Understanding social learning relations of international students in a large classroom using social network analysis

Abstract

A common assumption in higher education is that international students find it difficult to develop learning and friendship relations with host students. When students are placed in a student-centred environment, international students from different cultural backgrounds are "forced" to work together with other students, which allows students to learn from different perspectives. However, large lecture rooms may provide fewer opportunities for students to work together in small groups. The purpose of this article is to understand how 191 international students from 34 cultural backgrounds and 16 host students build learning and friendship relations in a large classroom of 207 students. We have used an innovative mixed-method design of Social Network Analysis in a pre- and post-test manner combined with two sets of focus groups.

Using multiple regression quadratic assignment procedures, the results indicate that learning ties after 11 weeks were significantly predicted by the friendship and learning ties established at the beginning of the module, (sub)specialisation, and whether students were Chinese or not. Contrary to previous findings, team divisions played only a marginal role in building (new) learning relations. A substantial segregation between Confucian Asian, European international and UK students was present. Follow-up qualitative data highlighted that international students made a conscious effort to build friendship and learning relations primarily outside the formal team, which for some were along co-national lines, while others were pro-actively looking for new perspectives from multi-national students. These results indicate that the instructional design might have a strong influence on how international and host students work and learn together. We believe that this study is the first to provide an in-depth and unique understanding of how international students from different cultural backgrounds build friendship and learning-relationships with other students in- and outside their classroom over time in a large classroom of 200+ students.

Introduction

An increasing number of students prefer to study at a university abroad (Rienties, Grohnert, Kommers, Niemantsverdriet, & Nijhuis, 2011; Russell, Rosenthal, & Thomson, 2010; Sherry, Thomas, & Chui, 2010; Ward, Masgoret, Newton, & Crabbe, 2005). In many "Western" universities, teachers and institutes place a lot of responsibilities on students to self-determine their learning (Hofstede, 1986; Sherry et al., 2010; Tempelaar, Rienties, Giesbers, & Schim van der Loeff, 2012). International students may experience a culture shock when behaviours and expectations of the host university are different from those of the students' cultural background (Zepke & Leach, 2005; Zhou, Jindal-Snape, Topping, & Todman, 2008). In particular when classroom sizes are large and

students follow programmes with many students (Gallego & Casanueva, 2009; Tempelaar et al., 2012), students have fewer opportunities to develop strong relationships with the teacher (Zepke & Leach, 2005) and other students.

While extensive research on internationalisation is available regarding how individual characteristics, such as academic integration (Rienties et al., 2011; Zepke & Leach, 2005), learning styles (De Vita, 2001; Joy & Kolb, 2009; Tempelaar et al., 2012), personal-emotional adjustment, stress and anxiety (Rienties & Tempelaar, 2013; Russell et al., 2010; Ward et al., 2005; Ward, Okura, Kennedy, & Kojima, 1998), influence how international students learn, adapt and adjust to the host-institute (See also recent reviews by Zhou et al. (2008) and Volet & Jones, 2012). A limited number of studies have focussed on how social (learning) relations of international and host students influence how they learn in and outside the classroom. The degree to which students are able to develop friendships has an impact on how students cope with the complex demands of higher education (Furnham & Alibhai, 1985; Hendrickson, Rosen, & Aune, 2011; Hommes et al., 2012). A common assumption by many teachers in large classrooms in higher education is that most international students prefer to and work together with others from similar cultural backgrounds (Hendrickson et al., 2011; Montgomery, 2009; Volet & Ang, 1998).

However, in the last 20 years, the use of team-learning in higher education to engage students in active learning has increased (Decuyper, Dochy, & Van den Bossche, 2010), even when teaching in large classrooms (Struyven, Dochy, & Janssens, 2011). Furthermore, teachers are increasingly using technologies, e.g. online discussion forums, to create opportunities for students to learn in small teams outside the classroom (Gallego & Casanueva, 2009). As a result, in a more student-centred environment students from different cultural backgrounds are "required" to work together with other international students and host students (Eringa & Huei-Ling, 2009; Montgomery & McDowell, 2009). This might lead to anxiety for some, but provides an opportunity to learn from others with different perspectives and cultural backgrounds (Hendrickson et al., 2011; Kim, 2001).

The purpose of this article is to understand how international students from different cultural backgrounds build friendship and learning relationships with other students in- and outside a large classroom of 200+ students. Therefore, we used a mixed-method design using a (dynamic) Social Network Analysis (Curşeu, Janssen, & Raab, 2012; Hernandez Nanclares, Rienties, & Van den Bossche, 2012; Hommes et al., 2012; Katz, Lazer, Arrow, & Contractor, 2004) and focus groups to understand how 207 students from 35 different nationalities built and developed learning relations with other students over time.

Friendships, team learning and cultural differences

Current research indicates that institutes and the social networks of students have a large impact on how international students adjust in an international learning environment (Rienties, Beausaert, Grohnert, Niemantsverdriet, & Kommers, 2012; 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 (Furnham & Alibhai, 1985; Montgomery & McDowell, 2009), sharing accommodation with other students (Ward et al., 1998), or joining a sports club, can influence social integration and finally increase academic performance (Neri & Ville, 2008; Rienties et al., 2011; 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, host-national and multi-national friendships. Most studies on friendships of international students 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 host-national students in contrast was positively correlated with satisfaction and connectivity.

Multi-national friendships, a third type of friendship, are often built because international students share a similar experience and are open to learn from other cultures (Hendrickson et al., 2011; Montgomery & McDowell, 2009). Montgomery (2009) found that international students make deliberate choices in building strong multi-national networks that provide them with a supportive environment. Previous research has shown that establishing friendship relations with host-national students is difficult for international students, due to language issues (Montgomery & McDowell, 2009; Rienties et al., 2012; Zhou, Topping, & Jindal-Snape, 2011), perceived discrimination (Russell et al., 2010), and the fact that most host-national students already have well-established friendship networks (Hendrickson et al., 2011; Rienties et al., 2012; Rienties et al., 2011). Volet and Ang (1998), Montgomery and McDowell (2009) and Rienties et al. (2011) found that the social worlds of host and international students are strongly segregated, and that international students have a tendency to develop relations with co-national students (Neri & Ville, 2008). However Hendrickson et al. (2011) found that international students develop both co-national and host-national friendships.

While these findings are important and show the complexities of how international students develop different learning and friendship relations when "random" samples of international students are surveyed, to the best of our knowledge (except our own research) not a single study has measured the extent to which international and host students develop learning relations in the classroom. A methodological limitation of above quantitative (Hendrickson et al., 2011; Neri & Ville, 2008) and qualitative studies (Montgomery, 2009; Volet & Ang, 1998) is that only a subset of international students voluntarily participated in these studies, thereby potentially leading to a biased and an

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under- or overestimation of how international students build learning and friendship networks.

Previous research (Rienties, Hernandez Nanclares, Jindal-Snape, & Alcott, 2013) in two medium-sized classrooms of 59 undergraduate economics students and 69 post-graduate management students showed that implementing student-centred learning with authentic team work allowed students to develop multi-national and host-national learning relations over time. Despite friendship and learning relations at the start of the module being primarily related to co-nationality, after eleven weeks the primary predictor of learning relations was team division through tasks within and outside the two classrooms. However, in both classrooms students still had a moderately strong preference to work together with co-nationality students (Rienties et al., 2013).

Although the results of Rienties et al. (2013), to our knowledge, were the first to provide an in-depth measurement of how international and host students develop friendships and learning relations over time, the underlying mechanisms of why and how students build relationships with some (international) students were not analysed. Furthermore, while one may assume that building learning relations over time in small- to medium sized classrooms would happen quite naturally, in a large classroom of 200+ students it is questionable whether international students build similar relationships with host- and multi-national students over time.

Research questions

1: To what extent are the social friendship networks of international students different from those of host students at the start of the module?

2: To what extent are international students' social friendship networks at the start of the module built around the same cultural background?

3: To what extent is the development of social learning networks over time related to similarity of cultural backgrounds?

Methods

Participants and setting

This study took place in an elective post-graduate module of Organisational behaviour at a university in the south of the UK during the first semester. 148 (72%) students were from Confucian Asian and Southern Asian countries, primarily China, Thailand and India (see Table 1). The third largest group of international students came from Eastern Europe, while 16 (8%) students were from England. This sample composition is fairly representative for post-graduate business programmes in the UK (Higher Education Statistics Agency, 2012). 61% of participants were female, and the average age was 25.10 (SD = 5.06). This module included students from five different programmes: Entrepreneurship (11%), Intercultural Communication with International Business (8%), Food Management (11%), Healthcare Management (14%), and International Hotel Management (56%). Alongside this module, students also followed a second module in their own specialisation in the first semester.

➔ Insert Table 1 about here

41 small working teams were formed at random (i.e. irrespective of nationality, specialisation, gender, age, etc.) after Week 4, with an average group size of 4.90 (SD = 0.82). During this eleven week course, 207 students met formally once a week during a three-hour interactive lecture. In addition, students were expected to meet (online and/or face-to-face) with the peers of their team during the week, whereby they worked on a case study and a set of questions given to them at the end of each lecture. Each team had an online private community to share knowledge and expertise together in the Virtual Learning Environment (VLE), and invited to share their discussion in the subsequent class. These team products were not formally assessed but the teacher provided formative feedback online and in class.

Measuring friendship and learning networks

For ascertaining how international and host students from different cultural backgrounds learned together at the start of the module and over time, we employed a method developed within the field of Social Network Analyses (SNA) (Wassermann & Faust, 1994), which 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). Recent research highlights that social networks are the key determinant for learning (Hommes et al., 2012; Russo & Koesten, 2005).

In this study, 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 207 students answered the Social Network question stem "I am a friend of ..." after four weeks as . A list with names of all the students was provided as is commonly done in SNA (Curşeu et al., 2012; Hernandez Nanclares et al., 2012). Second, learning from team members and other members was also measured in Week 4.

Third, we again measured the social learning and friendship networks at the end of the module at week 11 (i.e. post-test). If students did not indicate their name (which is essential for SNA to identify the respective actor of the network), their respective answers were not used, which occurred for nine students during the pre- and post-test. For the two measurement periods, a response rate of 89% and 84% was established, which is well-above the recommendations of SNA by Wassermann and Faust (1994) of 80%.

Separate ANOVAs were conducted in order to determine whether respondents were different from non-respondents in terms of age, teams, nationality, GLOBE, and specialisation. With the exception of gender at the pre-test of SNA (F= 4.177, p < .05), whereby men were less likely to complete the pre-test (but not the post test), no significant differences were found in any of these demographics. Therefore, we argue that

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the respondents at the two time intervals provide an adequate representation of the actual sample in the classroom. Given that visualising the interaction patterns amongst 207 students from 35 different countries would be extremely difficult to interpret social network graphs, we clustered the nationalities according to the GLOBE study (see Table 1). The GLOBE project (House, Hanges, Javidan, Dorfman, & Gupta, 2004) identified nine cultural dimensions by investigating the relation between culture and leadership styles, and created ten clusters of world cultures transcending national boundaries.

Qualitative analysis of learning and friendship relations in and outside teams

One month after the module was completed, based upon the (lack of) interaction in the online team forums, we invited two teams for follow-up focus groups. The focus groups discussion was based on five open questions (without explicitly mentioning cultural differences) aimed to trigger students to reflect on their experience, namely: 1) the most powerful and challenging element of the module; 2) reasons to share knowledge with other learners; 3) the usability of the VLE to share knowledge; 4) team-building processes; 5) learning outside the team. Using triangulation-methods, a social learning and friendship network graphs from the post-measurement without any student information was presented, although we colour-coded each of the participants present at the focus group without their actual names. Of the eight students invited for the focus group, five students (three in limited active team; two in highly active team) participated in the 45 minute focus groups.

Data analysis

First, a graphical analysis using Netdraw 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 after four and eleven weeks. First, a team division matrix was constructed in order to control the influence of the team division on the social learning network, a procedure similar to creating a dummy-variable for each team in "classical" statistical analyses (Rienties et al., 2013). Second, a specialisation matrix was conducted to control for the fact that students followed a parallel specialisation module. Third, a separate co-nationality matrix was constructed in order to test the first two research questions. Fourth, given that there were 109 Chinese students, and Montgomery (2009) found that some students had a prejudice against working with Chinese students, we constructed a Chinese matrix. Finally, a separate GLOBE matrix was constructed in order to determine whether students from the same geocultural region learned together.

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 host students predicted social learning networks after 11 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 6.445. 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 host students (i.e. our primary research interest) remain intact.

The focus groups were audio-recorded, transcribed and coded by two independent researchers who did not know the students. Two of the authors (one who conducted the interview, one who had never met the students) analysed the transcribed data using emergent themes analysis to identify the key themes expressed by the participants. All

students participated voluntarily in the pre- and post-test of SNA and focus groups. Students who were not present during the lecture(s) were contacted via email. The participants were assured that the SNA and focus group results would be completely anonymous.

Results

Descriptive statistics

In order to illustrate the power of SNA in understanding how friendship networks of international and host students after four weeks and eleven weeks developed, Figure 1 and Figure 2 are presented using Netdraw. First of all, Figure 1 illustrates whom students considered as their friends after four weeks. The colour and shape of the node (see also Table 1) represents the respective GLOBE cluster of each node (i.e. student). For example, in the top-left of Figure 1, two female students from Eastern Europe (grey, box) were friends, while two English male students (blue, circle) were also just friends with each other.

A crucial point to remember is that SNA is not based upon the perception of one participant alone. That is, although the above two female students from Eastern Europe indicated to only have a friendship relation with each other, the other 205 students independently "confirmed" that they also did not have a friendship relation with these two students. In other words, SNA measures the (perceived) network interactions amongst all 207 participants simultaneously, which verifies and/or provides counter perceptions from all participants. Finally, note that Netdraw positions nodes at random across the X- and Y-axis based upon the (perceived) social interactions between students, whereby students who share similar connections are positioned more closely together. Being on the left of the graph is not necessarily better or worse than being on the right, top or bottom, but students with similar connections are positioned closer together.

➔ Insert Figure 1 about here

Second, some learners were on the outer fringe of the friendship network and were not well-connected to other learners, while eleven students had no friends after four weeks, and one student had no friends after eleven weeks. Confucian students (green, diamond) and South Asian students (black, triangle down) formed strongly connected friendship networks, primarily with students with same cultural background. Third, 13 Anglo-Saxon students and in particular English host students on the left of Figure 1 were primarily friends with other Anglo-Saxon students, as they were closely positioned together. Fourth, the other Globe clusters of international students were primarily positioned closely together, but on the outer fringe of the friendship network after four weeks.

→ Insert Figure 2 about here

Learning ties and prior friendship relations over time

On average, English host students had 1.50 (SD = 1.46) English friends, while they had 2.00 international friends (SD = 2.90) at the beginning of the module. In contrast, international students had 6.64 international friends (SD = 4.39), while they were friends with 0.16 English host students (SD = 0.50), which was significant at 1% using independent sample testing. In other words, in combination with the visualisation of Figure 1, the social friendship networks of international students were different from host students (Research Question 1).

In Table 2, the team division, specialisation, co-nationality matrix, Chinese, GLOBE network, and friendship and learning ties after four and eleven weeks are illustrated, and QAP correlations between the nine social networks. Students had on average 6.55 friends after four weeks and 8.71 friends at the end of the module. This is visually illustrated by the more friendship ties between students in Figure 2 than in Figure 1, and all except one student in Figure 2 have at least one friendship connection to other students. The average number of students with whom students were learning was 4.51 after 11 weeks, which is similar to the number of learning links developed in previous research (Rienties et al. 2013). When visually comparing the number of links of friendships (Fig. 2), with learning

links (Fig. 3) after 11 weeks, it is apparent that students learned with fewer people than they were friends with, whereby 19 students indicated not to have learned from peers in their classroom. The numbers added to Fig. 3 refer to the students' group numbers, whereby most students had learning links with members from different groups. For example, the Anglo-Saxon student from group 8 on the left of Fig. 3 has four learning links with other co-national students (from groups 13, 21, 27, and 31).

➔ Insert Table 2 about here

➔Insert Figure 3 about here

In Table 2, as one would expect when students were put in randomised teams in a large classroom at the beginning of a new post-graduate programme, using QAP correlations the team division was not significantly correlated to the initial friendship networks. Furthermore, the team division was correlated to both the friendship and learning network after 11 weeks, but with a small rho. This indicates that most students developed and maintained strong friendship and learning links outside their respective teams. Specialisation was significantly correlated to both friendship and learning networks, indicating that students developed friendship and learning relations with students following a similar specialisation. The co-nationality matrix, Chinese network and GLOBE network were all positively correlated to the four friendship and learning networks. This seems to indicate that students preferred to work with students from the same nationality, in particular from the same Chinese network. However, given that there was a strong cohort of Chinese students present, these three "culture" networks were strongly correlated to each other.

➔ Insert Table 3 about here

Finally, in order to identify the magnitude of the team, specialisation and cultural matrixes on friendship and learning networks after four and eleven weeks, we used

multiple regression quadratic assignment procedures, as illustrated in Table 3. In Model 1, using MRQAP in order to estimate which of the three matrices had the strongest influence on our dependent variable, friendship ties after four weeks were not significantly predicted by the initial team division, but were positively predicted by the same specialisation (β = .164; p < .01) and co-nationality (β = .032; p < .01), whereby β represent standardised betas. This indicates that the specialisation students were following was the best predictor for initial friendship formation, followed by same co-nationality. In Model 2, the Chinese and GLOBE network were added, whereby again specialisation but now Chinese network rather than co-nationality predicted initial friendship relations. Therefore, international students, in particular Chinese students, develop strong friendship relations with co-national students (Research Question 2).

The friendship network after eleven weeks was significantly positively predicted by specialisation, Chinese network, and team division, while it was negatively predicted by co-nationality matrix. In other words, while students from the same Chinese culture developed positive friendship links with other (Chinese) students, other international and host students developed friendship relations with a different nationality. Model 4 (see Table 3) highlights that best predictor for friendships after eleven weeks are friendships developed in the first four weeks, while learning networks developed in the first four weeks play a role as well. Similar to Model 2, learning networks after four weeks were predicted by specialisation and Chinese network. Finally, in Model 6 learning ties after 11 weeks were primarily predicted by initial learning and friendship networks, followed by specialisation, team division and the proxy for Chinese network (Research Question 3).

Quantitative results from focus groups

Cultural background and language proficiency

All 5 students present acknowledged that working and learning with other students is a powerful method to enhance their understanding of the module. Some students believed

that significant cultural differences and unspoken 'norms' exist that sometimes inhibit them from expressing their views freely.

> *To be honest, I think I kind of more comfortable speaking to someone from my own country. Not because of my own language but because sometimes we came from a different culture and some, you know value… so when I talk to someone from my country I can be sure they understand the value that I hold and I can understand, you know, how they behave in certain ways.* (S*, Thailand, Female, 28 years old, Entrepreneurship)

Two other students in this team agreed with this view. There was a consensus that students sometimes hesitate in discussing their ideas with students from other cultures as they are concerned that they might unknowingly offend them. She elaborated further in the context of the SNA graph.

> *I would expect the people around here [pointing to the node in the social friendship network graph] to be someone from my community, because I remember filling in the questionnaire and I had to tick out the people that I know, I would say 80% of them are Thai, for me….*(S*)

However, in the second focus group (who used the online private forum very intensively), two students emphasised that cultural differences were not a barrier and were seen to be an advantage due to differing perspectives.

> *… we had very different perspective on things which we found useful.*(N*, India, Female, 24 years old, Hospitality)

> *… we would be set little tasks to do within the [online] community and so I put my perspective through then N* would respond and sometimes we talk about what each other had said and say well I find that interesting, or I might not agree as much, or whatever and then put the other person's view on.* (G*, Australia, Female, 40 years old, Health Care Management)

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N* also emphasised that she would put more value on the views of G* due to their frequent online interaction and perceiving her to be knowledgeable, compared to another co-national student in their team. Some students like N* consciously looked for students with similar attitudes beyond their own team and their own co-nationality, as was previously found by Montgomery & McDowell (2009).

Factors supporting networking

The quantitative data suggests that specialisation was the best predictor for initial friendship formation, followed by co-nationality. This is not surprising as the qualitative data suggests that students from the same specialisation also tended to be roommates and were usually from the same cultural background.

> *[work with]…my room-mates, because I know they are my community members…they are from the same cultural background; we are in the same major [specialisation]* (Y*, Chinese, Female, 24 year old, Hospitality)

Other students commented on how coming from a specialisation might help some but hinder the involvement with those from other areas.

> *[In] the [online] community forum…4 of us was from Healthcare and the other poor person we never saw [online]. She wasn't from our stream, so at least 4 of us saw each other.* (G*)

Students found other ways of looking for common ground that was not necessarily linked to specialisation and nationality. This involved discussions about their countries, weather and sports.

Reasons for lack of networking with team members

Several reasons were put forward to explain why students were not learning with their team mates, whereby the large size of the classroom, the way the teams were formed, and the lack of clear assessment criteria related to team work were raised as issues.

[B]ecause I have a huge group and sitting in the [large lecture] classroom. And sometimes maybe we sit back but we can't hear it very clearly and the other things. (L*, China, Female, 22 years old, International Hospitality Management)

The other lady [Chinese woman aged 22] had very poor English, so obviously I think for her it would have been a really struggle and maybe she didn't want to be embarrassed…. (G*)

Suggestions for enhancing networking

They suggested that higher educational institutes, and teachers in particular, can actively create a more interactive international classroom environment by providing more social activities, and ensuring constructive alignment between intended learning outcomes, team work and the assessment of the team products.

I hope the [Business] school can hold activities for us, so we can know more students. Initially, I just know a few of my class mates, very few so, you know when I graduated in my class I had 120 class mates, but just know maybe 20 of them so I think it is a loss. (Y*)

Maybe it can be in some kind of assignment, because if you have assignment then obviously you have to get together and work together, you cannot be just a free-rider. (S*)

Discussion and Conclusion

This study provides a unique insight into how 207 students developed and maintained learning relations with co-national, multi-national and host-national students over time in a large classroom setting. In contrast to research in medium-sized classrooms (Rienties et al., 2013) and expectations raised by Hendrickson et al. (2011), active learning methods such as team work were not very effective in crossing cultural boundaries in this context. It seems that the motivators for learning or working together over time in teams did not

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have a substantial impact on how students interact with students from other cultures, although some students like N* and G* did learn from their interactions in their team.

We believe that by using SNA in a dynamic manner, an innovative and useful approach was used to understand how international and host-students develop and maintain learning- and friendship relations over time. Although some English students developed substantial friendships with international students, most English students formed a relatively separate subgroup of social learners. There was a large group of 109 (53%) Chinese students, who seemed to form close networks with co-national students, supporting Volet and Ang's (1998) co-nationality assertion. However, when the international students came from smaller nationality groups, they were seen to integrate well with host students or international students from other countries, as the need to develop links outside one's culture probably was stronger for these students (Rienties et al., 2013). Previous research shows difference in acculturation for those who go in groups and those who go to a new country on their own (Volet & Jones, 2012; Zhou et al., 2008). A large number of students from same country/culture have less visible problems with transitions, as they can support each other within cultural groupings, but have relatively poor acculturation (Hofstede, 1986; Kim, 2001). Similar to Schumann's (1986) and Rienties et al. (2012) assertion that relationships between host and international students are on a continuum of social and psychological distance; the greater the distance the lower the chances of integrating into the new culture, Figure 3 shows that international students from Europe were more able to work and network with host students than Confucian students.

The visualisation of three social networks are complex, as existing relationships may have influenced the learning networks, and it is unclear whether existing relationships were initially formed based on factors related to the same culture or academic motivation. The focus group results seem to highlight that international students apply different strategies for building and maintaining friendships and learning networks.

Some students like N* and J* are actively looking for knowledge sharing and learning opportunities with students with similar attitudes, irrespective of any cultural differences. Other students like S* and Y* seem to have a strong preference to work with co-national students as they found it easier to communicate and share knowledge with them.

Last but not least, in contrast to our previous research in medium-sized classrooms, one of the explanations (in addition to the complexities to arrange sub-group meetings in a large lecture room) why team divisions in this setting were not the primary predictor for learning at the end of the module may have been the lack of constructive alignment (Biggs & Tang, 2007; Struyven et al., 2011). The aims of team work (i.e. sharing knowledge and expertise) and how the assessment criteria of team work were designed (i.e. no summative marking of group work) perhaps limited the incentive for some students to cross the cultural barrier within their team. At the same time, working in teams is known to be complex (Borgatti & Cross, 2003; Decuyper et al., 2010; Katz et al., 2004), whether teams are actually judged and rewarded by summative assessment or not, irrespective of the possible stress and anxiety that might result from working with team-members from different cultures (Volet & Ang, 1998).

Constraints and Limitations

A limitation of this research is that both social network analysis of learning networks and friendship networks were self-reporting instruments, whereby perceived socially desirable behaviour might influence the results. Furthermore, prior experience with English education and language mastery was not measured. 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 our high response rates. Multiple regression quadratic assignment procedures is a conservative technique given that 2000 random permutations of alternative models were conducted with a 99% confidence interval, whereby we found strong and robust findings that specialisation,

initial friendships, Chinese networks and co-national relations are predicting learning (with adjusted R2 explaining 13–32 % of variance after 11 weeks). Finally, the triangulation of the SNA data with the focus group discussions provided insights how international students have different strategies and attitudes to developing learning and friendship relations with co-national, multi-national and host national students.

The dynamic use of SNA by measuring social learning and friendship interactions over time allows researchers 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.

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Table 1 Descriptive statistics of cultural backgrounds and labelling in SNA

Cluster	#students	Countries (samples, and ordered by relevancy)	Shape/colour in Social Network figures
Anglo	19	UK (16), Australia, Ireland, , USA	Blue circle
Latin Europe	5	Italy (2), Belgium, France, Spain,	Light green square
Germanic Europe	2	Germany (2)	Yellow, triangle up
Eastern Europe	16	Greece (5), Cyprus (5), Romania (2), Bulgaria, Czech Republic, Russia, Slovakia,	Grey box
Latin America	2	Bahamas (1), Columbia (1)	Light blue, triangle down
Sub-Saharan Africa	5	Nigeria (2), Zimbabwe (2) Ghana,	Black box with pink circle
Middle East	7	Arabic (5), Jordan, Turkey	Red diamond
Southern Asia	28	Thailand (11), India (10), Malaysia (3), Iran (2), Indonesia, Pakistan	Black triangle down
Confucian Asia	123	China (110), Taiwan (6), South-Korea (3), Japan (2), Brunei, Vietnam.	Green diamond

Table 2 Descriptive statistics of team division, specialisation, nationality, friendship, and learning networks and correlations.

	M	SD	1	2	3	4	5	6	7	8
1. Team Division	4.04	0.74								
2. Specialisation	66.59	46.90	-.01							
3. Co-nationality matrix	59.54	51.37	.00	.46**						
4. Chinese network	102.79	5.50	.00	.25**	.65**					
5. GLOBE network	77.04	51.40	.00	.41**	.82**	.52**				
6. Friendship after 4 weeks	6.55	4.48	.00	.18**	.11**	.11**	.10**			
7. Friendship after 11 weeks	8.71	5.59	.03**	.21**	.11**	.12**	.10**	.55**		
8. Learning after 4 weeks	2.89	2.54	.00	.12**	.06**	.07**	.06**	.53**	.34**	
9. Learning after 11 weeks	4.51	3.70	.03**	.12**	.07**	.06**	.06**	.32**	.43**	.30**

**p <.001.

Table 3. Regression analyses of social friendship and social learning networks and cultural differences (standardised beta coefficients)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Friendship after 4 weeks	Friendship after 4 weeks	Friendship after 11 weeks	Friendship after 11 weeks	Learning after 4 weeks	Learning after 11 weeks
1. Team Division	.004	.004	.034**	.031**	-.001	.028**
2. Specialisation	.164**	.168**	.210**	.120**	.122**	.055**
3. Co-nationality matrix	..032*	-.040	-.071**	-.049*	-.041	-.005
4. Chinese network		.079**	.108**	.065**	.059**	.021**
5. GLOBE network		.024	.017	.004	.014	-.007
6. Friendships after 4 weeks				.486**		.212**
7. Learning after 4 weeks				.067**		.181**
						.028**
	.03	.04	0.05	0.32	0.02	.055**
R-Squared adjusted						

* p < 0.01, ** p < 0.001

Figure 1 Social Friendship network after four weeks

Figure 2 Social friendship network after eleven weeks

Figure 3 Social learning network after 11 weeks (including team numbers)