the same condition reported that they thought that the CS was unnecessary or that they simply did not follow it because “...in such a short time, you just go your own way to get the things done,” “...there are differences in how to work together, you just need to accept those differences,” or “...we rushed into the task and skipped several steps from the guideline.”

Out of the 10 interviewed students who participated in the IECS condition, 4 Dutch and 4 Ukrainian students reported that the instructions helped them get on with the task and how to approach group members. According to the students, they referred to the script once or twice per collaboration step on average.

Kate (Dutch student in the IECS condition): It was very good to have a guideline. I read through the instructions and said I would try. Especially when I was struggling with what to do next, I just looked it up. But I have to say that some people need those instructions more than others. For example, sometimes my Dutch group members asked “What shall I say, what shall I talk about?”. They needed a little bit more guidance than I did.

Two of the 10 interviewed students in the IECS condition reported that they did not follow the instructions for reasons similar to those mentioned for the CS condition.

When asked what they would do differently if given a second chance to collaborate in an otherwise similar situation, the students suggested the following points: "...after two days of collaboration, students should reflect together with teachers on the group process and provide feedback on how to improve the group process"; "...improve the quality of the video and audio to speed the flow of communication"; "use Skype as an alternative communication platform because most students are already familiar with this program, which is not the case for Adobe Connect"; "...make the collaboration longer than a week"; and "make the group smaller in order to increase involvement of all members."

DISCUSSION

To evaluate the effects of using an IECS in a CSCL environment, we first examined the attitudes of students towards online collaboration before and after use of an IECS versus a general CS. The results showed the different groups to have roughly the same attitudes towards online collaboration at pre-test. At post-test, however, the students in the IECS condition tended to have more positive attitudes toward online collaboration in culturally heterogeneous groups than the students in the CS condition. It is thus possible that the students in the IECS condition did not experience as many challenges or barriers as the students in the CS condition and that, as a result of this, they developed a more positive attitude towards online collaboration as well. This would be in line with previous research showing the collaborative learning experiences of students to affect their attitudes towards online collaborative learning (e.g., Lizzio, Wilson, & Simons, 2002; Zhao & McDougall, 2008; Zhu, 2009).

In contrast, the attitudes of the students towards online collaboration in the CS condition were less positive at post-test than at pre-test. The interview data showed the students in the CS condition to experience more communication and coordination difficulties than the students in the IECS condition, which can impede group dynamics (Anderson & Hiltz, 2001). Decentralized thinking, divergent compliance with the required collaborative learning activities, and disagreement on the course of action may arise and result in the report of less positive collaborative experiences and attitudes towards online collaboration in the end.

The use of the IECS did not produce changes that were substantial in the attitudes of the students towards online collaboration. Although attitudes are generally not considered stable and can thus be seen to be susceptible to social influences (e.g., the opinions and behavior of others), individuals nevertheless strive to be consistent and avoid cognitive dissonance (i.e.,

discrepancies between thought and deed) (Eagly & Chaiken, 1995). Thus, attitudes change slowly and therefore that major changes within a very short period of time cannot and should not be expected. Additional research is therefore needed to see if students' attitudes towards online collaboration may change more strongly in longer-term studies and/or with more extended exposure to positive online collaboration experiences.

With regard to the students' online collaborative behavior, the students in the IECS condition displayed a higher frequency of Feedback giving, Sharing knowledge, and Explaining behavior than the students in the CS condition but a lower frequency of Initiating activities, Organizing work, Feedback seeking, Advocating effort, and Social interaction. These differences can be attributed to specific aspects of the scripts that were used in the two conditions and the IECS instructions in particular. The relatively low frequency of Initiating activities and Organizing work in the IECS condition can be attributed to the IECS fulfilling a coordinating function. The instructions provided by the IECS reduced the organizational needs of the relevant groups. In keeping with this, the students in the CS groups more frequently sought feedback from the group and had to urge group members to contribute to the group effort than the students in the IECS groups, which suggests that the groups in the CS condition regularly needed more postings to agree upon a course of action than the groups in the IECS condition.

With regard to the students' online collaborative behavior during the main collaboration phase of the project planning, the students were instructed to share information and ideas on how to solve the task with their fellow group members. The IECS instructions *explicitly* encouraged the Dutch students to share as much information as they could and also allow group members sufficient time to reflect and respond. The IECS instructions *explicitly* encouraged the Ukrainian students to feel free to disagree with the opinions of group members and be as direct and as specific as possible when doing this. Together, these IECS instructions elicited a greater circulation of information as reflected by more Feedback giving, Sharing knowledge, and Explaining behavior than the instructions in the CS condition.

It should be noted that the students in both conditions had conversations about social matters. However, the students in the CS condition showed a greater exchange of utterances for social interaction throughout the collaborative task than the students in the IECS condition. Presumably due to the social exchanges at the start of the IECS condition, the students in this condition were later more task-focused than the students in the CS condition.

With regard to our third research question about the possible differences in learning performance between the students working in culturally heterogeneous groups using IECS versus CS instructions, the groups in the IECS condition attained higher scores for their project plans than the groups in the CS condition. Previous research on CSCL has shown learning outcomes for a group to depend on the quality of the collaboration in the group (Lipponen,

2002). Compared to the groups in the CS condition, the groups in the IECS condition showed higher levels of Feedback giving, Sharing knowledge, and Explaining interactions — or the types of interactions that have been shown to be conducive to learning (Andriessen, Baker, & Suthers, 2003). Studies using larger sample sizes and thereby inferential statistics are nevertheless needed to verify this finding.

With regard to the fourth research question about the CSCL experiences of the students and the usefulness of an interculturally-enriched collaboration script. The majority of the Dutch students closely examined the offered script — either the IECS or the CS — while the majority of the Ukrainian students did not do this to the same extent. The Ukrainian students reported repeatedly referring to the script for help with their communication. According to the interviewed Ukrainian students, they mostly consulted two parts of the scripts as most helpful: (1) the general instructions on WHAT to do and (2) the IECS instructions on HOW to perform a particular subtask. The WHY part of the IECS scripts in which the reasons for conducting a particular subtask are explained was reported as uninteresting by most of the interviewed students because the goal of the assignment as a whole was sufficiently clear and the students therefore focused on completion of the assignment. Also, a substantial number of students in both conditions reported the three-step organization of the collaboration process to be quite helpful: (1) individual work, (2), discussion with group members, and (3) discussion and integration of input.

As expected, the Dutch students in our study mostly concentrated on the content of the learning process and were more task-oriented than the Ukrainian students who showed more “small talk” in order to establish, confirm, maintain, and develop group cohesion. In the Ukrainian group of students, there were some with weak English language skills — as indicated by the interviews and chat protocols. Language problems can certainly impede intercultural collaboration and learning outcomes. Also due to the uneven English language skills of the Ukrainian students and a more collectivist attitude towards group work among the Ukrainian students than among the Dutch students, the Ukrainian students with weak English language skills would mask their deficiencies by “saddling” the stronger students in the group with parts of their responsibilities.

CONCLUSION

In this chapter, we present the results of an exploratory study of the effectiveness of an interculturally-enriched collaboration script relative to a general collaboration script to facilitate computer-supported collaborative learning. We examined the attitudes of students towards online collaboration before and after participation in the study, their online collaborative

behavior during the study, and both group performance and experiences of the students following the study. We conclude that a well-designed IECS script can facilitate collaboration and help collaborating students bridge culture-related differences.

Additional experimental investigations using larger sample sizes are needed to confirm the present results. Smaller groups of more culturally heterogeneous students or even dyads might also be studied. In the present study, students from only two cultures collaborated in groups of six; generalization on the basis of the present findings is, thus, limited.

Cultural background proved to be an important factor, as expected, in the present study. Cultural background should nevertheless not be overestimated or treated as an absolute research parameter in light of other research suggesting that individual, personal characteristics can also play a role and sometimes prevail over cultural background during collaborations involving people with different backgrounds (Ting-Toomey, Oetzel, & Yee-Jung, 2001). It is therefore recommended that the contributions of both individual and cultural characteristics to the online collaboration of culturally heterogeneous groups be examined in future research.

It is also recommended that more extended online collaboration be examined in the future. The duration of the present intervention was brief, which means that the effects may have been limited in addition to the period of data collection and observation.

The present results provide a better understanding of collaborative learning in culturally heterogeneous groups of students in higher education. The cultural backgrounds of students, for example, provide an indication of what their attitudes towards online collaboration may be and what collaborative behaviors can be expected on their part. Collaborative tasks can and should therefore be tailored to the expected interaction process and to help students working in an online learning environment. Not only educators and learners but also machine learning techniques can be used to do this by identifying problems that actually or might occur in the intercultural conversation and working to prevent these with — for example — adaptive scripting as developed by Gweon, Rosé, Zaiss, and Carey (2006). The present study provides insight for the design of collaboration scripts for use in an online, intercultural environment. For example, social interaction should be fostered via informal introductions and the exchange of personal profiles. Similarly, critical discussion that includes concrete feedback and sufficient time to reflect should be encouraged. All of this can be done with the use of an interculturally-enriched collaboration script but also a general collaboration script that scaffolds the online collaboration between the members of a group. And providing a more or less set sequence of activities for the collaborating students to follow as part of the script instructions can minimize the amount of effort required to coordinate the collaborative learning process. Nevertheless, additional studies using a similar experimental set up but with larger sample sizes are needed to provide more definitive evidence for both the theoretical and practical aspects of using an IECS to promote CSCL.



Chapter 6

**Effects of an interculturally-enriched
collaboration script on student attitudes,
behavior, and learning performance
in a CSCL environment**

ABSTRACT

To foster collaboration in general and bridge intercultural differences when working in a computer-supported collaborative learning (CSCL) environment in particular, this study introduced an interculturally-enriched collaboration script (IECS). A randomized, two group, pretest-posttest research design was used to compare the effects of the IECS with the effects of a general collaboration script (CS). The outcome variables were student attitudes towards online collaboration, online collaborative learning behavior, and learning performance within the culturally heterogeneous groups working in a CSCL environment. A total of 74 masters students representing 22 countries worked in dyads on the environmental problem of biodiversity collapse. The IECS positively affected student attitudes towards online collaboration and their online collaborative learning behavior but not their learning performance. The dyads in the IECS condition used more frequently concepts concerned with solutions to the problem than the dyads in the CS condition. The IECS can thus be used to improve collaboration across cultures and distance in education.

INTRODUCTION

Since the 1990s, many studies have aimed to provide insight into the use of Computer-Supported Collaborative Learning (CSCL) to develop educational practice (Stahl et al. 2006). In CSCL, two or more students work together to solve problems or build knowledge with the aid of specially designed software (Prinsen et al., 2007). Collaborative problem-solving is a sequenced process, typically involves three phases: problem orientation, problem solution, and solution evaluation (Ploetzner et al., 1999). Each phase has specific objectives and requires specific types of interactions to be effective (Hmelo-Silver et al., 2007). CSCL groups may face various difficulties in these three phases (e.g., turn-taking, managing time, task distribution, giving and receiving feedback, etc.).

To address the problems experienced with CSCL, several instructional approaches have been developed and their influences on collaboration and learning been documented (e.g., Dillenbourg & Jermann, 2007; Kirschner et al., 2004; Rummel & Spada, 2005; Weinberger et al., 2005). The use of so-called *collaboration scripts* has been found to be very valuable in recent CSCL research. Such scripts are intended to “promote productive interactions by designing the environment such that suggestions of different degrees of coercion are made to the collaborating students, engaging them in specific activities that otherwise might not occur” (Weinberger, 2011, p. 190). And overviews of the relevant research can be found in Fischer et al., 2013; Kollar et al., 2006, and Weinberger et al., 2005).

The students in a collaborative learning situation obviously hold unique patterns of thinking, feeling, and acting. Cultural diversity further complicates the collaborative learning situation, which often requires management of collaboration that may be both intercultural and virtual (Cox et al., 1991; Gunawardena et al., 2001; Weinberger et al., 2007). While recent research has shown collaboration scripts to effectively support online (i.e., virtual) collaboration, we have little knowledge of how collaboration scripts can be designed to help culturally diverse groups of students achieve the rewards of working collaboratively. We know that culture influences individuals’ social behavior, attitudes, communication, and cognition, but we do not have ground rules for promoting online collaborative learning in groups that are culturally diverse. The development of CSCL scripts where cultural differences will, at the very least, be accommodated and perhaps even leveraged effectively to promote learning can fill this gap.

The objective of the present study was therefore to 1) design an Interculturally-Enriched Collaboration Script (IECS) for use in a CSCL environment and 2) document the effects of using this IECS on the attitudes towards online collaboration, collaborative learning behaviors, and learning performance of students working in culturally heterogeneous groups. The IECS was developed on the basis of previous research concerned with the use of collaboration scripts

for CSCL and intercultural learning (e.g., Cox et al., 1991; Rummel & Spada, 2005; Vatrappu & Suthers, 2007; Weinberger et al., 2007). A randomized, two group, pretest-posttest research design was adopted to evaluate the effects of using the IECS.

CSCL and the influence of culture

The main purpose of CSCL is to promote online collaboration between students and thereby improve their learning and facilitate group cognition (Kreijns et al., 2003; Stahl, 2010). This kind of learning is characterized by the negotiation of meaning and thus the sharing and construction of knowledge among students working together with the help of technology. Although CSCL offers great opportunities (e.g., development of collaboration skills and cognitive strategies; see Lehtinen et al., 1999 for review), its potential is difficult to realize because an online environment alone does not solve many of the challenges of collaborative learning (Lipponen, 2002). For this reason, a collaboration process is often structured and the collaborating students are given additional guidance (van Bruggen et al., 2003).

Previous research on CSCL indicates that collaborative problem solving is considered as a sequenced process, incorporating usually the following three phases: problem orientation, problem solution, and solution evaluation (Ploetzner et al., 1999; Slof et al., 2010). In the problem orientation phase, collaborating students orient themselves to the learning task, become aware of each other's background and establish a shared understanding of the problem. In the problem solution phase, students elaborate their points of view, discuss their points of view, reflect, and explain different discourse topics related to a learning task in question. In the solution evaluation phase, students strive to find the most viable problem solution by gauging all options based on specific evaluation system or criteria (e.g., making calculations, fitting data to a model). These phases can be repeated and re-entered, i.e., students may go through the processes again or return to them if necessary.

Students differ in how they collaborate and comply with the activities required for collaboration (Rummel & Spada, 2005). Student attitudes towards online collaboration have been found to be one of the key determinants of the success of educational activities requiring online collaboration (Zhu, 2009). Attitudes towards online collaboration can be defined as learners' perspectives, feelings, and expectations with regard to online collaboration and seen to influence their learning (So & Brush, 2008). Culture can be similarly defined as "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) and seen to influence the way in which individuals perceive learning and construct knowledge (Woodrow, 2001). Within the

context of online collaborative learning, thus, culture can influence student perceptions of the collaborative learning process, their behavior in the group, and their online communication (Cox et al., 1991; Shi et al., 2013; Vatrappu, 2008; Weinberger et al., 2007; Wertsch, 1998).

The differing attitudes, perspectives, feelings, and expectations of students from divergent cultures working within a CSCL environment can lead to discrepant viewpoints at times (Vatrappu, 2008; Weinberger et al., 2007; Wertsch, 1998; Zhu, 2009). Liang and McQueen (2000), for example, showed groups consisting of Asian and Western members to have very different expectations for learning in groups and expectations for the role of teachers under such circumstances. Most of the Asian students in this study were more teacher-oriented and likely to rely on teacher directions than the Western students who tended, themselves, to be more peer-oriented and positive towards online peer interaction. Similarly, when Wang (2007) compared the perceptions of online collaborative learning, and the comfort level within teacher-student interactions for students from China, the U.S.A., and Korea, they found the participation of Korean and Chinese students in online discussions to mainly depend on course requirements. In contrast, the American students reported liking the connection with their peers and the Korean students exhibited less of a preference for online collaborative learning than the American and Chinese students.

Student attitudes towards online collaboration may influence their learning behaviors. While accomplishing a task collaboratively students from various cultures differ in terms of their procedural knowledge of how to collaborate and learn together (Weinberger et al., 2007; Cox et al., 1991). Previous research suggests that collaborative learning behaviors are integral activities of joint problem-solving, and group composition has been found to play a crucial role in such collaboration (Zhu, 2009). The Individualist - Collectivist (I-C) cultural orientation as put forth by Hofstede (1991) has been widely used to describe what appear to be culturally-based differences in collaborative group processes (e.g., Cox, 1991; Goncale & Staw, 2006; Oetzel, 2001). Research replicating and supporting the robustness and validity of Hofstede's cultural framework is large in scope and number, exceeding more than 1500 published studies (Metcalf & Bird, 2004). The I-C cultural orientation identifies: (1) the degree of dependence on the self (individualists) versus the group (collectivists); (2) attitudes towards goals with individualists geared specifically towards personal goals and collectivists geared towards group success; and (3) behavioral motives with collectivists tending to act on the basis of a shared group identity, social norms, and commitments to a group while individualists tend to act on the basis of their own values, beliefs, and motives (Hofstede, 1991; Triandis, 1994; Shamir, 1990).

The I-C cultural orientation has been widely used in educational research to describe culturally-based variation in learning styles (e.g., Cox et al., 1991; Oetzel, 2001). It has similarly been used to investigate the functioning of culturally diverse students involved in online learning

environments and the results attained during the three phases of a collaborative problem-solving learning process as summarized in Table 6.1.

I-C differences can affect the flow of discourse and transactivity of talk, which can in turn determine the extent of student involvement in a collaborative learning process and degree to

Table 6.1 Summary of differences found in orientations towards the collaborative learning process

Phases in the collaborative problem-solving process	Individualists	Collectivists	Literature sources
<i>Social introduction and problem orientation phase</i>	Nature of task-related behavior		
	<i>Task oriented</i> Individualists tend to exhibit more task-oriented activities and focus on content-related background of group members.	<i>Relationship oriented</i> Collectivists tend to focus more on aspects related to group norms and group relationships.	Economides, 2008; Cox et al., 1991; Chan & Watkins, 1994; Oetzel, 1999; Phuong-Mai et al., 2005, 2006; Shi et al., 2013; Tapanes et al., 2009; Weinberger et al., 2007.
<i>Collaborative problem-solving phase</i>	Nature of conflict-related behavior		
	<i>Competitive behavior</i> Individualists are more likely to exhibit competitive behavior focused on personal achievement.	<i>Cooperative behavior</i> Collectivists are more likely to avoid conflicts and demonstrate predominantly cooperative behavior.	
<i>Solution evaluation phase</i>	Nature of social and cognitive behavior		
	<i>Open to disagreement</i> Individualists are more inclined to identify and discuss conflicts in knowledge and beliefs. They tend to have more opinions independent of group members.	<i>Preference for consensus</i> Collectivists are more inclined to identify and discuss point of consensus. They tend to conform and try to be consistent with their collaborative partners.	Chang et al., 2002; Gudykunst et al., 1996; Gunawardena et al., 2002; Hall & Hall, 1990; Oetzel et al., 2000; Phuong-Mai et al., 2005, 2006; Salili, 1996; Setlock et al., 2004; Shi et al., 2013; Tapanes et al., 2009; Vatrappu & Suthers, 2007.
<i>Solution evaluation phase</i>	Type of communication style		
	<i>Direct</i> Individualists tend to structure their online contributions in an explicit, direct manner with a focus on main points. They also tend to be more literal.	<i>Indirect</i> Collectivists tend to be indirect and implicit. They place greater emphasis on context and details than on main issues and explicitness.	
<i>Solution evaluation phase</i>	Nature of reason-giving		
	<i>Analytical</i> Individualists tend to argue for a more differentiated, analytic solution that also seems most logically viable.	<i>Holistic</i> Collectivists prefer a final solution that is highly inclusive.	Nisbett & Norenzayan, 2002; Salas et al., 2004; Vatrappu, 2008.

which students refer to each other and build upon each other's contributions during this process (Weinberger et al., 2007). As might be expected, it has been shown that students coming from collectivist cultures are more likely to stress the interpersonal relations between members of the group and cooperative actions aimed at collective goals (Cox et al., 1991; Phuong-Mai et al., 2006) while students from individualist cultures stress mostly task-related activities and personal goals (Chen & Starosta, 1998; Oetzel, 2001; Triandis, 1994). In more recent research, Vatrappu and Suthers (2007) claimed that students from individualist cultures are likely to see the collaborative learning environment as a medium to jointly identify problems and discuss conflicts in knowledge beliefs. Students from collectivist cultures, in contrast, are more likely to view the collaborative learning environment as a place to share information and explanations (Economides, 2008; Gunawardena et al., 2002; Oetzel et al., 2000; Vatrappu & Suthers, 2007). Cultural differences in reasoning may then, in turn, influence how the members of a group reach decisions and draw conclusions during collaborative learning activities (Nisbett et al., 2001; Nisbett & Norenzayan, 2002).

Finally, research suggests that the learning gains of individual students or groups of students from collaboration are also shaped (i.e., mediated) by their attitudes towards collaboration and their behavior during a collaborative learning activity (e.g., Kim & Bonk, 2006; Lim & Liu, 2006; Lizzio et al., 2002; Zhu, 2009; Zhao & McDougall, 2008). Successfully solving collaborative problems requires students actively engage in a process to actively make sense of the subject matter by articulating relevant concepts, considering multiple perspectives, and discussing alternative solutions to the problem (Slof et al., 2010). Early CSCL research focused on the quality of individual learning results and/or collaborative learning products but often overlooked the fact that the outcome is mediated by the quality of the group learning process itself (Lim & Liu, 2006). The many social and cultural factors that can significantly influence the interaction process have yet to be taken into account when studying CSCL (Popov, Biemans, Brinkman, Kuznetsov, & Mulder, in press; Weinberger et al., 2007). And there is very little research comparing the learning performances of students from different cultures when working together in a CSCL context (for exceptions, see Shi et al., 2013; Vatrappu, 2008; Zhu et al., 2009).

Collaboration script as a means to foster online collaboration

There is a well-documented body of CSCL research that reports the effectiveness of using collaboration scripts to stimulate/support online collaboration (for overviews, see Fischer et al. (2013) and Kollar et al. (2006)). The use of collaboration scripts in a CSCL context can be viewed as providing scaffolding and thus guidance of students with regard to the learning task, the roles that must be played, and the sequence in which particular activities should be undertaken (Carmien et al., 2007). By following script instructions, specific interaction beneficial for the

collaborative task performance can be initiated (Kolodner, 2007). The collaborative script may be presented via teacher instructions (e.g., oral presentation, handout materials) or the learning environment itself (e.g., online text, cues, prompts, graphic representations).

When Rummel and Spada (2005) integrated empirical findings regarding effective communication and computer-mediated collaboration, they were able to introduce an approach that subsumed the processes necessary for successful collaborative problem-solving. The initial, main, and final processes in this approach correspond to the three phases previously identified for collaborative problem-solving, namely: problem orientation, problem solution, and solution evaluation. Each of the three phases/processes includes a three-step cycle that entails (a) elicitation (i.e., individual work, which allows collaborative partners to bring in their own knowledge and ideas), (b) explication (i.e., discussion of individual ideas to ensure exchange of any unshared information, and (c) integration (i.e., combining of individual proposals to attain a joint solution). All of the phases and subcomponents require online collaborative behavior and are intended to structure the problem-solving process to make it efficient and effective (Slof et al., 2010).

In addition to the need for a general collaboration script to guide the online solution of collaborative learning tasks, the results of studies concerned with the roles of intercultural differences between students in collaborative learning processes and online collaborative learning processes in particular (see Table 6.1) suggest that additional guidance may be needed at times. An Interculturally-Enriched Collaboration Script (IECS) that is supplemented with critical intercultural elements is thus called for by CSCL environments.

Research questions

With the present empirical research, we provided answers to the following three questions.

RQ1 Does the influence of an interculturally-enriched collaboration script on the attitudes towards online collaboration differ from that of a general collaboration script for culturally heterogeneous groups of students working in a CSCL environment?

RQ2 Does the influence of an interculturally-enriched collaboration script on the online collaborative learning behavior measured in terms of categories and patterns of behavior differ from that of a general collaboration script for culturally heterogeneous groups of students working in a CSCL environment?

RQ3 Does the influence of an interculturally-enriched collaboration script on the learning performance differ from that of a general collaboration script for culturally heterogeneous groups of students working in a CSCL environment?

METHOD

Participants

First year students enrolled in an Environmental Sciences Master's program at a university in the Netherlands participated in this study. The total sample of 74 included 18 Dutch students and 56 international students; 53% of the students was female. The age of the participants ranged from 19 to 37 years, with a mean of 24 years ($SD=3.2$); 96% of the participants were under the age of 30.

Of the international students, 18 came from Europe, 6 from Africa, 25 from Asia, 6 from South America, and 1 from North America. The total number of countries represented in the study was 22. And 98% of the international students had only arrived in the Netherlands two or three weeks prior to the conduct of this study. All of the participants had demonstrated English language proficiency.

The cultural backgrounds of the students were determined by asking them to indicate their country of origin during the introductory session. The countries of origin were then coded using the individualist-collectivist cultural orientation of Hofstede's individualism (IDV) index (see Hofstede et al., 2010). The ratings were standardized and set into a range from 0 (most collectivist) to 100 (most individualist). Students from countries with low IDV scores (≤ 48) versus high IDV scores (≥ 58) were then identified for further comparison. It should be noted that Hofstede's cultural value scores as a proxy are widely accepted and adopted for quantification of the cultural differences between countries (Tihanyi et al., 2005; Murray-Johnson et al., 2001; Popov, Brinkman, Biemans, Mulder, Kuznetsov, & Noroozi, 2012).

Research design

A randomized, two group, pretest-posttest research design was used to assess the effects of an IECS versus a general CS on culturally heterogeneous groups of students working in a CSCL environment (see Figure 6.1). The participants were randomly assigned to one of two conditions (i.e., IECS or CS), but it was further ensured that each dyad was composed of one student from a country with an individualist cultural orientation and one from a country with a collectivist cultural orientation. The students in each of the dyads did not know each other beforehand.

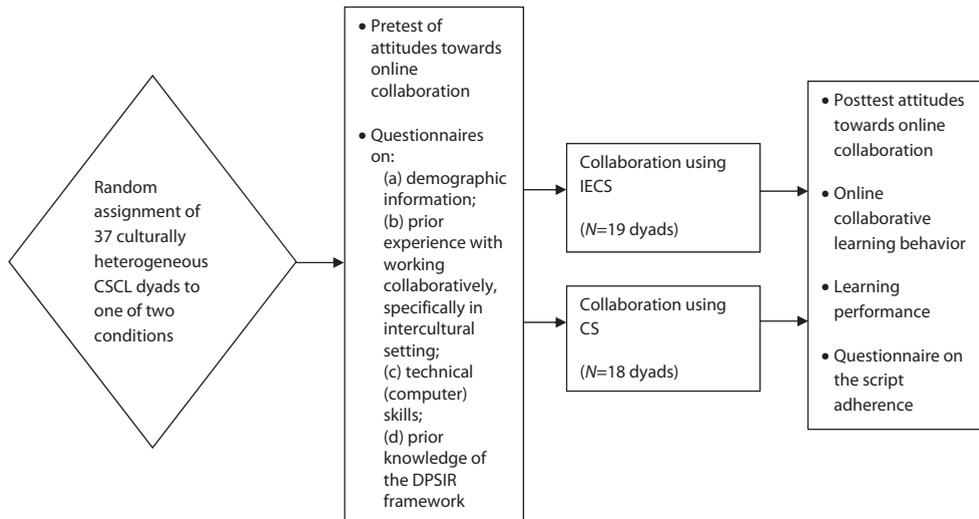


Figure 6.1 Outline of research design. IECS = Intercultural Enriched Collaboration Script; CS = general Collaboration Script.

Research setting, assignment and study procedure

As part of an introductory Principles of Environmental Sciences course for university masters students, the students had to analyze the problem of biodiversity collapse in tropical forests using a paper written by Laurance et al. (2012). The dyads collaborated online using the groupware program from the Virtual Collaborative Research Institute (VCRI; Jaspers et al., 2004) as the CSCL platform (see below for further description of the platform). When doing this, the students were expected to: (1) analyze the problem of biodiversity loss in terms of causes and effects, (2) propose possible solutions to avert biodiversity loss, and (3) select the most viable solutions for the problem of biodiversity loss. The students were expected to complete a Driver–Pressure–State–Impact–Response (DPSIR) model for the environmental problem under study (Fortuin et al., 2011). And the students had to complete this online collaboration assignment to pass the course.

A pilot study was conducted with 5 culturally diverse dyads (i.e., 10 students who did not participate in the present study) to check on the appropriateness of the script instructions, applicability of the research instruments, adequacy of task difficulty, and technical functioning of the learning platform.

In the actual experiment, a single plenary (i.e., introductory) session and two online working sessions were held on three consecutive days (see Table 6.2 for further details on the

collaborative learning process and timetable for the experiment). The total time required for completion of the CSCL assignment was about 10 hours; this included completion of pretest/posttest questionnaires and three breaks. For the online sessions, the students were seated at individual computers. All students were interacting with the study personnel and with each other in English.

After the introduction of the assignment, the VCRI groupware program, and the procedures for collaboration on the first day, the participants were asked to complete the pretest questionnaires. This provided background demographic information, information for the outcome measures, and information for control.

On the second day, the students were given time to individually read the Laurance et al. (2012) paper on “Averting biodiversity collapse in tropical forest protected areas” and collectively watch the BBC Planet Earth documentary on biodiversity. Social introduction of the dyads

Table 6.2 Outline of study procedure

Day	Phases	Task number and name	Time (min)
Day 1	Social introduction and problem orientation phase	Explanation of the assignment and VCRI platform, introduction of the DPSIR model	60
		Completion of series of pretest questionnaires	40
		1.1 (a) Task introduction (BBC documentary and article)	120
Day 2	Collaborative problem-solving phase	Break	30
		1.2 (b) Creation of personal profile	15
		1.3 (c) Establishment of dyad	15
		2.1 (a) Individual work on questions related to the learning task	45
		2.2 (b) Exchange and discussion of individual ideas	30
		2.3 (c) Completion of DPSIR model	30
		Break	15
		3.1 (a) Individual work on possible solutions	15
		3.2 (b) Exchange and discussion of preferred solutions and support for them	30
		3.3 (c) Integration of individual proposals and creation of list of possible solutions	20
		Day 3	Solution evaluation phase
4.1 (a) Individual prioritization of the responses	30		
4.2 (b) Exchange of the individual prioritization of the responses and its supporting argumentation	30		
4.3 (c) Integration and reporting of the overall prioritization of the responses	15		
Completion of posttest questionnaire and debriefing	40		
			595

then occurred, and the problem orientation phase of the CSCL procedure was undertaken (i.e., steps 1.2.–2.1 in Table 6.2).

On the third day, the collaborative problem-solving and solution evaluation phases were conducted. This involved three subtasks per phase (i.e., steps 2.2–4.3 in Table 6.2). Each student then completed the posttest questionnaire concerned with their attitudes towards online collaboration.

CSCL platform

The VCRI groupware program has a number of features that have been specifically designed to facilitate collaborative online activity (see Figure 6.2). These include: (1) a Chat tool to allow students to communicate with their collaborative partner via instant messages; (2) a Source tool for instructions on how to proceed with a task and the supply of the background information needed to complete a particular task (e.g., assignment description, literature); (3) a Cowriter tool, which is a shared word processor that allows students to simultaneously work on a text; (4) a Diagrammer tool to collaboratively create representations of various sorts (e.g., diagrams, flow charts); and (5) a Notes tool, which is a personal space that can be used to write down some remarks. The CS and the IECS scripts used in this study were embedded in the Source tool.

Use of the collaboration scripts within the CSCL environment

All of the students in the two conditions were expected to work through the same collaborative learning steps (see Table 6.2). The only difference was that the general CS provided scaffolding for only WHAT to do during each step. The IECS, in contrast, provided three types of scaffolding for each collaborative learning step: (1) general instructions on WHAT to do, which is the same as in the CS; (2) instructions on HOW to proceed with a particular subtask; and (3) an explanation of WHY that particular subtask is important.

In this study, both the CS and IECS involved text scaffolds represented within the CSCL platform. The introduction to the task at the plenary introductory session stressed the importance of following the script instructions and each student monitoring to see that the instructions were indeed followed. At the end of the study, the script adherence was checked in two ways: (1) by asking the students immediately following completion of the study if they had indeed followed the instructions and, if yes, how frequently; (2) by collecting interaction log files. For the latter, a link entitled “WHY the subtask instruction is important” was created, which meant that the students had to click on the link to access the instructions (see Figure 6.3). This allowed us to indirectly measure the use of the instructions by calculating the number of hits

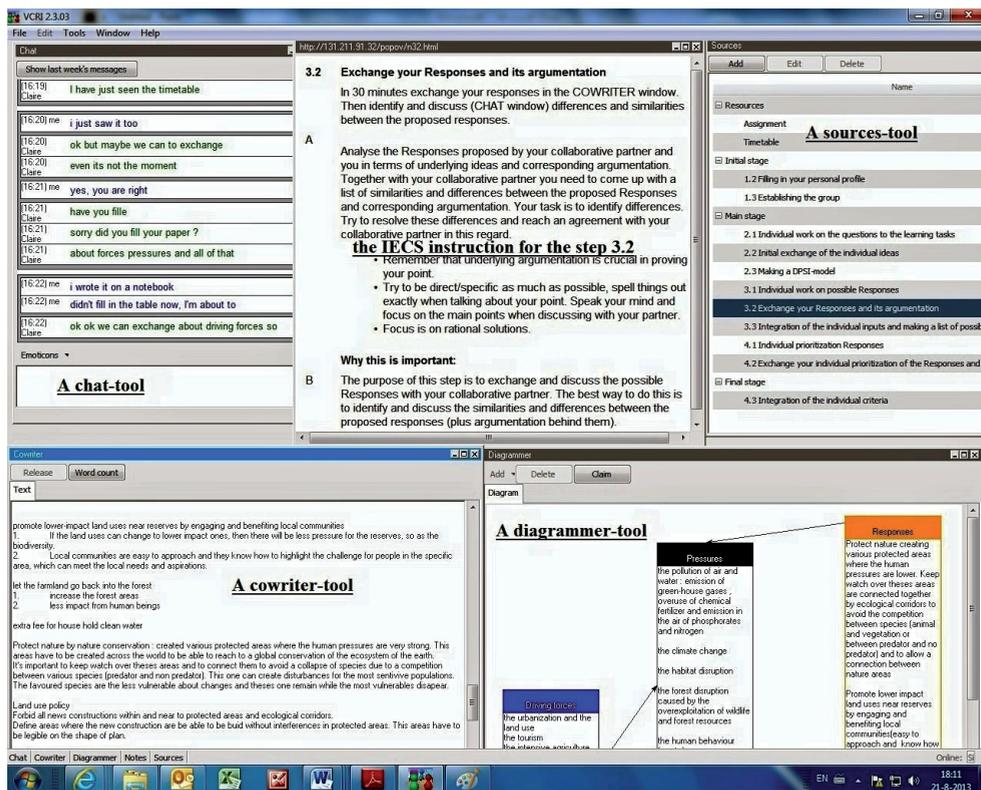


Figure 6.2 Screenshot of the VCRI platform.

for this link. In the IECS condition, the students clicked on the “WHY the subtask instruction is important” link an average of four times during the collaboration process. This was consistent with what they reported when asked after the study. In the CS condition, all of the students reported that they had tried to follow the “WHAT to do” instructions as much as possible.

The main purpose of the “WHAT to do” script scaffolds for the collaboration steps was to help coordinate the learning activities. Step-by-step guides and timelines were provided for the subtasks constituting the collaborative problem-solving process. For instance, “in 30 minutes make a conceptual DPSI model in the Diagrammer window, together with your collaborative partner, indicating Driving forces, Pressures, States, and Impacts related to the collapse of biodiversity.” These instructions were then followed by those for the next subtask. For instance, “in 15 minutes, make use of the designed DPSI model to identify three possible Responses. Write individually your three responses in the Notes window and provide supporting argumentation for these responses.”

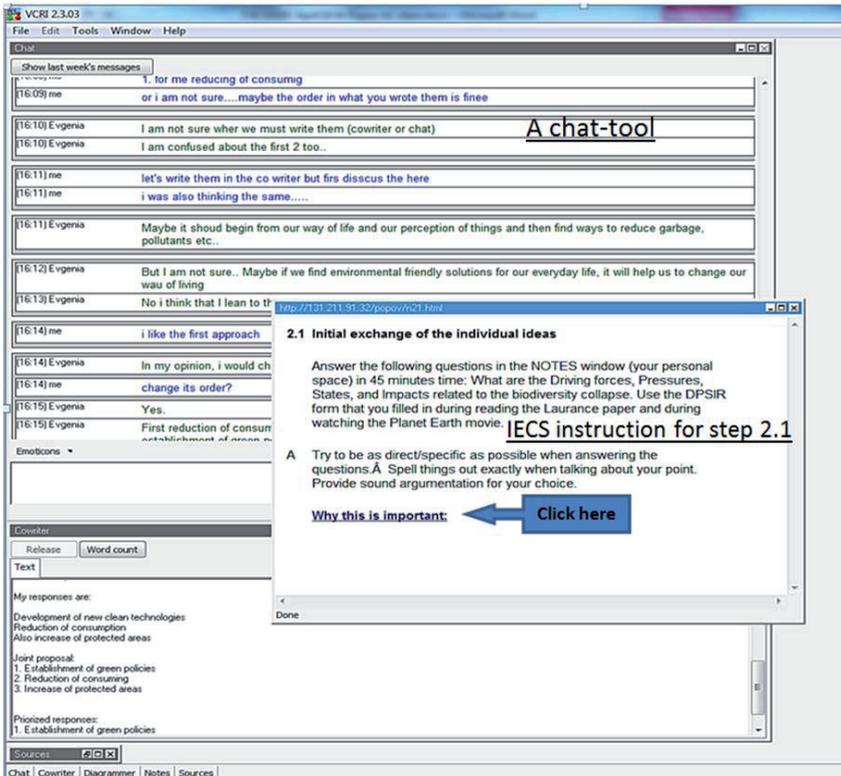


Figure 6.3 Screenshot of step 2.1 — IECS scaffolding within a VCRI environment.

“HOW and WHY to do” IECS scaffolds were intended to evoke specific interactions between the culturally heterogeneous students, increase the frequency of specific behaviors, and thereby facilitate the collaborative problem-solving task. Building on previous research findings on intercultural differences (see Table 6.1), we identified specific discourse practices and interaction patterns that were likely to emerge in culturally heterogeneous CSCL groups and tailored the instructions to students with an individualist orientation, on the one hand, and students with a collectivist orientation, on the other hand. The tailored instructions on how to approach a collaborative partner and engage in a collaborative discourse were expected to enhance mutual understanding, engagement in debate, and convergence on the steps to be taken to complete the collaborative learning activities. In the following, we specify the sequence of activities that the students had to follow and, in Table 6.3, we give examples of the culturally-specific instructions provided for the activities.

Table 6.3 Design of the IECS in application to culturally heterogeneous CSCL groups

Phase of collaborative problem-solving process	Examples of IECS scaffolds	
	Individualists	Collectivists
<p>Initial phase</p> <p><i>Bridging differences in initial encounter and problem orientation</i></p> <p>Table 6.2: steps 1.2–2.1</p>	<p>“Try to get to know your collaborative partner and his/her background and build a trustful relationship to solve the task together.”</p> <p>“Try to be open and consider this learning platform as a safe environment in which to exchange ideas and to come to a possible solution together with your collaborative partner.”</p>	<p>“Try to construct a concrete idea of the content-related experiences of yourself and your collaborative partner.”</p> <p>“This task is aimed at collaborative learning with no teacher. There is no right or wrong answer for solving this task as long as you can prove your point.”</p>
<p>Problem-solving phase</p> <p><i>Bridging differences in the exchange and discussion of ideas.</i></p> <p>Table 6.2: steps 2.2, 3.2, and 4.2</p>	<p>“Try to give context information when presenting your ideas (i.e., what is your reasoning behind your thoughts/opinion).”</p> <p>“Allow adequate time for communication. Try to understand collaborative partner’s point of view and critically discuss this with him/her.”</p>	<p>“Try to be as direct/specific as possible when answering the questions. Spell things out exactly when talking about your point. Provide sound argumentation for your choice.”</p> <p>“Feel free to disagree with your collaborative partner and be as direct/specific as possible. Speak your mind and focus on the main points when discussing with your partner.”</p>
<p>Solution evaluation phase</p> <p><i>Bridging differences in reaching an agreement</i></p> <p>Table 6.2: steps 2.3, 3.3, and 4.3</p>	<p>“Take multiple perspectives into account when formulating different solutions (responses) and providing sound argumentation for your choice. Try to reach an agreement with your collaborative partner in this regard.”</p>	<p>“Compare the prioritization inputs proposed by your collaborative partner and you. Together with your collaborative partner try to find the proposed prioritization approach that seems to fit best to assess the solutions (responses).”</p>
Excerpt of communication strategies		
Examples of communicative intentions	Examples of communication strategies	
If you wish to make suggestions / initiate activities or exchange information	<i>- I think it might be good idea to start with... - It seems to me that we could elaborate our positions first and then react to each other's ideas. - I would suggest we consider the problem of...</i>	
If you wish to state that you have a different perspective	<i>- I see what you mean, but... - I'm afraid I can't agree with you on that, because... - Well, you have a point there, but... - I see what you mean, but... - This is not convincing, because...</i>	
If you wish to show compromise, or summarize the discussion	<i>- Considering... we may note that... - Regarding our difference of opinions... - To sum-up... - Taking everything into account, ...; - In conclusion we should reconfirm that...</i>	

Social introduction and problem orientation phase. In the initial phase of the collaboration process (Table 6.2, steps 1.2-2.1), the students were asked to create personal profiles. The IECS but not the CS instructions for doing this included questions that addressed both the content- and task-related experiences but also the personal backgrounds of the students in the dyad.

The students with a *collectivist* orientation were further instructed to construct a concrete idea of themselves and their collaborative partners based on the basis of the knowledge and experiences shared with regard to the content of the assignment. The students with an *individualist* orientation were further instructed to introduce themselves to their partner and get to know their partner in terms of their partner's personal background. It was expected that the receipt of specific information about the collaborative partner in each dyad would help the students build a good working relationship at the start of their collaboration and solve the assigned task together.

In addition, it was explicitly stated in the introductory instructions for *all* of the students that the assigned task was aimed at collaborative learning with no teacher control and that the task concerned an open-ended problem with no single, correct solution. It was also explicitly stated in the introductory instructions that the argumentation used to support the proposed solution(s) was crucial. The collaborating students were further asked to be open with each other and to consider the learning platform a safe environment for the exchange of ideas to jointly solve the assigned problem.

Collaborative problem-solving phase. In the main phase of the collaboration process (Table 6.2, steps 2.2, 3.2, and 4.2), the students were instructed to exchange and discuss their individual ideas.

Students with a *collectivist* orientation were instructed via the IECS but not the CS to feel free to disagree with their partner and to be as direct and specific as possible (e.g., “Feel free to disagree with your collaborative partner. There is no right or wrong answer for solving this task as long as you can prove your point. Support your points of view by providing some examples or reference to literature.”). The students with an individualist orientation were instructed via the IECS to share as much information and ideas concerned with how to solve the task as possible with their fellow student. It was explained that the best way to do this is to ask their partner to share their ideas about how to solve the task (e.g., “Allow adequate time for communication. This means make time to fully understand your partner's answers to the questions and give your collaborative partner time to think of a way to respond. Try to share, as much as you can, with your fellow student about ideas that you can think of on how to solve the task.”).

Both of the students in the dyad were instructed to see this online communication as a means to exchange information, ideas, and opinions but also “engage” with their collaborative partner (e.g., “Try to see this online communication both as a way of exchanging information,

ideas/opinions and as a form of discussing them with your collaborative partner. Try to share, as much as you can, with your fellow student about information/ideas that you can think of on how to solve the task”). It was expected that these IECS scaffolds would foster collaboration and debate.

The cultural communicative style of the participants was also expected to affect the extent to which they would present information, reflect upon this, and elaborate upon it. The students with an *individualist* orientation were therefore instructed to give contextual information when communicating with their partner (e.g., “Try to give context information when preparing your ideas, explain your underlying reasoning behind your ideas.”). The students with a *collectivist* orientation were instructed to be as direct and specific as possible; to spell things out precisely when talking about their points; and to provide information to support their points of view (e.g., “Try to be direct/specific as much as possible, spell things out exactly when talking about your point. Speak your mind and focus on the main points when discussing with your partner.”).

It was expected that these IECS scaffolds would stimulate the communication flow and mutual understanding within the dyads.

Solution evaluation phase. During the last phase of the collaborative process (Table 6.2, steps 2.3, 3.3, and 4.3), the students were instructed to summarize and synthesize their contributions to come up with a joint solution for the problem.

The students with an *individualist* orientation were instructed to be as open as possible while working on the solution to the problem and to consider a number of alternatives) (e.g., “It is possible that there is no concrete answer to this task, be open to see the approaches to the learning task in very diverse ways.”). Students with a *collectivist* orientation were instructed to be as specific as possible while integrating ideas to come up with a joint solution to the problem (e.g., “Try to be logical while formulating your joint proposal with possible responses to the problem of biodiversity loss. Focus on solutions that seem logical and viable for this particular problem.”).

Both of the students in the dyad were further instructed that, even though they may have opinions that differ from each other, overall assignment success depends on how well they resolve these differences and reach agreement on a solution to the problem.

In addition, a list of communication strategies to be used in all phases of the collaboration process was provided on paper as part of the IECS but not the CS (Table 6.3). The list of communication strategies included interaction prompts and sentence openers. The strategies were based upon the interaction analysis model developed by Gunawardena et al. (1997), and they followed culturally-neutral rules of net etiquette as recommended by Shapiro and Anderson (1985). Students were encouraged to call upon the communication strategies whenever they had problems getting their message across.

Measures

Pretest and posttest measures of attitudes towards online collaboration

A 17 item questionnaire (Thompson and Ku 2006) was used to measure the students' attitudes towards online collaboration both before and after the conduct of the study. The original questionnaire consisted of 18 items but one item was not relevant for the present study and therefore removed (i.e., "I found our group discussion of team agreements at the beginning of the semester helpful."). The students were asked to indicate the extent to which they agreed/disagreed with the statements (1 = Strongly Disagree; 5 = Strongly Agree; higher scores thus reflect a more positive attitude towards online collaboration). Some sample questionnaire items are: "I feel comfortable providing feedback to my peers," "I like to share information and ideas with other learners," or "I enjoy using the computer to communicate with my classmates online." The Cronbach's alpha coefficients for the reliability of the questionnaire were sufficiently high: .86 at pre-test and .82 at post-test.

Attitudes towards online collaboration were analyzed at the level of the dyad. To transform the individual attitude scores to dyad scores, we subtracted the individual attitude score at pretest from the individual attitude score at posttest for each of the two students in a dyad and then calculated the mean of the individual scores (i.e., added the scores for attitude change together for the two students in the dyad and then divided by 2 or, in other words, the number students in the dyad). This produced a mean attitude change towards online collaboration per dyad.

Measuring online collaborative learning behavior

Chat protocols were analyzed to determine the extent to which the IECS and CS affected the students' online collaborative behavior. We drew upon the coding scheme of Curtis and Lawson (2001) to identify relevant behavioral categories for working in an online collaborative environment. In studies of computer-mediated collaboration and cross-cultural collaboration, the coding scheme of Curtis and Lawson was used to analyze the behavior of students engaged in collaborative learning (for details, see Curtis & Lawson (2001), Kim & Bonk (2002) or Swigger et al. (2012)). Five main categories of online collaborative behaviors were identified: planning, contributing, seeking input, reflection/monitoring of medium, and social interaction. Each category of collaborative behavior had several subcategories, which are illustrated in Table 6.4. In total there are fifteen subcategories of collaborative behavior.

Pilot testing of the coding scheme showed its suitability for analyzing the data obtained in our study. Every posted utterance that indicated a specific collaborative behavior was

regarded as a coding unit. The utterances contained mostly phrases and sentences. Salutory and closing utterances were ignored. Both inter-rater agreement between two trained coders (Cohen's $k=0.83$) (Landis & Koch, 1977) and intra-coder test-retest reliability for each coder for 10% of the data (95% of identical scores) were sufficiently high.

Measuring learning performance

To assess the quality of the group work on the assignment, quantitative criteria were developed by experts in the area of environmental sciences (see Table 6.5). The group output from the Diagrammer tool was analyzed to assess completion of the DPSI model and the group output from the Cowriter tool to assess the argumentation provided for the solutions presented by the students. In addition, content analyses were conducted to identify the use of task-related concepts in the Diagrammer tool, Cowriter tool, and Chat tool.

Assessment was done using a five-step rating scale for the four criteria (i.e., width, correctness, structure, and argumentation). Two expert coders, using the same assessment criteria, coded students' group work outputs independently. Both inter-rater agreement between two expert coders (Cohen's $k=0.82$) (Landis & Koch, 1977) and intra-coder test-retest reliability for each coder for 15% of the data (90% identical scores) were sufficiently high. Subsequently, the points assigned for each dyad of students were summed and then divided by 4 (i.e., total number of criteria) to obtain a mean quality score, which could range between 1 and 5 per dyad.

The content analysis of the Diagrammer, Cowriter, and Chat tools was done in terms of the list of 243 task-related concepts put together by two experts in the field of environmental sciences. The list had three main categories and eight subcategories. The main category of *Environment* had two subcategories: Abiotic (e.g., air, CO₂, soil) and Biotic (e.g., park, habitat, forest). The main category of *Society* had three subcategories: Stakeholders (e.g., consumer, farmer), Infrastructure (e.g., city, dams), and Societal Processes (e.g., awareness, behavior). And the main category of *Responses* (i.e., possible solutions to the environmental problem) had three subcategories: Technological (e.g., irrigation, renewable), Policy (e.g., conservation, education), and Other (e.g., campaigns, research). The coding of the main categories and their corresponding subcategories was done using the Multiple Episode Protocol Analysis (MEPA) computer filter which applies 694 "if-then" decision rules and pattern matching to identify concepts (see for more details Erkens & Janssen, 2008). When compared to hand-coding of 10% of the data from the three tools, overall agreement of 74% and a Cohen's kappa of .71 were found.

Table 6.4 Collaborative behavior coding scheme of Curtis and Lawson (2001) with examples obtained from chat protocols in present study

Main collaborative behavior categories	Subcategories	Examples obtained from chat protocols
Planning	<p><i>Establishing group:</i> encouraging group collaboration and cohesiveness</p> <p><i>Organizing work:</i> creating shared tasks and deadlines; making suggestions</p> <p><i>Initiating activities:</i> scheduling activities to discuss progress and organization of group work.</p>	<ul style="list-style-type: none"> - Take your time. I have a great view over here. If there is anything you don't understand, feel free to ask. - Let's start writing now so that we can exchange later... - Do we leave now and pick up from where we stopped tomorrow? - Let's start with the driving forces. Shall we begin with exchanging our ideas?
Contributing	<p><i>Help giving:</i> responding to questions and requests from others</p> <p><i>Feedback giving:</i> reflecting on partner's contributions and providing feedback on partner's proposals</p> <p><i>Exchanging resources:</i> sharing of resources and information to assist each other in a collaborative dyad</p> <p><i>Sharing knowledge:</i> sharing existing knowledge and information with other partner</p> <p><i>Explaining or elaborating:</i> supporting one's position</p> <p><i>Challenge:</i> challenging the contributions of collaborative partner and seeking to engage in debate</p>	<ul style="list-style-type: none"> - Because the items show up off screen if you don't have it maximized. - It sounds like we have the same driving forces except you added change in rainfall patterns. - Well, you have a point there. - I'm sending you an example I read about today. - Alright, I added your responses from yesterday and added two more. - If we draw it directly from the movie, "combination of number of people and consumer needs has led to a growth in economy and how we use our wealth." - I think I would go with sustainable population because of the less energy consumption, plus land protection and damming of rivers. - I'm sorry to be so bold, but I think my way is better since it takes the effects for society into account. If you can prove otherwise or have a better solution, I would be happy to hear that

Seeking Input	<p><i>Feedback seeking:</i> seeking feedback to a position advanced</p> <p><i>Advocating efforts:</i> urging others to contribute to the group effort; requesting information</p> <p><i>Help seeking:</i> request for assistance from partner</p>	<ul style="list-style-type: none"> - The second, then, should be population controls; the third, a green economy. Do you agree with me? What's your opinion? - Okay, should we continue then? - Are you ready to write? - Are you working on it now, because I need your input to continue. - Could you tell me how to add the arrows?
Reflection/Monitoring	<p><i>Reflecting on medium:</i> comments about the effectiveness of the medium for supporting group activities</p> <p><i>Monitoring group effort:</i> comments about the group's processes and achievements</p>	<ul style="list-style-type: none"> - Can you change it or is the program not working? - I was trying to figure out how to make arrows in the diagram section, but it's not working. - We're almost done, yeah! So excited. - So looks like we only need to do the final stage.
Social interaction	<p><i>Off-task comments:</i> conversation about social matters that are unrelated to group task. This activity helps to 'break the ice'.</p>	<ul style="list-style-type: none"> - How is the day going so far? - I missed another class because of a flat tire... but I managed to join the lab session.

Table 6.5 Quantitative criteria used to assess group learning performance

Assessment criteria (rated along a scale of 1 to 5)	Description of the criterion
1. Width ("very inadequate" to "very adequate")	The degree of elaboration for the DPSI model (i.e., total number of DPSI items included in the model).
2. Correctness ("very incorrect" to "very correct")	The degree to which items in the DPSI model are included and positioned correctly. If one item is not included or positioned incorrectly, the entire box is considered wrong and 1 point is subtracted from the possible total of 5 points.
3. Structure ("not at all structured" to "very well structured")	The degree to which the DPSI model is constructed and presented in an orderly manner.
4. Argumentation ("No explanation for the priorities" to "Clearly and correctly explain prioritization, with reference to a source").	The degree to which a particular student dyad supported and justified arguments using examples, proofs, and reasonable evidence related to the prioritization of the identified responses in the cowriter tool.
5. Use of task-related concepts	The frequency of use for task-related concepts (i.e., Environment, Society, and Responses) in Diagrammer tool, Cowriter tool, and Chat tool.

Control measures

Prior to the start of the study, a questionnaire was administered to collect information on the participants' age, gender, country of origin, duration of stay in the Netherlands (for non-Dutch students), and prior knowledge of the DPSIR framework. The participants were also asked to rate their experiences with group work in the form of face-to-face interaction, online collaboration, and intercultural collaboration along a five-point scale (1 = "very little"; 5 = "very much"). Finally, the students were presented five multiple-choice questions to assess their level of computer skill (i.e., knowledge necessary to work with the CSCL system). The questions addressed the use of the World Wide Web browser, MS Word, MS Excel, and other Internet programs used for communication like Discussion boards, E-mail, and chat applications.

Analyses

Analyses of variance were conducted to compare the control measures for the two conditions. Chi-square tests were used to test whether the distributions of males and females within the two conditions were equivalent.

To answer our first research question and thereby compare the influences of the IECS and CS on *attitudes towards online collaboration*, a univariate ANOVA was undertaken with condition (IECS vs. CS) as the independent variable and aggregate mean of attitude change towards online collaboration as the dependent variable.

To answer our second research question and thereby compare the influence of the IECS and CS on the *online collaborative learning behavior of the students*, one-way multivariate analyses of variance (MANOVA) were conducted. Specifically, to examine the differences in the mean frequency scores for each of the main behavioral categories (planning, contributing, seeking input, reflection/monitoring, and social interaction) in the two conditions, MANOVA was employed followed by univariate analyses of variance (ANOVAs) when the multivariate statistical test was significant. The independent variable was condition (IECS vs. CS). The dependent variables were the total absolute scores for each dyad on the fifteen subcategories of collaborative behavior (see Table 6.4).

The *patterns of collaborative behavior* displayed during the collaborative learning task were examined in a lag sequential analysis (see Bakeman & Quera, 1995; Wampold & Margolin, 1982). This was done to (1) determine the significance of the behavioral transitions (i.e., when one collaborative behavior was likely to be followed by another) and (2) identify significant differences between the conditions in behavioral transitions. The MEPA software was used to analyze the coded sequences behavior (Erkens, 2005). Based on the obtained codes from the quantitative content analysis of the behavior categories, the coded strings were organized chronologically and a sequential analysis was conducted on the strings. The sequential analysis allowed to determine the frequency of each behavioral event in succession, and the significance of a behavioral sequence when one collaborative behavior followed another. Subsequently, in order to determine whether differences in the behavioral patterns between the IECS and CS conditions are statistically significant, effect sizes, as measured by transformed kappa (k'), were examined to determine the direction and magnitude of any significant differences in the behavioral patterns for the IECS and CS conditions (Wampold & Kim, 1989). Transformed kappa provides an index of effect size that can be used to compared conditions or groups (Wampold, 1992). The transformed kappa ranges from -1.00 to +1.00, with zero indicating no sequential association between the subsequent collaborative behavior and the antecedent collaborative behavior. The transformed kappa can range from -1 (which “indicates that the number of transitions from i to j occurred to the minimum extent possible”) to +1 (which “indicates that the number of transitions occurred to the maximum extent possible, given the base rates”) (Wampold, 1995, p. 207). For each dyad, we calculated the transformed kappas for 47 transitions out of 225 possible transitions. A total of 47 transitions were analyzed on the basis of the criterion that at least 10 or higher percentage indication of the conditional probabilities

of transitions in either the IECS or the CS condition. Univariate ANOVAs were then conducted to compare the transformed kappas for the 47 transitions in the two conditions (IECS vs. CS).

To answer our third research question and thereby compare the influence of the IECS and CS on *student learning performance*, two sets of analyses were undertaken. First, a univariate ANOVA was undertaken with condition (IECS vs. CS) as the independent variable and aggregate mean quality of learning performance as the dependent variable. Second, one-way MANOVAs were conducted to compare the mean frequency of the use of task-related concepts in the Diagrammer tool, Cowriter tool, and Chat tool across the two conditions. The independent variable was again condition (IECS vs. CS). The dependent variables were the total absolute scores per dyad for the main categories of Environment, Society, and Responses together with the subcategories for each category used in the diagrammer, chat, and cowriter tools.

The individual was adopted as the unit of analysis to ensure an equal distribution of the students across the two conditions with regard to age, gender, prior knowledge, and so forth. Attitude towards online collaboration, online collaborative behavior and student learning performance were measured and thus analyzed at the level of the dyad. That is, these variables clustered within dyads and could therefore not be analyzed independently (Kapur, 2008; Stahl, 2010).

RESULTS

Control measures

None of the participants had prior knowledge of the DPSIR framework. No significant differences were found between the IECS and CS conditions with respect to age, $F(1, 72)=.30$, $p=.58$, the computer skills, $F(1, 72)=.16$, $p=.33$, or prior group work experience, $F(1, 72)=1.25$, $p=.26$. The distributions of males and females were also similar in the two conditions (Chi-square=.205, $df=1$, $p=.65$). These results showed that the random assignment of students to the two conditions led to no significant differences in terms of students' prior knowledge, group work experiences, technical (computer) skills, age, and gender.

Attitudes towards online collaboration

The change in attitudes toward online collaboration was significantly higher for the dyads in the IECS condition than the dyads in the CS condition (IECS $M=.36$, $SD=.29$ versus CS $M=.15$, $SD=.26$, $F(1, 35)=4.78$, $p<.05$).

Online collaborative learning behavior

Behavioral categories

For the frequency of utterances reflecting the Planning category of collaborative behavior (i.e., the subcategories Group, Organizing work, Initiating activity), a significant main effect of script condition was found, *Wilks' Lambda*, $\lambda=.61$, $F(3, 35)=7.13$, $p<.001$, $\eta^2=.39$. Since the main effect was significant, univariate analyses of the respective subcategories showed the dyads in the IECS condition to exhibit a statistically higher frequency of Initiating activities and statistically lower frequency of Organizing work than the dyads in the CS condition. The means, standard deviations, and results of the univariate ANOVAs are reported in Table 6.6.

For the Contributing subcategories (i.e., Help giving, Feedback giving, Exchange resources, Sharing knowledge, Challenging, and Explaining), a significant main effect of script condition was also found, *Wilks' Lambda*, $\lambda=.45$, $F(6,35)=6.15$, $p<.0001$, $\eta^2=.55$. The dyads in the IECS condition showed a statistically higher frequency of the Challenging subcategory and lower frequency of the Exchanging resources and Sharing knowledge subcategories than the dyads in the CS condition (see Table 6.6).

Table 6.6 Means, standard deviations, and outcomes of univariate tests of significance for frequencies of collaborative behavior categories and subcategories according to condition

Collaborative behavior main categories and subcategories	IECS		CS		F
	M	SD	M	SD	
Planning	19.78	8.00	26.88	14.22	7.13**
Group	.73	.99	.77	1.00	.01
OrgWork	10.31	6.28	21.27	13.60	10.07**
InitActiv	8.68	4.32	4.88	2.78	9.96**
Contributing	88.36	33.37	85.72	47.59	6.15**
HelpGiv	7.73	3.85	10.00	6.51	1.67
FeedbGiv	40.89	17.44	36.61	21.56	.44
ExchResour	.36	1.16	1.94	2.55	5.93*
SharKnowl	2.94	2.01	11.88	13.36	8.31**
Challenge	9.15	3.98	4.38	3.07	16.46**
Explain	27.31	13.28	20.94	14.29	1.97
Seeking Input	31.68	9.99	44.11	24.58	1.39
Reflection/Monitoring	14.31	6.56	19.05	9.26	1.70
Social Interaction	15.36	9.85	31.61	18.79	11.00**

* Significant at $p<.05$.

** Significant at $p<.01$.

IECS = Intercultural Enriched Collaboration Script; CS = general Collaboration Script.

There was no significant main effect of script condition for the collaborative behavior category of Seeking input, which includes the subcategories of Help seeking, Feedback seeking, and Advocating effort, $F(3, 35)=1.39, p=.26$.

There was also no significant main effect of script condition for the collaborative behavior category of Reflection/Monitoring, which includes the subcategories Reflecting on medium and Monitoring group effort, $F(2, 35)=1.70, p=.19$.

For the Social interaction category of collaborative behavior, which was composed of only off-task comments on social matters, the dyads in the IECS condition exhibited a statistically lower frequency of occurrence than the dyads in the CS condition, $F(1, 35)=11.00, p=.002$ (Table 6.6).

Behavioral patterns

The lag sequential analyses were conducted separately for 3066 and 3744 utterances in the IECS and CS conditions, respectively. The transitional probabilities for the 15 subcategories of collaborative behavior were calculated and those found to be significant incorporated into

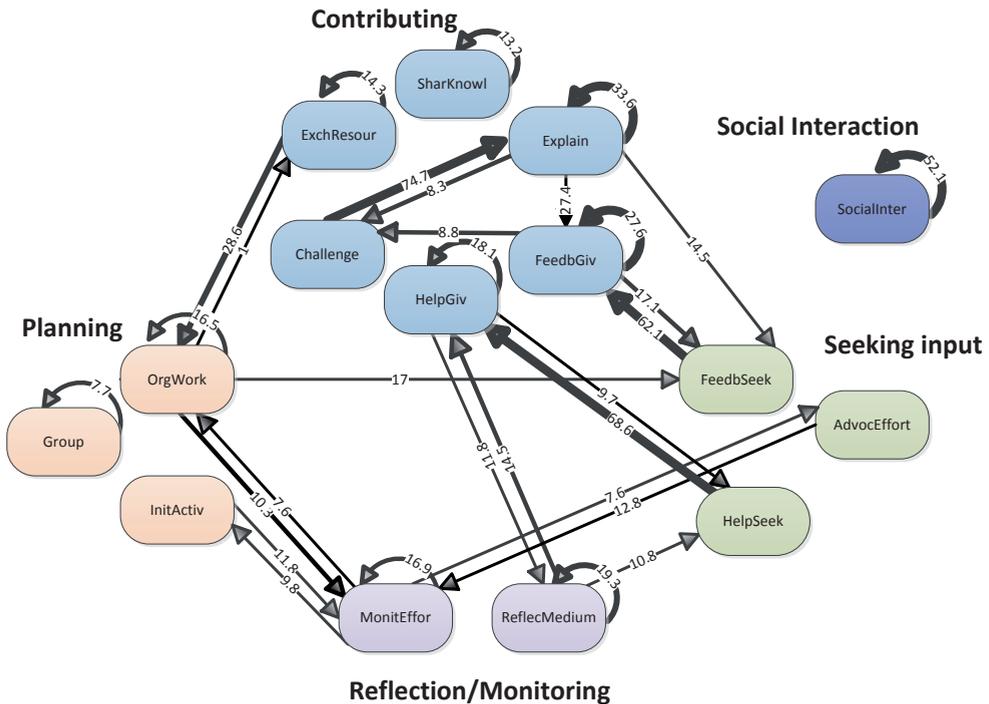


Figure 6.4 Behavioral transition diagram for IECS condition.

the behavioral transition diagrams presented for the IECS condition in Figure 6.4 and the CS condition in Figure 6.5.

Only positive z-scores are depicted in the diagrams. A z-score greater than 1.96 means that the transition between the two subcategories was statistically significant — it occurred significantly more often than might be expected by chance based on the frequency probability ($p < 0.05$) (Bakeman & Gottman, 1997; Wampold & Margolin, 1982). These diagrams depict the flow of behavior in the online discussions; more likely interactions are indicated by thicker arrows and less likely interactions by thinner arrows. Each arrow points in the direction of the transition with the conditional probability of this happening presented as well. In Figure 6.4, for example, Feedback seeking (FeedbSeek) is likely to be followed by Feedback giving (FeedbGiv) for 62.1% of the occurrences of Feedback seeking on average. So-called self-transitions are indicated by semi-circular arrows and show, for example in Figure 6.4, a Social interaction utterance to be followed by another Social interaction utterance from either one's partner or oneself in 52.1% of the occurrences of Social interaction on average.

Comparison of the behavioral transition diagrams for the IECS and CS conditions shows the collaborative patterns of behavior to be relatively similar. One difference that stands out is

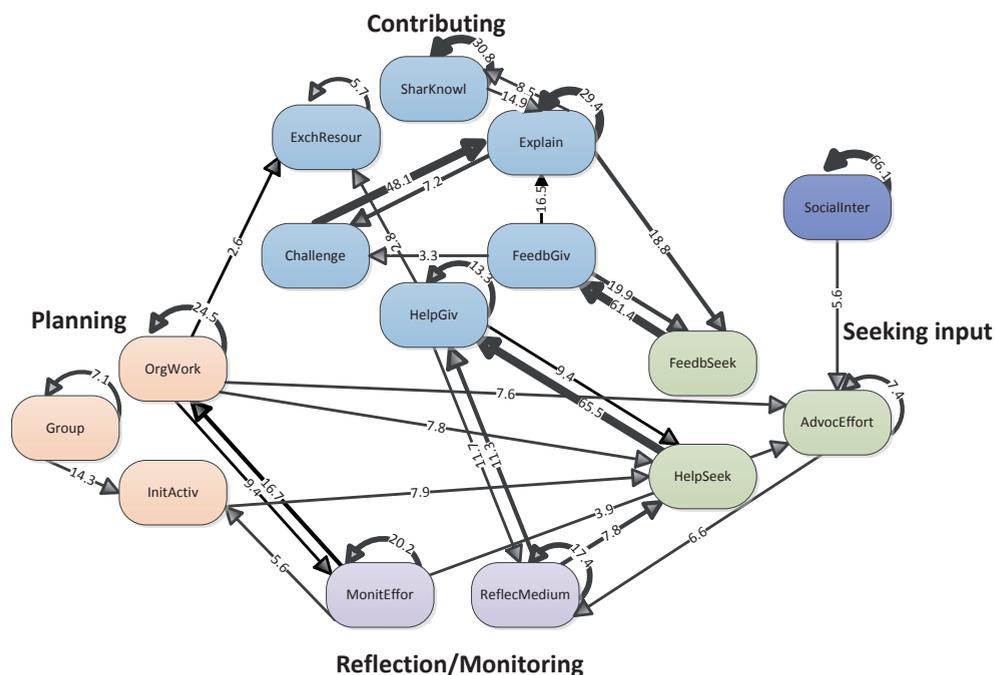


Figure 6.5 Behavioral transition diagram for CS condition.

Table 6.7 Means, standard deviations, and outcomes of univariate tests of significance for four transformed kappas showing statistically different patterns of collaborative behavior for two conditions

Behavioral transitions	IECS		CS		F
	M	SD	M	SD	
Challenge→ Explaining	.71	.23	.41	.48	5.52*
Sharing Knowledge→ Explaining	-.49	.61	-.05	.57	4.49*
Explaining→ Feedback Giving	.03	.15	-.26	.47	6.48*
Feedback Giving→ Explaining	-.28	.34	.09	.31	11.75**

A negative transformed kappa shows the probability of subsequent collaborative behavior following antecedent collaborative behavior to be less than expected by chance.

* Significant at $p < .05$.

** Significant at $p < .01$.

IECS = Intercultural Enriched Collaboration Script; CS = general Collaboration Script.

that the students in the IECS condition are more likely to post Explaining utterances following Challenging comments than the students in the CS condition (74.7% versus 48.1%). Another difference is that the dyads in the IECS condition tended to post more Explaining (Explain) contributions following Feedback giving (FeedbGiv) (27.4%), whereas the dyads in the CS condition tended to post more Feedback giving (FeedbGiv) contributions following Explaining (Explain) comments (16.5%).

To determine if the differences between the behavioral patterns for the IECS versus CS conditions were statistically significant, the effect sizes were next calculated and presented as transformed kappas (k'); the direction and magnitude of the differences were then examined (Wampold & Kim, 1989). For each dyad, we calculated the transformed kappa for 47 out of 225 possible transitions. As it was mentioned above, a total of 47 transitions were selected on the basis of the criterion that at least 10 or higher percentage indication of the conditional probabilities of transitions in either the IECS or the CS condition.

The results of a 2 (conditions) \times 47 (behavioral transitions) ANOVA revealed only four statistically significant differences between the IECS and the CS conditions (see Table 6.7). The IECS condition showed significantly *more frequent* Challenging→ Explaining transitions ($F(1,34)=5.52, p < .05$) and Explaining→ Feedback giving transitions ($F(1,34)=6.48, p < .05$) than the CS condition but statistically *less frequent* Sharing knowledge→ Explaining ($F(1,34)=4.49, p < .05$) and Feedback Giving→ Explaining ($F(1,34)=11.75, p < .01$) than the CS condition.

The following excerpts illustrate the transition types.

Challenge→ Explain

vp8405: *but then my question to you: why does better agriculture and more food increase their wealth on the long term?*

vp8406: *yeah, in our driving part we also said that economic growth is a problem. so maybe explain more in driving part the economic growth means too much commercial waste.*

Explaining→ Feedback giving

vp8411: *Rivers are running dry, water levels drop because of overpumping. Either way, a driving force that is not very different, in my opinion, from food or timber shortages.*

vp8412: *I think I forgot things like building a dam and so on. So now I agree.*

Feedback giving→ Explaining

vp8408: *Okay. The converse means the opposite.*

vp8407: *so I was mentioning organisms which live deep in the woods of fragmented areas would be pushed further in as the edge of the forest increases.*

Sharing knowledge→ Explaining

vp8420: *in ppt, the impact is about health, culture, economy.*

vp8421: *fire risk is more of an impact, I suppose...you remember in the movie, there was one part when the man said because there was no frost that year it's a sign of fires to come meaning because of the change, the immediate impact is fire.*

Online collaborative learning performance

No significant differences were found between the IECS and CS conditions when the means for learning performance were examined: IECS condition $M=2.78$ ($SD=.45$) and CS condition $M=2.81$ ($SD=.30$), $F=0.06$; $p=.81$.

Inspection of the frequencies for the use of task-related concepts (i.e., *Environment*, *Society*, and *Responses* and their corresponding subcategories) in the Diagrammer tool, the Cowriter tool, and the Chat tool revealed no significant differences between the two conditions except for the *Responses* category in the Cowriter tool, *Wilks' Lambda*, $\lambda=.76$, $F(3,35)=3.35$, $p<.05$, $\eta^2=.23$. The dyads in the IECS condition used concepts related to both Policy (IECS $M=19.68$, $SD=5.95$ versus CS $M=14.77$, $SD=7.93$, $F(1, 35)=4.55$, $p<.05$) and Other (IECS $M=2.31$, $SD=2.71$ versus CS $M=.61$, $SD=1.19$, $F(1, 35)=6.01$, $p<.05$) statistically more often than the dyads in the CS condition.

DISCUSSION

With regard to our first research question, namely *Does the influence of an IECS on the attitudes towards online collaboration differ from that of a general CS for culturally heterogeneous groups of students working in a CSCL environment?*, our results showed the students at the beginning of the study in both conditions to have relatively positive attitudes towards online collaboration on average (mean scores greater than 3.6 along a 5-point Likert scale). Following completion of the study (i.e., at posttest), the students in the IECS condition showed even more positive attitudes towards online collaboration. With the support of the IECS instructions at the start of the collaboration process (i.e., for the creation and exchange of personal profiles) and through the remainder of the collaboration process on how to collaborate with each other, it may be that the students in the IECS condition did not experience the same challenges and barriers as the students in the CS condition where only limited instructions were provided. And as a result of this facilitation and group experience, the students in the IECS condition may have developed an even more positive attitude towards online collaboration.

The results of previous research indicate that the cultural orientations of learners shape their perceptions of working in groups: learners with a more collectivist orientation feel that they perform better in a group than learners with a more individualist orientation (Chan & Watkins, 1994; Zhong et al., 2008). Other findings suggest the opposite, namely that students from collectivist cultures tend to be less motivated to participate in online collaboration than students from individualist cultures (Wang, 2007). It is argued by some that online forms of collaborative learning focus largely on conflict-oriented behavior between the collaborating partners, which is less compatible with a collectivist orientation towards interacting and learning in a group than in individualist orientation (Anakwe & Christensen, 1999; Oetzel, 1999; Phuong-Mai et al., 2005, 2006; Uzuner, 2009). In our study, the IECS presumably helped the collaborating students and particularly those with an already collectivist orientation to engage in a productive debate and to critique each other's contributions by instructing them to take the time to fully understand their partner's contributions and think about the best way to respond (e.g., give specific feedback, feel free to disagree, advance one's reasoning). In both the IECS and CS conditions, moreover, the students were explicitly instructed to see the online communication as a safe environment for the sharing of ideas, opinions, and information.

With regard to our second research question concerned with categories and patterns of collaborative behavior, namely *Does the influence of an IECS on the online collaborative learning behavior measured in terms of categories and patterns of behavior differ from that of a general CS for culturally heterogeneous groups of students working in a CSCL environment?*, we found the students in the IECS condition tended to display a higher frequency of Initiating activities and

Challenging behavior than the students in the CS condition but a lower frequency of Organizing work, Exchanging resources, Sharing knowledge, and Social interaction than the students in the CS condition (see Table 6.6). These differences can presumably be attributed to specific aspects of the scripts in the different conditions and the IECS instructions in particular. During the problem-solving phase of the collaborative learning task, the IECS instructions encouraged students with an individualist orientation to share ideas and information as much as possible, to critically assess their partners' contributions, and to allow their partners adequate time to respond; similarly, the IECS instructions encouraged students with a collectivist orientation to feel free to disagree with their partners, be as direct as possible, and be specific. The result is presumably attributed to more challenging behavior and initiation of activities to solve the task in the IECS condition. Further research is needed to unravel the exact influence of IECS instructions on the individual behavior of students with a collectivist and individualist orientation. A further study could compare the students with a collectivist orientation in the IECS condition with the students with a collectivist orientation in the CS condition in terms of their collaborative behavior, social and cognitive changes. The same comparison needs to be done between the students with an individualist orientation in the IECS and CS conditions.

The relatively lower frequency of Organizing work and Exchanging resources in the IECS condition relative to the CS condition probably emerged as a result of the IECS fulfilling a coordinative function that the CS did not. The scaffolding provided by the IECS throughout the entire collaboration process and particularly for how to undertake specific subtasks presumably reduced the need for organizational behaviors. The CS condition indeed required more postings to establish the group, agree upon a particular course of action, and explain things to each other, and assist each other with understanding the assignment.

We also found a significantly lower frequency of Sharing knowledge and Social interaction in the IECS condition compared to the CS condition. The students in the IECS condition showed a more "critical discourse" and the students in the CS condition showed a more "cumulative discourse." According to Arvaja et al. (2003), in critical discourse "statements and suggestions are offered for joint consideration. These are then challenged and counter-challenged with justifications and alternative hypotheses" (p. 2). A cumulative discourse is characterized by the pooling of resources and sharing of existing knowledge and information to "build positively but uncritically on what the other has said, thus constructing common knowledge by accumulation" (p. 2). The present findings suggest that students are predisposed towards a cumulative discourse and thus to share existing information and knowledge with each other rather than makes assertions, raise questions, and challenge each other unless they are explicitly encouraged to do this. And this is in keeping with the results of previous studies (e.g., Andriessen, 2006; Curtis & Lawson, 2001; Kanuka & Anderson, 1998).

It should be noted that the students in both conditions had conversations about social matters. This is important for the social cohesion and interactional dynamics of the group (Kreijns et al., 2003). Utterances concerned with social interaction accounted for almost 8% of the utterances coded in the IECS condition and almost 12% of the utterances coded in the CS condition. The difference in the amount of Social interaction in the IECS and CS conditions was nevertheless statistically significant. It appears that once the students in the IECS condition had established their dyad with the exchange — as instructed — of personal profiles, they quickly moved on to complete the task at hand. In contrast, the students in the CS condition had a greater exchange of utterances for social interaction throughout the collaborative task, which supports the conclusion that the dyads in the IECS condition were more task-focused than the dyads in the CS condition.

With regard to the sequential pattern of the students' behavior when working in a CSCL environment, all of the noticeable differences between the two conditions involved the Contributing category of behavior in one way or another (see Table 6.7 and Figures 6.5 and 6.6). Overall, the student dyads in both conditions interacted through a negotiation of meaning and clarification style of discussion. As already pointed out, the students in the IECS condition demonstrated more critical discussion than the students in the CS condition. This entailed Challenging the contributions of others and Explaining and/or elaborating on input. In the CS condition, uncritical joint knowledge sharing was more characteristics than critical discussion. More detailed research on the particular behavioral patterns of Challenging→ Explaining and Sharing knowledge→ Explaining is nevertheless called for in order to foster students engagement in “high-level” collaboration processes. From a cognitive perspective on the collaborative learning (King, 1997), these behavioral patterns seem to affect students' cognitive structures. Identifying the mechanisms of these behavioral patterns would allow to engage online group members in a critical but constructive discussion with each other which would lead to greater quality of learning (Hathorn & Ingram, 2002).

Also with respect to the main Contributing category of collaborative behavior, relatively more Explaining→ Feedback Giving behavioral transitions were observed in the IECS condition than in the CS condition but more Feedback Giving→ Explaining transitions in the CS condition than in the IECS condition. These behavioral patterns represent different forms of reflective behavior and distinct processes of developing a shared understanding among the collaborating students in the two conditions. The IECS condition, in particular, appeared to foster more frequent attempts to elaborate and explain one's position followed by the provision of feedback on the position advanced. In the CS condition, feedback on a proposal was usually expressed in the form of consent, which was then followed by elaboration or explanation to make sure that both collaborative partners were “on the same page.” In further more detailed

analyses of these and other patterns of interaction, the roles of reflection and just how shared understanding is established between the partners should be considered. For the reason that reflection, peer feedback and the process of how perceived shared understanding is being developed among collaborating students have been regarded as important for group's social and cognitive performance (Phielix et al., 2010; Kreijns et al., 2003).

Turning to our third research question, namely *Does the influence of an IECS on the learning performance differ from that of a general CS for culturally heterogeneous groups of students working in a CSCL environment?*, we found comparable scores for the DPSIR assignment and the use of task-related concepts in the Diagrammer tool, Cowriter tool, and Chat tool. However, the dyads in the IECS condition used concepts related to the solutions (Responses category) to the environmental problem more frequently in the Cowriter tool than dyads in the CS condition. This was the only learning difference found between the two conditions.

Previous research on CSCL has nevertheless shown both individual and group learning outcomes to depend on the quality of the collaboration (Lipponen, 2002). As already discussed, the students in the IECS and CS conditions exhibited largely comparable categories and patterns of online collaborative behavior. The dyads in the IECS condition nevertheless showed relatively more “challenging and explaining/elaborating” interactions than the dyads in the ICS condition who showed more uncritical “joint sharing of knowledge and explanation/elaboration” interactions. Both types of interactions have been shown to be conducive to learning but to imply different levels of engagement in the collaboration process. And previous research has shown that learning is particularly likely to occur when the collaborating students engage in constructive argumentation (i.e., critique, challenging of positions, and attainment of synthesis via discussion) (Andriessen et al., 2003; Cho & Jonassen, 2002). Despite the different patterns of collaboration found in the different conditions in our study, significant learning differences did not manifest themselves.

There are at least two explanations for the observed lack of significant learning differences in our study. First, the amount of time for collaboration and task performance was brief. It is possible that students need more training time to optimally benefit from an IECS. Previous research suggests that the more often students interact on the basis of an external script, the stronger the possibility that it will lead to an internalization of collaborative practices as collaboration skills and cognitive strategies (Fischer et al., 2013; Kollar et al., 2007). More extensive and possibly longitudinal research in the future should help us shed more light on the learning effects of using an IECS to work in culturally heterogeneous groups within a CSCL environment.

The second possible explanation for the observed lack of significant learning differences between the conditions in our study concerns the measurement of group work. The assessment

criteria that we used did not reveal if students worked better online in culturally heterogeneous groups, had increased awareness of cultural differences, or developed better collaboration skills. Future investigations should therefore include measures that are sufficiently sensitive to reveal individual social and cognitive growth (e.g., greater reflection, greater awareness of cultural diversity, ability to apply acquired knowledge and skills in diverse situations). A comparable assignment could be introduced as a transfer task, for example. This would enable individual students or groups of students to demonstrate whether they gained more knowledge and skills.

Finally, with regard to our third research question and the learning manifested in the different conditions, the frequencies of certain task-related concepts was found to differ significantly for the two conditions. In the IECS condition, the students produced more concepts related to the solutions of the environmental problem in the Cowriter tool (e.g., mention of the subcategories (Policy Responses or Other Responses) than the students in the CS condition. The students in the CS condition produced more posts concerned with establishing the group, agreeing on the course of action, and helping each other understand the subject matter in the various steps of the collaboration process. An average of 270 utterances was coded in the CS condition as opposed to 200 in the IECS condition in the Chat tool. It thus appears that students in the IECS condition quickly discussed and resolved any differences of opinions in the Chat tool with a high frequency of “challenging and explaining/elaborating” interactions, which allowed them to move on to the formulation and discussion of their solutions (i.e., Responses) in the Cowriter tool. In contrast, the students in the CS condition had spent more time on organizational issues in the Chat tool and thus had less time to formulate and discuss their solutions (i.e., Responses) in the Cowriter tool.

Some questions remain about the use of the I-C cultural orientation to determine the cultural backgrounds of the students in our study and the heterogeneity of the CSCL dyads. Although a student coming from a collectivist country can be assumed to be more likely to hold collectivist values and norms, the individual student may nevertheless exhibit certain individualist patterns of behavior due to prior exposure (i.e., travel, work) and learning on the basis of this or other experiences. It is also possible that only students with more individualist orientations choose to study abroad and that the differences between the individualist and collectivist groups in our study were not as large as might be expected on the basis of Hofstede’s I-C orientations. Conclusions based on international populations of students must thus be interpreted with caution as they may not be completely applicable to peers residing in the native country. As pointed out by Vijver and Leung (1997): “cross-cultural studies often involve highly dissimilar groups. Consequently, groups can differ in many background characteristics, only some of which are relevant to the topic studied” (p. 32).

In a similar vein, it can be argued that the similarities between international students along Hofstede's I-C cultural orientation may be greater (e.g., the similarities between some Asian and South American students) than those along other dimensions, such as Power Distance or Uncertainty Avoidance. That is, cultures that are similar in terms of an individualist or collectivist orientation may still vary with respect to the behavior of individuals and discussion styles. For example, Danish and the U.S. culture seem to be similar with respect to individualist cultural orientation (Hofstede et al., 2010), but may still differ with respect to, for instance, level of sociability, modesty in presenting ideas and sharing information (Bannon, 2005; Weinberger et al., 2007). The present findings should thus be verified using a larger sample and possibly other cultural frameworks (e.g., measures of analytic/holistic reasoning, see Choi & Nisbett (2000); seven-dimension framework for understanding cultural diversity, see Trompenaars (1993)). Accounting for all cultural factors is very desirable, but it was not feasible within the scope of the present study. There are also studies showing personal features to prevail over cultural background in influencing the efficiency of intercultural collaboration (e.g., Ting-Toomey et al., 2001). Although some scholars have argued, cultural differences cannot always be reduced to individual differences (see Na et al., 2010 for a review).

CONCLUSION

Cultural background influences a student's attitudes towards collaboration with peers and the student's level of engagement in the activities needed for collaborative problem solving. In the present study, we investigated how cultural differences can be bridged within an CSCL environment. To this end, an intercultural enriched collaboration script was developed to facilitate and guide the online intercultural interaction process. Our results show that the individualist-collectivist cultural orientation can provide an indication of how students will collaborate given their cultural backgrounds. Fostering social interaction (e.g., informal introductions, exchange of personal profiles) and encouraging critical discussion (e.g., concrete feedback, time to reflect) via an intercultural enriched collaboration script can effectively scaffold online collaboration to improve group dynamics. Providing a specified sequence of events for the collaborating students to follow as part of the script instructions effectively minimized the amount of effort required to coordinate the collaborative learning process. Script instructions tailored to the individualist or collectivist cultural orientations of the students working collaboratively may thus promote greater rapport, greater engagement in productive debate, and greater convergence on the collaborative learning activities. Students' awareness of existing differences in communication styles can be heightened with the help of special features

of CSCL tools (e.g., adaptive scripting as developed by Gweon et al. (2006)) and by providing examples of such differences or case transcripts illustrating such differences (Kim & Bonk, 2002). In sum, the instructional support provided by the IECS in the present study proved useful for intercultural online collaboration. The ingredients of the IECS are presumably transferable to other educational settings that require collaboration across cultures and distance, but only time and future studies will tell us just how transferable.



Chapter 7

General discussion

INTRODUCTION

In this final chapter, the main research findings and conclusions pertaining to the research questions formulated in the Introduction are summarized. All of the findings and experiences from the various studies will then be integrated and discussed in order to draw more general conclusions. Some remaining methodological issues and limitations will then be pointed out. And finally, some suggestions for future research and implications for educational practice will be proposed.

MAIN FINDINGS

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), there are more than 2.5 million students studying outside their own country as of 2009. UNESCO expects the number of international students to reach about 7 million by the year 2020 (Altbach, Reisberg, & Rumbley, UNESCO report, 2009, p. 3). Incorporating intercultural learning into a collaborative learning environment brings both challenges and benefits. Among the challenges are the need to manage expectations that can differ, acknowledge alternative perceptions, accommodate different types of reasoning, and collaborate effectively despite sometimes different styles of communication. Key benefits are the sharing of culturally diverse knowledge and the preparation of students to work effectively in culturally heterogeneous groups. It is thus important for educators to maximize the benefits of multicultural collaborative learning and respond appropriately to its challenges. The research reported on in this dissertation helps meet these two objectives by (1) providing an overview of the challenges inherent to multicultural learning in groups of higher education students and (2) examining the extent to which culturally diverse students perceive the identified challenges in similar or different manners.

In Chapter 2, we address our first research question: RQ1 *What are the most important challenges encountered during multicultural student group work in higher education, and how do culturally diverse students differ in their perceptions of those challenges?*

Previous research shows that some challenges are unique to culturally heterogeneous groups and some are not. All groups share the challenges of planning work, communicating about work, coordination of work, conflict management, adherence to timelines, and agreement on acceptable group behavior. In addition, multicultural groups must overcome an additional layer of complexity that can stem from culture-related differences. Based on this information, we developed a theoretical framework for the challenges that can affect both monocultural and multicultural groups. We then designed a questionnaire to examine whether and how the

cultural backgrounds of students affected their perceptions of the challenges of multicultural student group work (MCSG).

The results showed certain challenges in MCSG in higher education to be perceived differently by students coming from diverse cultural backgrounds. All participants perceived free-riding, inadequate English language skills, and insufficient communication to be the greatest challenges of MCSG. Students from individualist cultures perceived general challenges (e.g., free-riding, group conflicts) to be a more important challenge than students from collectivist cultures. Students from collectivist cultures tended to emphasize culture-related challenges during MCSG more than students from individualist cultures (e.g., culturally different styles of complying with guidelines provided by a supervisor, culturally different ways of interacting). Culturally diverse group members can have completely different expectations about learning in groups but also the behavioral motives of others, which can give rise to misunderstanding and conflict. Students with a more individualist cultural orientation may be more sensitive to general challenges because these can be perceived as obstacles to the achievement of their own, specific goals. And students with a more individualist orientation are less concerned with the cultural diversity within a group than students with a more collectivist cultural orientation.

The search for common ground and mutual understanding with respect to the goals of the group thus plays a key role in MCSG precisely because of the different backgrounds, expectations, and goals/motives that members can bring to the group. If common ground and mutual understanding are not found, then misinterpretations of the ultimate group goals, differing levels of commitment, and communication difficulties may prevail. And for this reason, the utility of providing instructional support for MCSG in a CSCL environment was examined in this dissertation. And the results of the relevant studies are presented in Chapters 4, 5, and 6.

Advances in computer and information technology have brought new opportunities for people to connect across physical and temporal barriers. And computer-supported collaborative learning (CSCL) has shown itself to be a valuable form of instruction. However, the use of CSCL learning environments brings not only benefits but also challenges, which can include competing, culture-related interests (Chase, Macfadyen, Redeer & Roche, 2002; Reeder, Macfadyen, Roche, & Chase, 2004). For this reason, we explored the similarities and differences in the ways in which culturally similar and culturally dissimilar groups of students proceed in a CSCL environment and the characteristics of the collaborative discourse in particular. The second research question in this dissertation was thus: RQ2 *What are the differences between students' perceptions of collaborative learning, their reported learning experiences, and their learning outcomes when they collaborate in a CSCL environment with a culturally similar or dissimilar partner?*

The results of this study of the challenges of working in intercultural CSCL groups are reported in Chapter 3. A collaborative partner with a different cultural background negatively affected a student's overall perception of the online collaborative learning experience. Students with an individualist cultural background had significantly less positive perceptions of the collaborative learning experience than students with a collectivist cultural background, moreover. Interview data revealed that the individualists were primarily concerned with feedback from their partners to make sure that the message being sent was understood as intended while the collectivists collaborative partners lacked sufficient contextual information to adequately interpret the message being sent. Collectivists tended to be more concerned with the social relationships within the group than with the task while the individualists were more concerned with working on the task than with relationship building. The individualists believed, moreover, that better group performance could be achieved by directly exploring their partners' experiences and task-related knowledge but also communicating what is meant as explicitly, precisely, and directly as possible. In contrast, the collectivists believed that maintaining positive relations between members of the group is essential and that online messages — in order to ensure that nobody is inadvertently offended — should be written with utmost care.

These results provide insight into the different ways in which students with culturally different backgrounds can proceed in a CSCL environment and the problems that can plague the collaborative discourse as a result of these differences. The students can or do not understand each other sufficiently and can or do not agree on how to proceed. In order to achieve the potential rewards of collaborative learning in culturally diverse groups, collaborative procedures and tasks must thus be tailored to the needs of the interactants in a group. And this tailoring/facilitation can be realized, we reasoned, with the supply of explicit collaboration instructions for use in CSCL environments.

Taken together, the results of our first two studies show students' understanding of the collaborative process, their behavior in a group, and their communication to be greatly shaped by their cultural backgrounds. Without additional facilitation, the students collaborating in multicultural groups may therefore fail to understand each other and the task at hand. Recent research on CSCL, however, has shown that so-called collaboration scripts can effectively support online collaboration (e.g., Fischer et al., 2013; Kollar et al., 2006, Rummel & Spada, 2005; Weinberger et al., 2005). But very little is known about the use of such collaboration scripts with mixed- as opposed to same-culture CSCL groups.

In the next step in our research, we therefore designed and evaluated a general collaboration script (CS) for use by students working in culturally diverse CSCL groups. The CS draws upon the coding scheme of Curtis and Lawson (2001) developed to analyze collaborative online learning behavior. To document the utility of using a general CS to facilitate

the CSCL of students working in intercultural groups, we compared the online collaborative learning behaviors and quality of the online discussions for mixed- versus same-culture learner dyads either using or not using the general CS in a CSCL environment. That is, same- versus mixed-culture dyads were randomly assigned to one of two conditions (i.e., a condition with versus a condition without use of the general CS). Accordingly, the third research question in this dissertation was: RQ3 *To what extent do group composition (mixed- vs. same-culture learner dyads) and general collaboration script (with vs. without) affect students' online collaborative learning in terms of collaborative behavior and the quality of discussions in a CSCL environment?*

The results regarding the utility of using a general collaboration script to facilitate the CSCL of students working in mixed- as opposed to same-culture groups are presented in Chapter 4. The introduced script did not help the students working in culturally mixed dyads engage in a sufficiently productive discussion and thus realize the purported benefits of working in an intercultural CSCL context. The culturally mixed dyads that used the CS showed more Seeking input and Social interaction than the culturally mixed dyads not using the CS. The same-culture dyads using the CS required less Planning activity than the same-culture dyads not using the CS. Independent of script condition, however, the same-culture dyads showed more Contributing activity and produced a higher quality of online discussion than the mixed-culture dyads.

While the general CS appeared to increase group interaction, the mixed-culture dyads nevertheless exhibited a lower level of content-oriented (i.e., on task) discussion than the same-culture dyads. The general CS did not help the students working in culturally mixed dyads engage in a qualitatively more productive discussion when compared to those mixed-culture dyads that did not use the general CS and compared to the same-culture dyads. Our conclusion was therefore that the design of a CS for use by culturally mixed groups of learners should incorporate additional culture-specific elements and thus “culturally enriched.” We thus turned to previous research on the use of collaboration scripts for CSCL and intercultural learning to identify elements of relevance for the development of an interculturally enriched collaboration script (e.g., Cox et al., 1991; Rummel & Spada, 2005; Vatrappu & Suthers 2007; Weinberger et al., 2007).

The dynamic and heterogeneous influence of cultural background on the social behavior, attitudes, communication, and cognition of individuals has been well documented (e.g., Hofstede, 1980, 2001; Nisbett, 2003; Triandis, 1995, 2007; Schwartz, 1992). Relatively little is known about the influence of cultural background on the behavior, attitudes, communication, and thinking of individuals in groups, however. And ground rules for online collaboration in culturally diverse groups and the facilitation of such collaboration are virtually nonexistent.

Building on previous research regarding intercultural differences and the possible impact of these on group collaboration processes, we identified specific discourse practices and patterns of interaction that were likely to emerge in culturally heterogeneous CSCL groups. We then created specific collaboration instructions to help students with a more individualist cultural background (i.e., orientation in the group) and students with a more collectivist cultural background (i.e., orientation in the group). Culturally tailored CS instructions were created for the initial, main, and final phases of the collaboration process. In the initial phase, the collaborating students were given instructions on how to learn about each other's backgrounds, orient themselves towards the learning task, and establish a shared understanding of the learning task. In the main phase, the students given instructions on how to elaborate a point of view, discuss alternative points of view, reflect upon what has been said, critically assess their partners' contributions, and to allow their partners adequate time to respond and feel free to disagree with their partners. In the final phase, the students were given instructions on how to identify the solution(s) for the task/problem at hand by weighing the available options.

In the exploratory study reported on in Chapter 5, we compared the effects of the interculturally-enriched collaboration script (IECS) that we developed to those of the general collaboration script (CS) that did not include special intercultural elements. This was done for student attitudes towards online collaboration, their collaborative learning behaviors, their learning performance, and their reported learning experiences. The main research question was: *RQ4 Are there differences in attitudes towards online collaboration, collaborative learning behaviors, learning performance, and reported learning experiences for culturally heterogeneous groups of students using an interculturally-enriched collaboration script as opposed to a general collaboration script when working in a CSCL environment?* The results of this pilot study provided the basis for our subsequent study.

The results of the pilot study described in Chapter 5 show student attitudes towards online collaboration to become more positive in the IECS condition and less positive in the CS condition. The groups given an IECS tended to show a higher frequency of contributing behavior but a lower frequency of planning, seeking input, and social interaction when compared to the groups given a general CS. The groups in the IECS condition received higher scores for their jointly developed project plans than the groups in the CS condition, moreover. These results suggest that a well-designed IECS script can indeed help collaborating students overcome culture-related differences and foster productive collaboration. However, further experimental investigation was needed to document the effects of using an IECS with a larger sample of students.

In Chapter 6, the results of an intervention study using the same experimental set up as in the pilot study described in Chapter 5 but with a larger and more diverse sample of students are

presented and discussed. Once again, the effects of using an IECS were compared to the effects of using general CS in terms of the attitudes towards online collaboration, online collaborative behavior, and learning performance for students working in culturally heterogeneous groups in a CSCL environment. The following research question was addressed: RQ5 *Do the effects of an interculturally-enriched collaboration script on the attitudes towards online collaboration, online collaborative behavior, and learning performance differ from the effects of a general collaboration script for students working in culturally heterogeneous groups in a CSCL environment?*

The students in the IECS condition showed significantly more positive attitudes towards online collaboration following the study than the students in the CS condition. The dyads in the IECS condition exhibited a statistically higher frequency of Initiating activities, Challenging subcategories of online collaborative behavior and statistically lower frequency of Organizing work, Exchanging resources, Sharing knowledge, and Social interaction than the dyads in the CS condition. With regard to the nature of the students' interactions while working in the CSCL environment, the dyads in the IECS condition showed relatively more "challenging and explaining/elaborating" interactions than the dyads in the CS condition who showed more uncritical "joint sharing of knowledge and explanation/elaboration" interactions than the dyads in the IECS condition. No significant differences in learning performance were found between the two script conditions, but the dyads in the IECS condition were found to more frequently mention concepts concerned with a solution of the problem at hand than the dyads in the CS condition. These findings suggest that the IECS instructions tailored to the differing individualist and collectivist orientations of students working on a CSCL task effectively promote greater attitude towards online collaboration, greater engagement in productive debate, and greater convergence on the collaborative learning activities to be performed. An IECS supplemented with instructions containing critical intercultural elements thus appears to provide the facilitation that is called for working in an intercultural CSCL environment. Future studies of the proposed ingredients for an IECS are, of course, needed to further this line of research.

INTEGRATED DISCUSSION OF THE MAIN FINDINGS

In the five studies presented in this dissertation, the focus has been on those variables considered important for student learning in a collaborative environment: attitudes, behavior, and learning outcomes. Individualism and collectivism (Hofstede, 1991) were added in order to operationalize the cultural background orientations of the collaborating students and thereby explain the nature of the collaborative group learning process. The studies built upon each other, which meant that the findings of the previous studies provided the input for subsequent studies.

In the first exploratory study, it was found that perceptions of the challenges of working in multicultural groups differed depending on the cultural backgrounds of the students. In the second study, student perceptions of online collaborative learning, their reported learning experiences, and their actual learning performance were investigated for groups working in a CSCL environment with either a partner who was culturally similar or culturally dissimilar. Having a partner with a different cultural background negatively affected the students' online collaborative learning experience in general. Those students with an individualist cultural background also had significantly less positive perceptions of online collaborative learning but achieved better learning outcomes than those students with a collectivist background. In the third study, a general collaboration script was introduced to facilitate the group collaboration process. The online collaborative learning behaviors and quality of the online discussions were investigated for mixed- versus same-culture dyads of learners working in a CSCL environment. The findings showed use of a general collaboration script to increase the amount of interaction in the group but to nevertheless not help the students in mixed-culture dyads sufficiently to achieve a productive discussion (i.e., perform equally to same-culture dyads). It was therefore decided to design a collaboration script that incorporates additional elements to help structure the group interaction, guide the performance of learning activities, and bridge any differences in the cultural orientations of students working in a CSCL environment. In the fourth study, the use of an interculturally-enriched collaboration script (IECS) positively affected students' attitudes towards online collaboration, their online collaborative behavior, and their learning performance. In the fifth and final study, the positive effects of using an IECS with culturally mixed groups of students working in a CSCL environment were verified using a larger sample of students. When the effects of the IECS on the same variables as in the previous studies (i.e., attitudes towards online collaboration, online collaborative behavior, and learning performance) were examined in a different educational setting with a larger but also more diverse sample of students, the similar positive pattern of results was found.

The present research contributes to the body of knowledge concerned with the CSCL of students, their behavior, and their communication when working in same-culture but also mixed-culture groups. The empirical results show the attitudes of students towards working with an online collaborative learning format and their actual behavior in such a collaborative learning situation to be influenced by both their cultural backgrounds and the specific learning context (e.g., course requirements, learning task at hand, collaborative media). Understanding just how students from different cultures *perceive* the collaborative learning task and therefore how they can be expected to interact with each other in such a situation is thus of importance for the design of instructional interventions aimed at fostering both learning and international exchange (Liaw, Chen, & Huang, 2008; Zhu, 2009).

Based on the Piagetian approach of socio-cognitive conflict, the efficacy of collaborative learning effort is thought to be influenced by the extent to which students can identify and discuss conflicts in their knowledge and beliefs (De Lisi & Goldbeck, 1999). While this holds for an individualist culture, more consensual forms of collaborating may predominate in a collectivist culture (Vatrapu & Suthers, 2007). And the findings of the second study, described in Chapter 3, showed individualists collaborating with collectivists to have significantly less positive perceptions of the collaborative learning process than individualists collaborating with other individualists; collectivists collaborating with other collectivists or collectivists collaborating with individualists did not differ significantly from each other in this respect.

Student *perceptions and reactions* to a social-constructivist learning environment can thus differ depending on their prior experiences and cultural backgrounds (Zhu, 2009). Students with a collectivist orientation think that they want to perform well in a group but are wary of conflict while students with an individualist orientation are geared towards their own personal goals and not wary of conflict when working in a group (Anakwe & Christensen, 1999; Chan & Watkins 1994; Phuong-Mai et al., 2005, 2006; Oetzel, 1999; Uzuner, 2009; Zhong et al., 2008). These differing approaches to how to collaborate and learn together appear to lead students with an individualist orientation to hold less positive attitudes towards online collaboration in culturally diverse groups. And the findings of the present research taken in this light suggest that culture-specific guidance for individualists and collectivists engaged in a CSCL task may thus be needed to bridge major intercultural differences and foster productive collaboration.

In response to this need, in the studies described in Chapters 5 and 6, we designed and tested an interculturally-enriched collaborative script (IECS) for use in an intercultural CSCL environment. The use of the IECS from the very beginning of the collaboration (i.e., for the creation, exchange, and discussion of personal profiles in order to establish the group) and then throughout the remainder of the collaboration process led to more positive intercultural CSCL experiences. It is therefore essential that collaborating students be given support for not only the establishment of the group but also productive debate (i.e., to stimulate critical discussion, full comprehension of the contributions of others, and reflective responding). Students working in an intercultural CSCL environment should also be instructed to view the online environment — or any other collaborative environment — as a safe environment for the sharing of ideas, opinions, and information. Sufficient time must also be provided to allow students to optimally benefit from an IECS (i.e., the IECS to be gradually faded out of the online interaction). Previous research suggests that the amount of time that students have to interact on the basis of an external script is related to the internalization of the desired practices: greater time, greater internalization (Fischer et al., 2013; Kollar et al., 2007). To effectively manage intercultural CSCL, we need to identify those aspects that are shared by most cultures and

therefore not likely to give rise to intercultural misunderstanding or conflict and those aspects that are not shared and thus possible causes of misunderstanding and/or conflict. Only then can we intervene in ways that help group members adapt to varying cross-cultural scenarios but also independently deal with future challenges (Brett et al., 2006). Ultimately, collaborating students should be able to interact in accordance with principles underlying an IECS but without the actual script. The aim of initially using an IECS is also not to reduce existing intercultural differences to zero but, rather, to show students how they can benefit from such differences. More extensive and possibly longitudinal research in the future should help us shed more light on the learning effects of using an IECS to work in culturally diverse CSCL groups.

Given that cultural context is known to influence perceptions and attitudes towards a collaboration process but *also behavior and communication* within the collaborative group (e.g., Kim & Bonk, 2002; Vatrappu, 2008; Wertsch, 1998), students' actual collaborative learning behaviors were also examined in the studies described in Chapters 4, 5, and 6. Chat protocols were analyzed to gain insight into the collaborative behaviors and patterns of discourse for students in collaborating in culturally mixed groups. The coding scheme developed by Curtis and Lawson (2001) to analyze online collaborative behavior was called upon for this purpose. Pilot testing showed the coding scheme to be applicable to the data collected in the three studies reported in Chapters 4, 5, and 6, respectively. The coding scheme of Curtis and Lawson (2001) encompasses five categories of behavior previously identified as necessary for successful online group collaboration (Kim & Bonk, 2002).

While the same coding scheme was used in all three of the studies reported on here, the outcomes of the content analyses must be interpreted in light of the following factors: the task assigned to the students, the cultural composition of the group, the size of the group, the collaborative media used, and the presence or absence of a CS or IECS to guide the online collaboration. The particular mixture of these factors can obviously influence the group dynamics. According to Henri (1992), high levels of clarification and inferencing activities can be expected when knowledge acquisition or problem resolution are part of a learning task. In the present research, complex, open-ended tasks which thus required such activities were used. And the majority of the collaboration activities analyzed in the studies reported on in Chapters 4, 5, and 6 were task-oriented activities. Activities such as giving feedback, sharing knowledge, explanation, and seeking feedback were prevalent in the online discussions. However, only in the study described in Chapter 6 using the IECS did the students collaborating in mixed-culture groups show relatively more “challenging and explaining/elaborating” interactions than in the other studies in which the students collaborating in mixed-culture groups showed more uncritical “joint sharing of knowledge and explanation/elaboration” interactions. This difference can be attributed to the IECS instructions, which were aimed at — among other things — the

allowance of challenging behavior and the initiation of task-solution activities. Particularly during the problem-solving phase of the collaborative learning tasks, the IECS instructions encouraged students with a collectivist orientation to feel free to disagree with their partners, to be as direct as possible, and to be as specific as possible in their communication; the students with an individualist orientation were encouraged to critically assess the contributions of others but also allow adequate time for others to respond. The findings of the study reported in Chapter 3 showed students from collectivist cultures to be less motivated to participate in online forms of collaborative learning because these ways of learning often involve conflict or disagreement between the collaborative partners, which not compatible with a collectivist's manner of interacting in a group. Specifically, 14 out of the 27 students coming from a collectivist culture in the study judged the statement of opposing opinions and/or explicit disagreement to be counterproductive for collaborative learning. In contrast, 7 out of the 13 students from an individualist culture in the study experienced difficulties receiving clear feedback from the collaborative partner or complained that the collaborative partner was not critical enough when they — the individualist — collaborated with a collectivist. It is therefore concluded that the use of an IECS can help culturally diverse students to conduct productive discussions by encouraging them to engage in critical debate.

The effect of the IECS on “challenging and explaining/elaborating” interactions was relatively less in the study reported in Chapter 5 than in the study reported in Chapter 6. This lesser effect can perhaps be attributed to the size of the group (i.e., a group of six as opposed to a dyad) and the nature of the particular learning task. More communication and coordination difficulties are likely to occur in a larger group than in a smaller group, and such difficulties can impede group dynamics and thereby lower the quality of the collaboration. The learning task also differed in the study reported in Chapter 5 from that used in the other studies and previous research, and it appears to have elicited different collaborative behaviors as well. In the assignment used in the study reported on in Chapter 5, the students all had to develop a project plan, which elicited a considerable amount of knowledge sharing and clarification activities. In the assignment in the study reported on in Chapter 6, the students had to solve an environmental problem, which elicited — as expected — high levels of argumentation, elaboration, and challenging activities.

Challenging and explaining/elaborating interactions were expected to occur more frequently in culturally diverse groups working in a CSCL environment. The learners in in such groups bring a variety of perspectives, skills, and decision-making strategies to the task at hand (Maznevski, 1994). It is assumed that the students will try to resolve any conflicts or misunderstandings by asking questions, discussing, explaining, and providing extra information to support their viewpoints, and this is considered beneficial for learning from a socio-constructivist point of view (Vygotsky, 1978). However, when disagreements and conflicts do

not get explicitly verbalized and subsequently discussed, the expected positive CSCL outcomes will not occur. All of the following factors were probably at work: self-protection, anxiety and uncertainty associated with working with people from different cultural backgrounds, miscommunication, and difficulties expressing disagreement and/or an unwillingness to openly disagree. These factors may hamper the exchange of new information and ideas, with less productive forms of collaboration occurring as a result. In other words, simply placing people with different cultural backgrounds together in a group does not guarantee the occurrence of “productive” socio-cognitive conflicts and collaborative learning. It is necessary to set up a “high-performing,” culturally mixed group that can capitalize on its diversity rather than being constrained by it (McCorkle et al., 1999).

The results of the study described in Chapter 6 indeed show that the use of an IECS can promote engagement in productive debate (e.g., constructive criticism, challenging of positions, attainment of synthesis via discussion). Analysis of the students’ collaborative behavior in the studies reported in Chapters 5 and 6 showed use of either a general collaboration script or an IECS to fulfill many planning functions (e.g., prompt quick agreement on a specific course of action, clearly articulate how to proceed). The use of a collaboration script thus required culturally diverse groups to devote less time to planning activities than would otherwise be the case. And given that the coordination of expectations, viewpoints, and activities is one of the prerequisites for effective online collaborative learning, this is a very important finding. Coordination difficulties have been reported to be one of the major impediments to online collaboration in general (Strijbos, Martens, Jochems, & Broers, 2004) and online collaboration between culturally diverse students in particular (Anderson & Hiltz, 2001). Educators must thus help collaborating students to establish a shared focus and otherwise spend as little time as possible on coordination activities in order to maximize the amount of time and effort for collaborative learning (Cox et al., 1991; Weinberger et al., 2007).

METHODOLOGICAL STRENGTHS AND WEAKNESSES

Multiple methods calling upon both quantitative and qualitative measurements were used in the studies reported here: questionnaires, interviews, and both discourse and content analyses of chat protocols. This use of mixed methods allowed us to triangulate the data we collected and thereby strengthen the explanations offered for our findings.

A total of 11 different instruments were used in the studies. For all of the instruments, the reliability and internal consistency of the measurement was checked. For the self-constructed questionnaires, pilot tests were conducted to document the suitability of the measures.

In Chapter 2, a logistic regression analysis might have been used as opposed to a one-way analysis of variance (ANOVA) to differentiate between the cultural groups that were studied (i.e., individualists and collectivists). Placing the groups in a single equation might have provided greater insight into their effects on each other. Also, there were 141 participants from over 40 countries, which means that a larger population should be surveyed in future studies conducted across multiple study periods/semesters to improve the generalizability of the findings.

The data in the studies described in Chapters 3, 4, 5, and 6 were analyzed at the level of the group because the individual-level data could not be treated independent of the group-level data. For example in Chapter 5, Ukrainian student 1 collaborated with Dutch students 1 and 2, who have their own unique patterns of collaborative behavior, and not with Dutch students 3 and 4, who also have their own unique and thus different pattern of collaborative behavior. The way in which Ukrainian student 1 interacted in the group thus depended at least in part on the group and the other collaborators in the group. Recent multilevel modelling and other methodological research (Cress, 2008; De Wever, Van Keer, Schellens, & Valcke, 2007) has shown many studies reporting effects for collaborative work to have disregarded this basic statistical issue (i.e., the axiom requirement of independence). 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 but not from individual to individual. Future research should therefore comply with the axiom requirement of independence, acknowledge the group constraints on CSCL, and perhaps adopt multilevel models (e.g., hierarchical linear models, nested models) to the analyses in order to cope with the inherently nested nature of the data.

The coding scheme developed by Curtis and Lawson (2001) to understand online collaborative learning behavior was adopted for the analyses of the chat protocols in Chapters 4, 5, and 6. Pilot testing of the coding scheme in several studies showed its suitability for analyzing the type of data obtained in these studies. In addition, the inter-rater reliability and intra-coder test-retest reliability measures in the studies showed satisfactory coding reliability. While this coding scheme has been widely applied in previous studies, extension and refinement of the coding scheme should be considered in future research to give us insight into those collaborative behaviors that are directly scaffolded by the use of a collaborative script in general and an IECS in particular. The specific differences that students with a collectivist cultural orientation and students with an individualist cultural orientation are expected to display when working together in a CSCL environment might also be captured more precisely with an expanded or refined coding scheme. In view of this, a specific coding category might be introduced to capture the extent to which a direct or indirect style of communication predominates. For example, collectivists are expected to exhibit collaborative behavior, which is indirect, aimed at

not being blunt, not hurting feelings and creating consensus. They might place more emphasis on the context and information details rather than explicitly on the main issues. Coding for a direct/indirect communication style could thus give us insight into the extent to which an IECS also influences the style of communication used in an intercultural CSCL environment.

With regard to the research design used in most of the studies reported here, group composition (mixed vs. same), cultural background (individualist vs. collectivist), and script condition (general CS vs. none or general CS vs. IECS) were all treated as independent variables. The dependent variables were mostly attitudes, behavior, and learning outcome. Other independent and dependent variables are conceivable and merit consideration for studying the nature of the group dynamics during CSCL and the efficacy of using collaborative scripts in culturally diverse CSCL groups. Future investigations should thus include measures that are sufficiently sensitive to reveal: social and cognitive growth, greater reflection, greater awareness of cultural diversity, enhanced ability to apply acquired knowledge and skills, and enhanced ability to apply acquired knowledge and skills in diverse situations. Additional background/control information might also be collected in order to better understand the role of the individual student in the collaborative learning process: epistemological beliefs, motivation, preferred learning strategies, preferences for collaborative learning, and willingness to adopt new forms of learning. Information on these variables in addition to the variables studied here can provide greater insight into CSCL in culturally diverse groups and most importantly the design of instructional activities that are meaningful for students, facilitate their group interactions, and promote their learning and development.

The students in our studies, with the exception of Bachelor of Science students in the study described in Chapter 5, were all Master of Science students. In all of the studies, with the exception of the study described in Chapter 3, authentic learning environments were used. And the knowledge domain in all of the studies came from the field of environmental sciences or a closely related field. The present results therefore cannot be directly generalized to other levels of education or other field of study without additional documentation.

The students in our studies collaborated for a short period of time. The longest collaboration period was 8 weeks in the study described in Chapter 2; the shortest was 4 hours in the study described in Chapter 3. The effects of cultural diversity and the use of collaboration scripts presumably change over time as students become familiar with each other and familiar with the outlined procedures. It is therefore recommended that future studies be undertaken spanning a longer period of time in order to gain great insight into the nature of the collaborative learning over time.

In our research, special attention was paid to the comparability of the participants. Information on several background variables was collected for matching/control purposes:

participants' age, gender, duration of stay in the Netherlands (for non-Dutch participants), prior domain knowledge, prior experience with group work in the form of face-to-face interaction, prior experience with online collaboration, prior experience with intercultural collaboration, and mastery of computer skills. In addition, special attention was paid to the — at the time — largely theoretical notions of individualism and collectivism in the selection of the student samples.

It was assumed that each student would be influenced by his or her individualist or collectivist cultural background and that the students could therefore be assigned to intercultural collaborative learning groups on the basis of this information. Drawing on Hofstede's conceptual model of individualism and collectivism (1991) culture was operationalized here. Our results show that distinguishing cultures in terms of collectivist and individualist orientations is useful for identifying but also predicting differences in behavior, attitudes, communication, and cognition during collaborative group learning. The total sample for the present research included over 500 students representing a total of 55 countries. Culture is nevertheless a complex phenomenon and can hardly be analyzed using a single, simple model. According to the psychologist Alex Mesoudi (2011), "the most productive approach to understand a phenomenon such as culture is to divide it up into small pieces and try to explain them in a piecemeal style, much like a jigsaw puzzle solver might assemble only small sections of a much larger and elaborate puzzle at a time" (p. 125). The differentiation of cultures in terms of relative individualism and collectivism thus provides initial insight into possibly critical cultural factors for working in a collaborative learning context and thus a small piece of the larger picture of multicultural collaboration, which is exactly what we set out to do in this research. The individualism/collectivism conceptual model was called upon to formulate what we could expect in a multicultural student group learning context or CSCL context. This was done in a series of research questions.

In the following, the strengths and weaknesses of using collectivist and individualist cultural orientations to study the intercultural CSCL of students will be summarized. This will be done in light of the present research findings and experiences but also other relevant research.

Although type of cultural background proved to be an important factor in the present research, its importance as research parameter should not be overestimated. In some relevant studies, for instance, the personal characteristics of the collaborators have been found to prevail over cultural characteristics in terms of influencing the efficiency of the intercultural collaboration (Ting-Toomey, Oetzel, & Yee-Jung, 2001). Cultural differences cannot always be reduced to individual differences, however (see Na, Grossmann, Varnum, Kitayama, Gonzalez, and Nisbett, 2010, for a review). For this reason, the influence of collectivist and individualist cultural orientations on group work and collaboration processes has traditionally been studied

at both the national and individual levels. The most frequently used individualism/collectivism scale (e.g., Hofstede, 1980, 2001; Triandis, 1995, 2007; Schwartz, 1992) has items that clearly correlate with each other, which encouraged the assumption that the individualism-collectivism dimension of culture also applies to the individual. However, some have argued that the paper and pencil individualism/collectivism test (i.e., a set of self-report scales) does not correlate with independent and interdependent task performance and thus that cultural differences are not always reducible to individual differences. Similarly, in the meta-analysis by Oyserman and colleagues (see Oyserman, Coon, & Kemmelmeier, 2002, for an overview), only weak differences were found between countries for what was exclusively self-report data. The difference between the USA and Japan, in particular, was much weaker than anyone knowledgeable of the two cultures would expect. In future studies, thus, researchers should take that variance which can arise from both inter-cultural difference and inter-individual differences into account.

Generalizations about collectivist populations based on samples consisting of a mixture of international students should be interpreted with caution. The findings may not be representative of the pure “native” situation and thus completely transferable to the “native” population. Despite the fact that the individual international student coming from a collectivist country may hold largely collectivist values and norms, the student may nevertheless exhibit behavior that is more individualist due to his/her experiences abroad. It is also possible, of course, that only students with a more individualist orientation choose to study abroad. The cultural differences between such students may therefore not be as big as suggested by Hofstede’s cultural framework. In all of studies presented in this dissertation, the students representing an individualist cultural orientation came largely from the Netherlands. Future studies should therefore include students from other countries that are known to have a predominantly individualist cultural orientation.

Long-term residence in a foreign country can be assumed to create at least some cultural assimilation of the host culture (Berry, 1997). International students can similarly be assumed to adopt at least some aspects of the values, beliefs, and practices of the culture to which they are exposed. International students may also form new values and beliefs that are a fusion of values and beliefs from the native culture and the host culture. These changing and newly emerging values and beliefs may then, in turn, determine how international students frame a learning situation and how they behave in the situation — which is different in all likelihood from how their counterparts in the home country would frame the situation and behave. There is recent evidence, however, that the values and beliefs associated with the home cultures of international students continue to influence their perspectives and behavior (Alegria, 2009; Shi et al., 2013). And when an international student works with a student with a culturally similar background, this familiar cultural context may highlight certain shared values and beliefs and

thereby influence the attitudes and behavior of the international students in the collaboration context (Shi et al., 2013).

It has been argued that while international students can show marked similarities in their individualism or collectivism orientations (e.g., some Asian and South American students can clearly resemble each other in terms of collectivism), they can also differ markedly from each other with respect to other cultural aspects. Power Distance and Uncertainty Avoidance are two such aspects. Cultures that are similar to each other in terms of an individualist or collectivist orientation may still vary with respect to the behavior of the individuals in the cultures and their discussion styles. For example, Danish and American (i.e., USA) cultures resemble each other with respect to a predominantly individualist cultural orientation (Hofstede et al., 2010) but differ with respect to — for instance — the level of sociability, modesty in the presentation of ideas, and the public sharing of information in a group (Bannon, 1995; Weinberger et al., 2007). In a similar vein, Weinberger and his colleagues (see Weinberger, Marttunen, Laurinen, & Stegmann, in press) have recently conducted a study in which they examined the effects of a peer-critique collaboration script on the collaboration process in mixed Finnish and German CSCL groups. The German students showed more (constructive) conflict-oriented behavior in their online discussions than the Finnish students. That is, collaborative online patterns of behavior can vary even between seemingly closely related West European cultures. The researchers in that study further linked, on the basis of Hofstede (1991), the observed conflict resolution styles (i.e., domination, integration, or conflict avoidance) to the preponderance of the cultural dimensions of masculinity or femininity. Also classifying cultures in terms of their masculine and feminine characteristics and identifying those elements that are needed for a IECS to be tailored to the masculine and feminine cultural predispositions of students working in a group is a promising direction for future research.

At this point it should be noted that we did not depart from a particular cultural perspective and thus aim to be ethnocentric in our analyses of the data collected for our research. The outcomes of our analyses were aimed, rather, at furthering our understanding of online collaborative learning that may involve more than one culture and thus the need to accommodate differences between cultures. In light of the associations that exist between culture and learning, it is important for educators to provide students with equal opportunities to learn using different modes of participation and thereby meet the needs of students with different cultural backgrounds but also allow all students to benefit from an awareness of the differing modes of participation and needs of students.

THEORETICAL AND PRACTICAL IMPLICATIONS OF THE RESEARCH FINDINGS

The findings of this research have a number of implications for future research and practice.

On a theoretical level, the findings have implications for the use of collaborative scripts to facilitate the collaboration and learning process in particularly CSCL environment. Special attention must be paid to the cultural differences that students bring in such a learning environment. In a recent article entitled “Toward a script theory of guidance in computer-supported collaborative learning” in the *Educational Psychologist*, 48 (2013), Fischer, Kollar, Stegmann, and Wecker put forth a framework for systematizing empirical research on a collaboration script approach to the facilitation of CSCL and pay particular attention to the interplay between internal and external collaboration scripts in doing this.

Internal collaboration scripts are defined as sets of personal knowledge and strategies that help an individual to understand and act in a collaborative situation. And we argue that, within the context of CSCL practices, internal collaboration scripts that guide students’ understanding of collaborative processes but also their behavior and communication in the group can be greatly influenced by their cultural backgrounds and previous learning experiences. In other words, the individual’s experiences with group interaction processes within their own culture have been transformed into internal scripts (Chang, 2009; Nishida, 1999; Schank & Abelson, 1977; Schank, 1999) and are brought to a CSCL context (Weinberger et al., 2007). Students collaborating in mixed-culture groups may thus bring different internal scripts to the situation, and a mismatch between the activated internal scripts and individual frames of reference may occur among the students working in a collaboration context in general and a CSCL context in particular. When Kellermann, Broetzmann, Lim, and Kitao (1989) analyzed the conversational activities that are common for the initial encounter of two persons (i.e., university students in the case of their study), they could identify culture-specific patterns of understanding and acting. Brislin (1990) showed individualists (and thus people coming from a predominantly individualist culture) to focus on the task at hand even during the initial encounter and early phases of working together. Collectivists, in contrast, focus on the personal relationship during the initial encounter and early phases of working together. This means that group members with an individualist orientation and immediate focus on the task at hand as opposed to the person can unintentionally offend group members with a collectivist orientation. Conversely, collectivists with their initially greater interest in the person than the task at hand may not be taken seriously by individualists with a lack of participation from the collectivists or conflict as a results. Different, multicultural, and thus varying patterns of how students get acquainted during the early phases of collaboration may thus emerge and shape the ways in which a learning task

gets accomplished. The merits of adopting a script approach to facilitate CSCL and particularly the initial phases of this thus become apparent. The attitudinal and behavioral data collected in the present research and reported in Chapters 2, 3, 4, 5, and 6, moreover, provides a sound basis for how students coming from different cultural backgrounds can be expected to think and act but also introduced and guided towards a productive CSCL.

A script approach to the facilitation of CSCL can be used to more generally identify typical interaction patterns and misunderstandings that occur in intercultural collaborative groups and, in doing this, particular attention can be paid to the influence of the participants' internal scripts. To start with, the extent to which a particular internal collaboration script is culturally shared should be determined (a) and then exactly which internal scripts are shared between cultures (b). Identifying internal scripts that are culture specific or shared across cultures can improve CSCL practices by allowing educators to provide better support for culturally diverse groups of students working in a CSCL environment (Weinberger et al., 2007). This support can take the form of an external collaboration script as used in the present research.

External collaboration scripts are textual or graphic representations that can “guide CSCL practices by either facilitating or inhibiting the application of internal collaboration scripts” (Fischer et al., 2013, p. 61). External collaboration scripts can help reconcile differences between the participants in a group and minimize the amount of effort needed to get acquainted and needed to coordinate the required learning activities. Nevertheless, an external collaboration script should never undermine critical collaborative learning activities or the internal collaboration scripts of the participants; an external collaboration script should only foster productive learning processes and therefore uphold students' internal collaboration scripts to the greatest extent possible (Kollar et al., 2006, 2007). A balance must thus be sought between available internal and external collaboration scripts. And for this purpose, a more systematic analysis of the existence and effects of internal scripts, external scripts, and their interplay is needed in future research involving many cultures.

The present research has a number of practical implications for both F2F and CSCL forms of collaboration among culturally diverse groups of students in higher education. The present findings provide insight into some specific culture-related variables that can hinder or facilitate the collaborative learning process. The findings also demonstrate the value of a promising new approach to facilitate CSCL, namely the use of an IECS to bridge intercultural differences and foster collaboration.

In Chapter 2, insights were provided into the group dynamics of working in a multicultural, higher education setting and students' perceptions of the challenges of working in a multicultural group. It was concluded that if educators and instructional designers can manage to take advantage of the positive intercultural experiences that multicultural group

work can offer and also therefore respond adequately to its challenges, then multicultural groups can develop into successful and productive learning resources. Additional research is still needed, but at least a start can be made on the development of educational programs to improve multicultural group work in higher education.

In Chapter 3, insight was provided into how dyads composed of culturally similar or dissimilar students in terms of individualist or collectivist cultural backgrounds differed in their perceptions of CSCL experiences. Educators and instructional designers can utilize these findings to inform the design and creation of learning environments that are sufficiently responsive to the multicultural aspects of collaborative learning (i.e., structured but nevertheless flexible). In such a manner, cultural differences can be accommodated and again put to work to promote effective cross-cultural interaction and learning within a CSCL environment.

In Chapter 4, the effects of a specially designed, general collaboration script were explored when used by same- versus mixed-culture collaborative learning dyads. The online collaborative behavior and quality of the online discussions in the dyads were analyzed for this purpose. The findings showed collaboration in culturally mixed groups to not be optimal and therefore require extra facilitation. The results of this study thus laid the foundation for the design of an external, interculturally enriched, collaboration scripts — a script with special attention to the unique cultural backgrounds of the different participants in a CSCL environment.

In Chapters 5 and 6, more specific instructional support was introduced to facilitate the collaborative learning process. This took the form of an interculturally-enriched collaborative script (IECS) to help guide the online, intercultural interaction process (e.g., introduction of group members, coordination of activities). The results showed the IECS with instructions specifically tailored to the individualist or collectivist cultural backgrounds of the various students in the collaborative group to indeed promote greater rapport, greater engagement in productive debate, and greater convergence on critical collaborative learning activities. Providing a specified sequence of events for the collaborating students to follow as part of the script instructions effectively minimized the amount of effort required to coordinate the collaborative learning process. The elements included in the IECS and the findings of these two studies can thus be used in other educational settings to improve the collaboration process across cultures and distance.

The question that now arises is what this research has to say to an international University like Wageningen University. To start with, the research clearly fits into the internationalization policy of the university. 1) The university has been recognized as an international university by the Dutch-Flemish Accreditation Organization, and the Executive Board of the university places great emphasis on the international context and content of the university's education and research. 2) The present research provides a number of recommendations, instructional means,

and strategies to optimize collaborative learning in a multicultural setting and thus contributes to improved education at the Wageningen University for both Dutch and international students.

Many of the graduates of international universities later work in an international context — either physically or virtually. Part of their professional competence (Mulder, 2014) must therefore be to effectively function in international settings and thus in culturally heterogeneous groups. Learning how to productively collaborate across cultures and distances is therefore playing an increasingly important role in the educational preparation and competence development of students at international universities. Important drivers of this are the vast and rapid expansion in science worldwide, the globalization of the economy, an increasingly international student population, and increased mobility of labor in addition to the later employment of the graduates of international universities in international contexts. The demand for collaboration between professionals from different fields of expertise and different parts of the world is only growing.

In response to this trend, Wageningen University has increasingly been using new technology-enhanced learning environments, such as CSCL, to prepare students to work both face-to-face and online in a world of growing diversity and complexity. Within this context, the present research was aimed at better understanding the learning of students working in culturally heterogeneous groups and the facilitation of this learning. Despite the many challenges of CSCL, such an approach was found to provide a solid foundation for students to work together in culturally heterogeneous groups. The scripting of the intercultural interaction process in CSCL may empower students so that they are better prepared to work effectively in an intercultural CSCL environment and are thus better equipped to handle various intercultural scenarios in the future. Furthermore, the ability to apply acquired knowledge, skills, and awareness in diverse situations is essential part of the professional competence of any university graduate (Gulikers, Biemans, & Mulder, 2009; Mulder, 2012). Finally, the aims of stimulating students from different cultures to interact constructively, benefit from the cultural diversity and synergy present in a culturally diverse groups, and thereby prepare them for future intercultural challenges were put forward in the present research and should be strived for in the future research. The remaining challenge is to fade out the educational support to increase self-regulation in the end.

A question that remains is the extent to which a university with a largely international student body should impose a particular educational/learning philosophy on its students. Does it make sense to teach students from China, for instance, participatory and interactive learning methods when we know that, when they return to their home country, such an approach will be culturally inappropriate? Internationalization and cultural diffusion certainly play a role in this regard, but the above question remains (Zhu, 2009). The answer lies in the assumption that while studying internationally, intercultural differences must be made apparent to students and

taken into account where possible and needed for reasons of social inclusion and alternative learning styles. If this is not done, then educational effectiveness can be expected to be hampered.

Lecturers and instructional designers can perhaps benefit most from the present findings. They can draw upon the information reported here to enrich collaborative learning environments for culturally heterogeneous groups of students in higher education. And courses like *Principles of Environmental Sciences and International Study Visits Environmental Sciences* can serve as examples.

SUGGESTIONS FOR EDUCATIONAL PRACTICE

Synthesizing all of the empirical findings from the present research, the following recommendations can be offered. The recommendations are aimed at helping instructional designers and lecturers to increase the effective use of intercultural CSCL in their courses but also relevant for face-to-face work in a group. The recommendations can be realized via explicit instruction (e.g., oral presentation by the teacher, handouts) or via collaboration scripts embedded in the collaborative learning environment.

1. Preparation to use intercultural CSCL in university courses

- *Reasons for using intercultural CSCL*
 - When incorporating intercultural CSCL into course activities, make sure that the choice of CSCL is justified and the added value and relevance of CSCL thus made clear to the students. The intercultural CSCL work should be mandatory in order to maximize commitment on the part of the collaborating students.
- *Lecturer's intercultural competence and knowledge of CSCL*
 - The teachers need to be familiar with the core concepts of intercultural communication (e.g., Hofstede's cultural value framework (1991), communication and culture (Hall & Hall, 1990)) in addition to the theoretical, methodological, and technological issues involved in using CSCL. Teachers must understand that the implementation of intercultural CSCL requires a considerable amount of preparation; simply sending students off to work in CSCL groups does not guarantee successful collaboration and intercultural interaction.
- *Alignment of study tasks with learning outcomes*
 - Teachers need to formulate clear learning objectives. They also need to instruct the collaborating students to be explicit about their own expectations for the group, the

collaboration, the final group product, and their own learning goals. It is likely that students in culturally diverse groups will differ in their preferences for activities, group structure, communication style, and collaboration approach; this makes it important that the teachers also know the expectations and preferences of the students for working in an intercultural CSCL group and align the study tasks with this information in addition to learning objectives.

- Make sure that the collaborative learning task is complex and open-ended. Students can gain more from the constructive debate and sharing of information for complex, open-ended problems and questions. The information in such cases must be considered from multiple perspectives and multiple solutions can typically be proposed.
- *Selection of the CSCL platform*
 - The selection of the CSCL tool is crucial because it can influence the extent of use by the students and predetermine the mode of communication (e.g., synchronous or asynchronous exchange of information; presence or absence of visual and/or audio features). Teachers need to carefully select the CSCL tool and take into account its affordances (i.e., opportunities for activities that it provides in a given situation) and constraints (i.e., limitations that it can impose on activities in a given situation). The students must also be given sufficient time to familiarize themselves with the CSCL tool and practice with it at the beginning of the CSCL process.
- *Composition of the intercultural CSCL groups*
 - Teachers must obviously arrange for culturally heterogeneous groups but also take the following into account when composing the groups: prior collaboration experience, prior domain knowledge, age, and gender. The greater the cultural gap between the students in a group, the greater the probability of communication difficulties, misunderstandings, conflicts, and problems with the coordination of activities. It is therefore recommended that small groups of 2-6 be used. By limiting the size of the group, the aforementioned problems can be minimized and the level of involvement on the part of the collaborating students maximized.
- *Instructional support for intercultural CSCL*
 - Intercultural CSCL requires instructional scaffolding to foster collaboration and accommodate cultural differences. Generic CSCL task designs should be carefully considered in light of the cultural backgrounds of the students.
 - Teachers must identify cultural commonalities but also differences that can be possible sources of conflict in order to intervene and encourage all members of the group to

adapt to the intercultural situation, acknowledge alternative cross-cultural scenarios, and thus be able to deal with similar collaborative challenges in the future but on their own.

2. Facilitation and monitoring of CSCL process

- *Social introductions and problem orientation phase*
 - During the initial phase of the collaboration process, teachers must encourage the collaborating students to introduce themselves and get to know the group members in terms of their disciplinary and personal background information. Building good working relationships at the start of a collaboration can foster understanding of culturally distinct collaborative partners and also confront students with stereotypes that they may have.
 - It is recommended that the learning task not be presented all at once but broken into parts for presentation to the students across the collaboration period and process. The parts of the learning task should involve concrete, structured activities and built into the problem-solving phase of the collaboration process.
- *Collaborative learning phase*
 - After the introductory phase of the collaboration process, students usually start to distribute tasks, share information, and discuss viewpoints. To facilitate the efficient exchange and integration of information in an intercultural CSCL group, have the students follow a three-step collaboration cycle involving a) individual work; b) the exchange of information and discussion of this information with group members; and finally c) the integration/synthesis of two or more sources of information on the basis of the foregoing discussion. These steps can be repeated or returned to as necessary.
 - During the problem-solving phase of the collaboration process and specifically during steps (b) and (c), instructional scaffolds should be used as necessary to encourage students with a largely individualist orientation to critically assess the contributions of others, and to allow their partners adequate time to then respond; students with a more collectivist orientation should be encouraged to also critically assess the contributions of others, feel free to disagree with others, be as direct and specific as possible in their feedback and responding, and raise questions.
 - To facilitate the communication process, it is important that the collaborating students be made aware of possibly different and possibly culture-specific communication styles. There are direct and indirect cultural styles of communication. This can be discussed in the group and subsequent rules for “direct” and “indirect” writing and

communication within the group established for the group. Or, such discussion can be prompted with instructional scaffolding as done in the present research with the help of an interculturally-enriched collaboration script (IECS).

- Teachers should consider moderating group discussions to assess the quality of the ongoing collaboration process. Teachers might contribute to some conversations in order to stimulate more extensive discussion, keep the group focused, or give feedback on a particular question.

3. Assessment following completion of the CSCL task

- *Assessment of student learning and efficacy of the instructional support*
 - Upon completion of the CSCL task, teachers should assess the quality of the learning process, the learning outcomes, and the interrelations between the two. The willingness of the students to pursue intercultural CSCL in the future should also be assessed. This can be done in terms of both the learning of new information and the enrichment of their education.
 - In cases in which instructional scaffolding has been used, teachers should assess its efficacy. Insight into the effectiveness of the instructional scaffolding allows teachers to see if the expected positive effects have been achieved and can help the teachers apply the scaffolding in other intercultural CSCL settings when needed.
- *Student self-reflection*
 - Students should be asked to reflect upon the collaboration experience. This can be done with regard to what they have discovered about themselves, their culture, how they are perceived by students from other cultures, how they — themselves — perceive students from other cultures, their achieved performance, and their satisfaction with the collaboration process.

SUGGESTIONS FOR FUTURE RESEARCH

We believe that future research should concern the core questions of how to make CSCL work for learners within a particular cultural setting and how to “ameliorate culture-based incompatibilities” when students from different cultural backgrounds work together in a CSCL environment (Smith & Ayers, 2006, p. 413). In order to address these questions, we need to better understand of how cognitive structures concerned with the nature of the world and other patterns of thinking, behavior, and communication develop within a single culture

as well what personality characteristics are inherent and thus common to particular cultural groups.

In the present research, we examined the learning processes of university students working in culturally heterogeneous groups in a CSCL environment in terms of their attitudes toward online collaboration, actual online collaborative behavior, reported learning experiences, and group performance. Mapping the development of these key variables over time in future research can provide considerable more insight into the effects of the intercultural CSCL. Social Network Analysis (SNA) might be adopted to improve the quality of the analyses of the interactions that unfold in an intercultural CSCL environment. SNA maps the social relationships between the individual actors in a network (e.g., group cohesion, working relations) (Cho, Gay, Davidson, & Ingraffea, 2007). With the help of SNA, it may be possible to determine the extent to which increased cultural sensitivity and more positive attitudes towards online collaboration contribute to the development of new social and collaborative structures. The ways in which culturally diverse groups of students develop and sustain collaborative learning networks when engaged in CSCL and face-to-face learning environments can be compared, and just how the resulting social networks and their properties influence the learning outcomes of the group can also be examined.

Another direction for future research is students' appreciation of CSCL in general and the intercultural aspects of CSCL in particular. While we view both the collaboration and international aspects of intercultural CSCL as excellent educational "resources," it is possible that they are perceived — either jointly or individually — as cumbersome and thus limiting by the collaborating students. Do students actually see intercultural CSCL to have added value for their education and, if so, to what extent does this motivate them to learn in culturally diverse CSCL groups? Some of these questions were addressed in the present research but should be studied more in depth.

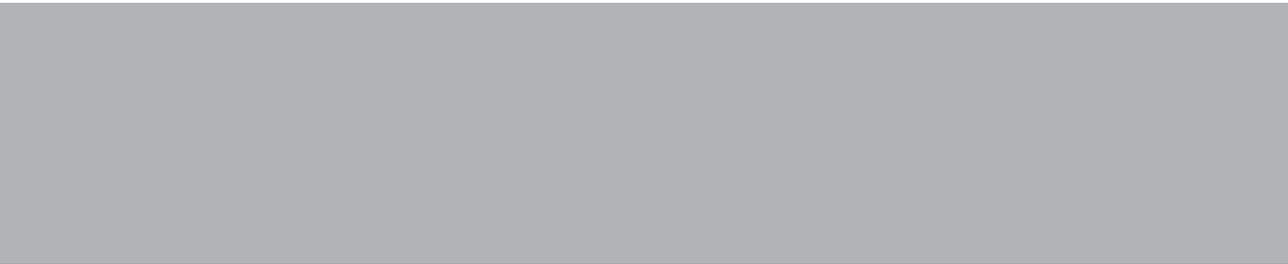
In future research, the possibility of "over-scripting" should also be addressed. Learners in groups can exhibit a high level of active participation when they work in moderately structured conditions (Dillenbourg, & Jermann, 2007). Highly structured learning tasks and overly-scripted instructions for the performance of these tasks can limit students' creative and critical thinking (Rumel & Spada, 2005). Limited collaboration and knowledge construction may then occur with lower learning outcomes under such learning conditions. Collaborative scripts are intended to fuel the cognitive, social, and emotional mechanisms needed for effective collaboration to occur but also afford the space needed for genuine collaboration to emerge. This is why the use of collaborative scripts should be gradually faded during out the course of a collaborative or educational process (Dillenbourg, 2002) but also why additional research is needed to tell us how to do this in intercultural CSCL.

The use of what may be a second or — for that matter — third language by some of the students in a collaborative group presumably increases the cognitive task load for these students. Greater insight into the impact of interacting and working with textual information in a second or third language on collaborative behavior and perceptions is thus needed. It is therefore suggested that the associations between language proficiency, cognitive load, and student learning be investigated in future research by, for example, comparing the presentation of learning materials in the first versus second language of the participants.

Future research should also work to improve the content and implementation of the IECS developed here. One promising approach for doing this is use of “dynamic adaptive scripting.” In this approach to the facilitation of collaborative learning, students are grouped with optimal collaborative partners and thus partners who can be expected to prompt dynamic and suitable (i.e., adapted, tailored) prompts with deeper discussion and explanation as a result (Gweon, Rosé, Zaiss, & Carey, 2006; Rose & Fussell, 2008). Furthermore, not only teachers and students but also machine learning techniques can be applied to identify potential or actual problems arising from the intercultural CSCL context. It is conceivable, thus, that a CSCL system can be designed in the future to provide scaffolds that are triggered by the automatized analysis of the online CSCL interaction. When the system “sees” that a student has not responded, a specific response or responding in general can be prompted (e.g., “I know you have been under considerable pressure. However, I am really waiting for your reply, your feedback on ...”). In other words, a dynamic adaptive scripting approach to fostering intercultural CSCL can be adopted to create context sensitive collaborative scripts when and as needed (Rosé, Fischer, & Chang, 2007).

Last but not least, it is now known that students from various cultures can have different procedural knowledge of how to collaborate and learn together. CSCL methodologies should be developed to detect, manage, and bridge those differences. In the present research, an interculturally-enriched collaboration script (IECS) was found to be needed and introduced for this purpose. The IECS that we used helped structure the collaborative interaction, coordinate task activities, and address culture-related differences stemming from the individualist or collectivist cultural orientations of students working in a multicultural CSCL environment. In future research, the learning effects of using an IECS should be investigated more thoroughly and possibly when integrated into a university curriculum. The question that still remains, however, is: Does one need to have prior knowledge of specific cultural differences in order to design an appropriate IECS? Or is it possible to design an IECS in general terms? The answers to these questions will dictate what elements to include in an IECS and the applicability of such an IECS in future university education. If we want to encourage voluntary compliance with teacher guidelines and thus student learning that is responsible and largely autonomous,

for example, then the high/low power distance dimension of culture as put forth by Hofstede (2001) may need to be addressed; the less powerful members of institutions and organizations in a culture with a high power distance will “expect and accept that power is distributed unequally” (p. 98), which means that students coming from such cultures will comply with teacher’s recommendations differently than students coming from cultures with a low power distance. Both teachers and students may therefore need to understand how power differentials influence the teaching/learning process, and this understanding can be heightened with the incorporation of culture-specific instructions into a collaborative script (i.e., an IECS) as we have done in the present research. In such a manner the optimal conditions for learning are created. And to close, we hope that others will pursue this line of research to establish the applicability and generalizability of an IECS approach to higher education.



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English summary

INTRODUCTION

Introduction of computer-supported collaborative learning (CSCL), specifically in an intercultural learning environment, creates both challenges and benefits. Among the challenges are the coordination of different attitudes, styles of communication, and patterns of behaving. Among the benefits are the sharing of culturally diverse knowledge, hands-on preparation for working in an international climate. The research reported in this dissertation explored the process of collaborative learning among culturally diverse students in terms of attitudes, behavior, and learning outcomes. A specially designed instructional approach was also developed to help bridge cultural differences and foster collaboration when working in a CSCL environment. The so-called interculturally-enriched collaboration script (IECS) was implemented and found to facilitate CSCL in an intercultural learning environment.

GENERAL RESEARCH PROBLEM

There are several theoretical arguments and widespread empirical support for the promotion of online collaborative learning in general and intercultural collaborative learning in particular. The need to collaborate across distances and cultures is a reality of the 21st century not only for academia but also business. And despite significant progress in the field of CSCL, little is known about the support that is needed to help culturally diverse groups of students collaborate and thereby benefit from the online sharing of knowledge and experiences. Universities are becoming increasingly international, which means that diverse manners of interacting and learning traditions are being brought together. Previous research has shown that these cultural differences must be taken into account when designing and implementing collaborative learning environments (Cox et al., 1991; Zhu, 2009). And the core of the present research therefore concerns the question of how to effectively promote the online collaborative learning of culturally diverse groups of students in order for them to reap the benefits of international collaboration.

THEORETICAL BACKGROUND AND APPROACH

In the present research on the CSCL of university students, we adopted a social constructivist perspective in which the importance of the backgrounds and cultures of learners are also recognized as factors that can influence their manner of learning and knowledge acquisition (Vygotsky, 1978; Wertsch, 1998; Zhu, 2009). CSCL was defined as the negotiation of meaning

and the shared construction of knowledge among students interacting with the help of technology (Stahl, Koschmann, & Suthers, 2006). We adopted Hofstede's definition of culture as namely: "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" (1980, p. 25). And within the context of online collaborative learning, we took culture to be one of the factors that can shape students' perceptions of the collaborative process itself, communication in the group, and collaborative behavior (Cox et al., 1991; Shi, Frederiksen, & Muis, 2013). The role of culture was then analyzed in terms of individualist and collectivist orientations in particular (Hofstede, 1991; Triandis, 1995). This approach was used to test a number of assumptions and the associated hypotheses that we expected to be particularly relevant for the learning of students working in culturally diverse groups in a CSCL environment. In the first chapter of this dissertation, the General Introduction, the five empirical studies and their focus are introduced along with the necessary background information and an overview of the research conducted. The five empirical studies are then presented as published or submitted for publication in international peer-reviewed journals. And thereafter, the results of the empirical studies are integrated in the General Discussion and a number of implications are distilled for current educational practice and future research.

THE STUDIES

Five empirical studies are reported in the dissertation. The first two were exploratory and descriptive with the aim of gaining insight into the challenges of working in a multicultural university environment. We were particularly interested in the similarities and differences in how culturally diverse groups of students perceive the challenges of working either face-to-face in multicultural student groups (MCSG) (Chapter 2) or in a computer-supported collaborative learning (CSCL) environment (Chapter 3). The subsequent three empirical studies were intervention studies and thus concerned the design, implementation, and evaluation of collaboration scripts for use by culturally diverse groups working in a CSCL environment. The efficacy of introducing collaboration scripts was examined in terms of attitudes towards online collaboration, collaborative behaviors, and learning outcomes. Both quantitative and qualitative analyses were undertaken in the studies.

In study 1, reported in Chapter 2, we examined the challenges of using MCSG in higher education in general but also the similarities and differences in how culturally diverse groups of students perceive these challenges in particular. A 19-item survey was completed by master's

students taking the Academic Consultancy Training course at the Wageningen University (The Netherlands). The sample of 141 students included 66 Dutch and 75 international students representing a total of 40 countries. Respondents rated the importance of a particular challenge of MCSG work along a five-point Likert scale. Exploratory factor analyses revealed both shared and culture-specific challenges. To examine the extent to which the culturally diverse students differed in the perceived importance of the identified challenges, one-way analysis of variance (ANOVA) was conducted using Hofstede's individualist-collectivist cultural orientation as the independent variable. The results show free-riding, inadequate English language skills, and communication problems to be perceived by all participants as the most important challenges in MCSG work. Culture-specific differences in the perceived importance of the various challenges of working MCSGs were also found. Depending on their cultural backgrounds, students can have very different expectations for learning in groups and the behavioral motives of others in the group, which can result in misunderstandings and conflict. The results of this study highlight the role of cultural differences in student group work and help us better understand the differences and their influence.

In study 2, reported in Chapter 3, we explored the differences in students' perceptions of collaborative learning, their reported learning experiences, and their learning outcomes when collaborating in a CSCL environment working with either a culturally similar or culturally dissimilar partner. The sample of 120 bachelor and masters students was comprised of 56 Dutch and 64 international students representing 26 countries. Dyads of students worked together to perform an online learning task in the domain of life sciences. The results showed that collaborating with a partner with a culturally dissimilar background negatively affected student perceptions of the collaborative learning experience. For females, working in a culturally dissimilar dyad resulted in a much more negative perception of the collaborative learning process than for males. Students from an individualist cultural background achieved better learning outcomes than students from a collectivist background, regardless of group composition. These results provided insight into the ways in which culturally similar and culturally dissimilar groups of students can proceed in a CSCL environment and thus the role of culture in collaborative learning in general and collaborative learning in a CSCL environment in particular.

Study 3, reported in Chapter 4, was undertaken to gain insight into the facilitative effects of using a general collaboration script for same- versus mixed-culture dyads of students working in a CSCL environment. The sample of 130 masters students was comprised of 81 Dutch and 49 international students representing 27 countries. A general collaboration script (CS) was developed on the basis of the coding scheme of Curtis and Lawson (2001). Same- versus mixed-culture dyads were then randomly assigned to one of two conditions: a condition using or a condition not using the general collaboration script. The dyads were asked to jointly discuss

materials concerned with intercultural communication. The quality of their CSCL was then evaluated in terms of online collaborative behaviors and the quality of the group discussion. The results showed the general collaboration script to increase dyadic interaction, but the mixed-culture dyads nevertheless exhibited a lower level of substantive discussion than the same-culture dyads (i.e., lower scores on task-oriented, content-oriented quality of discussion variables). These findings show the collaboration of mixed-culture groups to be less than optimal and therefore in need of greater facilitation than the collaboration of same-culture groups.

Study 4, reported in Chapter 5, introduced an Interculturally-Enriched Collaboration Script (IECS) for working with culturally diverse groups in a CSCL environment and then assessed student attitudes towards the online collaboration, their actual online collaborative behavior, the group learning outcome, and the reported CSCL experiences of the collaborating students. The main research question was if and how these variables differed for groups that used the IECS versus the general collaboration script (CS). Using a Web conferencing tool, 47 students from a university in the Ukraine and a university in the Netherlands worked together in groups to develop project plans for the environmental problem of nuclear power and radioactivity. The results showed attitudes towards online collaboration to become more positive after using the IECS and less positive after using the CS. The groups in the IECS condition showed a higher frequency of so-called contributing behavior but a lower frequency of planning behavior, seeking input, and social interaction than the groups in the CS condition. The IECS groups also produced better project plans than the CS groups. Interview data further showed the CSCL experiences of the students to vary depending on the use of a IECS or a general CS. Out of the 10 interviewed students who participated in the IECS condition, 4 Dutch and 4 Ukrainian students reported that the instructions helped them get on with the task and how to approach group members. These results suggest that a well-designed IECS script has the potential to foster effective collaboration. However, documentation of the positive effects of using an IECS with a larger sample of students was needed to come to more decisive conclusions.

Study 5, reported in Chapter 6, used the same experimental set up as in study 4 but with a larger and more diverse sample of students to compare the effects of using an IECS versus a general CS. Once again, we analyzed the changes in student attitudes towards online collaboration, their actual online collaborative behavior, and the group learning outcome for culturally heterogeneous groups working in a CSCL environment. A total of 74 masters students representing 22 countries worked in dyads on the environmental problem of biodiversity collapse. The results showed use of the IECS to positively affect the attitudes of the students towards online collaboration and also their actual online collaborative learning behavior but not group learning outcome. However, the dyads in the IECS condition more frequently used concepts concerned with the solution of the problem than the dyads in the CS condition.

The instructional support provided as part of the IECS in this study successfully promoted intercultural interaction in a CSCL environment. The IECS and elements used to promote intercultural interaction can presumably be transferred to other educational settings calling for collaboration across cultures and distance.

In the General Discussion presented in the final chapter of this dissertation, Chapter 7, we summarize the main findings and present the main conclusions. Some remaining methodological issues are considered, and both the strengths and limitations of the present research are pointed out. And to close, suggestions for future research and implications for current educational practice are presented.

IMPLICATIONS

The findings of this research have a number of theoretical and practical implications. The findings provide insight into the development and use of collaboration scripts facilitate learning in international education and the application of the script theory to guide CSCL in a multicultural context by paying special attention to the potential role of cultural differences in the interaction and collaboration of students in multicultural groups. Departing from a script perspective, the attitudinal and behavioural insights provided by the results of the present research also give us a sound basis for future studies of how students from different cultural backgrounds understand CSCL tasks and act in a CSCL environment. As for the practical implications of the findings reported here, both educators and instructional designers can benefit from the outcomes since these provide critical insights for the design of higher education, collaborative learning environments that are suited for use by culturally heterogeneous groups. The instructional elements of the IECS as reported in Chapters 5 and 6 can, for example, be adopted more or less directly by educators to foster intercultural CSCL in a variety of contexts.

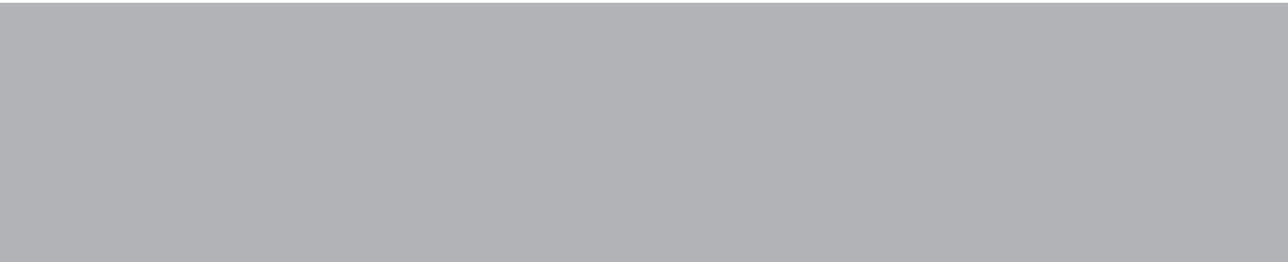
REMAINING LIMITATIONS

Some remaining limitations on the present research can also be acknowledged here and hopefully then addressed in future research. Firstly, the individualism versus collectivism conceptual model was utilized to operationalize culture in this dissertation. We acknowledge that there are nevertheless other cultural and contextual factors that can be expected to play a role in the ways in which students from different cultural backgrounds interact and learn in either face-to-face or online collaborative learning groups. Secondly, generalizations about student populations based on a sample consisting of international students must be interpreted

with caution. The findings based on the experiences of international students may not be completely transferable to students with no such international experience and thus students residing in home country. Thirdly, the sample populations in this research involved mostly masters students in the field of life sciences. The results may therefore not be generalizable to other levels of education or simply applied to another field of study without additional research. Finally, the students in all of the studies reported on here only collaborated for a short period of time. The effects of cultural diversity and the use of collaboration scripts presumably change over time as students become familiar with each other and more familiar with the required procedures. It is therefore recommended that longitudinal study be undertaken in the future to trace the social and cognitive development of students working in an intercultural CSCL environment across a longer period of time.

CONCLUSION

Taken together, the findings of this research suggest that the cultural backgrounds of students in general and differences in their cultural backgrounds in particular should be taken into consideration when designing and implementing collaborative learning environments. A number of the challenges that are inherent to both face-to-face student group work and working in a CSCL environments were identified in the present research and then examined to see how culturally diverse students perceive these challenges in a higher education context. It was found that the members of culturally diverse groups can have very different expectations with respect to learning in groups and the behavioral motives of others in the group. It was also found that collaborating with a partner from a different cultural background can negatively affect the reported CSCL experiences of students. Collaboration in culturally diverse groups was shown to be less than optimal and therefore require extra facilitation, which we then developed and implemented with relative success. Use of an interculturally-enriched collaboration scripting was found to positively affect student attitudes towards online collaboration, their actual online collaborative behavior, and — to some extent — their learning. We can thus conclude that a scripting approach can foster collaboration and bridge intercultural differences in culturally heterogeneous groups working in a CSCL environment. A scripting approach to international education and cooperation is thus promising and applicable.



**Nederlandse samenvatting
(Dutch summary)**

INTRODUCTIE

Het introduceren van computerondersteund samenwerkend leren (*computer-supported collaborative learning*, CSCL), met name in een interculturele leeromgeving, kent zowel uitdagingen als voordelen. Voorbeelden van uitdagingen zijn de coördinatie van verschillende houdingen, communicatiestijlen, en gedragspatronen. Voordelen zijn onder andere het delen van cultuurgebonden kennis en de voorbereiding op het werken in een internationaal klimaat. Het onderzoek dat in deze dissertatie wordt beschreven exploreerde het proces van samenwerkend leren onder studenten met verschillende culturele achtergronden in termen van houdingen, gedrag en leeruitkomsten. Er is een instructiemethode ontwikkeld om culturele verschillen te overbruggen en samenwerking in een CSCL omgeving te bevorderen. Het zogenaamde intercultureel verrijkte collaboratiescript (*interculturally-enriched collaboration script*, IECS) werd geïmplementeerd en was in staat om CSCL in een interculturele leeromgeving te faciliteren.

ALGEMENE ONDERZOEKSVRAAG

Er zijn verschillende theoretische en empirische argumenten om online samenwerkend leren in het algemeen, en intercultureel samenwerkend leren in het bijzonder, te ondersteunen. In de 21^e eeuw is samenwerking op afstand en tussen verschillende culturen aan de orde van de dag, niet alleen in de academische maar ook in de zakelijke wereld. Ondanks significante vooruitgang in het onderzoeksveld van CSCL is er weinig bekend over de ondersteuning van samenwerking tussen cultureel diverse groepen studenten zodat zij kunnen profiteren van het online delen van kennis en ervaringen. Universiteiten zijn in toenemende mate internationaal georiënteerd, wat betekent dat verschillende manieren van interactie en diverse leertradities bij elkaar gebracht worden. Onderzoek heeft aangetoond dat er rekening gehouden moet worden met deze culturele verschillen bij het ontwerpen en implementeren van collaboratieve leeromgevingen (Zhu, 2009; Cox et al., 1991). De kern van het hier beschreven onderzoek is daarom de vraag hoe online samenwerking tussen cultureel diverse groepen studenten gestimuleerd kan worden zodat studenten de vruchten kunnen plukken van internationale samenwerking.

THEORETISCHE ACHTERGROND EN BENADERING

In dit onderzoek over CSCL tussen universiteitsstudenten is gekozen voor een sociaal constructivistische benadering, waarin de achtergrond en cultuur van lerenden worden erkend

als factoren die de manier van leren en kennisacquisitie kunnen beïnvloeden (Vygotsky, 1978; Wertsch, 1998; Zhu, 2009). CSCL is gedefinieerd als het onderhandelen over betekenis en de gedeelde constructie van kennis tussen studenten die interacteren met behulp van technologie (Stahl, Koschmann, & Suthers, 2006). We maken gebruik van Hofstede's definitie van cultuur: "de collectief geprogrammeerde geest die de leden van één groep mensen van een ander kan onderscheiden... het interactieve aggregaat van gedeelde eigenschappen die de reactie van een groep mensen op zijn omgeving beïnvloedt" (1980, p. 25). Binnen de context van online samenwerkend leren beschouwen we cultuur als één van de factoren die de percepties van studenten op het samenwerkingsproces, groepscommunicatie en collaboratief gedrag kan vormen (Cox et al., 1991; Shi, Frederiksen, & Muis, 2013). De rol van cultuur werd geanalyseerd in specifieke termen van individualistische en collectieve oriëntaties (Hofstede, 1991; Triandis, 1995). Deze benadering werd gebruikt om een aantal assumpties en bijbehorende hypothesen te testen waarvan wij verwachtten dat deze relevant zouden zijn voor het leerproces van studenten die in cultureel diverse groepen werken in een CSCL omgeving. In het eerste hoofdstuk van deze dissertatie, de Algemene Introductie, worden de vijf empirische studies en hun focus geïntroduceerd alsmede de benodigde achtergrondinformatie en een overzicht van het uitgevoerde onderzoek. De vijf empirische studies worden vervolgens gepresenteerd als gepubliceerde of ingediende artikelen in internationale, door specialisten beoordeelde tijdschriften. Daarna worden de resultaten van de empirische studies geïntegreerd in de Algemene Discussie en wordt een aantal implicaties beschreven voor de huidige onderwijskundige praktijk en voor toekomstig onderzoek.

DE STUDIES

In deze dissertatie worden vijf empirische studies beschreven. De eerste twee zijn exploratief en descriptief van aard en hebben als doel om inzicht te verkrijgen in de uitdagingen van het werken in een multiculturele, universitaire omgeving. We waren met name geïnteresseerd in de overeenkomsten en verschillen in de percepties van cultureel diverse groepen studenten wat betreft de uitdagingen van het werken in multiculturele groepen studenten (*multicultural student groups*, MCSG) in ofwel een face-to-face (Hoofdstuk 2) ofwel een computerondersteunde leeromgeving (Hoofdstuk 3). De drie daaropvolgende empirische studies waren interventiestudies en hadden betrekking op het ontwerp, de implementatie en evaluatie van collaboratiescripts die gebruikt kunnen worden door cultureel diverse groepen die aan de slag gaan in een CSCL omgeving. De opbrengst van het introduceren van collaboratiescripts werd onderzocht in termen van houdingen ten opzichte van online

samenwerking, collaboratief gedrag, en leeruitkomsten. In deze studies werd zowel gebruik gemaakt van kwantitatieve als kwalitatieve analyses.

In studie 1, beschreven in Hoofdstuk 2, onderzochten we de uitdagingen van het gebruik van MCSG in het hoger onderwijs in het algemeen alsmede de overeenkomsten en verschillen in hoe cultureel diverse studentengroepen deze uitdagingen ervaren. Een vragenlijst bestaande uit 19 items werd ingevuld door masterstudenten van de cursus Academic Consultancy Training op de Universiteit van Wageningen. Van de 141 ondervraagde studenten waren 66 Nederlands en 75 van buitenlandse afkomst, die bij elkaar in totaal 40 landen representeerden. De respondenten beoordeelden het belang van specifieke uitdagingen van MCSG op een 5-punts Likert schaal. Een exploratieve factoranalyse onthulde zowel gedeelde als cultuur-specifieke uitdagingen. Om te onderzoeken in welke mate de studenten van verschillende culturele afkomst verschilden in hun beoordeling van de uitdagingen, werd een variantieanalyse (ANOVA) uitgevoerd met als onafhankelijke variabele de door Hofstede beschreven culturele oriëntatie (individualist-collectivist). De resultaten laten zien dat meeliftgedrag, onvoldoende beheersing van de Engelse taal en communicatieproblemen door alle participanten worden gezien als de belangrijkste uitdagingen van het werken met MCSG. Er werden ook cultureelspecifieke verschillen gevonden in het ervaren belang van uitdagingen van MCSG. Afhankelijk van hun culturele achtergrond hadden studenten sterk verschillende verwachtingen voor het leren in groepen en de motivatie en drijfveren van hun groepsgenoten, wat kan resulteren in misverstanden en conflicten. De resultaten van deze studie benadrukken de rol van culturele verschillen in groepswerk onder studenten en helpen ons om culterele verschillen en de invloed daarvan beter te begrijpen.

In studie 2, beschreven in Hoofdstuk 3, werd het verschil onderzocht tussen de percepties van studenten op collaboratief leren, hun gerapporteerde leerervaringen, en de leeruitkomsten als studenten samenwerken in een CSCL omgeving met een partner die ofwel dezelfde ofwel een verschillende culturele achtergrond heeft. De steekproef van 120 bachelor en masterstudenten bestond uit 56 Nederlandse en 64 buitenlandse studenten afkomstig uit 26 landen. Tweetallen van studenten werkten samen aan een online leertaak in het domain van biowetenschappen. De resultaten lieten zien dat samenwerking met een partner met een verschillende culturele achtergrond een negatief effect had op de perceptie van de collaboratieve leerervaring. Bij vrouwen resulteerde het werken met een partner met een verschillende culturele achtergrond in een negatievere perceptie van het collaboratieve leerproces dan bij mannen. Studenten met een individualistische culturele achtergrond behaalden betere leeruitkomsten dan studenten met een collectivistische achtergrond, ongeacht de groepcompositie. Deze resultaten bieden inzicht in de manier waarop groepen studenten met dezelfde of verschillende culturele achtergrond te werk kunnen gaan in een CSCL omgeving en daarmee in de rol van cultuur in samenwerkend leren in het algemeen en samenwerkend leren in een CSCL omgeving in het bijzonder.

Studie 3, beschreven in hoofdstuk 4, geeft inzicht in de ondersteunende werking van het gebruik van een algemeen collaboratief script (*collaboration script*, CS) voor studenten met gelijke versus gemengde culturele achtergronden, lerend in tweetallen, in een CSCL omgeving. De steekproef van 130 masterstudenten bestond uit 81 Nederlandse en 49 internationale studenten afkomstig uit 27 landen. Het CS in deze studie is ontwikkeld op basis van het codeerschema van Curtis en Lawson (2001). De tweetallen werden willekeurig toegewezen aan één van de volgende twee condities: een conditie met of een conditie zonder een CS. Ze werden gevraagd om artikelen over interculturele communicatie te bespreken. De kwaliteit van hun online samenwerking werd vervolgens geëvalueerd in termen van online collaboratief gedrag en de kwaliteit van de groepsdiscussie. Deze studie toonde aan dat het gebruik van een CS interactie tussen studenten verhoogt. Maar bij de tweetallen met gemengde culturele achtergrond bleek de inhoudelijke discussie van een lager niveau dan bij de tweetallen met dezelfde culturele achtergrond (d.w.z. lagere scores op de variabelen taakgerichtheid en inhoudelijke kwaliteit van de discussie). Het blijkt dus dat de samenwerking bij tweetallen met gemengde culturele achtergrond minder is dan bij de tweetallen met dezelfde culturele achtergrond, en dat zij daarom profijt zouden kunnen hebben bij meer ondersteuning.

Studie 4, beschreven in hoofdstuk 5, introduceert een intercultureel verrijkt collaboratiescript (*Interculturally-Enriched Collaboration Script*, IECS) voor het werken met multiculturele groepen in een CSCL omgeving. In deze studie wordt de houding van de studenten tot de online samenwerking, hun feitelijke gezamenlijke online gedrag, de leerresultaten van de groep, en de gerapporteerde ervaringen met CSCL van de samenwerkende studenten geëvalueerd. De belangrijkste onderzoeksvraag was of en hoe deze variabelen verschilden voor groepen die het IECS gebruikten ten opzichte van de groepen die een CS gebruikten. Met behulp van een *web conferencing tool* werkten 47 studenten van een universiteit in de Oekraïne en een universiteit in Nederland samen in groepen om projectplannen te ontwikkelen voor milieuproblemen veroorzaakt door kernenergie en radioactiviteit. Uit deze studie kunnen we concluderen dat de studenten die gebruik maakten van IECS een positievere houding kregen tot online samenwerking en dat de groep die een CS hadden gebruikt een minder positieve houding kregen tegenover online samenwerking. De groepen gebruik makend van het IECS hadden een hogere frequentie van zogenaamd bijdragend gedrag, maar een lagere frequentie van plannend gedrag, op zoek gaan naar input en sociale interactie in vergelijking tot de groepen die gebruik maken van een CS. De IECS-groepen produceerden betere projectplannen dan de CS-groepen. Uit de interviewgegevens bleek verder dat de ervaringen van de studenten met CSCL variëren afhankelijk van het gebruik van een IECS of een CS. Van de 10 ondervraagde studenten die hebben deelgenomen aan de IECS-conditie gaven 4 Nederlanders en 4 Oekraïense studenten aan dat de instructies hielpen om de taak uit te voeren en groepsleden te benaderen. Deze

resultaten suggereren dat een goed ontworpen IECS potentie heeft om effectieve samenwerking te bevorderen. Echter, documentatie van de positieve effecten van het gebruik van een IECS door een grotere steekproef van studenten was nodig om tot meer doorslaggevende conclusies te komen.

In studie 5, beschreven in hoofdstuk 6, wordt dezelfde experimentele opstelling gebruikt als in studie 4, maar met een grotere en meer diverse steekproef van studenten om de effecten van het gebruik van een IECS versus een algemeen CS te vergelijken. Nogmaals werden de veranderingen in de houding van de student ten opzichte van de variabelen geanalyseerd: online samenwerking, hun feitelijke gezamenlijke online gedrag, en de leerresultaten van de groep voor cultureel heterogene groepen. Een totaal van 74 masterstudenten uit 22 verschillende landen werkten in tweetallen aan het onderwerp achteruitgang van biodiversiteit. De resultaten van de studie gaven aan dat het gebruik van het IECS een positieve invloed heeft op de houding van de studenten jegens online samenwerking en op hun werkelijke online samenwerkend leren, maar niet op het leerresultaat van de groep. De tweetallen die gebruik maakten van het IECS, maakten vaker gebruik van concepten betreffende de oplossing van het probleem dan de tweetallen die gebruikt maakten van een CS. De educatieve ondersteuning als onderdeel van het IECS droeg succesvol bij aan de interculturele interactie in een CSCL omgeving. Het IECS en elementen die gebruikt worden om de interculturele interactie te bevorderen kunnen waarschijnlijk gebruikt worden in andere onderwijsomgevingen die meer interculturele samenwerking en samenwerking op afstand verlangen.

In hoofdstuk 7, de algemene discussie, worden de belangrijkste bevindingen en conclusies gepresenteerd. Daarnaast beschouwen we resterende methodologische kwesties en worden zowel de sterkte punten als de beperkingen van dit onderzoek beschreven. Het hoofdstuk wordt afgesloten met suggesties voor toekomstig onderzoek en gevolgen voor de huidige onderwijspraktijk.

CONSEQUENTIES

De bevindingen van dit onderzoek hebben een aantal theoretische en praktische gevolgen. Wat de bevindingen doen is inzicht geven in de ontwikkeling en het gebruik van collaboratiescripts om het leren in een internationale onderwijspraktijk te ondersteunen. Daarnaast hebben we inzichten gekregen in de toepassing van *scripting* om CSCL te begeleiden in een multiculturele context met bijzondere aandacht voor de potentiële rol van culturele verschillen in de interactie en samenwerking van studenten in multiculturele groepen. Verder geven de onderzoeksresultaten, met aan de basis een scriptperspectief die inzicht heeft gegeven in de houding en gedragingen van

hoe studenten met verschillende culturele achtergronden CSCL taken begrijpen en hoe ze handelen in een CSCL omgeving, een goede basis voor toekomstige studies. Wat betreft de praktische implicaties van de bevindingen kunnen zowel onderwijzers als onderwijskundigen profiteren van de uitkomsten omdat het essentiële inzichten geeft voor het vormgeven van het hoger onderwijs, en dan wel voor leeromgevingen geschikt voor samenwerking tussen cultureel heterogene groepen. De educatieve elementen van het IECS zoals gerapporteerd in de hoofdstukken 5 en 6 kunnen bijvoorbeeld bijna rechtstreeks door onderwijskundigen worden gebruikt om interculturele CSCL te bevorderen in een verscheidenheid aan onderwijskundige omgevingen.

RESTERENDE BEPERKINGEN

Enkele resterende beperkingen van het huidige onderzoek zullen hier worden erkend en hopelijk ook daarna worden meegenomen in toekomstig onderzoek. Ten eerste, in dit proefschrift is het individualisme versus collectivisme als conceptueel model gebruikt om het begrip 'cultuur' te operationaliseren. We erkennen echter dat er ook andere culturele en contextuele factoren zijn die mogelijk een rol spelen in de manier waarop leerlingen met verschillende culturele achtergronden samenwerken en samen leren in een face-to-face of online groep. Ten tweede, generalisaties over studentenpopulaties op basis van een steekproef bestaande uit internationale studenten moeten behoedzaam worden geïnterpreteerd. De resultaten van dit onderzoek zijn gebaseerd op de ervaringen van internationale studenten en deze zijn mogelijk niet volledig vergelijkbaar met de ervaringen van studenten met geen internationale ervaringen en dus studenten die in eigen land blijven. Ten derde, de onderzoeksgroep in deze studie bestond uit voornamelijk masterstudenten van de studierichting biowetenschappen. De resultaten zijn daarom niet generaliseerbaar naar andere onderwijsniveaus of andere vakgebieden zonder aanvullend onderzoek. Tot besluit, de studenten in dit onderzoek hebben voor een korte tijd meegewerkt aan het onderzoek. Hoogstwaarschijnlijk veranderen de effecten van culturele diversiteit en het gebruik van een collaboratiescript naargelang de studenten meer vertrouwd raken met elkaar en met de vereiste procedures. Het wordt daarom aanbevolen om in de toekomst longitudinaal onderzoek uit te voeren om de sociale en cognitieve ontwikkeling van studenten te bestuderen in een interculturele CSCL omgeving.

CONCLUSIE

Alles overziend suggereren de resultaten van dit onderzoek dat bij het ontwerpen en implementeren van collaboratieve leeromgevingen rekening gehouden moet worden met de

culturele achtergronden van de studenten in het algemeen en de verschillen in hun culturele achtergronden in het bijzonder. Een aantal van de uitdagingen die inherent zijn aan zowel face-to-face groepswork en het werken in CSCL omgevingen is in deze studie geïdentificeerd en vervolgens onderzocht om te zien hoe studenten in het hoger onderwijs met verschillende culturele achtergronden deze uitdagingen waarnemen. Het bleek dat de studenten zeer verschillende verwachtingen hebben wat betreft het leren in groepen en de motivatie en drijfveren van hun groepsgenoten. Ook werd geconstateerd dat de samenwerking met een partner met een andere culturele achtergrond een negatieve invloed kan hebben op de gerapporteerde ervaringen van studenten met CSCL. Daarnaast toonde deze studie aan dat de samenwerking in cultureel diverse groepen minder dan optimaal was en daarom extra ondersteuning vereiste. Deze ondersteuning hebben we vervolgens ontwikkeld en geïmplementeerd met relatief succes. Het gebruik van een IECS bleek de houding van studenten ten opzichte van online samenwerking, hun feitelijke gezamenlijke online gedrag, en — in zekere mate — hun leren positief te beïnvloeden. We kunnen dus concluderen dat *scripting* in cultureel heterogene groepen in een CSCL omgeving samenwerking tussen studenten kan stimuleren en de eigenschap heeft om interculturele verschillen te overbruggen. *Scripting* in internationaal onderwijs en samenwerking is dus veelbelovend en toepasbaar.

**Реферат на русском языке
(Russian summary)**

ВВЕДЕНИЕ

Внедрение системы учебного сотрудничества на основе современных информационно-коммуникационных технологий (УСИКТ), особенно применительно к учебной межкультурной/кросскультурной среде, делает актуальным рассмотрение как преимуществ, так и сложностей этой системы. Среди основных сложностей внедрения и применения данной дидактической системы – сопряжение разных личностно-деятельностных характеристик (в том числе системы отношений к самой деятельности и ее объектам), стилей общения и поведенческих паттернов. К числу преимуществ можно отнести взаимный обмен/обогащение учащихся культурным опытом, а также прикладная подготовка к работе в международном коллективе. Исследование, результаты которого приводятся в данной диссертации, было посвящено изучению процесса учебного сотрудничества студентов-представителей разных культур. В качестве исследуемых параметров выступали: система отношений к самой деятельности и ее объектам, коммуникативное поведение и уровень учебных достижений. Специально разработанный инструктивный подход явился инструментом преодоления культурных различий и стимулятором сотрудничества при работе в УСИКТ. В педагогическую практику был внедрен скрипт (сценарий) сотрудничества с расширенным межкультурным/кросскультурным компонентом, позволивший повысить эффективность УСИКТ учебного сотрудничества студентов-представителей разных культур.

ПРОБЛЕМА ИССЛЕДОВАНИЯ

Существует большое количество теоретических и экспериментальных работ, посвященных проблематике применения УСИКТ, в том числе учебному сотрудничеству в области межкультурной коммуникации. Подготовка к сотрудничеству с помощью средств дистанционной коммуникации и в кросскультурном полилоге актуальна не только для учебного, но и делового контекстов. Несмотря на значительные достижения в научно-практической области использования УСИКТ, до сих пор оставался недостаточно исследованным вопрос о характере методического и инструментального обеспечения, необходимого для успешного взаимодействия представителей разных культур, в том числе в обмене опытом в коммуникативном режиме «реального времени». В условиях повышающегося уровня интернационализации вузов, актуальным становится обеспечение сочетаемости различных способов представления учебной информации, типичных для разных академических систем, вступающих во взаимодействие. Ранее

проведённые исследования (Zhu, 2009; Cox et al., 1991 и пр.) показали, что при разработке и внедрении УСИКТ необходимо учитывать подобные культурные и академические различия. Таким образом, основу данного исследования составило изучение способов повышения эффективности УСИКТ применительно к обучению представителей разных культур для обеспечения возможно более высокого результата межкультурного сотрудничества.

МЕТОДОЛОГИЯ ИССЛЕДОВАНИЯ

Представленное исследование подготовки студентов вузов к учебному/ профессиональному межкультурному/кросскультурному сотрудничеству на основе ИКТ основывается на положениях социального конструктивизма, подразумевающего значимость предыдущего опыта и культурного фона учащихся как фактора, влияющего на предпочитаемый способ учения/обучения (Vygotsky, 1978; Wertsch, 1998; Zhu, 2009 и пр.). Применение ИКТ для обучения сотрудничеству определяется как совместное установление системы значений и совместное создание системы знаний, которые были бы освоены и присвоены учащимися в процессе и результате организованного взаимодействия посредством ИКТ (Stahl, Koschmann & Suthers, 2006). Нами было принято определение, данное Hofstede (1980, p.25): «Культура – коллективная программа, определяющая сознание и отличающее членов данной социальной группы ... некий комплекс общих поведенческих характеристик, являющийся результатом внутригруппового взаимодействия и влияющих на характер взаимодействия представителей данной социальной группы с факторами внешней среды». В контексте учебного сотрудничества в режиме реального времени (УСРРВ), концепт «культура» рассматривался нами в качестве одного из факторов, определяющих характер восприятия учащимися процесса сотрудничества как такового, коммуникации внутри группы и поведенческие аспекты сотрудничества (Cox et al., 1991; Shi, Frederiksen & Muis, 2013 и пр.). Роль культуры была проанализирована, в частности, на основе индивидуалистского и коллективистского подходов (Hofstede, 1991; Triandis, 1995 и пр.). Эти подходы применялись автором для проверки ряда выдвинутых гипотез, касающихся подготовки учащихся в условиях гетерокультурного контекста УСИКТ.

В первой главе диссертации («Введение») представлен формат теоретического изыскания по теме работы, а также намечены и теоретически обоснованы пять экспериментальных мини-исследований, результаты которых уже опубликованы или приняты к публикации в ведущих рецензируемых международных научных журналах.

Таким образом, данная глава содержит апробированные результаты, имеющие ценность как для педагогической практики, так и теоретическую значимость.

АСПЕКТНЫЕ ЭКСПЕРИМЕНТАЛЬНЫЕ МИНИ-ИССЛЕДОВАНИЯ

В рамках диссертации были проведены пять аспектных экспериментальных мини-исследований, соответствующих логике раскрытия данной научной темы. Первый и второй эксперименты носили исследовательский и описательно-констатирующий характер и имели целью проникнуть в суть тех проблем, что возникают при учебной работе в мультикультурной/гетерокультурной вузовской среде. Акцент делался на сходствах и различиях в восприятии подобных проблем представителями разных культур, особенно при непосредственном гетерокультурном взаимодействии (подробнее об этом - см. главу 2) или при применении УСИКТ (см. главу 3). Последующие три эксперимента имели формирующий характер и были связаны с проектированием, внедрением и оценкой эффективности скриптов гетерокультурного сотрудничества учащихся в условиях применения УСИКТ. В качестве критериев оценки эффективности применения предложенного скрипта были приняты следующие: отношение к учебному сотрудничеству в режиме реального времени, поведенческие аспекты сотрудничества и уровень учебных достижений. Автором использованы инструменты как качественного, так и количественного анализа полученных экспериментальных данных.

В первом эксперименте (см. главу 2) исследовались сходства и различия в восприятии проблем учебного сотрудничества представителями разных культур, особенно при непосредственном гетерокультурном взаимодействии в рамках освоения вузовских дисциплин. Студентам магистратуры Университета Вагенингена (Wageningen University, Нидерланды), проходящим подготовку по дисциплине «Академическое консультирование» (Academic Consultancy Training), был предложен составленный автором вопросник (19 пунктов). Выборка составила 141 чел., в том числе 66 голландских и 75 зарубежных студентов – представителей 40 культур. Респонденты оценивали значимость той или иной проблемы по пятибалльной шкале (the Five-point Likert Scale). Анализ полученных данных позволил установить, что представителям разных культур присущи как сходства, так и различия в восприятии исследуемых проблем. Для исследования степени выявленных различий, был применен односторонний анализ дисперсии (односторонний ANOVA), при принятии в качестве независимой переменной параметров культур по числовой шкале культурных ориентаций «коллективизм-

индивидуализм» (Hofstede's individualist-collectivist cultural orientation scale). Среди основных результатов проведенного экспериментального исследования было установление ключевых проблем: неустойчивость и нарушение логики рассуждений, недостаточный уровень сформированности англоязычных умений, а также сложности с выстраиванием стратегии гетерокультурного/кросскультурного взаимодействия. Кроме того, были выявлены проблемы, свойственные представителям конкретных культур; в зависимости от базового культурного фона (то есть родной культуры), студенты выражали разные ожидания от совместного обучения и разную мотивацию, что может приводить к недопониманию и конфликтам. Результаты данного эксперимента выявили значимость учета культурных различий для проектирования и обеспечения успешности учебного сотрудничества в гетерокультурных группах.

В рамках второго эксперимента (см. главу 3) исследовались сходства и различия в восприятии проблем коммуникативного сотрудничества представителями разных культур, а также декларируемый ими предыдущий академический опыт, уровни учебных достижений при работе в гомокультурной и гетерокультурной учебной группе в условиях применения УСИКТ. Выборка составила 120 студентов бакалавриата и магистратуры, в том числе 56 голландцев и 64 представителя других культур (из 26 стран). Работа в учебных минигруппах подразумевала совместное выполнение учебных заданий (проектов) по естественным наукам в режиме реального времени. Полученные результаты свидетельствуют о том, что взаимодействие с представителем иной культуры оказывает негативное влияние на восприятие и дальнейшее отношение учащихся к кросскультурному сотрудничеству. В случае студентов-женщин, взаимодействие с представителем иной культуры приводило к более серьезным негативным последствиям, нежели в случае студентов-мужчин. Представители индивидуалистских культур достигали более высоких учебных результатов по сравнению с представителями коллективистских культур, причем вне зависимости от состава учебной минигруппы. Эти результаты позволили лучше понять, как студенты, работающие в гетерокультурных и гомокультурных группах в условиях применения УСИКТ, могут достигать больших результатов; тем самым выявлена роль культуры в успешности учебного сотрудничества вообще, и УСИКТ в частности.

В ходе третьего эксперимента (см. главу 4) была предпринята попытка верифицировать гипотезу о положительном влиянии применения традиционного (неспециализированного) скрипта сотрудничества при обучении студентов в гетерокультурных и гомокультурных группах в условиях применения УСИКТ. Экспериментом были охвачены 130 магистрантов: 81 голландец и 49 представителей других культур из 27 стран. Учебный традиционный скрипт взаимодействия был

разработан на основе схемы кодирования, предложенной Curtis и Lawson (2001). Учебные гомокультурные и гетерокультурные мини группы были случайным образом распределены в два потока: группы первого потока работали с применением скрипта, а группы второго потока – без скрипта. Учащиеся, входящие в каждую из групп, должны были в ходе обсуждения совместно найти решение некой проблемы, относящейся к области межкультурной/кросскультурной коммуникации. Качественные характеристики УСИКТ выявлялись и оценивались исходя из проявления поведенческих аспектов сотрудничества в режиме реального времени и качественных характеристик обсуждения. Результаты эксперимента позволили сделать вывод о том, что применение традиционного скрипта сотрудничества оказывает положительное влияние на качество взаимодействия в мини группах; при этом в случае с гетерокультурными группами выявлен более низкий уровень качества обсуждения по существу (выраженный в параметрах двух переменных: ориентированности на выполнение задания и поддержание качества обсуждения). Эти результаты свидетельствуют, что уровень учебного сотрудничества в гетерокультурных мини группах является недостаточным для достижения учебных/профессиональных целей, и, следовательно, необходимы поиск/разработка и применение более эффективных инструментов (например, нетрадиционных скриптов), которые позволили бы обеспечить решение задач учебного/профессионального кросскультурного взаимодействия.

Четвертый эксперимент (подробное описание которого приведено в главе 5) был посвящен, прежде всего, исследованию эффективности применения скрипта (сценария) сотрудничества с расширенным межкультурным компонентом (ССРМК) в условиях применения УСИКТ для повышения качества учебного сотрудничества студентов-представителей разных культур; кроме того, выявлялись следующие характеристики учащихся: динамика отношения к сотрудничеству в режиме «реального времени», особенности поведенческих аспектов сотрудничества при работе в режиме «реального времени», уровень учебных достижений при работе в группе и декларируемый предыдущий опыт работы с УСИКТ.

Основная гипотеза данного аспектного исследования заключалась в том, что указанные характеристики учащихся (выступающие здесь в качестве переменных) будут положительно отличаться в двух условиях проведения эксперимента: случае применения традиционного скрипта и в случае применения инновационного скрипта (с расширенным межкультурным/кросскультурным компонентом). В качестве инструмента коммуникации было применено Web Conferencing. Выборку составили 47 студентов украинского и голландского вузов, работавшие в смешанных группах над выполнением учебного проекта – составлением плана решения одной из экологической проблем, связанных с атомной энергетикой и радиоактивностью. Результаты экспериментального

обучения доказали, что отношение учащихся к сотрудничеству в режиме реального времени после применения инновационного скрипта было значительно более положительным по сравнению с применением традиционного скрипта. Мини-группы, работавшие по инновационному скрипту, демонстрировали более высокий уровень (качество) личного вклада в подготовку проекта (так называемого «contributing behavior»), но, вместе с тем, более низкий (по сравнению с применением традиционного скрипта) уровень эффективности планировочной деятельности (так называемого «planning behavior»), мотивированности к участию в проектной деятельности (так называемого «seeking input») и группового взаимодействия (так называемого «social interaction»). Кроме того, применение инновационного скрипта положительно сказалось на качестве подготовленного плана решения экологической проблемы. Результаты проведенного интервьюирования участников эксперимента позволили установить, что учащиеся в определенной степени различались в аспекте обладания предыдущим опытом в области работы с УСИКТ, и различия коррелировали с применением традиционного и инновационного скриптов в ходе данного эксперимента. Из 10 проинтервьюированных учащихся, работавших с инновационным скриптом, 4 голландских и 4 украинских студентов сообщили, что скрипт помог им в выполнении задания и выстраивании взаимодействия партнером по группе. Из анализа этих результатов можно сделать вывод о том, что качественно спроектированный инновационный скрипт (с расширенным межкультурным/кросскультурным компонентом) обладает потенциалом для повышения качества и эффективности учебного/профессионального сотрудничества. Однако для верификации подобных выводов необходимо было получить документальное подтверждение эффективности применения инновационного скрипта для большей выборки учащихся.

В рамках пятого мини-исследования (см. главу 6) ставилась та же цель, применялся тот же формат эксперимента, и исследовались те же переменные, что и в предыдущем случае, но привлекалось большее число учащихся, и их культурный состав был более диверсифицирован. Экспериментом были охвачены 74 студента магистратуры, представлявшие (в культурном плане) 22 страны. Тематикой проектной работы мини-групп вновь были проблемы экологии, и, в частности, сокращение биоразнообразия. Полученные в эксперименте результаты свидетельствуют о том, что применение инновационного скрипта оказывает положительное влияние как на отношение учащихся к сотрудничеству в режиме «реального времени», так и на повышение качества УСИКТ; при этом положительной динамики уровня учебных достижений не выявлено. Однако участники мини-групп, в которых использовался инновационный скрипт, демонстрировали более частотное применение концептов,

релевантных конкретной решаемой проблеме. Инструкционный блок, включенный в состав инновационного скрипта в рамках данного эксперимента, обеспечил повышение качества кросскультурного взаимодействия в условиях применения УСИКТ. Исходя из этого, вполне можно предположить, что применение инновационного скрипта и отдельных его элементов, обеспечивающих эффективное межкультурное/кросскультурное взаимодействие, могут использоваться и в других образовательных контекстах, подразумевающих межкультурное/кросскультурное опосредованное (дистанционное) сотрудничество.

Общие выводы по материалам исследования представлены в заключительной (седьмой) главе диссертации. Кроме того, там рассматриваются некоторые методологические вопросы, не нашедшие отражение в предыдущих главах работы, а также основные достоинства и возможные недостатки проведенного исследования. В заключение автор приводит научную новизну и теоретическую и практическую значимость работы, рассматривает перспективы исследования, предлагает методолого-методические рекомендации для современной педагогической практики.

НАУЧНАЯ НОВИЗНА, ТЕОРЕТИЧЕСКАЯ И ПРАКТИЧЕСКАЯ ЗНАЧИМОСТЬ РАБОТЫ

Результаты проведенного исследования позволяют проектировать и внедрять скрипты сотрудничества, которые в свою очередь способствуют повышению качества учебной деятельности в условиях интернационализации вузов. Кроме того, работа вносит вклад в уточнение теоретических положений проектирования скриптов сотрудничества в условиях применения технологии УСИКТ в межкультурном/кросскультурном контексте; вклад этот заключается в инструментальном учете потенциальной роли культурных различий в области учебного/профессионального взаимодействия и сотрудничества членов культурно гетерогенных групп. Поведенческие характеристики и системы предметных отношений учащихся, выявленные в результате серии из пяти разработанных на основании теории скриптов, тщательно спланированных и проведенных экспериментов, также могут быть положены в основу дальнейших исследований в области успешности восприятия и осознания учащимися, имеющими разные культурные основы, заданий, подразумевающих применение УСИКТ. Практическая значимость исследования заключается в применимости и воспроизводимости полученных результатов для преподавателей-практиков и методистов, занимающихся разработкой учебно-программной и инструктивной

документации; эта значимость обусловлена тем, что полученные материалы являются важными для дидактического проектирования на уровне высшего профессионального образования в аспекте создания образовательных сред, способствующих формированию компетентности сотрудничества у учащихся культурно гетерогенных групп. В частности, межкультурный/кросскультурный компонент разработанного автором инновационного скрипта (описание которого приведено в главах 5 и 6) может в той или иной степени быть адаптирован методистами для достижения целей обучения при применении УСИКТ в разнообразных образовательных и культурных контекстах.

ПЕРСПЕКТИВА ДАЛЬНЕЙШИХ ИССЛЕДОВАНИЙ ПО ТЕМЕ

Несмотря на глубину проведенного теоретического и экспериментального исследования, остается не до конца решенным ряд вопросов, составляющих перспективу дальнейшего научного поиска по теме. К числу подобных вопросов можно отнести, прежде всего, правомерность использования в подобных исследованиях концептуальной модели противопоставления индивидуализма и коллективизма в качестве инструмента качественной и количественной оценки культуры; данный инструмент не является единственно верным, так как наряду с ним существуют и иные культурно-сопряженные и контекстуально-значимые факторы, оказывающие определенное значимое влияние на способ взаимодействия учащихся с разным культурно-фоновым опытом в условиях непосредственного и опосредованного (в том числе в режиме «реального времени») сотрудничества. Вторым перспективным исследовательским вопросом можно считать правомерность обобщения результатов в количественно и качественно (к аспекте культурной диверсификации) ограниченных выборок; результаты, полученные при обследовании учащихся, обладающих предыдущим межкультурным опытом (полученным, в частности, в рамках участия в программах международной академической мобильности), могут не быть валидными в случае проведения экспериментальной работы с учащимися, не обладающими подобным опытом (в основном с теми, кто обучается в стране постоянного проживания и не включен в интернационализированный академический контекст). Третий вопрос касается того, нужно ли для получения более валидного и воспроизводимого результата включать в выборку учащихся разных ступеней образования и направлений подготовки/специальностей. И, наконец, какой должна быть длительность исследования для получения валидных результатов? Влияние культурных несовпадений и эффективность применения скрипта сотрудничества могут, вероятно, меняться в зависимости от длительности межличностного и культурного

контакта учащихся, а также постепенно приобретаемого процедурного опыта в области межкультурного/кросскультурного учебного/профессионального сотрудничества при использовании УСИКТ; следовательно, целесообразным представляется проведение лонгитюдного исследования динамики уровня сформированности профессионально-значимых личностных качеств учащихся, в том числе аспектной стратегической компетентности в области профессионального межкультурного/кросскультурного взаимодействия.

ЗАКЛЮЧЕНИЕ

Подводя итог сказанному выше, можно утверждать, что при проектировании и внедрении учебных сред, способствующих формированию/развитию компетентности сотрудничества, должны учитываться как культурный фон учащихся, так и существующие между ними культурные различия. В результате проведенного исследования были выявлены определенные теоретические и практические проблемы, характерные как для непосредственного, так и для опосредованного (на основе УСИКТ) учебного взаимодействия. Кроме того, было изучено отношение к этим проблемам студентов ряда вузов в нескольких странах. В частности установлено, что даже в рамках одной гетерокультурной группы учащиеся могут иметь совершенно разные ожидания в отношении уровня учебных достижений, характера и уровня мотивированности к учебной/коммуникативной деятельности и учебному сотрудничеству, а также разное восприятие партнеров по взаимодействию и мотивов их деятельности. Было установлено, что сотрудничество с партнером–представителем иной культуры может негативно влиять на декларируемый учащимися опыт в области УСИКТ. Показано, что учебное сотрудничество в рамках культурно гетерогенных групп является недостаточно эффективным, что обуславливает необходимость применения некоторых дополнительных инструментов повышения эффективности, которые были достаточно успешно разработаны и апробированы к ходе данного исследования. Установлено, что применение скрипта сотрудничества с расширенным межкультурным/кросскультурным компонентом положительно влияет на следующие характеристики учащихся: динамика отношения к сотрудничеству в режиме «реального времени», особенности поведенческих аспектов сотрудничества при работе в режиме «реального времени», положительный характер декларируемого предыдущего опыта работы с УСИКТ, а также (в определенной степени) уровень учебных достижений при работе в группе. Таким образом, можно заключить, что применение скриптов способствует

повышению качества учебного сотрудничества в культурно гетерогенных группах за счет преодоления/нивелирования несовпадений при организации учебного сотрудничества на основе современных информационно-коммуникационных технологий. Полученные в ходе данной работы результаты являются теоретически и практически ценными для дальнейших исследований в области повышения эффективности учебного и профессионального межкультурного/кросскультурного сотрудничества.

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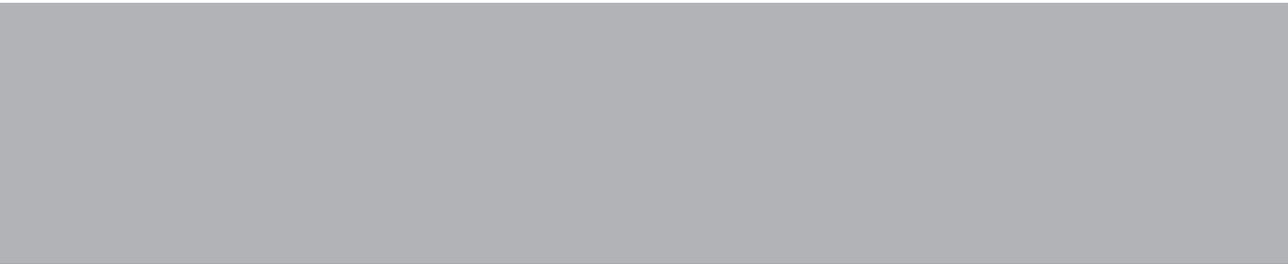
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Vitaliy Popov



About the author

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Popov, V., Noroozi, O., Biemans, H. J. A., Brinkman, D., Mulder, M., & Kuznetsov, A. (2012). Challenges in computer-supported intercultural collaborative learning in higher education: An experimental research. *Paper presented at the AERA Annual Meeting*. Vancouver, Canada, April 13-17, 2012.

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COMPLETED TRAINING AND SUPERVISION PLAN



Vitaliy Popov

Wageningen School of Social Sciences (WASS)

Name of the course	Department/ Institute	Year	ECTS (=28 hrs)
I. General part			
Techniques for Writing and Presenting Scientific papers	WGS	2009	1.2
Mobilising your scientific network	WGS	2010	1
PhD competence assessment	WGS	2010	0.3
Research Methodology: From Topic To Proposal	WASS	2010	4
Writing educational research	EERA	2010	7.5
Methods, techniques and computer tools for qualitative data collection and analysis	WASS	2009	1.5
Inauguration module of Argupolis (doctoral program on argumentation theory)	UVA & University of Lausanne	2009	1.5
Voice and Presentation Skills Training	WGS	2010	2
Scientific publishing	WGS	2010	0.3
II. WASS-specific part			
Mansholt Introduction course	WASS	2008	1.5
Mansholt Multidisciplinary Seminar (PhD day)	WASS	2012	1
Presentation at International conferences	-	-	7
III. Discipline-specific part			
Qualitative data analysis: procedures and strategies (YRM 60806)	WUR	2009	6
ICO introductory course (ICO)	ICO	2010	7.1
ICO Toogdagen presentation	ICO	2010	1
Qualitative research methodology	ICO	2010	3.5
ICO International Fall School	El Collell, Spain	2012	1
Advanced multilevel modeling with SPSS	ICO	2011	3.5
Domain specific instruction in innovative learning environments	ICO	2012	3.5
Competence theory and research	ICO/WASS	2012	4
Research synthesis including meta-analysis	ICO	2012	3.5
Writing research proposal	WASS	2009	6
Participation in research meetings at ECS	ECS	2011	2
IV. Teaching and supervising activities (optional)			
Intercultural communication skills		2012	1
Supervising of BSc student	WUR	2013	1
TOTAL (minimum 30 ECTS)			71.9

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