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# The role of cultural background and team divisions in developing social learning relations in the classroom

## Abstract

A common assumption is that students prefer to work together with students from similar cultural backgrounds. In a group-work context, students from different cultural backgrounds are “forced” to work together. This might lead to stress and anxiety, but at the same time may allow students to learn from different perspectives. The prime goal of this article is to understand how international and home students from different cultural backgrounds build learning and work-relations with other students in- and outside their classroom using an innovative quantitative method of Social Network Analysis in a pre-post test manner.

In Study 1, 50 Spanish and seven Erasmus economics students worked in self-selected teams. In Study 2, 69 primarily international students in a post-graduate management program in the United Kingdom worked in randomised teams. The results indicate that in Study 1 learning ties after 14 weeks were significantly predicted by the initial team division and friendship ties. The seven international students integrated well. In Study 2, learning ties after 14 weeks were primarily predicted by the team division, followed by initial friendship ties, and co-national friendships. Although international students developed strong (multi-nationality) team learning relations, international students also kept strong links with students with the same cultural background. As the initial team division had an eight times stronger effect on learning ties than cultural backgrounds, these results indicate that the instructional design of team work has a strong influence on how international and home students work and learn together.

## Introduction

An increasing number of students prefer to study at a university abroad (Russell, Rosenthal, & Thomson, 2010; Van der Wende, 2003). In many “Western” universities, teachers and institutes place a lot of responsibilities on students to self-determine their learning (Hofstede, 1986; Tempelaar, Rienties, Giesbers, & Schim van der Loeff, 2012). International students may experience a culture shock when the higher educational organisation, behaviours and expectations of the host university are different from those of the students’ culture (Zepke & Leach, 2005; Zhou, Jindal-Snape, Topping, & Todman, 2008). De Vita (2001, p. 167) refers to this as cultural learning style, “which re-proposes learning as a culturally-based phenomenon may then explain why teaching methods,

learning tasks and environments which promote learning in some cultures may be ineffective in others”.

While a large body of research on internationalisation has focussed on determining how individual characteristics, such as academic integration (Rienties, Beausaert, Grohnert, Niemantsverdriet, & Kommers, 2012; Zepke & Leach, 2005), learning styles (De Vita, 2001; Joy & Kolb, 2009; Tempelaar, et al., 2012), personal-emotional adjustment, stress and anxiety (Rienties, et al., 2012; Russell, et al., 2010; Ward, Okura, Kennedy, & Kojima, 1998), influence how international students learn and adjust to the host-institute, to our knowledge a limited amount of studies have focussed on how social (learning) relations of international and home students influence how students learn in- and outside the classroom. The degree to which students are able to develop friendship relations has an influence on how students cope with the complex demands of higher education (Furnham & Alibhai, 1985; Hendrickson, Rosen, & Aune, 2011; Rienties, et al., 2012). A common assumption by many teachers in large international classrooms in higher education is that most students seem to prefer to develop friendship relations and work together with students from similar cultural backgrounds (Hendrickson, et al., 2011; Montgomery, 2009; Volet & Ang, 1998).

In a student-centred learning environment, whereby students are given more responsibilities in self-determining their learning, collaborating with fellow-students, and/or providing feedback to each other (Decuyper, Dochy, & Van den Bossche, 2010; Katz, Lazer, Arrow, & Contractor, 2004), one would expect that cultural differences and cultural learning styles amongst students will become more visible than in a teacher-centred environment, where the teacher sets the pace of the learning activities and is primarily responsible for assessment and feedback-provision (Montgomery, 2009; Rienties, Willis, Alcott, & Medland, In Press). In the last 20 years, there has been a rapid growth in the use of team-learning in higher education to engage students in active learning (Decuyper, et al., 2010; Springer, Stanne, & Donovan, 1999). By implementing a learning structure based in teams, teachers aim to convert their classroom in a learning

environment where students learn from and together with their fellow team members (Hernandez Nanclares, Rienties, & Van den Bossche, 2012; Katz, et al., 2004).

As a result, in a student-centred environment students from different cultural backgrounds are “forced” to work together with other international students and with home students (Eringa & Huei-Ling, 2009; Montgomery & McDowell, 2009). This might lead to stress and anxiety for some, but at the same time would allow for an opportunity to learn from different perspectives and cultural backgrounds (Hendrickson, et al., 2011; Kim, 2001), and enhance international students abilities to adapt their learning style to the host-institute. This is particularly important to foster as Volet and Ang (1998) found that international and Australian (home) students preferred to work in teams with their own people. Furthermore, in a qualitative study amongst 60 British students at two universities Peacock and Harrison (2009) found that most British students preferred to work and develop friendships with co-national students, which Peacock and Harrison (2009) describe as a form of “passive xenophobia”.

Although an increasing number of studies have recently looked at whether and how international and home students develop learning and friendship relations (see next section), most studies have used either qualitative methods, such as interviews or focus groups (e.g. Montgomery, 2009; Peacock & Harrison, 2009; Volet & Ang, 1998), or used ex-post questionnaires amongst home or international students to reflect upon the extent to which they developed those relations (e.g. Hendrickson, et al., 2011; Neri & Ville, 2008) in a wider university-context. Also, in most of these studies the focus was on either international students or home students, and/or mostly only a subsample of the entire cohort following a particular program or class were taken into consideration, thereby limiting our understanding how learning and friendship relations in the classroom actually develop (for those who did not take part in the research).

The prime goal of this article is to understand the extent to which students from different cultural backgrounds build friendship, learning and work-relationships with other students in their class. Therefore, in this study we will contrast two studies that

differed in their degree of internationalisation to understand how international students over time build and develop learning relations with other students using a technique called Social Network Analysis (Hernandez Nanclares, et al., 2012; Katz, et al., 2004; Rienties & Veermans, 2012). SNA can be considered as a wide-ranging strategy to explore and predict social structures to uncover the existence of social positions of (sub)groups within a network (Curşeu, Janssen, & Raab, 2012; Katz, et al., 2004; Krackhardt & Stern, 1988; Rienties & Veermans, 2012). Although SNA techniques are increasingly used in educational psychology to identify social learning patterns in the classroom, only a couple of researchers have used (in a limited manner) SNA by counting the number of friends of international students (e.g. Furnham & Alibhai, 1985; Hendrickson, et al., 2011; Neri & Ville, 2008). Not a single article in this journal has thus far used this technique to understand the extent to which international students and home students learn from each other and build friendship relations over time.

The two case-studies were selected for the purpose of illustrating two relatively “extreme” cases of internationalisation, as research by Ward et al. (2005) indicates that a critical mass of international students may tip the balance of social interaction and the learning climate in the class from positive to negative. Study 1 represents a case-study of limited Erasmus program, whereby most students were local, with only a small minority of international students following a half-year Erasmus program in Spanish. In contrast, Study 2 represented an extreme form of intense internationalisation at a university in the UK, whereby 18 different nationalities were present and only 4% were home students. Please note that it is not our intention to compare these two studies, as the context of the studies (team structure, tasks, language, country) are completely different. However, we are interested in understanding whether these contexts might have played a part in the the development friendship and learning networks.

## **Friendships, cultural background and team learning**

Current research indicates that institutes and the social networks of students have a large influence on how international students adjust (Rienties, et al., 2012; Rienties, Grohnert,

Kommers, Niemantsverdriet, & Nijhuis, 2011; Tinto, 1998; Zepke & Leach, 2005; Zhou, et al., 2008). For example, the social life outside the academic environment has a strong influence on academic and social integration. Having a sufficient number of friends from the same culture as well as host-culture (Bochner, McLeod, & Lin, 1977; Furnham & Alibhai, 1985; Montgomery & McDowell, 2009), sharing accommodation with other students (Ward, et al., 1998), being member of a study association, student fraternity or joining a sports club can influence social integration and finally increase academic performance (Rienties, et al., 2012; Russell, et al., 2010). This allows students to establish a social life that is closely attached to the university setting (Tinto, 1998).

In recent research by Hendrickson et al. (2011) on social friendship networks of 84 international students at the University of Hawaii, a distinction was made between co-national, home-national and multi-national friendships. Most studies on friendship have focussed on co-national friendship networks (i.e. friends from the same country). Although co-national friendship networks provide (short-term) support through social interaction with students who are experiencing similar emotions, Kim (2001) argues that it will hinder adaptation processes in the long-run. Hendrickson et al. (2011) found that students with relatively more co-national friends were less satisfied with their lives. Having more relations with home-national students in contrast was positively correlated with satisfaction and connectivity. Multi-national friendships, a third type of friendship that commonly is developed by international students from different cultural backgrounds, are often build because international students share a similar experience and are open to learn from other cultures (Hendrickson, et al., 2011; Montgomery & McDowell, 2009). Therefore, our first two hypotheses test whether the social learning and social friendship networks at the beginning of the two Studies were determined by cultural background.

H1: The social friendship networks of international students are different from those of home students at the start of the module.

H2: International students' social friendship networks at the start of the module are built on the same cultural background.

Montgomery and McDowell (2009) found amongst 70 business, engineering and design students that international students build strong multi-national networks that provide them with a supportive environment, whereby students make a deliberate choice of whom to become friends with to provide academic and social support. Although these results are encouraging, Montgomery (2009) unfortunately does not report how students were selected for these focus groups, whether there was an under- or over-representation of particular groups of students, and whether these results are also applicable to non-Post 1992 UK institutes.

Previous research has shown that establishing friendship relations with home-national students is difficult for international students, due to language issues (Montgomery & McDowell, 2009; Rienties, et al., 2012), perceived discrimination (Russell, et al., 2010), and the fact that most home-national students already have well-established friendship networks (Hendrickson, et al., 2011; Rienties, et al., 2012; Rienties, et al., 2011). Furthermore, according to Peacock and Harrison (2009, p. 494) amongst British students there was a "perceived threat that an international student could bring the marks of the group down through his or her lack of language ability, lack of knowledge of the United Kingdom or understanding of British pedagogy". Both Montgomery and McDowell (2009), using a fine-grained analysis of learning networks amongst seven international students, and our research (Rienties, et al., 2011) amongst 871 business students at five Dutch business schools, showed that the social worlds of home and international students are strongly segregated. Also Neri and Ville (2008) found that international students have a tendency to develop relations with co-national students, while Hendrickson et al. (2011) found that international students develop both co-national and home-national friendships. Therefore, the third hypothesis is:

H3: The development of social learning networks over time is related to similarity of cultural backgrounds.

Higher educational institutes have a key role and responsibility in creating a powerful learning experience for both home and international students (De Vita, 2001; Russell, et al., 2010; Van der Wende, 2003). In particular, how teachers design their module and how students are encouraged to work together in small-groups has been found to have a strong influence on academic integration (Eringa & Huei-Ling, 2009; Hernandez Nanclares, et al., 2012). The positive effects of collaborative learning over individual learning has been shown in various studies and meta-analyses (Decuyper, et al., 2010; Michaelsen & Richards, 2005; Springer, et al., 1999): enhanced cognition; higher achievement; higher-level reasoning; better transfer of knowledge; more frequent generation of new ideas or solutions; more positive attitudes of students towards the subject matter; and increased motivation to do difficult tasks. However, at the same time there is an increased recognition that the introduction of teams as basic learning units in the classroom also questions the value of the classroom as learning space; a space in which the different agents in the learning process - teachers and students - are together (Hernandez Nanclares, et al., 2012; Hommes et al., 2012; Michaelsen & Richards, 2005).

Within educational psychology and internationalisation literature in particular, limited research has been conducted in order to assess whether international and home students also learn from the experiences of other teams in their class and what the underlying mechanisms for creating this learning space are (Hernandez Nanclares, et al., 2012; Montgomery, 2009; Rienties & Veermans, 2012). However, in a ground-breaking study in medical science using Social Network Analysis, Hommes et al. (2012) found that the primary predictor for academic performance was the social learning network medical students were engaging in, rather than more “classical” educational concepts like academic motivation, prior performance or academic integration. Hernandez Nanclares et al.(2012) found that students over time primarily developed strong relations with



students within their team, with a limited amount of links with students from other teams.

Therefore, the final hypothesis is:

H4: The development of social learning networks over time is related to team division.

## **Methods**

### *Study 1 Limited Erasmus program*

#### *Participants and settings*

Study 1 took place in an elective third-year course of International Economic Relations at a Spanish university. The students met twice a week during two-hour class session in a 14 weeks period. 57 (26 males, 31 females) students were divided into eleven teams, which consisted of four to seven members per team, who self-selected their members. Apart from seven international students (3x German, 2x Polish, 1x Irish, 1x French), 50 Spanish students came from the same geographical area. Therefore, we label this study as a typical example of “Limited Erasmus program”, whereby an institute has provided access to higher education to international exchange students, but the program is basically taught in the same manner as before (i.e. in Spanish). The reason for the self-selection of team members rather than random formation of teams was that most Spanish students were not familiar with active learning methods such as team work. The seven international students were assigned to seven separate teams by the teacher. As a result, four teams had only Spanish students. Research has highlighted when (novice) teams are formed, having a couple of members within a team that are familiar or even friends is beneficial for social interaction (Hernandez Nanclares, et al., 2012; Krackhardt & Stern, 1988). During the fourteen weeks, the eleven teams had to solve five authentic tasks related to international economics that were highly inter-related. These activities include the creation of a conceptual map of globalization, writing a reflection on an economics blog by a famous economist or organisation, and preparing and participating in a final conference about globalization. The assignments were designed in such a way that they require a broad

range of concepts, abilities and skills from each teams A detailed description of the design has been published elsewhere (Hernandez Nanclares, et al., 2012).

### *Study 2 International Classroom*

#### *Participants and Setting*

Study 2 took place in a post-graduate program of Event management at a research-intensive British university. In contrast to Study 1, whereby most of the students were from the same cultural background as the institute, in this setting only three students were from the UK. Therefore, we refer to this Study as an “International classroom”. 72% of the students were from Confucian Asian and Southern Asian countries, primarily China, Thailand and India. The third largest group of international students came from Eastern Europe. 84% of participants were female.

Nine small working teams were formed at random by the tutor after Week 1. Fifteen students from a “food management” specialisation were divided into Teams 8-9. The remaining 54 students from the hospitality management program were divided into Teams 1 – 7. The 69 students had worked together in different small teams within their specialisation in Semester 1 and had known each other for four months. During the 14 week course period, students met formally once a week during three-hour interactive class session. At the same time, students were expected to meet with the peers of their team during the week in order to work on three team processes/products, one of which was organising a profitable event, all of which were assessed on a group level by the teacher. A detailed description of the design of the module has been published elsewhere (Rienties, et al., In Press).

#### *Measuring friendship and learning networks*

For ascertaining how international and home students from different cultural backgrounds learned together over time during the two modules, we employed a method developed within the field of Social Network Analyses. Numerous researchers have found that

SNA networks provide robust and accurate depictions of actual learning processes and social networks (Curşeu, et al., 2012; Hommes, et al., 2012; Katz, et al., 2004; Russo & Koesten, 2005), and recent research highlights that social networks are the key determinant for learning (Hommes, et al., 2012; Russo & Koesten, 2005). That is, the evolution of the social friendship and learning networks was analysed as follows. First, the (possible) influence of pre-existing friendship relations was taken into consideration by using so-called “closed-network” analysis (Hernandez Nanclares, et al., 2012; Krackhardt & Stern, 1988). The 57 students in Study 1 answered the Social Network question stem “I am a friend of ...” in Spanish, while the 69 students in Study 2 answered the same question in English in a check-box manner in order to minimise questionnaire-fatigue. That is, given that we were primarily interested in how networks developed over time and students had to fill in the questionnaire 2-3 times, a check-box manner was adopted rather than a rating for each student, which requires more time from students and might lead to socially deserved answering. A list with all respective names of the students was provided as is commonly done in SNA (Haythornthwaite & Wellman, 1998). This approach is different from the open-network approach used by Hendrickson et al. (2011), where students could freely list the names of students they considered as friends.

Second, (perceived) learning from team members and other members was measured using SNA in Week 4 for Study 1. In Study 2, given that most students had already worked together before, we measured the initial working network in Week 1. Third, in both studies we measured the social learning networks at the end of the modules at Week 14 in order to analyse whether the dynamics of inter- and intra-team learning and international and home students had changed. For all three measurements a 100% response rate was established for Study 1, while for Study 2 a response rate of 71% and 84% was established. The relatively lower response rate of Study 2 at the beginning of the module can be explained by the fact that some of the students were still in their home country in the first week of the module. During the post-measurement some of the

participants were not present at the debriefing as they were working on their final thesis and were collecting data.

### *Data analysis*

First, a graphical analysis of the friendship and learning networks was conducted in order to identify the overall social network structure and identify possible patterns of sub-group development, as recommended by Wassermann and Faust (1994). Afterwards, a quantitative analysis was conducted in order to determine the dynamics of social friendship and learning networks at the beginning and end of each module. For both studies, as a proxy for cultural backgrounds a multi-national vs. home national matrix was constructed for Study 1 in order to control for differences in nationality and allowed us to test H1. Given that more international students with the same nationality were present in Study 2, a separate co-nationality matrix was constructed in order to test H2, a procedure similar to creating a dummy-variable for each person with the same nationality in “classical” statistical analyses. Furthermore, given that there were 37 Chinese students present in Study 2, and Montgomery (2009) found that some students had a prejudice against working with Chinese students, we constructed a final Chinese vs. non-Chinese matrix. Finally, a team division matrix was constructed in order to control the influence of the team division on the social learning network in order to test H4.

Follow-up quadratic assignment procedure Pearson correlations (Hanneman & Riddle, 2005) were conducted in order to compare similarity measures between the friendship and learning networks. Finally, multiple regression quadratic assignment procedures (MRQAP) were used to test whether pre-existing friendship and learning relations amongst international and home students predicted social learning networks after 14 weeks using 2000 random permutations. Basically, MRQAP tests are permutation tests for multiple linear regression model coefficients for data organized in square matrices of relatedness of friendship and learning, and the interpretation of the standardised betas is similar to more OLS regression analyses (Krackhardt, 1988). Data

were analysed on a network level using UCINET version 6.350. Although SNA data can be transformed and exported to “classical” statistical programs, such as Stata or SPSS as done by Hendrickson et al. (2011), analysis in UCINET is superior given that the specific learning relations between international and home students (i.e. our primary research interest) remain intact.

## Results

### *Study 1 Limited Erasmus program*

#### *Descriptive statistics*

In order to illustrate the power of SNA in understanding initial friendship networks of international and home students at the start of the module and how the social learning network after fourteen weeks developed, the social friendship network at Day 1 (Figure 1) as well the social learning network after Week 14 (Figure 2) are presented. Four aspects can be distinguished from these figures. First of all, Figure 1 illustrates who students considered as their friends and what the direction of the friendship was. Furthermore, the label attached to each node represents the respective team number. Finally, the colour and shape of the node represents the nationality of the respective student. For example, as indicated by the black arrow in Figure 1, a female German student of team 11 (white, diamond) indicated that she was friends with a Spanish male student from Team 8, a Spanish female student from Team 11, and a fellow-German female student from Team 4, which is indicated by the direction of the arrow.

➔ Insert Figure 1 about here

Second, the respective German female student from Team 11 had no so-called “reciprocal links” with the three class mates. However, her Spanish friends of team 8 and 11 did have a reciprocal friendship relation, indicating that these students “acknowledged” each others’ friendship. A crucial point to remember is that SNA is not based upon the perception of one participant how he or she perceives the social network. That is,

although the German female student indicated that she was only friends with two students, the other 57 students independently “confirmed” that they also did not have a friendship relation with this student. In other words, SNA measures the (perceived) network interactions amongst all 59 participants simultaneously, which verifies and/or provides counter perceptions from all participants. Third, the social network graph shows the respective position of individual students as well as of each of the 11 teams. In Figure 1, some learners and teams were on the outer fringe of the friendship network and were not well-connected to other members or teams. This seems to be in particular for international students, thereby providing initial support for H1 and H2. Eight Spanish, one German and one French student (as illustrated by the two grey arrows) were not connected at all to any of the students in the module in Figure 1. This is not an unexpected result, as most students in this interdisciplinary elective module were from separate disciplines and specialisations.

➔ Insert Figure 2 about here

Finally, when comparing Figure 1 with Figure 2, the number of (learning) links between students and teams alike increased substantially (See also Table 1). In Figure 2, most teams (e.g. Team 2, 4, 5, and 10) had strong links to their respective team members and were positioned distinctively as “separate” teams. Of particular interest to this study, all international students developed strong reciprocal links within their respective team. For example, as highlighted by the black arrow, the German female student from Team 11 had four links to her fellow Team 11 members. However, at the same time she had eight links to other members outside her team, four of which were with other international students and four with other Spanish students. Furthermore, the French and German international students who had no friends at the beginning of the module developed strong (reciprocal) links with their respective team members and other students (as highlighted by the two grey arrows).

### *Learning ties and prior friendship relations over time*

In Table 1, the multi-national vs. home national network, initial friendship and learning ties after four and fourteen weeks and the team division are illustrated, as well as the density scores for the entire classroom and the correlations between the five social networks using UCINET QAP correlations. Density compares to the number of ties present in the social network divided by the total number of possible ties. The overall density of learning increased from 6% after four weeks to 9% after fourteen weeks, which implied that only 9% of all possible network links were used for learning.

➔ Insert Table 1 about here

The dichotomised network measure of multi-national vs. home national network was significantly correlated to the initial friendship social network, thereby providing further support for H1. Furthermore, the multi-national vs. home national network was significantly correlated with the learning network after fourteen weeks. International students developed significantly fewer links with Spanish students in comparison to Spanish students ( $M_{INT} = 4.86$ ,  $M_{SP} = 6.84$ ,  $T = 3.95$ ,  $p < .01$ ), while they developed significantly more links to international students ( $M_{INT} = 2.29$ ,  $M_{SP} = .68$ ,  $T = -5.74$ ,  $p < .01$ ), providing initial support to H3. However, one has to be cautious to over-interpret this result, given that the sample size of Spanish and international students was unequal. The size of the multi-national vs. home national network correlations were lower than the size of correlations between the initial friendship and two learning networks, indicating that new learning links were established over time, irrespective of the cultural background of the students. The team division was strongly correlated to the learning network after four and fourteen weeks.

Finally, using multiple regression quadratic assignment procedures in order to estimate which of the four matrices had the strongest influence on our dependent variable, learning ties after fourteen weeks were significantly predicted by the initial team division ( $\beta = .62$ ;  $p < .01$ ), followed by friendship ties ( $\beta = .08$ ;  $p < .01$ ), and multi-national vs.

home national network ( $\beta = .02$ ;  $p < .05$ ), with an adjusted R-square of 0.42, whereby  $\beta$  represent standardised betas. Adding the learning ties after four weeks further improved the fit of the model. That is, learning ties after fourteen weeks was primarily predicted by the initial team division ties ( $\beta = .54$ ;  $p < .01$ ), followed by learning ties after four weeks ( $\beta = .12$ ;  $p < .01$ ), friendship ties ( $\beta = .07$ ;  $p < .01$ ), and multi-national vs. home national network ( $\beta = .04$ ;  $p < .05$ ), with an adjusted R-square of 0.43.

In sum, in Study 1 over time international students built strong learning relations with both international and Spanish students. Although the multi-national vs. home national network was a significant predictor for social learning, the effect size was small. All international students developed learning relations with members within their team, but also were brokers and bridge builders between teams, as illustrated by Figure 4. Therefore, we found limited support for H3, but strong support for H4 that most learning relations are a result of team-divisions.

### *Study 2 International classroom*

#### *Descriptive statistics*

In Figure 3, the initial friendships at the beginning of the module of Study 2 are illustrated, whereby three aspects are visually present. First, as expected there were two clusters of students, whereby Teams 8-9 formed different sub-groups on the left side of Figure 3, which was due to the fact that these two teams followed a separate specialisation in food management before participating in this module. Second, a large group of Chinese students (blue, square) formed a highly linked subgroup in the Event Management specialisation on the top right hand side of Figure 3. As students were randomised in teams, students from various friendship networks were “forced” to work together. For example as highlighted by the grey circles, Team 5 had five students relatively closely clustered, while three Chinese students were relatively far away from the other members at the beginning of this module. Finally, a highly culturally diverse



group of international students and British home students (Black, triangle up) was situated on the bottom right of Figure 3.

➔ Insert Figure 3 about here

➔ Insert Figure 4 about here

As illustrated in Figure 4, after fourteen weeks students in Study 2 developed substantial learning links with their respective team members, which was similar to our findings from Study 1. As expected, the food-specialisation group continued to learn primarily from students of their own specialisation, and as a result formed a relatively separate subgroup. For most teams, a relatively clear “team structure” could be visually identified in Figure 4 (e.g. Team 2, 8, 7), in that students from the same team were closely located together in the social learning network. This is visually also illustrated by team 5, whereby almost all members were closely situated together. Although almost all students developed learning relationships with team members irrespective of their cultural backgrounds, a central group of Chinese students remained visible in the middle of Figure 4, while the other international and English students were more situated on the right side and outer fringe of the network.

In Table 2, the co-nationality matrix and Chinese vs. non-Chinese were positively correlated with initial friendships, thus providing initial support for H1 and H2. The learning networks after fourteen weeks were most strongly correlated with team divisions and initial work and friendship relations. As the teams were mixed at random, no significant correlations were found with respect to nationality or Chinese students. However, a significant correlation of team division was found with initial friendships and work relations, which could be explained by the fact that most students were already familiar with each other.

Finally, again using multiple regression quadratic assignment procedures to estimate which of the four matrices explained most of the variance of the dependent social learning network variable, learning ties after fourteen weeks were again primarily predicted by the team division ( $\beta = .43$ ;  $p < .01$ ), followed by initial friendship ties ( $\beta =$

.18;  $p < .01$ ), and the co-nationality matrix ( $\beta = .06$ ;  $p < .05$ ), with an adjusted R-square of 0.25. The separate dummy matrix of Chinese vs. non Chinese was not a significant predictor when the same culture matrix was included. A separate MRQAP without the same culture matrix did however show that the Chinese vs. non Chinese matrix was a significant predictor for social learning. In sum, in Study 2 over time international students from different cultural backgrounds built strong learning relations with both international and English students. All international students developed learning relations with members within their team, but at the same time the same culture matrix was a significant predictor for social learning. Therefore, we conclude that although international students developed strong mixed-nationality team learning relations, international students also kept strong links with students with the same cultural background.

## **Discussion and Conclusion**

Studies 1 and 2 have provided a unique insight using in-depth dynamic social network analyses into how international students develop learning relations with co-national, multi-national and home-national students over time in two different team-learning settings. The purpose of selecting these two Studies was to illustrate the power of using Social Network Analysis techniques in understanding the complexities of learning in class between international and home students. We explicitly want to remind the reader that it is not our intention to contrast and compare the two studies. Instead both Studies provide two examples of how social learning processes in institutes with a limited Erasmus program and institutes with an extensive international and diverse classroom may take place, and we strongly encourage other researchers to use SNA to determine whether similar or different patterns will emerge over time.

It is clear from the data from Study 1, and with some students in Study 2, that active learning methods such as team work were effective in crossing cultural boundaries, in line with expectations raised by Hendrickson et al. (2011). That is, for both studies the

best predictor for explaining the extent to which learning ties after fourteen weeks were constructed was the initial team division, which had a eight to ten times larger standardised beta size than our proxies for cultural background. This is an encouraging finding, which seems to contradict the findings of Volet and Ang (1998), and Peacock and Harrison (2009) that most international and home students prefer to work with co-national students. That is, when “forced” to work together in multi-national teams for a substantial period of fourteen weeks on several authentic and complex team products, students seem to be able to overcome some of the initial cultural barriers that prevent students to learn together in multi-national teams.

Nonetheless, the two studies also highlight some complex and subtle transitional processes that some international students seem to go through. That is, both the positions international and home students take in the social networks figures and the relative sizes of the cultural background proxies in the MRQAPs indicate that cultural backgrounds had a marginally stronger impact on learning ties in Study 2. It seems that the motivators for studying or working together might over time have an impact on how students interact with students from other cultures. Some of the drivers for Erasmus students in Study 1 to move to Spain was to learn Spanish language and culture. For this to happen, they needed to work closely and interact well with the Spanish home students, both in the context of academic and social interaction. Further, it can be argued that since there were only seven international students and they were allocated to separate groups by the teacher, they had no choice but to interact with others from a different culture.

In the case of international students in Study 2, when there was a large group of Chinese students, they seemed to form closer networks with them, supporting Volet and Ang’s (1998) assertion and Ward et al. (2005) “tipping point” theory. However, when the international students came from smaller groups, they were seen to integrate well with home students or international students from other countries, as was illustrated in Figure 3 and Figure 4, as the need to develop links outside one's culture probably was stronger

for these students. Also Montgomery and McDowell (2009) found that international students built friendship and learning relationships by actively interacting with each other, irrespective of cultural backgrounds. Therefore, our research would suggest that although there was a significant but small-in-size tendency amongst international students to network with others from the same culture, it was not dependent on cultural similarities alone.

The visualisation of social networks in Study 2 are complex, as existing relationships have definitely played a big part and it is not clear whether existing relationships were initially formed based on factors related to the same culture or academic motivation. This might also suggest that there might be a generalisation and maintenance of networks from one setting to another as can be seen in the case of students who came from the same specialisation staying together in teams. However, the primary predictor for learning after fourteen weeks was the team division initiated by the teacher in Study 2, thereby implying that although cultural differences played a part, most students were able to effectively establish learning links over time irrespective of cultural backgrounds.

As can be seen by the substantial learning links formed by students in Studies 1 and 2, team work was effective when the international students were able to form a stronger module/task team identity as compared to cultural identity. It is suggested that it might not be a simple case of some cultures not finding team work effective; other factors such as language fluency (Peacock & Harrison, 2009; Ward, et al., 2005), the ability to develop trust in a team (Decuyper, et al., 2010), or learning styles (De Vita, 2001; Joy & Kolb, 2009; Tempelaar, et al., 2012) might be playing a part which need to be taken into account when working with international students. It would seem that instead of randomly allocating students to teams, it is better for the teacher and students to be clear of the purpose of team work. As highlighted by Peacock and Harrison (2009), in their study most of the British students seemed to shift the responsibilities for stimulating

interaction with international students to the teacher and the institute in general. If one of the purposes is better interaction and formation of cross-cultural networks, then higher educational institutes and teachers in particular need to rethink how active learning methods, such as small-group or team-learning, seem to have a significant and strong impact on learning and friendship relations between international and home students.

### *Constraints and Limitations*

Although both studies were developed and designed with the highest care, there are several limitations. A first limitation of this research is that both social network analysis of learning networks and friendship networks were self-survey instruments, whereby socially desirable behaviour might influence the results. However, a large body of research (Borgatti & Cross, 2003; Curşeu, et al., 2012; Hommes, et al., 2012; Katz, et al., 2004; Wassermann & Faust, 1994) has found that SNA techniques provide a robust predictor for actual social networks and learning outcomes, in particular given the high response rates in both our studies and the longitudinal research design. Furthermore, given that we used multiple regression quadratic assignment procedures to predict the social learning networks after fourteen weeks, which is a conservative technique (Krackhardt, 1988) given that 2000 random permutations of alternative models were conducted, in both Studies we found strong and robust findings (with adjusted R-squares explaining 25-43% of variance) that primarily team-divisions, initial friendships and co-national relations are predicting learning.

A second limitation is that we did not conduct a fine-grained analysis of the actual learning interactions between students, such as done by Montgomery and McDowell (2009). Although these methods provide an in-depth insight of interactions, the amount of time and effort to follow just a couple of students is prohibitive for larger class sizes as reported here. Students in Study 2 could possibly separate their two motivators (academic and social) in the course of this study. Therefore, strong in-team connections at university were possible but they might have strong social outside-

university connections with students from the same culture as well, supporting the findings of Tinto (1998). It is possible that they did this to create two distinct networks as that would give them two networks to support them during their integration in the home country. It is possible that these students might have been more resilient as, if one network or part of their life was not working well they could rely on the other network.

A particular contribution of our studies that is relevant for teachers and researchers is that SNA programs are increasingly intuitive to use, so by conducting a similar analysis as we have done in the first weeks of a module, teachers and researchers alike will be able to better understand the complexities in the classroom, and possibly intervene where necessary if a particular (group of) student(s) is consistently excluded from social learning interactions. Alternatively, when first asking students to fill in the friendship network, teachers can create multi-cultural groups with a mix of friends from different cultural backgrounds, thereby balancing the opportunities to learn from different perspectives while at the same time ensuring that at least one or two friends are present for each student in each team, as recommended by Krackhardt & Stern (1988) and common transition practice across educational stages. For researchers, in particular, the dynamic use of SNA by measuring social learning and friendship interactions over time allows them many new angles in understanding internationalisation and social interaction processes. For example, experimenting with different compositions of teams based upon cultural backgrounds and friendships, different task-structures, or different assessment methods would allow a deeper insight into how institutes can actively encourage learning across cultural borders. Furthermore, triangulation with qualitative research methods would further strengthen our understanding of the underlying mechanisms of why some international students develop strong links with co-nationals, while others develop strong links with home students.

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Table 1 Multi-national vs. home national, friendship and learning ties, density and correlations for Study 1.

	M	SD	Density (%)	Multi-national vs. home national network	Initial Friendship p	Learning after 4 weeks	Learning after 14 weeks
Multi-national vs. home national network	43.17	14.13	78				
Initial Friendship	2.26	2.36	4	.10**			
Learning after 4 weeks	3.51	1.81	6	.03	.25**		
Learning after 14 weeks	5.07	3.21	9	.04*	.24**	.51**	
Team Division	4.26	0.57	8	-.02	.24**	.69**	.62**

\* $p < .05$  . \*\* $p < .01$ .

Table 2 Multi-national vs. home national networks, friendships and learning ties for Study 2.

	M	SD	Density (%)	Co-Nationality	Chinese vs. Non Chinese	Initial Friendship	Learning after 14 weeks
Co-nationality	20.03	16.29	29				
Chinese vs. Non Chinese	33.61	2.49	50	.65**			
Initial Friendship	13.71	11.54	20	.06	.15**		
Learning after 14 weeks	6.17	5.51	9	.08**	.07**	.25**	
Team division	6.96	0.46	10	.01	.02	.15**	.46**

\* $p < .05$  . \*\* $p < .01$

Figure 1 Social friendship network at the start of Study 1

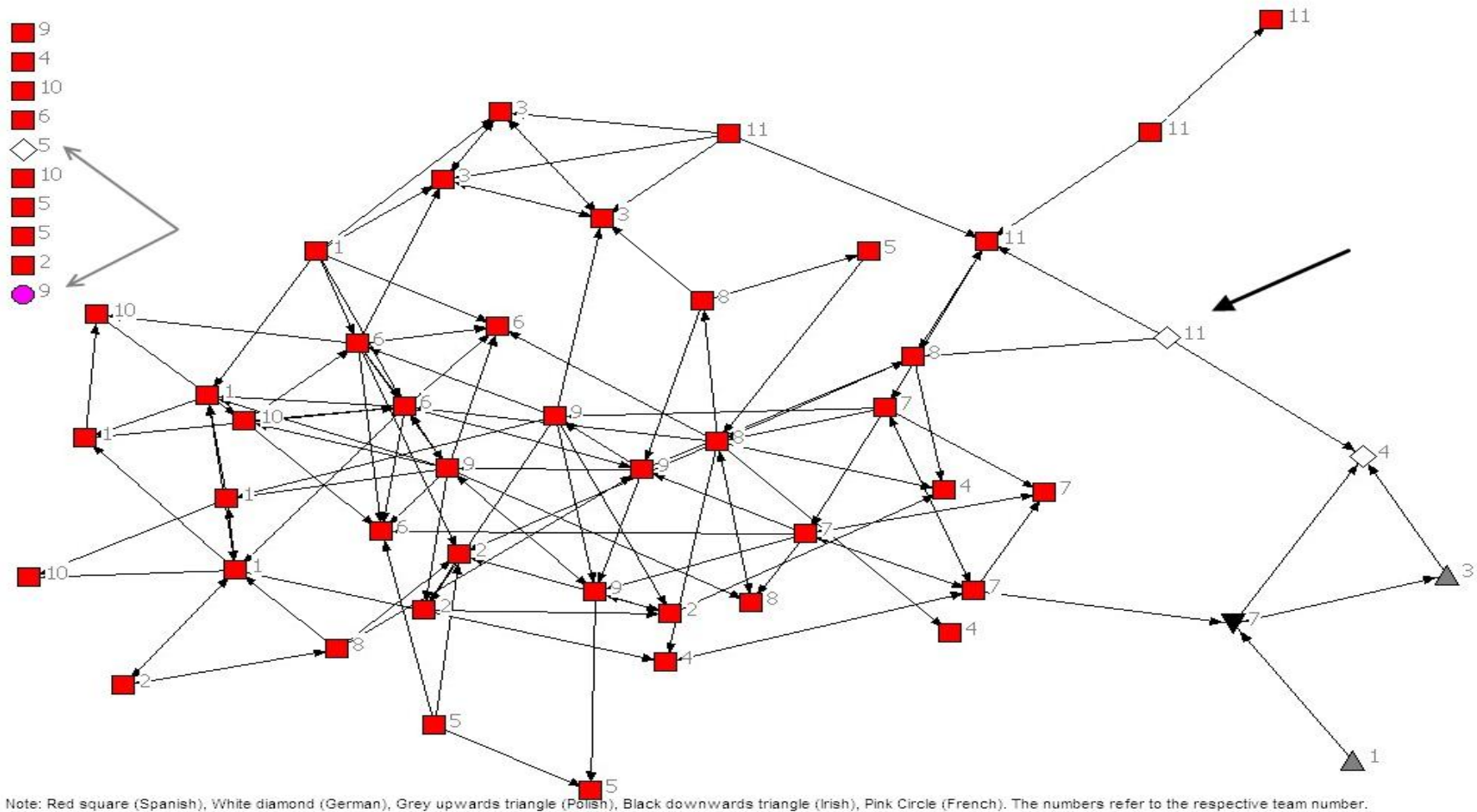
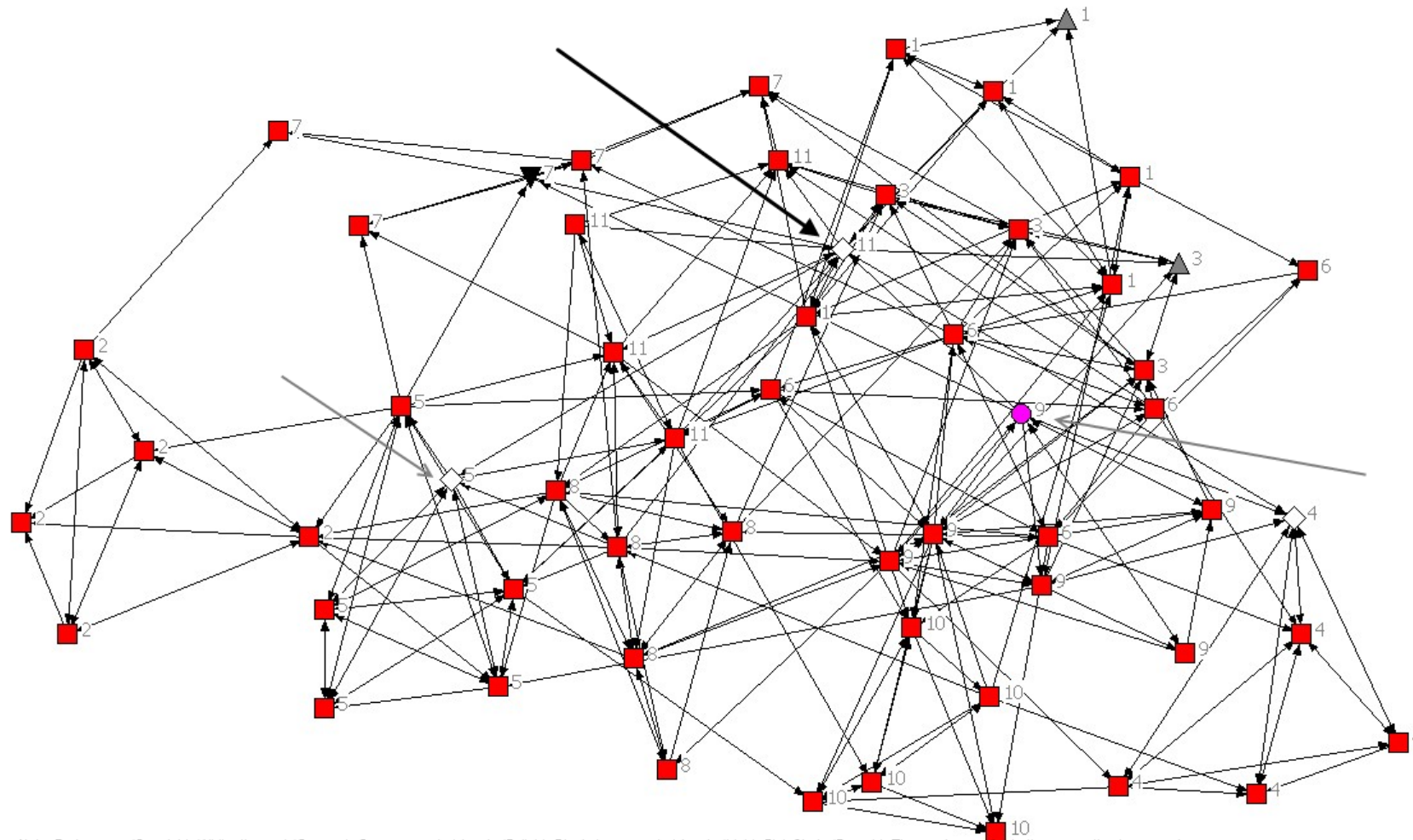
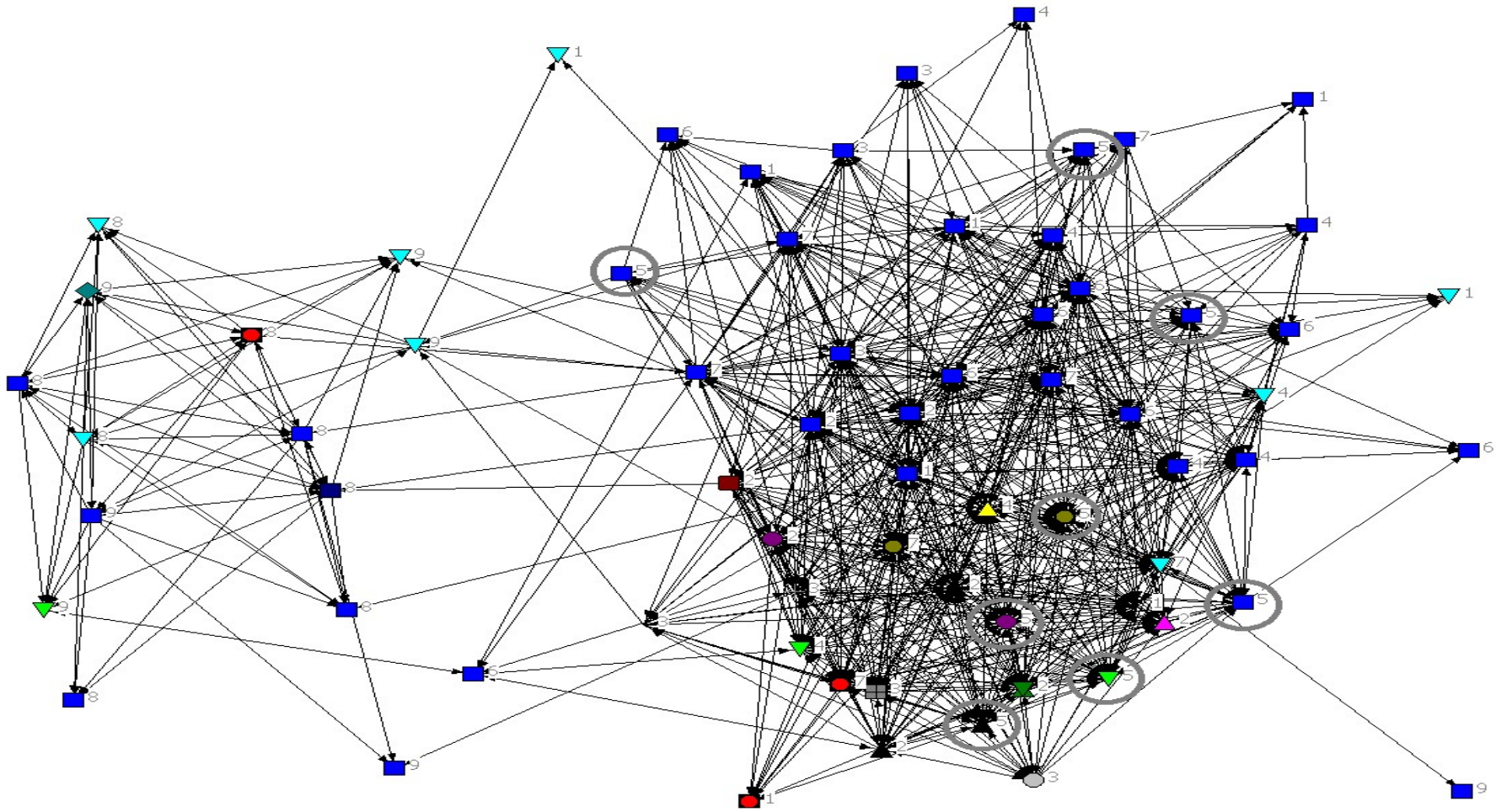


Figure 2 Social learning network of Study 1 after fourteen week



Note: Red square (Spanish), White diamond (German), Grey upwards triangle (Polish), Black downwards triangle (Irish), Pink Circle (French). The numbers refer to the respective team number.

Figure 3 Social friendship network at the start of Study 2



Note: in order of frequency (and with at least three students per country): blue square (Chinese), light blue triangle down (Thailand), black box with red circle (India), green triangle down (Greek), black triangle up (UK)

Figure 4 Social learning network of Study 2 after fourteen weeks

