Digital Resources in "Boundary Crossing": A Study of Intercultural Learning in Higher Education

Mengjie Jiang, Palitha Edirisingha,
University of Leicester, United Kingdom

Abstract

This study analyses international students "boundary-crossing" activities and appropriation of digital tools and resources during intercultural learning experience. Students who participated in the research are considered sojourners – temporarily living in the UK academic and cultural environment. The paper employs two theoretical approaches – the appropriation of cultural resources drawing on Pachler et al. (2010), and the model of boundary crossing (Akkerman & Bakker, 2011), which provides an alternative route to understand appropriation of digital tools to fulfil a bridge function.

Such theoretical approaches allow an interpretation that boundaries carry learning potential through the spectrum of transformative learning where students are seen as active agents shaping their learning trajectories. This paper contributes to the debates around the deficit view of internationalisation, portraying international students as "victims" or "problems" which creates a dichotomy between the learning strategies of Asian and Western students. This study highlights that international students' intercultural leaning experience involves ongoing engagement with social networks and artefacts. There is also an aspect of the expansion of the international students' capacity at a personal level and their strategic agency to appropriate digital tools to cross different sociocultural contexts such as bridging political, cultural and language differences.

Abstract in Chinese

本文探索跨文化学习中对数字工具和资源的跨界活动和分配挪用。参加研究的学生暂时居住在英国的学术和文化环境中，可以被视为旅居者。本文借鉴了两个理论方法：一是借鉴了Pachler, Bachmair, 和Cook提出文化资源分配和挪用, 以及Akkerman和Bakker提供的跨界模

型。这两个理论为理解分配挪用数字工具来实现桥梁功能提供了一个新的途径。

采用这样的理论方法， 学生被视为塑造他们学习轨迹的积极推动者，而边界可以通过变革性学习来提供学习潜力。此理论对围绕国际化的赤字观点的辩论 (将国际学生描绘为' '受害者' 或 '问题', 从而将亚洲和西方学生的学习策略二分法作出了贡献。该研究强调，国际学生的跨文化学习经历涉及与社交网络和人工制品的持续互动，个人的能力和动力感得到扩展，进而适当挪用数字工具来跨越不同的社会文化环境（例如弥合政治，文化和语言差异）。

Key words: intercultural learning; boundary crossing; appropriation; digital tools; international students

Appropriation of digital tools and resources for "boundary crossing"

Diversity and mobility in education presents both enormous opportunities and challenges: international students are regarded as vital to the UK higher education sector due to their cultural and economic contribution, with China being the largest source of international postgraduate (PG) students (British Council, 2014). Yet, international students embarking on university study bring with them their own diverse characteristics and experiences, which has led to growing attention for the process of international students' intercultural learning (Gill, 2007). Intercultural learning is "acquiring increased awareness of subjective cultural context (world view), including one's own, and developing greater ability to interact sensitively and competently across cultural contexts as both an immediate and long-term effect of exchange" (Bennett, 2009 p.2). The focus of this paper in intercultural learning is placed on one form of transnational higher education, programmes where students are studying abroad. Empirical studies (e.g., Liu & Winn, 2009; Hughes, 2013) show that tensions which occur when encountering a distinct cultural experience are more overwhelming at the initial stage of students' adaptation, particularly for Masters level postgraduate students since most of these full-time postgraduate programmes in the UK are expected to be completed within a year. Nevertheless, such intercultural experiences can lead to a transformative learning process in which international students negotiate learning as a dynamic interplay between challenges and professional development (Gill, 2007; Gu, Schweisfurth, & Day, 2010; Tran, 2013).

This cross-cultural learning experience essentially involves "boundary crossing": meaning "a person's transitions and interactions across different sites" (Suchman, 1994). Boundary crossing is often used to depict efforts made by people both as the personal and as the collective to integrate different knowledge learned for different contexts (Suchman, 1994). A boundary means "sociocultural difference leading to discontinuity in action or interaction" (Akkerman & Bakker, 2011; p.133). Boundaries can be viewed as discontinuities in various forms of practices, such as discontinuities in a community of practice and social activities (Walker & Creanor, 2005). Boundaries can also occur during the process of intercultural learning, for instance, Singh (2005) found that while Chinese international students continue to experience a sense of "strangeness" of the host culture, politics and pedagogies in Australian universities, they become autonomous agents of their life-changing experience and take responsibilities to participate in the intercultural community of learning.

These diversities are particularly important in the contemporary context as learning is increasingly mediated by online technologies (Hughes, 2013). China's social networking sites presents a different picture compared to the Western counterpart, with close imitators of those in the West's contributing to a participation gap (Guo, Shim, & Otondo, 2010). Differentiation in technology conditions, proliferation of online instruction in Western countries may place Chinese international students in a relatively alien learning context (Chen, Bennett, & Maton, 2008). Researchers (e.g., Mehra & Bilal, 2007) stated that international students confront challenges in applying learning approaches that address the importance of utilising online resources.

Pachler and his colleagues (2010) proposed a social ecological approach called *mobile complex* in which educational uses of technologies are viewed as part of sociocultural practices. The conceptual components of mobile complex is composed of three interrelated aspects, which are: *structure*; *agency* and *cultural practices*. Structure denotes the "sociocultural and technological structure" in which the appropriation of digital tools take place (Pachler, Bachmair & Cook, 2010; p.14). According to Pachler et al. (2010), the fundamental construct of the mobile complex is the idea of appropriation, which in their view, is "the processes attendant to the development of personal practices with mobile devices" and these processes are considered largely to be "interaction, assimilation and accommodation as well as change" (Cook, Pachler Bachmair & 2011). Agency involves students' personal choices and capacity to take action on the world through the use of digital tools and Cultural Practices views learning as culturally situated meaning-making of every life, including inside and outside of educational institutional settings.

The viewpoint that learning involves a meaning-making process mediated through interaction with other learners and with artefacts is echoed by sociocultural theorists (e.g., Engeström, Engeström, & Kärkkäinen, 1995). A shared insight of sociocultural approach is that students' learning takes place in historically situated practices mediated by their culture in which certain activities are regarded as valuable for their education. Participation involve various actors representing different cultures and students' engagement is mediated through artefacts such as technology or explicit instructions depending on the priorities of their cultures. Through participating in social practice in an activity with other members of their communities, students negotiate the meanings of their culture and ultimately achieve the internalisation as an ongoing process of appropriation in the authentic activities of a community by accepting, rejecting and transforming meaning as they experience it (Engeström et al., 1995; Vygotsky, 1978; Lave & Wenger, 1991).

The boundary crossing process during intercultural learning can be facilitated by *boundary objects*, namely objects that build bridges of different worlds to achieve hybrid situations (Star & Griesemer, 1989; p.393). An example of a boundary object within the context of vocational education can be portfolios used by mentors and supervisor to keep a track of their students' development (Meeus, van Petegem, & van Looy, 2006). This paper prefers the term *boundary crossing tool* over boundary objects, as it stresses the agency of learners, and we view them as a form of *cultural resource* that "integrates media, mobile devices, internet tools and services under the functional description of resources". The concept of boundary crossing emphasises the focus on ongoing, dimensional actions and interactions between contexts rather than a one-sided transition (Akkerman & Bakker, 2011).

The notion of boundary crossing is associated with how Bhabha (1990) used the notion of *third space* in intercultural learning. Bhabha (1990) called attention to the way that the encountering of two different cultures may open up a third space where meaning is negotiated. Burnapp and Feng (2007, cited in Burnapp, Feng, & Zhao, 2012) extended the concept of third space to investigate the possibility of a virtual third space. Later, Burnapp et al. (2012) studied how Chinese international online distance students use the Internet and social networking sites and concluded that the creation of mixed online communities of Chinese and British students facilitate intercultural learning in such a way that leads to a hybridity of previous and new expectations. This paper provides a sociocultural perspective to learning using digital tools within a transitional experience. It respects a learner-centred collaborative

leaning approach, wherein it is essential to explore the influence of cultural practices, social relations and community of learners (Prieto et al., 2016).

Research Methods

The research was carried out at the University of Leicester where over 25% full time students are international students (see www.thecompleteuniversityguide.co.uk/leicester/international). The university library holds over one million volumes and most of these are available online. The University has around 14,000 computers at the campus. Moreover, students have access to group study rooms and wireless connectivity.

The study employed a mixed methods design that combined quantitative and qualitative research methods (Creswell & Plano Clark, 2011). A questionnaire was selected for quantitative data collection. Qualitative data collection took place over a 15-month period from mid-2014, and research participants were Chinese international students on a master's programme at the University of Leicester. Data collection instruments included mind maps, semi-structured interviews and photographic journaling. In total, 409 valid survey responses were collected, 30 students took part in the interviews. Among these 30 students, 14 students did mind maps, 4 students sent photography and 4 students took part in observations. The information about online survey Participants can be seen from the below:

As it can be seen from Figure 1, 65% of the participants are female and 35% are male. The majority of the students (71.3%) are in the age group 20-24. Of the total participants (n = 403), 16.7% of the students had working experience, and 82% of the participants did not have working experience. The profile of the survey participants can be seen from the Appendix 1.
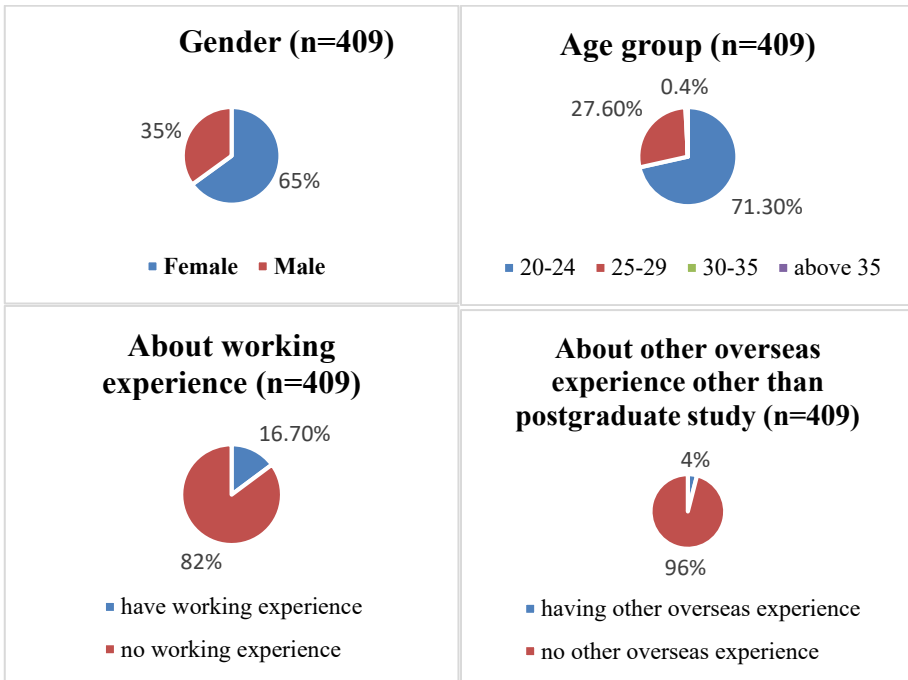
Gender (n=409)

35%   65%

▪ **Female** ▪ **Male**

Age group (n=409)

0.4%

27.60%   71.30%

▪ 20-24 ▪ 25-29 ▪ 30-35 ▪ above 35

About working experience (n=409)

16.70%

82%

▪ have working experience
▪ no working experience

About other overseas experience other than postgraduate study (n=409)

4%

96%

▪ having other overseas experience
▪ no other overseas experience

Figure 1. The profile of the survey participants

Survey

The questionnaire "A Study into Development of Digital Skills among Chinese Postgraduate Students in Leicester University" was designed based on the research inquiry. The design of some questionnaire items was adapted from the "Pelicans research project" based at the University of Leicester

(https://www2.le.ac.uk/departments/beyond-distance-research-alliance/projects/pelicans/pelicans-survey). Questionnaire item 1 asked about participants' ownership of a set of digital tools and how they access the Internet comparatively for undergraduate study and postgraduate study; Questionnaire item 2-4 aimed at collecting data on participants' patterns of technology use for different learning activities, and the translation of digital practices from undergraduate study to postgraduate study. Questionnaire items 5 and 6 touched on the degree of engagement with digital technology for learning-related activities. Questionnaire items 7 and 8 applied Likert scale to explore participants' attitudes towards the usefulness of digital technologies for learning and the barriers of using digital technologies. Questionnaire item 9 was an open-ended question which generates text-based data of participants' recommendations on how to cope with barriers of using technologies for learning.

Mind maps

Mind maps were used as a tool for preparation for interviews. Participants were invited to create mind maps to map out their use of various digital devices and technologies for educational purposes. Participants were encouraged to provide details, such as rating the relevance of different technologies, and to write descriptions of how they use certain technologies for learning. Wheeldon (2011) explained that qualitative research serves as an important means to explore meaning through looking into the ways in which individuals construct and frame their accounts of knowledge, experience and perception. For the depth of the qualitative data, mind maps facilitated a more comprehensive reflection of experiences by enabling participants to develop rehearsed narratives (Hathaway & Atkinson, 2003).

Semi-structured interviews

Semi-structured interviews were used as a primary method to elicit participants' viewpoints of the topic without pigeonholing the responses of those interviewed, and in turn semi-structured interviews allowed the researcher to identify unexpected things revealed by interviewees and so facilitate further probing. Thirty participants took part in interviews and the interview schedule began with demographic questions that asked their education background, subjects studied at undergraduate and postgraduate levels, the demographic area in China and IELTS examination results. The sequence of interview questions ranged from general to the more specific. Participants were asked about their general studying experience such as the formats of the assignments and assessments, they were then asked to share their experience of using mobile technology.

Photographic journaling

The use of photographic journaling was inspired by several works on social science research methodologies and empirical study, including the Experience Sampling Method (Hektner, Schmidt, & Csikszentmihalyi, 2007), the Day Reconstruction Method (Kahneman et al., 2004), and the Day Experience Method (Riddle & Arnold, 2007). The Experience Sampling Method (ESM) is a way of collecting data about the context and content of participants' daily lives relevant to the focus of the study. ESM has the potential to generate a rich and in-depth perspective on moments in a participant's life (Hektner et al., 2007). The implementation of this method was inspired by Riddle and Arnold (2007). WeChat (instant messaging app similar to WhatsApp) groups were established with the research participants. With prior agreement with the participants, they were prompted at several random points by

instant messages. If participants were doing study related activities, they were asked to use digital devices (e.g. mobile phones or tablets) to record their learning scenarios and the use of materials and devices they have at hand, such as taking photos or taking videos. They were invited to answer some questions at the time of the message if they were doing any study-related activities. The questions included information about the time of day when they were studying, with whom they are studying, study location, general feelings and issues about study. Out of 30 interviewees, 4 students took part for the photographic journaling activity that lasted a month, and participants were invited to return the photographic journaling each week.

Analysis and results

Descriptive statistics were used for quantitative data, which involves neither inference nor predictions (Cohen, Manion, & Morrison, 2007). This is because the purpose of the survey was to investigate the overall patterns of digital practices. Qualitative data analysis has gone through a continuous and iterative process, which was suggested as three interactive concurrent flows of activities: "data condensation", "data display" and "conclusion drawing/verification" (Miles, Huberman, & Saldana, 2013).

Survey results depict the general picture of the ownership of digital tools and major transitions, among participants in terms of using digital tools for information searching, management and learning related activities and the qualitative data help to answer how and why students begin to adopt certain digital tools.

Table 1:   Ownership of devices for undergraduate study and postgraduate study (n = 409, questionnaire item 1).

Digital device	Number and percentage of respondents who owned it for undergraduate study	Number and percentage of respondents who owned it for postgraduate study
Desktop	221 (54%)	137 (33.5%)
Laptop	339 (82%)	350 (85.6%)
Digital camera	251 (61.4%)	131 (32%)
Phone with Internet	362 (88.5%)	358 (87.5%)
MP3 player/iPod	220 (53.8%)	135 (33.0%)
iPad/Tablet	313 (76.5%)	323 (79.0%)
Amazon Kindle/other e-reader	79 (19.3%)	166 (40.6%)
Gaming device	75 (18.3%)	73 (17.8%)

According to the Table 1, the percentage of participants who own a laptop, phone with Internet, iPad/Tablet, and gaming devices almost levelled off for undergraduate and postgraduate study. Three devices (i.e., laptop; phone with Internet; iPad/Tablet) have

been the most popular tools among sample students since their undergraduate study. The ownership of an Amazon Kindle or other e-reader has increased from 19.3% to 40.6%, which indicates many of the participants began to use these during their postgraduate studies. The percentage of participants who owned a desktop or digital camera decreased from 54.0% to 33.5% and from 61.4% to 32.0% respectively. Access to those devices to connect the Internet. For example, using a desktop provided by the library to access the Internet has been reported by interview respondents. Survey also reveals the challenges of using digital tools among Chinese international students during postgraduate study, and the result is represented in Table 2.

Table 2: Mean and standard deviations of responses to statements about participants' personal barriers of using digital tools for learning (n = 409, questionnaire item 8.2, Cronbach alpha = 0.810)

Statement	Mean	Standard deviation
I lack previous experience of using Western digital tools and sites due to some were not accessible before.	3.20	0.949
I feel I lack the motivation to adopt new digital tools or social networking sites	3.18	1.009
Social networking sites is not very useful for my coursework learning.	3.14	1.168
I feel it is difficult to understand online English terms due to language inadequacy.	3.31	1.006
I find it is difficult to find, identify and view relevant documents.	3.18	0.992
I lack good grasp of technologies.	3.17	0.994
I feel it is difficult to synthesis online information.	3.25	1.057
I feel it is difficult to evaluate and analyse online information.	3.36	0.980

Questionnaire item used Likert scale questions and statements were measured in questionnaire item 8.1 on a scale of 1-5 (1 = *strongly disagree*; 2 = *disagree*; 3 = *not sure*; 4 = *agree*; 5 = *strongly agree*). In analysing the mean values of the items, means of less than 3 were regarded as negative and means with a value of more than 3 were regarded as positive to the statement. There seems to be more students who report that it is difficult for them to evaluate and analyse online information (mean = 3.36). There was also general agreement on the difficulty in relation to the item lack of previous experience (mean = 3.20). Sharpe and Beetham (2010) argued that *functional access* (ownership of digital devices, access to resource and time) is the fundamental step for students to use technology effectively. Research data shed some light that there is not a big difference in terms of their ownership of digital devices from undergraduate study to postgraduate study. However, the study confirms that access to network and information is an important mediating factor that influenced participants' digital practices. The quantitative data provides a snapshot of students'

uses and adopt of digital tools and resources during the transition, and the qualitative data provides more insights into how international students appropriate digital tools to cross boundaries.

Qualitative data was analysed in terms of Akkerman and Bakker's (2011) framework that identifies four learning mechanisms regarding the process of boundary crossing. These are:

- Identification – (re)defining intersecting cultures in light of each other.
- Coordination – mediating artefacts and procedures enable common practices in distributed work.
- Reflection – observing and explicating differences and similarities between practices and thus to value each other.
- Transformation – changes in practices and even hybridity of practices.

We studied how Chinese students cross boundaries through appropriating cultural resources in their intercultural learning experience, and report themes in relation to the above four learning mechanisms.

Identification

The mechanism of identification takes place by interpreting one practice in the light of another, focusing on differences and similarities. In turn it leads to the underlying need for a renewed understanding of different practices and the reconstruction of identities to overcome discontinuities (Akkerman & Bakker, 2011). As observed in interview data, the participants were consistently comparing their experience during their undergraduate study in relation to uses of digital technology and social media. For example, a Virtual Learning Environment (VLE) such as Blackboard is a key learning technology in UK universities. However, only 5 out of 30 students reported that they had used VLE for their undergraduate study in China. Some of these students mentioned using different VLEs for undergraduate study in China, such as Moodle (P5, male, age 23, Management) and Zhengfang Learning Management System (LMS) (P8, female, age 23, Translation), while the use of VLEs during their undergraduate study was mainly restricted to selecting courses, submitting assignments and checking the outcome of their exams (P5, P8). Others also mentioned differences, such as:

"Basically, the website in the university [where undergraduate studies were carried out] was used mainly to promote the university and to announce events. We also had university account that allows users to download articles from CNKI [a nation-wide central database in China] for free. However, unlike the website for postgraduate study [at Leicester], it does not have a system that works like Blackboard as a central platform for learning resources. There were not many things to be downloaded and to view. [Undergraduate] tutors did not share slides and materials. Maybe some did share, but only those famous teachers and in well-known disciplines" (P22, female, age 23, Media).

"I feel now I can make use of online resources because we have Blackboard. I mainly used printed books and CNKI for undergraduate study. But now the Leicester university database provides easy access to journal articles" (P1, male, age 23, Translation).

Understanding the social media and technology space in China is important for educators who try to engage with Chinese international students. In China, social media sites like Facebook, YouTube and Twitter are inaccessible without a VPN (Virtual Private Network). These conditions underscore how different China's Internet is compared to that in the West. In China, the National Knowledge Infrastructure (CNKI) serves as the most-used academic online library, and it contains comprehensive databases and resources such as journals, doctoral theses, masters' dissertations, e-books, newspapers and so on (Wan, Hua, Rousseau & Sun, 2010). Most of the interviewees (n = 25) reported using CNKI to search for resources when they had written assignments (e.g. essays), mainly driven by their undergraduate institutions. As can be seen from the transcripts, students are comparing their previous practice with new practices. A lot of students mentioned about their uptake of Google Scholar, University library's A-Z database, Wikipedia and YouTube for learning purposes during postgraduate study. Some students were introduced to discipline-based databases by their tutors, such as using Lexis to search for news (e.g. P10, female, age 23, Public Relations). Most of participants (n = 19) noted that to email their tutors and course representatives about studying issues or to arrange meetings is a more common practice in the UK (e.g. P28, female, age 22, TESOL).

Coordination

The second learning mechanism is referred to as coordination, focusing on identifying effective methods to enable connections and cooperation in communication to maintain the flow of the work (Akkerman & Bakker, 2011). The analysis of the interview data showed that all interviewed students used mobile technology on a daily basis and most of them can compare different practices and use different social media services to cross sociocultural boundaries (i.e. the participation gap caused by different experiences and formal-informal gap). In China, WeChat as a mobile communication service gained prominence and has become the most widely used social networking service (Lien & Cao, 2014). WeChat has WhatsApp-like messaging tools, a Facebook-like news feed known as moments, and a PayPal-like wallet, together with other built in applications which seemingly does most things for users, such as, booking taxis, shopping online (CIC, 2015). Although our research participants had varying degrees of experiencing technology, some had more experience with Facebook and YouTube because of their previous overseas experience developed during student exchange programmes (P6, P11), undergraduate (P15) and postgraduate (P8) studying experiences. Nearly all participants reported clues that shed light on their process of sense-making of the new experience, as in this case:

> "I have a Facebook group. Because I did a course 'academic media' at Leicester's English Language Teaching Unit [where students learn English and academic writing skills]. There were 14 people in the group. The tutor named it as 'new media', and we used it for discussion. Students post questions and comments. Now, I do not use it very often. There are many Chinese students now in the university. So, I still use WeChat for communication as a dominant tool. And even some foreign students have been influenced by us to start using WeChat" (P14, female, age 24, Media).

> "Facebook has some educational uses. For example, because it is an international environment, like we have Japanese, Hungarian students and students from other countries in the group. And they might not use WeChat, so we use Facebook and Messenger to discuss about the group assignment and arrange time for group meetings" (P10, female, age 23, Public Relation).

P14 described her adoption of Facebook as a result of an instance where Facebook was explicitly designed into a learning activity as a tool by her tutor to integrate the physical and virtual learning opportunities to cross the formal-informal boundary. Although Facebook was not designed to be used in formal classroom learning, it was used outside classroom to connect students who were working towards the same goal and to extend their learning and support. Although P14 mentioned that she still used WeChat as a dominant communication tool, and that the Facebook group was only active within the course time, later she described how she continues to add more contacts on Facebook and WhatsApp. These were used for groupwork, discussion and distribution of tasks and consequently helping her in her development of intercultural understanding and language skills. In another case, P10 pointed out the educational value of Facebook to bring students from diverse cultural backgrounds together for learning and to break the geographic boundary.

The photographic journaling activity also revealed similar themes. For example, P12 returned some photos of using WhatsApp for group work and was invited to talk about how he discusses questions with his classmates. As he lived in another city and was not able to travel to the University everyday, he often uses a photo-sharing tool to ask questions from one of his classmates. They also distribute work and make phone calls to explain questions when necessary. Examples are shown in Figure 2.

From P12's description, he did one group work with this peer and they added each other on WhatsApp to discuss group work. P12 said that although he was not in the same group for the following assignment with this classmate, they were still discussing course-related activities on WhatsApp. The analyse of data reveals mobile tools and social media such as Facebook and WhatsApp are appropriated by students to cross boundaries in different ways, such as: (a) technological boundary: students from different contexts use different technology under the wider dynamic environment, and some Chinese students perceive this differently and start to use Facebook or WhatsApp to connect their peers when necessary, (b) temporal and geographical boundary: because the formal classroom is time constrained, and, social media can assist in bridging communication connection and increasing immediacy to smooth coordination. It can be seen that mobile devices, especially with convergence of social media, allow for "seamless" and "just-in-time" learning opportunities to support information sharing and collective contribution (Sharples, Taylor, & Vavoula, 2007).
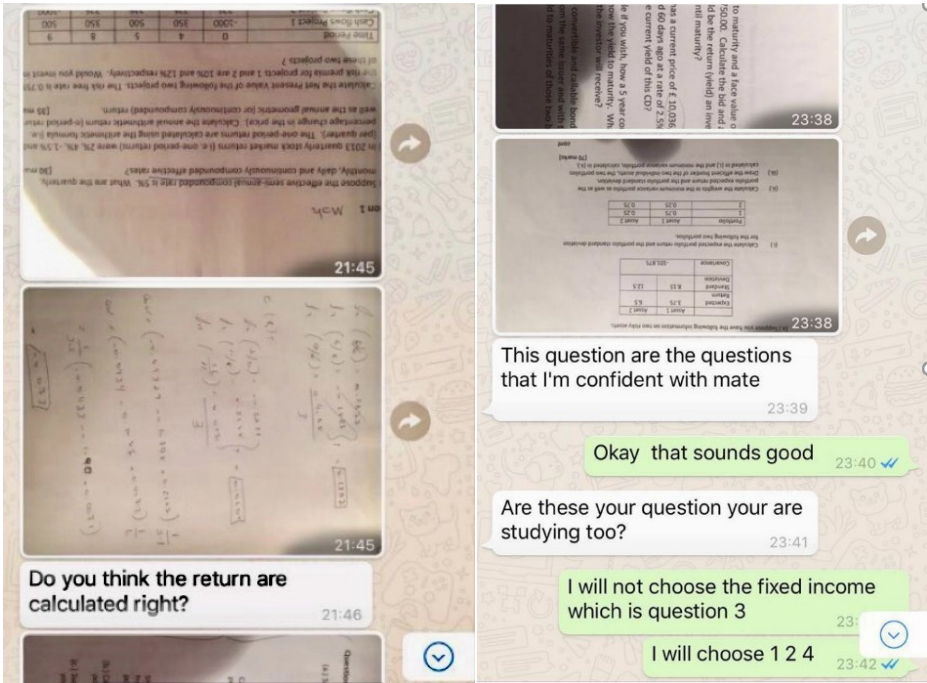
Figure 2. Example of using social network (e.g. WhatsApp) for discussion
(P12, male, age 23, Financial Mathematics and Computation)

Reflection

This mechanism involves reflection as a means to define differences between practices and will in turn learn own and other's practice (Akkerman & Bakker, 2011). The reflective impact involves dialogical inquiry, to scrutinise oneself from the others' eyes and eventually engage multiple perspectives (Boland & Tenkasi, 1995, cited in Akkerman & Bakker, 2011). Students' response entails how a self-reflective process facilitates them to rethink their biases, transcend limitations of knowledge and engage in cross-cultural dialogue, as in the case:

> *"At the beginning of the course of 'the politics of digital media', some lectures covered sensitive topics, which often offended Chinese students as they were feeling great about China. For instance, when the tutor was talking about the Fa Lung Gong [often understood as a spiritual practice in the Western context], he thinks the Chinese government is controlling the freedom of a normal organization. But some Chinese students argued that Fa Lung organization is an evil threat. I think it is because we have different mind-set. For them,*

they may think people have the free rights to do things to court others' attention. But for us Chinese people, we think social order should not be disturbed. But because I took that course, I read many Western comments about the Chinese politics which make me feel it is difficult to say which one is real and I started to be critical about the Chinese media as they always report something in a different way compared to the Western media." (P14, female, age 23, New Media).

P14's account reveals that conflicts and misunderstanding might occur when international students first enter the host country because teachers and international students were affected by a different political discourse. Some were able to reflect on their experience and developed understanding that media representation is not neutral, and she learned to critically compare different media representations. Later, she also described how her observation of Sina Weibo (a social media web tool in China) being used to accomplish an essay about writing sensitive words online developed her awareness of self-censorship behaviour among Chinese social media users.

Transformation

Transformation is discerned as the changes of practices or creation of new practices that stand in between the established practices (Akkerman & Bakker, 2011). Referring to the boundary-crossing interdisciplinary research of scientists, Palmer (1999) suggested that transformation denotes creation of a hybrid field that does not abandon existing practices but maintains value of the intersecting practices to one another. With interpretation, the analysis of data shows that participants embrace an aspiration to transform in a sense that, while maintaining their established digital practice, they also benefit from drawing on other cultural resources both for independent and collaborative learning with others, as in the case of the mind maps shown in Figure 3.
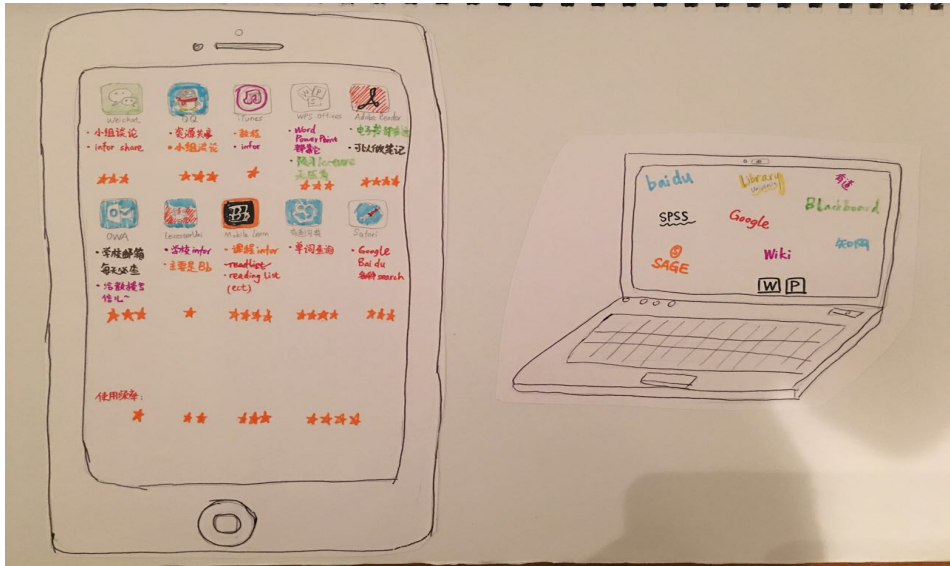
Figure 3. Example of frequently used digital sites and application for learning
(P13, female, age 24, media)

Figure 3 shows a set of digital tools as well as services that are used most frequently by P13 for learning purposes. As can be seen, P13 drew various tools that she often uses on the laptop and these tools include both tools that predominantly use Chinese language and those dominated by English language. On her drawing of her iPad, it not only shows an array of applications, but also the activities she conducts with the help of these applications. She also uses the number of stars to indicate the frequency of use among these applications: more stars means that she uses the tool more often. The above figure implies that P1 has expanded her knowledge of newly experienced tools into her cognitive structure and developed a strategic attitude towards the uses of digital tools, integrating available tools and using them purposively dependent on context to achieve specific goals. Other mind maps and interview data also confirm that students do not simply transfer one practice to the other, rather they expand their knowledge and combine Western tools with Chinese tools.

Conclusions

The study reports on the appropriation of digital tools during their intercultural adaptation. The paper employs two theoretical approaches to improve our understanding of how international students make sense of and use digital tools and resources when they begin to adapt to a new higher education environment. One theoretical approach is the appropriation of cultural resources, the process through

which digital tools are shaped in use, which draws on the work of Pachler et al. (2010). The other approach draws on the model of boundary crossing (Akkerman & Bakker, 2011), which provides an alternative route to understand appropriation of digital tools as tools that fulfil a bridging function. The present study found that these sojourners' initial encounter of challenge and conflict can be translated into a new capacity for personal expansion and transformation. Technology and social media are useful cultural resources to cross boundaries in a variety of ways, such as across culture, time, locations, formal-informal and physical-virtual (Pimmer, Linxen, & Gröhbiel, 2012). Sometimes, the tutor acts as the designer of co-creative learning practices, as in the case of the Facebook group, which later contributed to students' increased social capital (which broadly stands for the resources accumulated through the relationships between people), and mobile-based multimodal representation can be used to facilitate an iterative learning cycles and discussion.

Evidence shows that students are constantly assimilating and accommodating their learning through expanding something unknown into their cognitive structures and making sense of the contextual influences by changing cognitive structures. This is in line with the concept of situated learning (Lave & Wenger, 1991). For example, students use mixed pedagogical strategies. They made use of the university's VLE (Blackboard), tutor's slides, and other web-based learning opportunities to lessen the stress of initial change of academic context (e.g. P22); they used different social media to foster communication and connection both with Chinese friends and students from other cultural backgrounds (e.g. P14); they researched on Chinese sites to look into case studies for their essays and search on English search engines for academic journals to write in English (e.g. P13). The use of digital tools and resources can be seen as an act of agency as Chinese international students "strategic making and remaking of selves, identities, activities, relationships, cultural tools and resources" (Moje & Lewis, 2007; p.18). This appropriation process also entails social negotiation, which represents "the internalisation of the pre-given world of cultural products" (Pachler et al., 2010). Understanding this is important in a context where learning becomes increasingly mediated by technologies which can contribute to improving pedagogical approaches for using digital tools and services to engage international students.

References

1. Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research, 81(2),* (pp.132-169). doi: 10.3102/0034654311404435

2. Bennett, M. J. (2009). Defining, measuring, and facilitating intercultural learning: a conceptual introduction to the Intercultural Education double supplement. *Intercultural Education, 20(S1-2),* (pp. S1-13). doi: 10.1080/14675980903370763

3. Bhabha, H. (1990). The Third Space. In J. Rutherford (Ed*.), Identity: Community, Culture, Difference* (pp. 207–221). London: Lawrence & Wishart.

4. British Council (2014, 06 October). *UK universities will rely on China for postgraduate growth.* [Online] Retrieved 01 January 2017, from https://www.britishcouncil.org/organisation/press/uk-universities-will-rely-china-postgraduate-growth.

5. Burnapp, D., Feng, Y., & Zhao, W. (2012). The Development of Transcultural Third Spaces by International and Transnational Students. In P. O. Angela, & B. Schröttner (Eds.), *Transnational Spaces and Regional Localization. Social Networks, Border Regions and Local-Global Relations,* (pp. 209-225). New York: Waxmann.

6. Chen, R. T. H., Bennett, S., & Maton, K. (2008). The adaptation of Chinese international students to online flexible learning: two case studies, *Distance Education, 29*(3), 307-323. doi: 10.1080/01587910802395821

7. CIC (2015). *CIC China Social Media Landscape.* [Online] Retrieved 25 May 2015, from http://www.ciccorporate.com/index.php?Itemid=208&lang=en&option=com_content&catid=99&id=1204&view=article

8. Cohen, L., Manion, L., & Morrison, K. (2007). *Research Methods in Education* (6th ed.). London: Routledge.

9. Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and Conducting Mixed Methods Research* (2nd ed.). London: Sage. ISBN 978-1-4129-7517-9

10. Cook, J., Pachler, N., & Bachmair, B. (2011). Ubiquitous mobility with mobile phones: A cultural ecology for mobile learning. *E-learning and Digital Media, 8*(3), 181-195.

11. Engeström, Y., Engeström, R., & Kärkkäinen, M. (1995). Polycontextuality and boundary crossing in expert cognition: Learning and problem solving in complex work activities. *Learning and instruction, 5*(4), 319-336.

12. Gill, S. (2007). Overseas students' intercultural adaptation as intercultural learning: a transformative framework, *Journal of Comparative and International Education, 37*(2), 167-183. doi: 10.1080/03057920601165512

13. Gu, Q., Schweisfurth, M., & Day, C. (2010). Learning and growing in a 'foreign' context: Intercultural experiences of international students. *Compare: A Journal of Comparative and International Education, 40*(1), 7-23.

14. Guo, C. Q., Shim, J. P. & Otondo, R. (2010). Social Network Services in China: An Integrated Model of Centrality, Trust, and Technology Acceptance. *Journal of Global Information Technology Management, 13*(2), 76-99.

15. Hathaway, A. D., & Atkinson, M. (2003). Active interview tactics in research on public deviants: Exploring the two-cop personas. *Field Methods, 15*(2), 161-185.

16. Hektner, J. M., Schmidt, J. A. & Csikszentmihalyi, M. (2007). *Experience Sampling Method: Measuring the Quality of Everyday Life*. London: Sage.

17. Hughes, H. (2013). International students using online information resources to learn: complex experience and learning needs. *Journal of Further and Higher Education, 37*(1), 126-146. doi: 10.1080/0309877X.2011.644778

18. Kahneman, D., Krueger, A. B., Schkade, D. A., Schwarz, N., & Stone, A. A. (2004). A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method. *Science, 306*(5702), 1776-1780. doi: 10.1126/science.1103572

19. Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

20. Lien, C. H., & Cao, Y. (2014). Examining WeChat users' motivations, trust, attitudes, and positive word-of-mouth: Evidence from China. *Computers in Human Behavior, 41*, 104-111.

21. Liu, G., & Winn, D. (2009). Chinese graduate students and the Canadian academic library: a user study at the University of Windsor. *The Journal of Academic Librarianship, 35*(6), 565-57.

22. Meeus, W., van Petegem, P., & Van Looy, L. (2006). Portfolio in higher education: Time for a clarificatory framework. *International Journal of Teaching and Learning in Higher Education, 17*(2), 127-135.

23. Mehra, B., & Bilal, D. (2007). International students' perceptions of their information seeking strategies. *Proceedings of the 2007 Canadian Association for Information Science (CAIS/ACSI)*, 10-12.

24. Miles, M. B., Huberman, A. M., & Saldana, J. (2013). *Qualitative data analysis: A methods sourcebook.* London: Sage.

25. Moje, E. B., & Lewis, C. (2007). Examining opportunities to learn literacy: The role of critical sociocultural literacy research. In C. Lewis, P. Enciso, & E. B. Moje (Eds.), *Reframing sociocultural research on literacy: Identity, agency, and power* (pp. 15–48). Mahwah, NJ: Erlbaum.

26. Pachler, N., Bachmair, B. & Cook, J. (2010). *Mobile learning: structures, agency, practices.* Springer Science & Business Media. doi: 10.1007/978-1-4419-0585-7

27. Palmer, C. L. (1999). Structures and strategies of interdisciplinary science. *Journal of the American Society for Information Science, 50*(3), 242-253.

28. Pimmer, C., Linxen, S., & Gröhbiel, U. (2012). Facebook as a learning tool? A case study on the appropriation of social network sites from mobile phones in developing countries. *British Journal of Educational Technology, 43*(5), 726-738.

29. Prieto, L., Arreguín-Anderson, M. G., Yuen, T. T., Ek, L. D., Sánchez, P., Machado-Casas, M., & García, A. (2016). Four cases of a sociocultural approach to mobile learning in La Clase Mágica, an afterschool technology club. *Interactive Learning Environments, 24*(2), 345-356. doi: 10.1080/10494820.2015.1113711

30. Riddle, M., & Arnold, M. (2007*). Experience Method: A Resource Kit*. [Online]. Retrieved January 8, 2018, from https://minerva-access.unimelb.edu.au/handle/11343/34845

31. Sharpe, R., & Beetham, H. (2010). Understanding students' uses of technology for learning: Towards creative appropriation. In R. Sharpe, H. Beetham, & de Freitas (Eds.), *Rethinking Learning for a Digital Age: How Learners are Shaping their Own Experiences* (pp. 85-99). New York: Routledge.

32. Sharples, M., Taylor, J. & Vavoula, G. (2007) A Theory of Learning for the Mobile Age. In R. Andrews, & C. Haythornthwaite (Eds.), *The Sage Handbook of eLearning Research* (pp. 221-247). London: Sage.

33. Singh, M. (2005). Enabling transnational learning communities: Policies, pedagogies and politics of educational power. In P, Ninnes. & M, Hellstén (Eds). *Internationalizing higher education: Critical Explorations of pedagogy and Policy* (pp. 9-36). Dordrecht: Springer.

34. Star, S. L., & Griesemer, J. R. (1989). Institutional ecology, translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social studies of science, 19*(3), 387-420.

35. Suchman, L. (1994). Working relations of technology production and use. *Computer Supported Cooperative Work, 2*(1-2), 21-39.

36. Tran, L. (2013). Transformative learning and international students negotiating higher education. In S. Sovic, & M. Blythman (Eds.), *International students negotiating higher education: Critical perspectives* (pp. 133-150). Oxon: Routledge.

37. Walker, S., & Creanor, L. (2005). Crossing complex boundaries: transnational online education in European trade unions. *Journal of Computer Assisted Learning, 21*(5), 343-354.

38. Wan, J. K., Hua, P. H., Rousseau, R., & Sun, X. K. (2010). The journal download immediacy index (DII): experiences using a Chinese full-text database. *Scientometrics, 82*(3), 555-566.

39. Wheeldon, J. (2011). Is a Picture Worth a Thousand Words? Using Mind Maps to Facilitate Participant Recall in Qualitative Research. *The Qualitative Report, 16*(2), 509-522.

40. Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes.* Cambridge: Harvard University Press.

Acknowledgements

Appendix 1

Profile of the survey participants (N = 409)

Demographic information of participants who filled questionnaire (N=409)

The profile category	Sub-category	Number of respondents	Percent	Valid Percent	Missing data
PG discipline	MAIE	16	3.9%	4.0	13
	TESOL	5	1.2%	1.3	
	Media & Communication	122	29.8%	30.8	
	Museum studies	11	2.7%	2.8	
	Translation studies	3	0.7%	0.8	
	Modern Languages	2	0.5%	0.5	
	Law	4	1.0%	1.0	
	Business and Economics	195	47.7%	49.2	
	Mathematics	1	0.2%	0.3	
	Biosciences	2	0.5%	0.5	
	Chemistry	6	1.5%	1.5	
	Engineering	29	7.1%	7.3	
Study stage	Dissertation stage (enrolled in 2013)	22	5.4%	5.5	8
	Pre-sessional course (enrolled in 2014)	12	2.9%	3.0	
	Master programme (enrolled in 2014)	73	17.8%	18.2	
	Dissertation stage (enrolled in 2014)	91	22.2%	22.7	
	Master including pre-sessional course (enrolled in 2015)	203	49.6%	50.6	