

**Information-Seeking Behavior and the Intercultural Learning Process: Experiences of International Graduate Students from China: A Qualitative Sense-Making Case Study**

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University of Pittsburgh, 2014

In 1976, Deng Xiaoping opened China's economy to help modernize the country. This decision created a need for an educated work force to develop China's economy. In turn, China's citizens experienced educational opportunities to travel and/or live abroad, and gain knowledge from higher-education institutions located in developed economies. Students from China began traveling to the United States to obtain higher-education degrees in the 1980s, and since 2009, China has sent more international students to the United States than any other country (Open doors, 2013).

Many higher-education institutions have focused efforts on supporting their Chinese international student populations, as it represents growth and relevance to the institution.

Academic service departments such as libraries often assist students in the completion of their studies through user-centered services, relevant collections, and instruction in support of information literacy skills. In spite of the great effort that academic libraries undertake in researching user needs, unique populations, such as Chinese international students, can inadvertently be ignored when designing services or collections.

This study seeks to investigate the information-seeking behavior of one specific international student population to aid in identifying the information behavior of a specific population of students, and to aid in the development of evidence-based research for detecting student information needs.

Utilizing Brenda Dervin's sense-making method as a framework, this study investigates the information-seeking behavior of Chinese graduate students from the People's Republic of China (PRC) at the University of Pittsburgh's School of Information Sciences. A total of 20 qualitative interviews were conducted with these graduate students. Interviews were transcribed, imported into Atlas.ti, and analyzed using a qualitative content analysis approach.

Results from the study detected varied practices to identify and utilize authoritative and reliable sources of information in support of participants' information-seeking behavior. These include: reliance on personal networks, assumptions of reliability of information, and awareness of resources that help. Participants' opinions on authority and reliability of information offer insight into the need to further investigate the detection of information literacy skills among similar populations of international graduate students

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## **1.0 INTRODUCTION**

This study will explore the information-seeking behavior of Chinese graduate international students from the People's Republic of China (PRC), in support of their intercultural learning experience in the United States. More broadly, this study explores institutional cultures in China and the United States. The study seeks to understand and explain possible insight into participants' information-seeking behavior. The findings of this study will contribute to knowledge about the information-seeking behavior research on international students in the United States. This introductory chapter discusses the purpose of the study and theoretical foundation; it is organized in six sections. Section 1.1 describes the background of this study and section 1.2 states the problem being investigated. Section 1.3 addresses the research question explored and section 1.4 provides the theoretical lens that the researcher utilized to view the research problem. Section 1.5 supports the significance of this study. Lastly, section 1.6 provides terminology commonly used in this study.

## **1.1 BACKGROUND**

In fall 2006, I was a new librarian faced with my first task: co-teaching a semester-long information literacy course. While a co-instructor and I developed the lectures and exercises, neither of us considered the cultural background of the students. After one lecture, and talking to

an international student from Taiwan, I realized that my presentation of library systems and instruction on United States copyright law was culturally exclusive to the way that I was raised in the United States. The student informed me that, “we Chinese kids were not taught to be good like you American kids.” This statement came as a surprise. I never intended to present content in a culturally exclusive or alienating manner; yet, my lecture caused students to feel culturally unequal.

My MLIS education did not necessarily prepare me to teach, and certainly not to teach in a culturally inclusive manner. My instruction was unintentionally exclusive. My scope was not broad enough to consider the needs of international students whose cultural norms were different from my own. Upon investigating the professional literature addressing instruction of international student populations, I found that it lacked meaningful insight into specific cultural groups. Rather, the literature tended to generalize and group students into a single category of “international” or “foreign.” The abundance of culturally superficial literature for instructing international students led me to investigate the information-seeking behavior from the perspective of Chinese international students studying in the United States.

## **1.2 PROBLEM STATEMENT**

The term and classification of “international student” is used to describe any student studying in the United States that is not a citizen. Since 2005, the population of international students in higher education in the United States has experienced a steady increase (IIE, 2010a). For the academic year of 2012-2013, there were 819,644 international students studying in the United States, with the highest enrollment from China at

235,597 students (IIE, 2013). International students are a source of revenue for United States universities, so institutions have a vested interest in their needs. Academic libraries, which provide access to information through services and instruction on resources, are one way in which schools support student education. However, if there is no communication between users of the library and the librarian, disconnect may occur. A library may then risk failing to support the information needs of students and becoming irrelevant to users. Libraries face a challenge in the 21<sup>st</sup> century: How can the needs of students be identified and addressed? Chinese students are just one of many nationalities that come to the United States to study for educational, cultural, and social benefits. When international students come to study in the United States, they come with their own unique values and cultural insights of their representative countries. If institutions do not address these unique needs, they “may leave these students feeling disappointed, unfulfilled, and even exploited” (Sherry, Thomas & Chui, 2010, p.34).

While studies have explored the issue of services available to international students, a majority of these works were published more than a decade ago (Peters, D., 2010; Correll, 1983; Bilal, 1988; Lafon, 1992). Furthermore, the literature demonstrates the slow progress toward inclusion of international student needs and the continual argument for extending special services for them (Iheanacho, 2008; Liao, Fin, & Lu, 2005). Past literature emphasized librarians’ perceived opinions of student needs (Conteh-Morgan, 2003) and research primarily relied on quantitative survey research methods to capture student experiences (Lewis, 1969; Correll, 1983; Cope & Black, 1985; Moorhead, 1986; Liestman & Wu, 1990; Lafon, 1992). This research tactic failed to present specific insight into international student groups in the United States and overlooked their higher-education library and information experiences and needs.

### 1.3 RESEARCH QUESTION

Based on preliminary identification and exploration of the research problem, the following research questions have been identified to investigate the experiences of international graduate students:

Primary question: How do international graduate students from China make sense of the information they need in support of their intercultural learning experience?

Secondary questions:

- a. What kinds of information situations and challenges do students experience during their studies?
- b. What are the hindrances that prevent international students from accessing or using information resources related to their education?
- c. How do international students overcome obstacles to their access or use of library resources?
  - i. Sub-question: Are there “gatekeepers” that assist in this process?
- d. Do international students feel successful in accessing and utilizing library resources?
- e. Do international students feel satisfied with the information that they find?

## 1.4 THEORETICAL PERSPECTIVE

This study is framed by two theoretical perspectives – (1) Freire’s critical pedagogy (1970) and (2) Dervin’s sense-making theory and method (1983, 2008). Both are discussed below. According to Freire (1970, 2000), awareness of culture and its inclusion in instruction are essential to providing relevant instruction. This act of awareness is informed by self-reflection, which Freire (1970, 2000) defines as Praxis: the act of “reflection and action directed at the structures to be transformed” (p.126). Freire (1970, 2000) argues that Praxis driven by the oppressed is the only means of liberation from a hegemonic system. Denying marginalized groups the right to reflection prohibits people from exercising the “right to say their own word and think their own thoughts” (Freire, 1970, 2000, p.126). Educator and researcher James A. Banks (1996) reflects on Freire’s Praxis by suggesting that when previously marginalized groups are able to take hold of their rights, they can influence mainstream culture. Thus, creating progress and empowering previously excluded groups.

The democratization of power in educational capital, i.e., knowledge, within the United States can be traced to the Civil Rights Movement of the late 1960s and ‘70s. Historians specifically point to the Third World Liberation Front (TWLF) at San Francisco State University (SFSU), where racially oppressed SFSU students employed “grassroots political participatory models for social change” (Ono, 2005, p.2) within an education system for the purpose of curriculum inclusion.

Beginning on November 6, 1968, “black activists” at SFSU who were part of the Black Students Union recruited other students of color (Asian American, Chicano Latino, and Native American) to establish the “Third World Liberation Front (TWLF)” (Chiang, 2005, p.65). This student uprising eventually caused “a shutdown of the campus for five months” (Chi, 2005, p.40)

and was resolved by only partially meeting student demands to establish a School of Ethnic Studies. SFSU established “the first ethnic studies in the nation, including an Asian American studies program” (Chi, 2005, p.40). Movements such as these gave way to multicultural education through the establishment of Ethnic American Studies (African-American, Asian-American, Chicano/a and Native American Studies) (Banks, 1996, p.38).

Applying Freire’s (1970) critical pedagogy context to SFSU’s establishment of the first Ethnic Studies School and Asian American Studies program in the United States indicates that, the oppressed were successful because:

“The pedagogy of the oppressed, which is the pedagogy of people engaged in the fight for their own liberation, ... those who recognize, or begin to recognize, themselves as oppressed must be among the developers of this pedagogy” (Freire, 1970, 2000, p. 53).

Self-determination or self-liberation, according to Freire (1970), is arrived at through Praxis. In order for Praxis to occur, hegemony needs to be controlled. Brenda Dervin’s (1983, 2008) sense-making theory, method (SMM) and interviewing tool serve as a means to detect hegemony within a person, or system, through the understanding that hegemony exists consciously or unconsciously.

Dervin (1983, 2008) cites the utilization of Freire’s *Pedagogy of the Oppressed* (Freire, 1970) and *Education for Critical Consciousness* (Freire, 1983) in the SMM, which “looks beyond hegemony and habits to how systems might be designed to be more responsive to human needs” (Dervin, 2008, p.6). This theory/method empowers the “actor”/person by allowing them to be free of “ideological judgment” (Dervin, 2008, p.6). It does not impose ideas of “correctness”; thus, allowing the actor to create a context of understanding based upon his/her perspective or self-reflection.

Utilizing the lenses of multicultural education and SMM (1983, 2008), this study focuses on the participants' perspectives. Allowing participants to reflect in their own words will facilitate Praxis. In addition, these theories will assist in detecting if participants see themselves as culturally excluded within their education system.

## **1.5 SIGNIFICANCE OF STUDY**

The study investigates the information challenges of the Chinese international student population utilizing a qualitative method of investigation. Previous research studies on international students had placed emphasis on survey method approaches, which limited participant responses to the researcher's predetermined selection of answers. Using a qualitative approach, this study allows participants to self-report, and thus, present a more nuanced insight into their information-seeking behaviors and experiences.

Many previous library-related investigations approached international students as a single population, grouping multiple nationalities into one sample population. This study avoids this limitation by focusing on one nationality: Chinese students from the People's Republic of China. This decision avoids the possibility of generalizations being made among cultural or national groups that might invalidate the study's findings.

This study occurs at a time when the largest international student population in higher education in the United States is from China; therefore, this work is timely and essential. In addition, the results of this investigation should provide library practitioners and researchers with authentic insight into students' use of information resources and systems, providing the knowledge needed to help improve services in support of student educational endeavors. Lastly,

participants were drawn from disciplines of study that fall under the scope of Information Schools (iSchools), as few studies have explored the information needs of students in these disciplines.

## 1.6 TERMINOLOGY

The theoretical foundation of this study is multidisciplinary; it borrows terminology from the fields of education, communication, and library and information science. The terminology primarily is based on a higher-education context. Two terms not defined for this study are “success” and “satisfaction.” Participants will define these terms during the data collection process, and will be explained later in the findings of the study.

Below are some working definitions for vocabulary that will be widely utilized in this study:

*Acculturation:* The direct and indirect process of adoption of similarity to a dominate culture groups’ normative behavior and/or practices (Berry, 2003, p.19).

*Bridge:* Within a sense-making context, identifies the various helps or sources that allowed the actor to overcome his/her problem (Dervin, 2008).

*China:* This refers to the People’s Republic of China (PRC).

*Chinese:* Those whose nationality is assigned to the People’s Republic of China. It excludes persons from Taiwan and nationals of the United States.

*Context:* Derived from the sense-making metaphor (2008) that depicts *context* as an umbrella hanging over the actor that he/she carries throughout life. The umbrella holds previous knowledge or experiences over the actor that he/she can draw upon while moving through life. This knowledge can shape one’s perception and approach to life (Dervin, 2008).

*Copyright:* In the United States, this term is used to describe the “exclusive rights granted by law to copyright owners for protection of their work” (United States Copyright Office, 2012).

*Cross-Culture:* Pertaining to interaction between persons of different cultural backgrounds that are “one or more cultures beyond one’s native culture” (Grant & Ladson-Billing, 1997, p.53).

*Culture*: Shared “knowledge, beliefs, and attitudes” of a society or group of people (Lawton & Gordon, 1996, p. 80).

*Exclusive education*: A system of education that is opposite of an inclusive educational environment.

*Gap*: Within a sense-making context, describes the question or muddle that the actor seeks to address or answer (Dervin, 2008).

*Gatekeeper*: “Someone who is able to grant or to deny access to the field” (Silverman, 2006, p.402).

*Hegemony*: In the context of multicultural education, “a process in which dominate groups in society come together to form a bloc to sustain leadership and control over subordinate groups” (Grants &Ladson- Billings, 1997, p.130).

*Inclusive education*: A system that “respects and reflects all aspects of the school, its community, students, and staff.” (Joshee, 2009, p.104)

*Information*: A “resource...that describes reality, reduces the uncertainty about it, and allows people to cope more effectively” (Dervin, 1980, 2006, p.30). For this study, the term will be used in relation to structured higher-education learning.

*Information-seeking behavior*: A subset of information behavior “concerned with the variety of methods people employ to discover and gain access to information resources” (Wilson, 1999, p.263).

*Intercultural*: Describes interaction between two cultural groups as cited by previous studies (Smith, 2008) when “individual participants of *differing cultural backgrounds* come into direct contact and interaction with one another” (Kim, 2001, p.140).

*International student*: Students who entered the United States through a student visa. This term will be used synonymously with literature that describes this population as “foreign.”

*Multicultural education*: Format of education that addresses issues of racism, discrimination, and prejudices by “changing the total school environment so that it will reflect the diverse groups in United States society” (Howard, 1996, p.337).

*Neutral-questioning*: As defined by Dervin (1984, 2006), a form of interviewing that uses “three classes of questions that are content free except in their allegiance to time-space premises” (p.266). These “classes” relate to the steps of the Sense-Making Method (situation, gap, & bridge) that identify the outcome of a situation as told through the words of the participant.

*Outcome*: Within a sense-making context, describes the result of a bridge; it can be an answer/solution or another *gap* or problem (Dervin, 2008).

*Plagiarism*: Is an act in which one may claim, present, or duplicate the work of another person without giving attribution (Pickering, 2008).

*Resource*: “A means of supplying a deficiency or need; something that is a source of help, information, strength, etc.”(OED, 2010b).

*Sense-making*: A qualitative research theory and method that utilizes the “behavior, both internal (cognitive) and external (procedural)” of an actor (participant/person) to understand how the individual “construct(s) and design his/her movement through time-space” to solve a problem (Dervin, 1983).

*Situation*: Within sense-making this describes the context for the cause of the information need (Dervin, 2008).

*Socially constructed knowledge*: knowledge from “everyday experience is socially shaped” by “the power relations of the social and historical forces that produced them” (Grant & Ladson-Billings, 1997, p.52).

## **2.0 REVIEW OF LITERATURE**

The library literature on services and instruction to international students studying in the United States is mainly limited to English as a second language (ESL), English language learners (ELL) or limited English proficient (LEP) in higher education. The scope of the literature evaluated for this study focuses on academic libraries, as non-academic libraries differ in mission and resources. In addition, non-college student immigrant populations were not included in this literature review as their information needs differ from those of students who come to the United States for education.

Section 2.1 is a literature review of library instruction to international students in the United States from the 1960s to 2000s. This section analyzes the various ways libraries have documented how they serve international students and identify the special needs of this population. Section 2.2 is a literature review of library instruction and orientations given to Chinese international students in English language countries outside of North America. Section 2.3 presents an overview of information literacy and its presentation in English language-published Chinese professional literature. Section 2.4 reviews literature that seeks to address information behavior of international students. Lastly, section 2.5 reviews a few Sense-Making Method studies examining participant background and qualitative interview techniques.

## 2.1 LIBRARY INSTRUCTION TO INTERNATIONAL STUDENTS

In the United States, one of the earliest examples of research on library service and needs of international students was Lewis' 1969 study, "Library Orientation for Asian College Students," a mixed method study conducted at the East-West Center, University of Hawaii. It included 60 Asian students from 20 different countries (Lewis, 1969). Through interviews and surveys, the subjects of culture shock, library anxiety, and students' unfamiliarity with the educational environment and library system were identified as challenges that Asian students faced during their studies in the United States. Some recommendation based on the findings of this study proposed that schools provide Asian international students with non-credit library orientation courses and small, student-guided, library tours.

Since Lewis's (1969) study, many library practitioners have followed her advice, and to some extent for over the last 45 years, the topic of challenges to service and instruction of international students has remained constant (Bilal, 1988; Lafon, 1992; Wang & Frank, 2002; Knight, Hight, & Polfer, 2010). A significant portion of the research performed within a library context has focused on reference services and instruction (Peters, 2010) and was conducted between the 1980s and 1990s (Morrissey & Given, 2006, p.222). Librarians and researchers have implemented Lewis's (1969) suggestions through integration of native language library instruction and tours by librarians (Liestman & Wu, 1990), student workers (Lopez, 1983), and audio tours (Huls, Parson, Peterson, & Vakili, 1994). Librarians and students both indicate that the usage of native languages in library instruction and orientations are helpful ways to address clarity in the communication of culturally dependent information.

Literature also mentions the use of collaboration efforts outside of the library, such as co-taught courses with ESL instructors (Cope & Black, 1985; Knight, Hight, & Polfer, 2010), and

international student services (Chau, 2003). However, librarians still struggle to reach students, and address the challenge of engaging students and assisting them when utilizing the library.

Ultimately, librarians seek to understand how to best provide access to information. In Felicia Suila Kimo Lafon's (1992) dissertation "A Comparative and Analysis of the Library Skills of American and Foreign Students at the University of Michigan," international students' library instructional needs were assessed. Lafon (1992) conducted a quantitative survey with 839 students (undergraduate and graduate) from both the United States and abroad (Japan, China, Korea, Taiwan, India, Iran, and Saudi Arabia) with the primary purpose of determining if library education needs of foreign students differed significantly from those of American students (pp. 155-154). The study found that international students had significantly different needs than American students due to a lack of familiarity with library resources, and a lack of English fluency. Furthermore, two challenges for librarians and library administrators were identified. The first was "to develop programs to teach foreign students how to use libraries effectively" (Lafon, 1992, p.165). The second highlighted the need "to prepare library staff to communicate effectively with these students" (Lafon, 1992, p.165).

Although the challenges Lafon (1992) addresses have been noted in previous research, the finding supported the need for continued research. Lafon (1992) suggested that further research should investigate the topic qualitatively (interview-based research) to better understand how international students perceive the library, their motivations (information-seeking behavior) behind their choices of information resources, and how students search (information-searching behavior) for material (Lafon, 1992, pp.170-171).

Throughout the 1990s and early 2000s, librarians continued to investigate ways to adequately address library services in a culturally sensitive way. Culturally inclusive library

instruction (Conteh-Morgan, 2003) and gender differences among international student populations (Bilal, 1988; Zoe & DiMartino, 2000) have improved. However, research has not identified what information international students need, and how the library does, or does not, assist them in fulfilling this need.

Although the United States library literature has not significantly addressed international student needs for information, guidance can be found in an example from Canadian researchers Renée Morrissey and Lisa M. Given (2006). In their case study, “International Students and the Academic Library,” conducted at the University of Alberta, nine graduate students from China were interviewed regarding their experiences with their library. The participants’ “information-seeking behaviours and their evaluation of the library’s digital systems” also were assessed utilizing American College & Research Libraries (ACRL) standards of information literacy (Morrissey & Given, 2006, p.225).

The interviews “lasted between forty-five and seventy minutes” and were “transcribed and coded using a grounded theory approach” (Morrissey & Given, 2006, p.225) to identify common themes within the data. Through the participants’ own words, the research offered insight into the difficulties that Chinese international students experience when utilizing library instruction and understanding and adhering to copyright laws. Students expressed that cognition of language was difficult to acquire and that library instruction given during school orientation was not useful. Furthermore, students expressed that in-class library instruction with professors’ support was the most beneficial form of library instruction (Morrissey & Given, 2006, p. 236). Students also noted that plagiarism was not a concept taught to them in China, but rather, learned while studying in Canada.

The most valuable aspects of this article are the participants' direct quotes, which build an authentic perspective of their reasoning behind their information-seeking behavior. Though the cultures being compared are Canadian and Chinese, this article is an exemplary model for conducting culturally relevant library research that seeks to understand the user's perspective on improving library services. Additional library research that directly captures the needs of international students, and how they can be assisted in their navigation through higher-education studies, is necessary.

## **2.2 LIBRARY EXPERIENCES OF CHINESE STUDENTS INTERNATIONALLY**

Library researchers in English language countries outside of the United States and Canada reported challenges associated with servicing Chinese international students. A literature review of research performed in the United Kingdom, Ireland, Australia, and New Zealand indicates a need for outreach to students, and cultural sensitivity training for staff, as means of overcoming cultural linguistic barriers between libraries, and namely, Chinese international students (Mu, 2007; Singer, 2005; Wang, 2006; Sackers, Secomb, & Hulett, 2008; Hughes, 2010).

In Belle Wang's (2006) thesis study of eight Chinese undergraduate and graduate students at Victoria University of Wellington, New Zealand, participants discussed their experiences related to libraries. Wang (2006) found cultural differences among New Zealanders and Chinese students between low context (New Zealand) and high context (Chinese PRC culture) communication. Wang (2006) cites that "In a low context culture as New Zealand, people rely heavily on words for information transmission. Silence is viewed as abnormal and

anxiety-producing” (Wang, 2006, p.72). In comparison, Mandarin Chinese is a high context language. The stresses of communication pattern differences contribute to conflict between students and natives of the country of study. Wang (2006) notes additional differences between norms of behavior and feelings toward knowledge of libraries, specifically:

Chinese international students may think their ignorance is a shame and do not ask for assistance or ask questions probably because they do not want to lose face. Alternatively they many not want librarians to lose face by not being able to provide them the correct answers: some participants do believe librarians may not be able to help them. This is an important issue in the library instruction sessions. (Wang, 2006, p.79)

Outreach through international offices, and those instructing international students, has been suggested to address the above challenges (Wang, 2006; Mu, 2007). Training library staff on culturally sensitivity and awareness of students’ needs is also suggested as ways to improve communication between service providers and recipients (Sing, 2005).

In Hilary Hughes’s (2010) doctoral research, carried out at two Australia universities, 25 international college students were interviewed on their experiences in Australian libraries. Findings from Hughes’s (2010) research specifically dealing with international students from China found that students did not use libraries in China. They indicated that assignments were not research-based; instead, exams determined grades (Hughes, 2010, p. 81). One Chinese participant suggested his/her lack of experience using libraries in China was due to limited and outdated resources (Hughes, 2010). Another Chinese student in Hughes’s (2010) study noted that the library at his/her previous institution of study in China did not have a catalog, which made finding information difficult. Chinese students also stated having difficulty using Australian

databases and knowing how to search a catalog, check out a book, and interpret call numbers (Hughes, 2010, p. 83).

Based upon the findings that Hughes (2010) presents in her study, she provides three recommendations, first, there is a need for sustained informal and formal interaction between library staff and international students in support of building relationships with students. Second, librarians should attempt to detect the possible learning needs and perspectives of international students in relation to libraries and librarians. Third, strategies in support of detecting learning needs of international students need to be developed (Hughes, 2010, pp. 86-87).

It is apparent through this brief review of the literature in English language countries that more research needs to be performed to inform to development of better services for international students, specifically students from China. Researchers have identified the need for engagement to address culturally specific differences between libraries, and culturally dependent communication between students and libraries. Additionally, Chinese international students are one population of special interest that can be better served and assisted in their understanding and use of library instruction and services.

### **2.3 INFORMATION LITERACY**

The introduction of the term information literacy (IL) has been credited to Paul Zurkowski, the then president of the Information Industry Association (IIA) in 1974 (Maughan, 2001, p.71). His utilization of IL was to describe the application and training of information resource use within a

work context. Although the origins of IL occurred outside of a library context, it was officially adopted by the American Library Association Committee on Information Literacy in 1989.

The committee was formed in 1987 with the task of defining IL and produced a final report. This final report included the following definition for IL: “To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (ALA, 1989, para 3). This definition is commonly cited to describe IL (Breivik, 2005), but it does not address how one becomes information literate.

IL terminology became prominent in North America during the 1980s among librarians utilizing the term as a synonym, or replacement, for library skills, library use, and bibliographic instruction (McCrank, 1992; Maughan, 2001). Support for the development of IL within both higher education, and K-12 in the 1980s, was also attributed to the 1983 National Commission on Excellence in Education report, “A Nation at Risk: The Imperative for Educational Reform.” The report advocated that in order for America’s youth to be competitive, they would be required to develop skills for the information age that included skills related to the use information resources and technology.

During the 1990s, and the beginning of the new millennium, IL for higher education institutions gained competencies through the creation of IL standards by the Association of College and Research Libraries (Association of College and Research Libraries, 2000). Using the 1989 ALA definition of IL, five standards with performance indicators were created. Using the performance indicators as guidance for teaching IL to students in higher education, numerous studies have been conducted in the United States (Williams, 2008).

The ACRL has been a proponent of IL within North American for more than thirty years (American Library Association, 1989). The uniformity of the concept and associated five standards is supported by the ACRL member institutions, along with a cultural value for intellectual property (in a United States context that is copyright law; United States Constitution, Article V). The five standards reflect the research-based higher education system that was developed in the United States during the 19<sup>th</sup> century (Weiss, 2003).

The promotion of IL as a form of literacy is not a culturally exclusive subject and has been addressed in other countries such as China. The presentation of IL through professional literature related to Chinese higher education is uniquely different from IL history and professional organization in the United States. Specifically, China does not have a uniformed professional organization such as ACRL to promote IL as a learning objective for higher-education libraries.

Unlike the United States where IL has been defined uniformly for higher education and tied to cultural values of property for information and tethered to educational pedagogy, Chinese higher educational institutions have yet to adopt IL uniformly as a literacy standard. IL in China emerged in the late 1980s (Li, X., 2006) and has been used widely to refer to other concepts such as information retrieval, information qualification, and information ability (Li, X., 2006; Sun, P., 2002). The absence of uniformity in the terminology, and a clear definition of IL present a challenge for researchers to measure this form of literacy and track its development.

In October of 2005, “the first information literacy competency standards for higher education in China” (Xiaomu, Z., Ping, S., Mengli, W., & Weichun, D., 2008, p.10) were approved in Beijing by the Institute of Beijing Academic Libraries (IBAL). This academic library system is comprised of university libraries that represent 10% of China’s higher-

education institutions. The standards promoted by IBAL differ from IL standards in North American in that IBAL standards place “emphasis on information consciousness besides information knowledge, information ability and information moral” (Xiaomu et al., 2008, p.10). These desired competencies related to information are challenging to assess as they are abstract and tied to socio-cultural specific values that may not be comparable to other countries that do not have the same laws related to censorship or government as PRC (Ling, 2010; Gao, 2011).

The PRC constitution states under Article 40 that the censorship of personal correspondents or communication is permissible “in cases where, to meet the needs of State security or of criminal investigation, public security or procuratorial organs are permitted to censor correspondence in accordance with the procedures prescribed by law” (China, 2004). Determining when censorship is permissible is not specifically defined; however, this article supports the role of government in the monitoring of information (Ling, 2010).

The means of monitoring the censorship of information is made permissible throughout the numerous Articles in the PRC constitution, which dictates the role of the State in controlling commerce (Articles 6, 7, 18, and 28). One of the most recent and notable cases of censorship of the Internet in China involved the search engine Google (Ling, 2010; Gao, 2011). In this case, the government told Google to either comply with China’s rules or it would not be allowed to continue doing business in China; Google complied but has varying degrees of filters between Hong Kong and Mainland China (Gao, 2011). In a 2011 congressional hearing on China's censorship of the Internet and social media, censorship was addressed as both an issue of commerce and human rights. Thus, thickening the ambiguity of what types of information may be available on the Internet to persons in China. This filtering or censorship of information might

omit or limit situations where one would develop or learn assessment techniques for detecting authoritative and non-authoritative information and thus change how one might gain IL skills.

China is still a developing economy, and access to computers and the Internet throughout the country is a continual process. These factors also pose a challenge to developing IL in China (Xiaomu et al., 2008). Beyond technology, China has challenges teaching IL, as the K-12 education system is exam-oriented and may not allow for the development of IL skills (Xiaomu et al., 2008). Xiaomu et al. (2008) cite the previous challenges as a basis for why high school graduates or incoming college students in China lack “information consciousness” (page.10) or awareness of the types of information and access points to information. Xiaomu et al. (2008) do not provide a definition for information consciousness in their article. Instead, the concept is attributed to a standard with performance indicators. The standard for information consciousness describes an information literate student as one who “knows the importance and effect of the information and information literacy” (p.10). Some performance indicators that information conscious students would demonstrate according to Xiaomu et al. (2008) include: identifying information, the effects of information on life and study, knowing that “gaining information is one of the important solutions to problems” (p.11). For the work of Xiaomu et al. (2008), it can be implied that addressing IL in China would entail participation of Chinese educators beyond the library.

The absence of a formalized definition of information literacy within a Chinese context may also create difficulty for educators seeking to detect, measure, and develop their own skills and abilities. This issue was addressed in the article “On information literacy for the University foreign language teachers in China” (Zhang, 2012). The author, Zhang, addresses the topic of IL from a Language teacher’s perspective and states that although IL has been addressed to

undergraduate students in China, “integration of information literacy into teacher preparation and development has not occurred for most universities in China” (Zhang, 2012, p.2146).

Zhang primarily uses IL to describe information retrieval skills and shares an anecdotal perspective on what types of IL skills are needed based upon personal reflections on IL literature in a Western context, citing Paul Zurovski (1974), Carol Kulthau (1987), and Christine Bruce (2002). Among the skills needed, Zhang mostly concentrates on skills related to information retrieval, assessment and selection of information for a specific need, and processing or interpreting information. From the author’s perspective, it appears that the issue of IL for educators in the area of Language teaching is a critical one, and that there is much room for the development of this concept, and the construction of competencies and methods of teaching and learning these competencies in China.

Other implications for a lack of formalized definitions and standards for IL within a Chinese context relate to methods of teaching IL. In Sun, Liu, and Cui’s (2013) article “The Design and Implementation of Library’s User Training System Based on Moodle,” the absences of uniformity in the definition of IL can be seen in the scope of activities described under the umbrella of IL. Sun’s et.al. (2013) article mainly concentrates on the logistics of using a course management software, Moodle, for the purpose of training Chinese medical students to use academic medical library resources in China. The authors did not discuss or explain how, or why, the content of the course was included, used to measure any specific skills or learning objectives, or discuss how the course content supported the development of IL. Rather, the discussion of IL was glossed over by briefly describing the content of the course by listing topics and using the abbreviation of “etc.” (Cui, 2013, p.302) after each list, operating under the assumption that the reader would understand what elements would fall within the listed

categories. This inadvertently presents a message of acceptance of marginalizing the importance of defining and articulating IL.

There is still much room for the development of the concept of IL within a Chinese higher-education context. Before one can compare IL in China to that of the United States, a clear and consistent formalized definition is needed among Chinese librarians and researchers. Otherwise, comparisons will not be valid as the same constructs will not be measured. Additionally, IL within a Chinese higher-education context should reflect the needs, skills, and environment of Chinese society, as IL is dependent upon the information environment that students must navigate to become information literate within their own society. What this might entail is uncertain, as it is culturally dependent and should come from Chinese values for knowledge, access, and authority of information.

## **2.4 INFORMATION-SEEKING BEHAVIOR STUDIES**

Librarians have sought to gain a deeper sense of international students' and LEP users' library usage by investigating their information-seeking behavior (ISB). Currently, few substantial research studies have captured the ISB of these populations. Rather, greater attention is given to evaluating the librarian's perspective of the user's behavior without inquiring into the user's perspective.

A person's information-seeking behavior might include intermediaries to information that assist with identifying and accessing information. These mediators have been referred to as *gatekeepers*. Literature presents gatekeepers as "agents of acculturation" (Liu, 1995a, p. 243) able to "disseminate information within their ethnic communities" (Liu, 1995a, p. 243). ISB

literature related to international students, LEPs, and minority groups in libraries mention gatekeepers as intermediaries (Lui, 1995a; Lui, 1995b; Lui & Redfern, 1997; Pyati, 2003). In this role as agents of acculturation, the concept of gatekeepers was supported in Ajit Pyati's (2003) article, "Limited English Proficient Users and the Need for Improved Reference Services." Pyati (2003) uses Liu's (1995a) definition of gatekeepers to claim that they can help identify unique ISB of LEP communities, which can be used to design "better library services" (Pyati, 2003, p. 267).

Pyati (2003) cites two cases in which a member of a cultural group served as an agent of acculturation. These members facilitated access to services related to health and education through public libraries in Santa Ana, California to Asian LEP users, and Latino immigrant laborers. Pyati (2003) took an observational approach to identify gatekeepers within the library literature but did not investigate how the users viewed the role of the gatekeeper in facilitating their access. Capturing the users' viewpoint would help libraries understand the extent of their role in the ISB process. The development of the existence, permanence, and long-term relevance of gatekeepers would be an added value to librarians interested in working with communities that many not have prominent gatekeepers or ones that are not easily identifiable. Without investigating specific user needs that interplay between behavior and external social and environmental factors, one cannot assume the influence of gatekeepers.

A common method utilized in the study of ISB of international students has been quantitative comparison survey studies between United States and international students. Studies such as Yan Liao, Mary Finn, and Jun Lu's (2005) "Information-Seeking Behavior of International Graduate Students vs. American Graduate Students: A User Study at Virginia Tech" and Yoo-Seong Song's (2005) "A comparative study on information-seeking behaviors of

domestic and international business students,” from the University of Illinois at Urbana-Champaign, did not appear to provide readers with a fair comparison of ISB between student groups, primarily because the structured surveys grouped "international" students together and did not control for culturally specific variables that might assist in understanding the context in which these students might approach seeking or searching for information. Furthermore, the surveys focused on asking students questions related only to the library and library instruction and did not include a way to capture other sources of information utilized that might be related.

Within the literature reviewed, there was a pattern of librarians' preferences toward the importance of the role of the library in the studies of international students, without considering what other sources of information students seek out in meeting their information needs. Aman Salem Abdullah's (2000) dissertation, "Factors Affecting International Students Use of the Online Catalog and Other Information Sources," is a good example of a survey study that focused on how well students retrieved information without considering if the information sought or the resources used did in fact meet their needs or were relevant.

The same theme of Abdullah's (2000) dissertation can also be found in Paulinus C. Iheanacho's (2008) dissertation "A Plan for Making the University of Delaware's Morris Library More Accessible to Students from Developing Countries." Iheanacho (2008) provides an example of the value of including a qualitative approach. This mixed method (survey & interview) study sought to investigate the ISB of international students related to the resources (services, collections, research tools, etc.) available to them at the University of Delaware's Morris Library. In the case of this study, the survey was found to be unreliable due to the low response rate (Iheanacho, 2008, p.71); thus, the major finding from this study was the interview data.

Iheanacho (2008) conducted brief (20 minute) interviews with 19 international students and 5 library staff members. In these interviews with students, participants expressed difficulty in communicating needs to staff members due to perceived biases against their non-American status (Iheanacho, 2008, p. 51). In the interviews with staff members, concern over how to best serve international students was expressed, along with a lack of cultural training (Iheanacho, 2008, p. 94). The interview data provided a basis for an area of improvement for University of Delaware's Morris Library, and identified contributing factors behind the conflict between staff and students.

From a methodological perspective, a review of the library literature on the ISB of international students indicates that most studies utilized surveys and statistical analyses. This approach may inhibit theory creation, as these studies only tested a set of predetermined variables that were based on librarians' experiences, not student experiences. As well, studies that utilized surveys made comparisons between international students and domestic students and overlooked distinctions between variables of nationalities and native languages, which would provide a richer context for comparison.

None of the above research precisely addresses behavior but rather, familiarity of, and with, library resources and services. This research tends to focus on information behavior of international students relating to their information-seeking and searching behaviors within a library context (i.e., resources, services, instruction, etc.). The limitations of survey research, utilizing descriptive statistics, are that it fails to explain the reasoning behind the behavior and therefore lacks "insights of value for the development of theory or ... practice" (Wilson, 1999, p. 250).

The literature indicates supports for the idea of gatekeepers as facilitators in the access to information (Lui, 1995a, 1995b; Pyati, 2003); however, further investigation needs to be conducted to explain the relationship between gatekeepers and the information behavior of international students. Quantitative methods have been used to study the “number of visits to libraries, to the number of personal subscriptions to journals and the number of items cited in papers” (Wilson, 1999, p. 250); however, this does not support the development of a grounded theory, which may be derived from the lived experiences of the information seeker. The literature analysis supports the need to investigate international student information behavior qualitatively (Lafon, 1992; Battle, 2004; Iheanacho, 2008).

### **3.0 METHODOLOGY**

The purpose of this chapter is to present the methodology utilized to investigate the research question for this study. It is organized in six sections. It begins with section 3.1, a general discussion of the sense-making methodology. Section 3.2, describes the study participants and their demographic information. Section 3.3 presents the data collection instruments. Section 3.4 presents the data analysis process. Section 3.5 exams the trustworthiness of the study. And section 3.6 addresses the limitations of this study.

#### **3.1 SENSE-MAKING METHODOLOGY**

The Sense-Making Method (SMM) was chosen as the method for this study because it supports the study's theoretical framework and was designed specifically to accommodate the identification of hegemony within a situation through reflection. Dervin began working on sense-making in 1972 and has since then, developed her work into a communication theory and method to study communication from "a more communicative (dialogic) perspective"(Foreman-Wernet, 2003, p.3). This perspective is supported by focusing on the " 'hows' of communication ...that contributed to understanding not only current communication practices but also the potentials for intervention and change-for improving-those practices in the future"(Foreman-Wernet,2003, p.5).

The Sense-Making Method (SMM), developed by Brenda Dervin, utilizes the “behavior, both internal (i.e., cognitive) and external (i.e., procedural)” (Dervin, 1983, p. 3) of an actor (participant/person) to understand how the individual “construct(s) and design his/her movement through time-space” to solve a problem (Dervin, 1983, p. 3). This study utilized Dervin’s (1983, 2008) SMM and Time-Line Interview as they seek to address the lack of LIS research on international student information-seeking behavior in support of their higher-education experience in the United States. SMM creates an environment of self-reflection in which each participant is able to “name his or her own world” (Foreman-Wernet, 2003, p. 8), with the analysis placed on the actions (verbs) of the respondent.

SMM (2008) is depicted metaphorically as a journey along a road in Figure 1. The main steps in the SMM metaphor are: Situation, Gap, Bridge, and Outcome. The Situation is the cause for the need of information. The Gap is the question or muddle that the actor seeks to address or answer. The Bridge is the solution composed of various helps or sources that allows the actor to overcome his/her problem. The Outcome is the result; it can be an answer/solution or another Gap/ problem.

The “squiggly” drawn diagram depicts the actor traveling through time and space on a “gappy” [sic] road. S/he holds an umbrella overhead that contains all of the contexts of understanding that come from hegemony or previous knowledge. The “squiggly” lines represent the constant flux of life that is in constant movement. Dervin (2008) makes the assumption that we all carry hegemony with us, regardless of where we are in life. This context influences our information-seeking behavior through our perception and approach to solving problems.

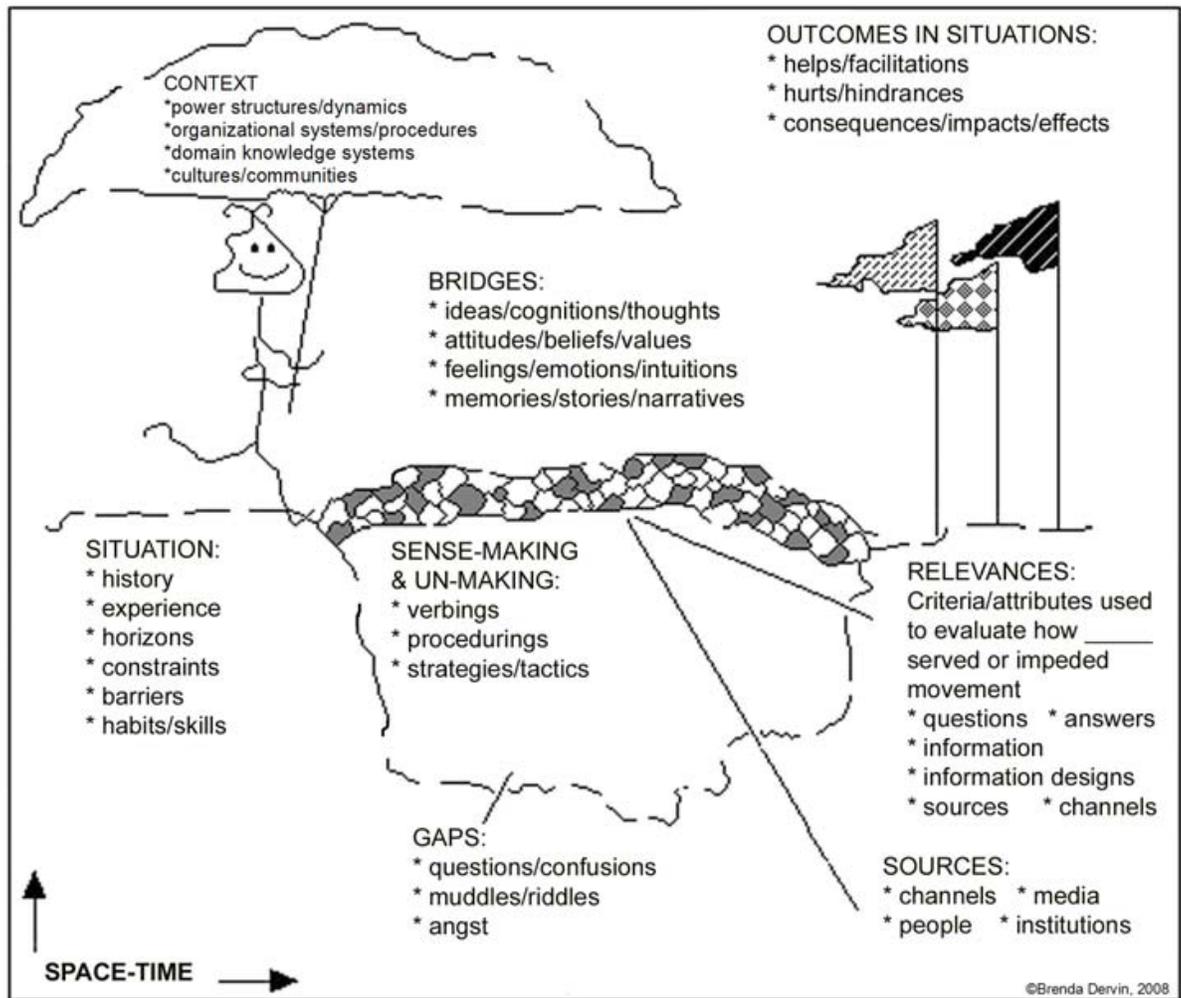


Figure 1. SMM Metaphor, 2008.

Reproduced from: “Interviewing as dialectical practice: Sense-Making methodology as exemplar,” by Dervin, B., 2008, Paper presented at the 26<sup>th</sup>-annual meeting of the International Association for Media and Communication Research (IAMCR). Reprinted with permission.

The Gaps in the journey reinforce that, between all of the concepts within SMM, there exists “the possibility of incompleteness” (Dervin, 2008). This incompleteness results in the repetition of the process of sense-making or unmaking. The unmaking of “sense” can occur within the sense-making metaphor when hegemony that restricts understanding or behavior is overcome by the actor. By overcoming hegemony, the actor is freed to approach or view the “problem” in another context that can prove to be a solution to the situation.

As mentioned in section 2.5, Sense-Making Method (SMM) utilizes the “behavior, both internal (i.e., cognitive) and external (i.e., procedural)” (Dervin, 1983, p.3) of an actor (participant/person) to understand how the individual "construct(s) and design his/her movement through time-space” (Dervin, 1983, p.3) to solve a problem. This method is utilized in conjunction with the “Micro-Moment Time-Line Interview” developed by Brenda Dervin (1983). This interview allows participants to create a timeline of events to describe an incident. The progression of a timeline allows the researcher to see each of the steps taken by the participant to complete a task, offering insight into his/her information-seeking behavior. The method was also chosen as it integrates critical pedagogical practices that require participants to create the description of the problem, rather than having the researcher impose a description.

To gain a better representation and understanding of international students’ information-seeking behavior, variables need to come from the participants, not the researcher. Interviews addressed this requirement by collecting data through in-depth discussions between the researcher and participants. Utilizing Dervin’s (2008) SMM can help improve information services and resources by identifying why resources or services might be utilized or ignored (Dervin & Zweizig, 1977).

Interviews are considered “a cornerstone in qualitative research” (Gorman & Clayton, 2005, p.41). Interviews provide researchers with an interactive opportunity to build contextual links between research questions, and data, through dialogical exchange (Gorman & Clayton, 2005, p.41). The Time-Line Interview Method can provide a deeper understanding of how situations or problems are solved/resolved and how or why choices are made (Dervin, 2008). Because of the advantages of qualitative interviews, this method of data collection was utilized

in this study and aligned with the methodology of the SMM through the Time-Line Interview method approach.

### **3.1.1 Sense-making Studies**

Researchers have used SMM to investigate the problems of diverse populations of varied sample sizes, diverse ethnic cultures, and unique contexts. The results of these studies have extended the usage and interpretation of Dervin's work. In Valerie Smith's (2008) dissertation, the decision to use gender (women) and culture (Afghani) as variables to investigate participants' information-seeking behaviors exemplifies SMM's adaptability to capture diverse constructs. The study was situated on the premise that Afghani culture places restrictions on women's interactions with the world by having them passively seek assistance through men. However, the Afghani refugees in the study were women living in the United States without men and therefore, were responsible for their own solutions for survival.

Methodologically, Smith (2008) identified a limitation in utilizing SMM in relation to non-Western people:

Effectively implementing the Sense-Making Methodology with people from non-Western backgrounds required adapting the assumptions of sense-making that individuals want to control their environment and that they ask questions to do so. If people, whether Western or non-Western, have not been authorized to be assertive or if they hold other values as more important, such as group harmony, this information seeking approach may not come naturally to them (Smith, 2008, p. 307).

Smith's (2008) assumption specifically taps into the possibility of value systems (cultural and religion) influencing people's approach to solving problems in their lives. However, this assumes that people are in systems (such as governing and culture) that are contrary to their own personal value systems.

Howard Rodriguez-Mori's (2009) study on the information behavior of Puerto Rican migrants focused on capturing the assimilation process. Participants in the study were not immigrants or refugees (such as in the case of Smith's (2008) study) but rather migrants coming from Puerto Rico to the mainland of the United States for the first time to live. Using a form of Dervin's Micro-Moment Time-Line Interview Method, Rodriguez-Mori (2009) conducted interviews in Spanish. Rodriguez-Mori's (2009) study focused on the process of migration in an assimilation context. Though assimilation is not clearly defined in his study, it appears to be used as a synonym for acclimation to an environment, as shown by this finding of the study:

[P]articipants' accounts, after they settled in the new community there was a time when they eventually took off on their own, either by driving or walking around, to explore the area ... Having experienced the migration process myself, in retrospect I had partly come to expect all of the other information behaviors found in this study. However, this sense-making/information seeking behavior arose unexpectedly out of the data as an agreeable surprise; I had in fact done the very same thing many years ago, but I had forgotten about it. I conclude that this sense-making strategy/information pattern is a regular occurrence in the assimilation process (Rodriguez-Mori, 2009, p. 77).

The description of the phenomena (assimilation process) investigated in this study is similar to Smith's (2008) study, in that, the process of learning to live in a new cultural environment is used to detect information behavior.

Methodologically, Smith's (2008) and Rodriguez-Mori's (2009) studies raise some questions regarding methodological and procedural methods used in interviewing participants who do not have fluency in the language of their country of residence. In the case of Smith (2008), an interpreter interviewed a refugee (Afghani) population, while in Rodriguez-Mori's study (2009) the shared native language (Spanish) of the researcher and participants was used during interviews. The semantics of language in the data collection process of qualitative sense-making interviews has not been adequately addressed, and as a result, further investigation into the influence of language on data collection is needed.

Laura Brendon's (2003) sense-making study on the information-seeking behavior of women uses gender as the unit of analysis and utilizes feminist theories in her treatment of variables, such as race, ethnic culture, or linguistic perspective. Brendon (2003) cites feminist theorist Donna Haraway when deciding to focus on gender as a unit of analysis. Brendon (2003) found that participants constructed perspectives toward understanding life based upon such personal characteristics as educational attainment, native language, socio-economic status, and marital status (p.118). She (2003) concludes that "further studies would benefit from working with participants who were more similar" (p. 118), suggesting a perspective beyond gender. Referencing Brendon's (2003) investigation into the information behavior of women as an example of a sense-making study provides support for the idea that participants should be grouped based upon very specific characteristics. This approach should result in a study that identifies the information behavior of specific populations.

Smith's (2008) argument to the question of whether culture or gender influences the use of the SMM is contrasted by the example of Daniel Roland's (2008) dissertation, "Interpreting Scripture in Contemporary Times: A Study of a Clergy Member's Sense-Making Behavior in

Preparing the Sunday Sermon.” The only participant in this study was a Caucasian, middle-aged American male Lutheran minister from the Midwest.

Roland (2008) makes no mention of how the race or ethnic culture of the Study’s informant related to limitations. However, he does state that:

Additional research may help to identify different and/or additional contextual factors for clergy members of other denominations and backgrounds that affect the verbing process in sermon preparation. The obvious contextual differences with the informant of the current research project would be education and theological position, but other contextual considerations include gender, age, and years of experience (Roland, 2008, p. 113).

Roland (2008) did not identify race or ethnic culture as variables in his investigation. However, his reasoning could have resulted from the participant self-identifying with the German heritage of the Lutheran Church (p. 227). Therefore, no issues of conflict between SMM and the participant’s approach to solving problems were detectable. This study agrees with Smith’s (2008) argument that a direct application of SMM within a Western cultural context is conducive.

SMM, has been used to facilitate the detection of people’s information behavior in which has allowed researchers to have a deeper understanding of how people use and do not use information. The studies discussed in this section highlight a number of areas requiring further investigation in relation to information-behavior as well as the use of Dervin’s SMM. Further investigation is needed into new applications of SMM to study the information-behavior of specific cultural groups beyond a Western cultural context. Additionally, further investigation into qualitative interview methods with participant populations that do not share the same

language as the investigator, or the language that the research study is being conducted, in would further the development of qualitative interview methods.

### **3.2 PARTICIPANTS**

At the University of Pittsburgh, students from China represent the largest population of international students (University of Pittsburgh, 2011). A total of 975 Chinese international students enrolled at the University of Pittsburgh in 2011, representing nearly 42% of the total international student enrollment. Within the University of Pittsburgh's School of Information Sciences, students from China also make up the largest international student population with a majority enrolled in Master-level programs: Master of Library Information and Science (MLIS), Master of Information Science & Technology (MSIS), and Master of Telecommunications & Networking (MST).

The participant population for the study consisted of a sample of 20 Chinese international graduate students from the PRC who enrolled in either the Summer or Fall 2011 semesters in one of the three Master-level degree programs at the School of Information Sciences. Convenience sampling was utilized in this study as the participants in this study attended the same school as the researcher. Previous SMM studies have had a participant population as small as 1 (Roland, 2008) and as large as 990 (Just, 2008). This study sought 20 participants to meet data saturation.

Eight of the participants had just begun their studies and had only been attending classes for a few weeks. These factors may have possibly contributed to six participants responding that they had not yet experienced an information problem related to their graduate studies. As a

result, the fourteen participants' responses were utilized for the analysis of participants' experiences as graduate students in the United States.

Participant recruitment was conducted through the University of Pittsburgh, School of Information Sciences listserves (e-mail communication), public notices (recruitment flyers) posted throughout the School of Information Sciences building, and word of mouth. A paid incentive of \$9.00 per hour encouraged students to participate. Funding was provided by the University of Pittsburgh's School of Information Sciences.

The data collection occurred during the Summer and Fall 2011 semesters, as a result of this the participant population was in flux, with new students arriving, and previously enrolled students completing degrees and preparing for graduation. Furthermore, participants' residency in the country ranged from less than a month to nearly two years. During the Summer 2011 semester, there were nine viable participants, there were 36 potential participants in the Fall 2011. Table 1 shows the distribution of the participant populations' enrollment among the Master-level programs at the School of Information Sciences during both of the semesters. The Fall 2011 enrollment does not reflect whether students were new or continuing; therefore, an exact viable participant population could be calculated without accessing restricted university enrollment data.

**Table 1.** School of Information Sciences master level Chinese international student enrollment

	MLIS*	MSIS**	MST***	Total
Summer 2011	2	6	1	9
Fall 2011	3	29	4	36
*Master of Science in Library Information Science (MLIS)				
**Master of Science in Information Science (MSIS)				
***Master of Science in Telecommunications (MST)				

Table 2 outlines the composition of the participants of this study by gender, age, undergraduate degree, and current degree of study. Of the 20 participants, 11 were female and 9 were male. Participants' ages were between 21-28, with a majority of them being between 21-24 years of age. Three of the 20 participants were pursuing Master's of Library & Information Science with the rest of the participants completing Master's of Information Science & Technology. Participants' in this study self-reported studying in disciplines related to computer science, business, and engineering as undergraduates in China.

**Table 2.** Study participant demographics

Participant	Gender	Age	Undergraduate Degree	Graduate Degree
DSP1	F	23	E-Commerce	MLIS
DSP2	F	23	Information Management	MSIS
DSP3	F	28	Business	MLIS
DSP4	M	23	Management	MSIS
DSP5	M	24	Computer Science	MSIS
DSP6	F	22	E-Commerce	MSIS
DSP7	F	24	Management	MSIS
DSP8	M	26	Electrical Engineer	MSIS
DSP9	F	23	Information System	MLIS
DSP10	M	23	Urban Planning	MSIS
DSP11	M	24	Information Systems	MSIS
DSP12	M	23	Communication Engineering	MSIS
DSP13	M	23	E-Commerce	MSIS
DSP14	F	23	Management Information Systems	MSIS
DSP15	F	22	Information Security	MSIS
DSP16	F	22	Network Engineering	MSIS
DSP17	F	22	Information Management	MSIS
DSP18	M	23	Management Information Science	MSIS
DSP19	F	21	Information Management	MSIS
DSP20	M	21	E-Commerce	MSIS

### **3.3 DATA COLLECTION**

Dervin's (2008) SMM and Micro-Moment Time-Line Interview Method approach guided the data collection of this study. The study captured 20 semi-structured interviews utilizing open-ended neutral questions derived from Dervin's (2008) model referred to as SMM questions or SMM-questioning. Questions probed for each of the stages of Dervin's timeline (Situation, Gap, Bridge, and Outcome) and are listed in Table 3.

**Table 3.** Sense-Making Method questioning

<p><b>TO TAP SITUATIONS</b> <i>*What happened?</i> <i>*What stood in the way?</i> <i>*What were you trying to deal with?</i> <i>*How did that connect with past events?</i> <i>*How did it connect to forces of power in family, community, society?</i></p> <p><b>TO TAP GAPS</b> <i>*What were your big questions?</i> <i>*What were you trying to unconfuse, figure out, learn about?</i> <i>*What did you struggle with?</i></p> <p><b>TO TAP BRIDGES:</b> <i>*What conclusions/ideas/ did you come to?</i> <i>*What emotions/feelings did you come to? .</i> <i>*What led you to that conclusion/idea/emotion/feeling?</i></p> <p><b>TO TAP OUTCOMES SOUGHT AND/OR OBTAINED</b> <i>*How did that [name that] help? facilitate? [And, how did that help? And, how did that help?]</i> <i>*How did that [name that] hinder? [And, how did that hinder? And, how did that hinder?]</i> <i>*If you could wave a magic wand, what would have helped?</i></p> <p><b>TO DIG DEEPER INTO GAPS AND STRUGGLES</b> <i>*What was missing?</i> <i>*How did that stand in the way?</i> <i>*And, how did that prevent you getting more help?</i></p> <p><b>TO DIG DEEPER INTO WHAT LED TO AN EVALUATION</b> <i>*What led you to that assessment?</i> <i>*How did that evaluation connect with your situation?</i> <i>*What was limited or incomplete about that?</i></p> <p><b>TO DIG DEEPER INTO HOW THINGS HELP</b> <i>*And, how did that help?</i> <i>*What did that allow you to do/achieve/think?</i></p> <p style="text-align: right;">© Brenda Dervin, 2008</p>
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By referencing Dervin's SMM (2008) questions, which are structured to lead the participant through the Sense-Making metaphor, individual responses are encouraged and anecdotal assumptions avoided. Questions for the semi-structured interviews are divided into two sections and seek information addressing students' information-seeking behavior related to their higher-education learning in general, not exclusive to library material or services. The first half

of the questions probed students for information-seeking behavior learned before coming to the United States to study; the second half probed for information-seeking behavior learned after coming to the United States. A two-part question design offers a way to compare practices for seeking information, and helps identify the previously learned habits or experiences that might influence current thinking or process. Interviews were recorded in both digital and analog formats to ensure the capture of data.

Follow-up questions for the primary situation questions were borrowed from and are modeled after Dervin’s (1983, 2008) SMM questions listed in Table 3. Examples of follow-up questions are listed below in Table 4.

**Table 4.** Sense-Making Method follow-up questions

SMM Follow-up Questions		
Gap	Bridge	Outcome/ Help
What was the information you needed?	What resources did you seek out?	How did you know that your need was met?
What were the questions that you needed to answer?	What assistance did you receive?	How did that information resolve your need /question?
	What information did you find?	How did the information help/ not help?
	What conclusions did you come to?	How did that make you feel?
		How did this situation influence approach of investigating information?

To aid in the data collection process, a native Mandarin-speaking interpreter assisted with any culturally dependent information. The interpreter also helped participants during instances where they might be unable to convey meaning from Mandarin Chinese into English. Furthermore, utilizing an interpreter who was a member of the study’s participating cultural

group supported cultural competence within the interview protocol. Guidance on the use of an interpreter to achieve cultural competence was gathered through a review of literature from the fields of social work and nursing (Watkins-Mathys, 2006; Shu,E., Kagan, S. & Strumpf,N., 2009).

Interviews were conducted at the University of Pittsburgh School of Information Sciences building during July and September 2011. The researcher applied several techniques to ensure participant comfort and understanding. Showing participants their assigned code names, which would be used in place of actual names, assured confidentiality while allowing them to review interview questions ahead of time, and sought to quell uneasiness. Additional techniques included providing participants an explanation of the study, both in electronic and analog formats, before the interview. Following proper interview protocol, participants were also notified in advance that the interview would be recorded, and notes taken (Clayton & Gorman, 2006, p.194). The recording included participants stating their consent to participate in the study, after reading the Participant Consent statement.

In this current study, translation of the interview tool was not considered. Participants in the proposed study are required to have a certain command of the English language as the University of Pittsburgh's School of Information Sciences requires a minimum Test of English as a Foreign Language (TOEFL) score of "550 (paper-based), 213 (computer-based) or 80 (Internet-based)" (University of Pittsburgh, 2010). Possible detection of challenges in language cognition may support previous studies that advocate for language services for international student populations (Lopez, 1983; Liestman & Wu, 1990; Huls et al., 1994; Chau, 2003; Morrissey & Given, 2006).

### **3.3.1 Cross-Cultural Interview Protocols**

Cultural awareness of ethnic minorities, and the migration of people, have been noted as contributing factors in the increase of cross-cultural research internationally (Wallin & Ahlstrom, 2006). Cross-cultural research involves research between different cultures. Successfully conducting cross-cultural research involves the integration of *cultural competence*, which is best defined as:

"a complex integration of knowledge, attitudes, beliefs, skills and encounters with those from cultures different from one's own that enhance communication, and appropriates an effective interaction with others"( Andrews, 2008, p.16; Jones,2011, p109).

Taking the above definition one step further, Shu et.al (2009), states that cultural competence is comprised of "cultural knowledge, cultural desire, cultural skills and cultural encounters." (p. 194). One of the many ways that researchers have supported cultural competence within interview protocol has been the inclusion of interpreters and translators who are members of the participating cultural group. In cross-cultural research, designing survey instruments that will collect valid data involves consideration of the extent of the usage of the tool to study culture (Pareek & Rao, 1980).

### **3.3.2 Procedures: Recruiting an Interpreter**

The decision to utilize an interpreter as an element of a culturally inclusive research methodology for an interview study involved more challenges than had been identified in the literature reviewed by the researcher. Hiring and selecting an interpreter from among the Chinese student population involved a number of legal and logistical challenges. International/ foreign

students in the United States of America are classified under F-1 visa status. The restrictions on the type of work that students with an F-1 visa can accept is restricted to employment only through a university or college, and for no more than 20 hours a week (US Citizenship and Immigration Services , 2011). Due to the restriction of hours, students who are already employed by a college/ department may not take on additional work.

Additional caveats were placed upon the researcher by the University, by limiting who could be hired to serve as an interpreter. The researcher was granted funding by the University of Pittsburgh School of Information Sciences with the restrictions that applicants had to be a University of Pittsburgh student and have already worked for the University but not currently employed at the University for 20 hours a week.

Once the qualifications of an interpreter had been established along with the employment restrictions, University resources were sought for assistance in the recruitment of an interpreter. The University of Pittsburgh Office of International Services (OIS) and the Confucius Center at the University of Pittsburgh were the first agencies identified for assistance, but no candidates were identified.

After nearly a month of advertisement with no viable candidates, the researcher turned to advertising on the public classifieds through the website Craigslist. In less than a week, two candidates were identified that qualified both culturally and logistically. This qualifying process involved interviewing the candidate, and having the candidate participate in the Pilot study to observe how they would interact with a participant.

The selected candidate was a Female graduate student in her mid-twenties from China. The selected interpreter was chosen both for her educational background, cultural background, and previous work as a medical physician in China. The researcher felt that since the interpreter

had a background in conducting patient consultations, this experience would transfer to the interviews.

### **3.4 DATA ANALYSIS**

This study used qualitative content analysis to discover themes and patterns in the information-seeking behavior of Chinese international graduate students. Content analysis is a research method that analyzes the content of communication in the form of text (Busha & Harter, 1980). Early examples of content analysis focused on a quantitative approach of counting words or phrases within text and then classifying them into categories for the purpose of drawing inferences of meaning (Weber, 1990). Focusing on the frequency of a word or phrase, rather than the content and context of the communication when gathering data for analysis has been identified as a concern for researchers. Concerns arise because the method does not factor in non-explicit themes that might be related to the data, providing further understanding behind a phenomenon (Weber, 1990).

To overcome the above limitation of content analysis, a qualitative form of this approach was used. Qualitative content analysis focuses on the context and meaning of communication versus frequency of words (Hsieh & Shannon, 2005). This goal is accomplished by identifying a unit of analysis based upon themes rather than specific words or phrases (Zhang & Wildenuth, 2009).

The researcher selected a qualitative content analysis method utilizing deductive codes from the SMM and theory to assist in the detection of the information-seeking behaviors of PRC student participants. Although deductive content analysis can be used to test the application of an

existing theory in a new context (Elo & Kyngäs, 2008), this was not the purpose of choosing to use the SMM instances as codes. Rather, detection of the participants’ information-seeking behavior by using predetermined codes from Dervin’s (2008) SMM was sought to align the methodological and theoretical structure of this study.

According to Elo and Kyngäs (2008), a categorization matrix can organize the deductive codes to assist with the coding process. The units of analysis for this study are the SMM instances taken from Dervin’s (2008) SMM metaphor. The codes have been aligned to the questions in the interview tool, and the following categorization matrix was developed based on SMM metaphor and is listed in Table 5.

**Table 5.** Coding Matrix of Sense-Making Instances

Coding Matrix of Sense-Making Instances, Components, and Examples From Dervin’s SMM (2008)	
Situation: The cause for the need of information.	Examples of Situation: <ul style="list-style-type: none"> <li>• History</li> <li>• Experience</li> <li>• Horizons</li> <li>• Constraints</li> <li>• Barriers</li> <li>• Habits/Skills</li> </ul>
Examples from the data: “Like in the course of Java, each week we are assigned to do an assignment and about the assignment, most of us were not clear what we were supposed to do. Some of my classmates will work together to think about the words of the professor in class.”  “I just finished my assignment about one hour ago. It talks about you should design lesson by ourselves and give your teacher the draft.”	
Gap: The question or muddle that the actor is seeking to address or answer.	Examples of Gap: <ul style="list-style-type: none"> <li>• Questions/Confusions</li> <li>• Muddles/Riddles</li> <li>• Angst</li> </ul>
Examples from the data: “I don't have teaching experience, so I thought it was very difficult for me to write down the structure of the lesson plan. So I need to find some information online. However, when I check	

online, it's very difficult to find such information on how to write lesson plan.”

“Never did anything like that before. It was an RSS reader and I didn’t know a lot about RSS file and at the very beginning I didn’t know anything.”

<p>Bridge: The connectors or helps that allow the actor to progress through his/her information need/problem.</p>	<p>Examples of Bridge:</p> <ul style="list-style-type: none"> <li>• Ideas</li> <li>• Cognitions</li> <li>• Thoughts</li> <li>• Attitudes</li> <li>• Beliefs</li> <li>• Values</li> <li>• Feelings</li> <li>• Emotions</li> <li>• Intuitions</li> <li>• Memories</li> <li>• Stories</li> <li>• Narratives</li> </ul>	<p>Components of a Bridge:</p> <p>Relevance - Criteria/Attributes used to evaluate how (___) serviced or impeded movement -</p> <ul style="list-style-type: none"> <li>• Questions</li> <li>• Answers</li> <li>• Information</li> <li>• Information designs</li> <li>• Sources</li> <li>• Channels</li> </ul> <p>Sources:</p> <ul style="list-style-type: none"> <li>• Channels</li> <li>• Media</li> <li>• People</li> <li>• Institutions</li> </ul>
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Examples from the data:

“We two Chinese students and we play together and are familiar with each other so we thought we should work together...We just discuss and we go through the book and see which topic is interesting and then we focused on two topics and she said maybe this one is better”

“Ok, API. Just search from Internet. Use Google and Baidu. Different search engine to search it. I don’t know how to say it, it is the things no school will offer. But some big website like Google or Twitter will they offer API always on website. Others, if we want data, they can copy API and use it. And we do with the music, so we want a music website can offer the API, which we can be use. Actually we found several API, but no one suitable for our system. So we just quit it and collect data by ourselves.”

<p>Outcome: The result of the information-seeking process.</p>	<p>Examples of Outcome:</p> <ul style="list-style-type: none"> <li>• Helps/Facilitations</li> <li>• Hurts/Hindrances</li> <li>• Consequences/Impacts/effects</li> </ul>
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Examples from the data:

“Previous experience you can find legacy code from a previous project. Of course it’s not always right on the Internet ...Cause you have to test it for the program until the program can work perfectly...You can’t copy code but you can learn algorithm from the legacy code just using different syntax and languages.”

“It’s just so-so... I still learned a lot from that assignment...the first thing was understanding of the topic and I not understanding very clearly or deeply...I think to ask a librarian is a way to understand this topic but everyone has their limitation”

According to Weber (1990), “there is no simple *right way* to do content analysis. Instead, investigators must judge what methods are most appropriate for their substantive problems” (p.13). To capture the information-seeking behavior of the participant population, this study was designed to have alignment between the theory and methodological approach, which is why the deductive codes correlate with the SMM.

Atlas.ti was utilized as the coding analysis software for this study. All transcripts were loaded into the software as one hermeneutic unit and initially coded with the four sense-making instances: *situation, gap, bridge, and outcome*. After this initial coding, the data was divided further by categorizing the codes between instances that occurred in China and situations in the United States. Situations related to experiences in China were denoted by the code *China education*. This was assigned to instances of *situation* that related to education experiences in China.

In further investigation of the situations, it appeared that some participants described their information behavior (IB) generally while others were more specific in describing information-seeking behavior (ISB) situations. In addition, in the instances where participants specifically described ISB situations, a patterned appeared where situations described three main tasks: writing assignments, programming assignment, and student life situations.

In order to better visualize this division among the data, a table was created denoting the types of information problems experience by the participant. Table 6 outlines the categorization

of the data. Four codes were created to describe the participants' responses for both situations related to their studies as undergraduates in China, and as graduate students in the United States. These situations should be viewed through an academic lens as they reflect participants' tasks and assignments in which an information need/problem was associated with it. The code of *None* described participants not providing a specific information problem. The code of *IB* was assigned to situations where participants spoke generally about their information-behavior that related to their academic studies, without identifying a specific incident. The code of *Programming* was assigned to situations where the participant specifically shared an information-seeking situation related to an assignment that involved computer programming. Lastly, the code *Writing* was assigned to an information-seeking situation related to an assignment that was focused on completing a written assignment.

**Table 6.** Distribution of participant situations

Distribution of participant situations		
Participant ID	Undergraduate	Graduate
DSP1	None	Programming
DSP2	Programming	Student Life
DSP3	Writing	Writing
DSP4	None	None
DSP5	None	Programming
DSP6	Programming	None
DSP7	IB	Writing
DSP8	Programming	Student Life
DSP9	Writing	Writing
DSP10	IB	Programming
DSP11	Programming	Programming
DSP12	IB	Programming
DSP13	Writing	Writing
DSP14	IB	None
DSP15	Programming	None
DSP16	IB	None
DSP17	IB	Student Life
DSP18	IB	Student Life
DSP19	Writing	Student Life
DSP20	IB	None

Participant responses that were assigned the codes of *None* and *IB* were excluded from the analysis as they do not address specifically information-seeking situations. The remaining responses were then divided into three main tasks types (programming, writing, and student life), loaded into three separate hermeneutic units, and re-coded again for the sense-making instances. The results of the codes associated with the sense-making instances were printed out and hand coded for patterns based on the activities, and lastly, grouped together for the results. The timeline for this process is outlined in Table 7, shown below.

**Table 7.** Research study activity timeline

Time frame:	Activity:
May 2011	IRB Approval
May-September 2011	Data Collection (Interviews)
October 2011-March 2012	Data Transcription
April 2012 - December 2013	Data Analysis

After the data was coded with the coding matrix, the identified themes were analyzed for patterns. Identified themes were centered to the interview questions, and the research questions, in order to locate patterns that might provide insight to the information behavior of the participants of this study.

### 3.5 TRUSTWORTHINESS

Qualitative content analysis has been categorized within a naturalistic paradigm (Lincoln & Guba, 1985; Bradley, 1993; Zhang & Wildemuth, 2009), which seeks “to describe and understand human behavior as it occurs in its natural contexts” (Owne, 2008, p.548). This type of analysis is the opposite of a positivist paradigm, which is associated with quantitative research that takes an experimental approach to assess the nature of reality (Owne, 2008; Bradley, 1993; Zhang & Wildemuth, 2009). Naturalist inquiry stems from a naturalistic paradigm and “focuses research endeavors on how people behave in natural settings while engaging in life experiences” (Owen, 2008, p.548). Multiple realities that are socially constructed are a central value to naturalistic inquiry (Owne, 2008).

Research methods that fall within a naturalistic paradigm seek to capture an understanding of human behavior that is innately subjective, and thus, methods used to ensure “validity, reliability, and objectivity would not apply as they do in a positivist research paradigm” (Given & Saumure, 2008, p.896). Rather, in evaluating qualitative content analysis research, one can find guidance through trustworthiness. A number of researchers (Bradley, 1993; Zhang & Wildenuth, 2009) have cited Lincoln and Guba’s (1985) book, *Naturalistic Inquiry*, as a source of guidance when outlining methods to aid in trustworthiness for qualitative content analysis. Trustworthiness can be described as “the ways in which qualitative researchers ensure that transferability, credibility, dependability, and confirmability [sic] are evident in their research” (Given & Saumure, 2008, p.896).

Transferability refers to how a researcher’s data and description of a study can be utilized by another researcher to formulize hypotheses and apply the information to a new context. This step in trustworthiness is not the responsibility of the researcher, but of the person developing

hypotheses from the study, and testing those hypotheses within a new context (Bradley,1993). This study supports trustworthiness by providing ample description and direct quotes from interview participants.

According to Lincoln and Guba (1985), dependability and credibility are dependent upon each other. While credibility in a study describes the “adequate representation of the constructions of the social world under study,” (Bradley, 1993, p.436) and may include prolonged engagement, persistent observation, triangulation, member checks, referential adequacy, negative case analysis, and peer debriefing (Lincoln & Guba, 1985), dependability in a study refers “to the coherence of the internal process” (Bradley, 1993, p.437). Therefore, if credibility can be demonstrated, it is sufficient in demonstrating dependability (p.316). This study sought to support credibility and dependability by using “members of the community under study” (Bradley, 1993, p.436) to verify the collected data. During the transcription process, three translators were utilized to ensure that applicable portions of the interviews were properly translated into English from Mandarin. This process involved having two Mandarin speakers transcribe while a third Mandarin speaker verified the transcriptions and assisted with cultural context.

Lastly, confirmability refers “to the extent to which the characteristics of the data, as posited by the researcher, can be confirmed by others who read or review the research result” (Bradley, 1993, p.437). Confirmability can be met through an audit of a researcher’s process and findings (Zhang & Wildemuth, 2009). For this study, confirmability was supported by having all interviews transcribed, and by keeping a log of notes and observations during the coding process to assist in the analysis process.

### **3.6 LIMITATIONS**

This case study, with its contextually specific participant population may not be generalizable to the experiences of all Chinese international students living and studying in the United States. This study did not seek to be generalizable, in order to identify genuine, unique examples of real situations and problems that international students experience while seeking to complete graduate studies in the United States. By capturing these unique experiences, this study attempts to contribute to the body of knowledge about international students' information needs, seeking, and use.

## 4.0 RESULTS

This study focuses on the information-seeking behavior (ISB) of graduate international students from China within a United States higher education context. Elements of this context include the academic environment and its associated helps and resources that support student learning. For this reason, the analysis includes two sections related to participants' behavior and opinions towards three Library Information Science topics; libraries and librarians, and information literacy (IL). These sections are contextualized with data collected from participants' experiences as undergraduates in China. Section 4.1 provides insight to participants' opinions towards libraries and librarians while studying in China. Section 4.2 addresses the detection of IL standards in participants' behavior as undergraduates in China.

The primary research question that guides this study is: *How do international graduate students from China make sense of the information they need in support of their intercultural learning experience?* The evaluation of data, grounded by this question, was framed by four key concepts from Brenda Dervin's (2008) Sense-Making Method (SMM) and metaphor, specifically *situation, gaps, bridges, and outcomes*. Within each of these conceptual categories, three broad themes related to Chinese international graduate students' information-seeking tendencies were identified.

Dervin's (2008) sense-making is a research theory and method that draws upon a person's (actor) internal and external behavior as it relates to a past experience with an

information problem. Constructing how a person might have been able to make sense of his/her information problem, the sense-making, relies on the identification of the sense-making instances: *situation*, *gap*, *bridge*, and *outcome*. Utilizing the sense-making instances as a framework, it may be possible to develop an understanding of how a person progressed through his/her information problem, and made sense of the resources used.

As noted in the Methodology section (section 3.4), the Study's interview instrument was derived from Dervin's (2008) model of neutral open-ended questions. This instrument allows the interviewer to tap into, and capture, the sense-making instances. The Results section presents the sense-making process of the study participants by operationalizing the instances as deductive codes. In order to provide an authentic representation of the participants' thoughts, ideas, opinions, and feelings, the results have been presented in their own words. The English of the participants' is that of an English language learner and does not reflect the written English of the students nor their academic performance. The analysis of the data within the framework of sense-making is divided by participants' ISB experiences in China as undergraduates, prior to studying in the United States, and then experiences as Graduate students in the United States. Section 4.3 is the analysis of participants' ISB as undergraduates in China. Sections 4.4 through 4.6 provide an analysis of participants' ISB in the United States as graduate students.

#### **4.1 LIBRARIES & LIBRARIANS: CHINA**

*Bridges* are comprised of sources of helps. Within an academic context, libraries and librarians can serve as sources of help for students when seeking information for their studies. In relation to participants' experiences in seeking information in China, the role of libraries and librarians

fulfilled varied roles in helping them to mediate their information problems. Participants described using their undergraduate library for information resources (books and databases). As one student said, “I went to the library to borrow some books for the basic programming” while another mentioned using a proprietary database, “... I searched the foreign database...first is from the school library [sic] has some bought from some foreigners”. These two participants described seeking and finding information resources from their undergraduate library in support of their studies, but this was not the case for all participants.

Relevancy and accessibility of a library were issues that two other participants raised when describing their undergraduate libraries in China. One participant described this problem:

“You, know my undergrad, the university has two campus and the one I studied in was far from the City. So the library facilities was not complete and it was a little small. Usually, me (sic) and my classmates would not borrow books. So when we wanted to find information or reference we just print the textbooks or go to the bookstore.”

For this participant, location of their campus, and the size of their academic library, seemed to prevent them from utilizing the space, collection, and services. However, this participant was able to navigate over these barriers by turning to his/her textbooks and accessing a bookstore.

Another participant also reported using a bookstore to access material for a course due to the collection of his/her undergraduate library: “... we won’t buy that just read some chapters in the bookstore...Because we can’t access the book in our library”. This participant, and the one cited above, experienced barriers to using their academic library in China. For one, location and size were cited as obstacle for access and support. For the second, scope or currency of the

collection of the library left the institution unable to support their information needs. However; both participants identify bookstores as relevant sources and places to utilize to support their academics. The role of a librarian in the academic learning process described by participants in this study was similar to their reported views on libraries. For some participants, librarians were relevant sources of assistance. As one participant said, “I just asked the librarian,” when they needed assistance with locating a book or assessing the authority of a book. Another participant described using the help of a librarian whom they identified as most authoritative:

“We could not find enough material and I tried to chat or email with the national librarian...National librarian because at that time I know we can send email [sic] to ask the national librarian and that was the most authorized people we can ask...They didn’t give me many or reliable resources, just recommend me to search some database from English [sic] or other countries.”

Although this was a government, not an academic librarian, it does demonstrate the student’s opinion of an information provider in support of resolving an information need. The idea of a librarian as a person who is educated and skilled in addressing information problems was not held by all participants. Two participants described not seeking out the assistance of a librarian during their undergraduate studies due to the perception that librarians in China are untrained information professionals lacking specific subject knowledge:

“The library [sic], they are just doing the work for the library but don’t understand what we really want...I think, I never, because I know they are not professional librarian [sic]...Actually, I think a lot of Chinese librarians have the librarian they just give them work as a job and they can find the work in the right place but I don’t think they have the knowledge for the specific degree.”

This sentiment was also expressed by another participant who offered context of, and a comparison of, his/her perceptions of differences between librarians and academic libraries in China and the United States. The participant explained:

“I just think something like, in China, a librarian is not a good job. It has low salary and the working [sic] is boring and not many people want to do that, it’s not noble work...I know it cause [sic] my school (in China), the university has three departments. I am in Information Systems and another department is Library and the third department is Archive. Sometimes we will have courses together and I have friends in those departments in my debating team and we will communicate about the future career of our major. They told me that, and you can tell, the staff in the Science and Library (library science) is not that professional...I can feel that basically they (University of Pittsburgh) are much more professional than the librarians in other place. Guangzong is a city that concentrates on its culture, but I still think I can’t get the help that I want. In today’s library (University of Pittsburgh), you want to [sic] information on biology (you can ask a librarian), ‘What books can you recommend?’ and you can get answers from Hillman Library because there is a special staff who have a biology master [sic] or PhD to help you. But in China, librarian [sic] just have a bachelor or master [sic] of library science, no specialty.”

The perceptions and opinions shared above provide possible motivations and perceptions as to why students from China may choose to overlook librarians as sources of informational support in their studies.

Awareness of the role of a librarian was another theme that appeared in another two participants’ response regarding their undergraduate experience in seeking help in searching for

information. For one participant they described librarians in China as non-accessible, (i.e., in their offices) and therefore, not a visibly apparent help for finding information:

“But to ask a librarian, in China it’s a little weird, because we don’t have that kind of librarian like reference librarian, that faces students. Maybe you need to come to an office to ask this kind of question.”

The absence of a reference desk where a librarian could be easily approached for help was identified as a barrier to asking for assistance by this participant. For another participant, a lack of awareness of the role of a librarian in searching databases was expressed: “Our professor advised us to search in CNKI...We just used some database to search...We didn’t know we can ask the librarian.” These participants who described librarians as inaccessible, or an unknown source for assistance, provide insights to their previous experiences.

These responses of participants’ understandings of libraries and librarians, drawn from their undergraduate studies in China, provide a deep source of context. The experiences the participants brought with them as international students studying in the United States provides background to their information behavior as graduate students.

## **4.2 INFORMATION LITERACY: CHINA**

As undergraduates in China, participants in this study expressed confidence in finding needed information online using the Internet. The skills required in accessing and assessing information in support of academic work has been associated with information retrieval skills. Within a United States higher-education context, retrieval skills are often associated with information literacy skills according to the Association of College and Research Libraries

(ACRL). Information literacy (IL), described as “the set of skills needed to find, retrieve, analyze, and use information,” (ACRL, 2006, para 1) is a goal of library instruction as a way to offer support skills for academic success and life-long learning. An information-literate student should demonstrate five IL standards that cover topics, such as information retrieval, to the ethical use of information. Three of the five standards were detected during participants’ descriptions of seeking information in support of their information problems. Standards two, three, and five will be discussed in this chapter.

#### **4.2.1 ACRL IL Standard Two**

As noted in the literature review (Section 2.3), ACRL’s IL standards are not universal and they are culturally contextual. ACRL’s (2000) IL Standard two states that: “The information literate student accesses needed information effectively and efficiently” (p.9). This standard essentially taps for performance indicators related to students’ searching behavior in both a physical and digital environments. It also assumes that a student is functioning in an environment where information is easily accessible.

Searching on the Internet for information was cited by 17 participants when sharing their general information behavior related to their studies. Participants were asked how they came to learn to use the Internet in searching for information. A summary of participants’ self-reporting on their first introduction to searching the Internet is listed in Table 8.

Of the 17 participants, eight cited first using the Internet during their middle school education, five during high school, three in college, and one in primary school. Formal instruction on how to use the Internet for their studies during his/her college education was described by only one participant, and it was presented as an information retrieval course. Other

participants described being taught how to search the Internet by parents, friends/classmates, teachers, Internet bar employees, or not at all (self-taught). Of the participants who specified using a search engine the first time they accessed the Internet, a majority listed Baidu and three mentioned the use of Google. Below is a table that details participants' responses to their first Internet search.

**Table 8.** Study participants' first introduction to the Internet

Participant ID	Grade Level	Place of Access	Method of Instruction	First Search Engine
DSP1	N/A	N/A	N/A	N/A
DSP2	N/A	N/A	N/A	N/A
DSP3	College	Internet Bar	Bar attendant	Google
DSP4	College	Internet Bar	Friend	Baidu
DSP5	Middle School	School	Teacher	N/A
DSP6	Middle School	School	Classmate	Baidu
DSP7	High School	Home	Parents	Baidu
DSP8	High School	Home	Friend	Baidu
DSP9	N/A	N/A	N/A	N/A
DSP10	College	University	Retrieval Course	N/A
DSP11	Middle School	School	Classmate	Google
DSP12	High School	Internet Bar	Self	Baidu
DSP13	High School	Home	Teacher	Google
DSP14	Middle School	Internet Bar	Classmates	N/A
DSP15	Middle School	Home	Self	N/A
DSP16	Middle School	Home	Self	Baidu
DSP17	Middle School	Home	Self	Baidu
DSP18	Primary School	Home	Parent	Baidu
DSP19	High School	Internet Bar	Friend	Baidu
DSP20	Middle School	Parent's Work	Parent	Baidu

The significance of this background information is that it provides insight into the accessibility of the Internet in China. When describing searching behavior in an online environment, some participants described using academic databases. One participant articulated their search method in detail: "...we used topics search, quick search, advance search and this kind of search

techniques we were very familiar.” This participant’s response aligns with the second performance indicator for this Standard; “The information literate student accesses needed information effectively and efficiently” (ACRL, 2000, p.9). This participant shared her/his experience of learning how to first use academic databases from a librarian, and receiving assistance with searching from a professor.

When describing techniques to search on the Internet, some participants described using keyword searching techniques, such as:

“If I wanted to find information on financial analysis or something like that, I just type in the words and search for it.”

And,

“You know, in China, the search engine is popular among students because you can search for free and in-putt the key words in the blank field and search.”

Participants did not describe using limiting or advance searching features during their use of search engine.

When participants were asked which search engines they used, and why, the responses varied. One participant described just using a particular search engine because it was recommended by a classmate: “My classmate told me. I ask them how they think of that (code) and then said you can search the Internet, Baidu, you can search some famous coding website.” Two participants described in more detail that the choice of search engine was based upon the language of the information being sought. One participant shared, “I can search more English website on Google but, Baidu I can search Chinese”, and another:

“Depends, if the assignment was in English then I search in English and if Chinese, I search in Chinese. In some situations, I use Baidu because Baidu is better in searching in

Chinese... Well, I just think that Baidu is a Chinese search engine and people say it's better for searching in Chinese.”

The relationship between the language of the information and choice of retrieval tool (search engine) identified by these participants above describes a culturally dependent relationship in that, utilizing language as a determinate in the selection of a search engine supports the probability of retrieving information more effectively.

The responses provided by participants in reference to their searching behavior and accessing information in an online environment suggests that some received instruction and guidance to develop techniques that would qualify as a demonstration of ACRL IL competency. However, actual assessment of Standard two to similar populations of college students from China may want to consider inclusion of their previous information environment, which may shape how Chinese culture and language may influence searching techniques.

#### **4.2.2 ACRL IL Standard Three**

ACRL's (2000) IL Standard three states that: “The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system” (p.11). This standard was expressed by two participant who described searching authoritative information as an undergraduate students in China. The first participant described identifying core literature within their subject field:

“We have the ‘core’, I only read papers in core periodicals, and I know the famous scientist in Information Science...You can do something like search the citation index...Just scientific database in our library database...The core journals are listed by

certain universities...Peking University, Beijing University, and others...In any field there will be three or four top scientist in a field.”

This cultural context for how information is ranked in China, based on its association with universities that are better funded and supported by the Chinese government, was shared in greater detail by another participant:

“I think because there is an organization to manage all the magazine (academic journal) and they evaluate which magazine is the core literature...Yeah, and another evaluation method is to look at the author and the author’s university or research center they belong to. If this research center or university is a very high level, then I think we trust better...Because high level university in China that means that the students and professors have a higher scholarly level then the common level university. According to my opinion that is a way to evaluate.”

The participant was asked how they learned this method of assessment and shared , “[F]rom professor because our professor also recommend some information for us and I think it depends on the course materials and I think most of the materials come from the high research center or university.”

The participants described utilizing a culturally constructed method for evaluating academic information. Participants shared evaluation of academic information by utilizing government rankings of an academic institution and its associated publications. Participants described seeking out “core literature” within a subject field, which was also tied to a ranking of its associated university. These responses express a learned method of determining the authority of information because of its place within a government ranking. Content and quality of a publication was not a factor in the assessment technique shared. These findings suggest that the

influence of the organization of China's higher education, and associated academic publications, infer how students may assess the authority of information. Those seeking to detect Chinese graduate students' understanding of methods of assessing information might need to consider the cultural context they bring with them in how they might perceive authority of information, and possible assumptions towards the authority of academic rankings.

### **4.2.3 ACRL IL Standard Five**

Standard five states, "The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally." Standard five specifically addresses the information behavior of an individual as it relates to his/her observance of copyright compliance and academic integrity. Copyright compliance and academic integrity, or plagiarism, has been cited as a possible problem for Chinese academic researchers. In both Beijing and Shanghai, academic programs have been closed (Centenary College, New Jersey) due to widespread plagiarism (Redden, 2010). These cases are only dwarfed by instances in which Chinese faculty and researchers were found guilty of plagiarizing research in academic publications (Friedman, 2010).

In this study, nine instances were identified in which the concept of copyright appeared in reference to participants' understanding of academic integrity and avoidance of plagiarism during their undergraduate studies. One participant shared how she/he became aware of copyright infringement through news stories in China. He/she shared, "I think in the news and the famous people they are doing the sentence. Because in the news we know that they used other people' writings and they are in the court. It happens a lot." This response demonstrates

how notable incidents of copyright infringement and plagiarism in China are publicized, and that students from China may have awareness of these issues.

Six participants reported learning about methods to avoid plagiarism from an undergraduate instructor/professor in China:

“Yeah, don’t cheating [sic]. In the second year of undergrad, in a course where we had to write reports. The professor said we had to have references and a bibliography don’t just Google and copy everything...It’s a kind of stealing.”

Another participant described how a teacher in China explained to them explicitly how to insert citations into their assignments:

“But my teacher explain [sic] that if you never write the reference it’s plagiarism. So if you take the exact words of others, cite it. If you paraphrase it is OK, you can put the author in the reference list.”

Other participants shared the following: “Yes, they tell you the format sometimes and tell you what information should include [sic] in the paper and also recommend you to put in the reference,” “I know how to write the reference from undergraduate studies, ‘Easy Bib’, it generates the reference automatically,” “Yeah, for different resources there is different format,” and “Yeah, he told us we can’t copy someone else...Because the article was written by other person. It’s like property, so we can’t stole it [sic]”. In these six instances, participants described receiving clear instructions during their undergraduate education on how to denote and assign attribution of information resources used to complete an assignment.

Not all participants were able to clearly articulate how they came to learn to include attributions to information utilized in support of their assignments as undergraduates in China.

One participant described how he/she identified the need to create a bibliography on their own:

“For the reference, I just figured it for myself; I just had a feeling to put it somewhere...For the copyright issue that, I when I first writing [sic] my essay in the bibliography. I just had a feel [sic] can’t just use all the resources as it was all mine.”

For another participant, she/he explained their process of including attribution on assignment, but did not provide where they came to learn that references “should” be included in their written assignments:

“Yeah, record with paragraph or sentence is cite and which book or journal or websites, I should record it and put it on the bottom of the page. If it is a book, put it at the end of the paper. Maybe some journals or websites put on the bottom of the page.”

These responses represent participant understanding of methods of adherence to copyright and the treatment of intellectual property within an academic context. Their procedural knowledge of the ways to avoid consequences associated with plagiarism and copyright infringement within an academic setting may demonstrate detection in Chinese higher education to address prior negative associations of plagiarism. Although not all participants were asked to describe their understanding of, or exposure to, the concept of copyright and the avoidance of plagiarism, it can be inferred from these examples that some participants had exposure to methods for preventing unintended academic dishonesty during their undergraduate studies the China.

From this data, it is not possible to determine whether participants understood the full complexity of the ethical issues assumed with the usage of information within a United States copyright context. However, the study did detect knowledge of practices for giving attribution to copyrighted material and other types of intellectual property. This finding positively supports the idea that Chinese students may have an awareness of the ethical and legal issues surrounding the

use of copyrighted information. Additional research on the degree of student understanding of copyright, and the policies governing academic integrity among newly arriving PRC graduate students, would help track the presence of this issue in relation to IL.

IL, and the ethical usage of copyrighted material within a United States context, is presented in this section as a means of offering a discussion of participants' attitudes towards these constructs. These findings suggest that the participants in this study may not have had full exposure to the methods or techniques necessary for the development of competencies related to IL in a United States context. These findings may suggest that librarians and educators should not make the assumption that international graduate students are fully equipped with the necessary techniques to carry out academic tasks that require IL competencies.

### **4.3 UNDERGRADUATE INFORMATION-SEEKING: CHINA**

#### **4.3.1 Situations: China**

The focus of this study is on participants' experiences in seeking information as graduate students in the United States. In order to understand the participants' experiences as international students studying in the United States, one has to also understand the cultural context they carry with them as persons from China. This cultural context becomes visible when participants express the differences between studying in the United States and growing up in China. By identifying participant's previous behaviors in seeking information as undergraduate students in China, this will assist to identify similarities and differences in behavior as well as provide space

for identifying possible barriers or challenges that participants may face during their intercultural learning experience in the United States.

*Situation* is the background information (history, past experiences, habits, etc.) that a person holds that may influence his/her choices. The sense-making instances were utilized as a framework to construct how participants made sense of their information problems as undergraduates in China. To acquire information relating to their prior information seeking experiences during their undergraduate educations in China, participants were asked the following question: *Can you please describe how you found information for an assignment while you were a student in China?* Of the 20 participants, 12 chose to share a specific information problem related to their undergraduate studies in China. Participants that shared examples of seeking information for an assignment concentrated on describing situations related to computer programming tasks, written papers, and undergraduate theses.

Two examples provided by participants that described completing tasks related to computer programming related primarily to assignments requiring the construction of a website or a web application. One example related to computer programming included building a website for an Ecommerce course:

“...it was a project for the course Ecommerce and we had to do a website related to a database and we need to do it but most of us don’t have the experience and the professor said that the course just teaches us the aspects.”

In another computer programming assignment example, a participant described learning a specific type of programming language during the process of designing an application:

“...there is a big assignment...it was called ‘Transportation Use for Java Framework’.”

Participants also described situations in which they needed to seek information to complete a final project during their last year of undergraduate study, or when they were researching a final paper. Examples include “I was preparing for my thesis; for it was a big assignment”, “[i]n my undergraduate time we need to write an essay this essay topic is Enterprise 2.0” and “[w]hen I did my final project in my last year, I worked on Google Maps”. These examples provide glimpses into the range of situations that participants decided to share with the researcher. Many of the participants were pursuing computer-based fields, of study, and thus, described the process of finding information to solve computer programming assignments. These included learning new software, creating a website or organization application, and writing a paper, such as an undergraduate thesis.

#### **4.3.2 Gaps: China**

Participants described their information gaps when recalling specific assignments or tasks they had difficulty completing as undergraduates in China. Some gaps were not attributed to a lack of subject knowledge. In some cases, external forces, such as language and government restrictions, and the limited availability of, or access to, the information they needed. Participants indicated that they lacked the information needed to complete assignments that required knowledge of computer programming design and their associated languages. To determine the nature of the gaps, participants were asked: What were you trying to solve? How did you know you had a need? And, how did you know what you were looking for?

Two participants recalled gaps caused by their lack of experience with computer programming: “...it was a project for the course Ecommerce and we had to do a website related to a database and we need to do it but most of us don’t have the experience,” and:

“...there is a big assignment... it was called ‘Transportation Use for Java Framework.’ It was a new software for me and I tried to find on the Internet if there were some forums to see if other people, what other people do.”

Participants spoke of completing their education in China; however, the subject matter of their studies was within an international context. To this point, one participant described how language created an information gap for an assignment, “In my undergraduate time we need to write an essay. This essay topic is ‘Enterprise 2.0’ and that is the topic and it is very new and [sic] can’t find a lot of materials in Chinese resources.” Another participant described an information gap caused by the difficulty of retrieving information through an academic database: “I need many papers to write and it much harder so I need to use it (academic database) more skillful.”

The role of the Chinese government appeared in one participant’s description of a gap created due to a lack of access to information online. “When I did my final project in my last year, I worked on Google Maps. You know, a few people know Google Maps because it is blocked in mainland China.” This participant was seeking information that was not legally accessible, yet it did not prevent her/him from having awareness that the information existed, and from seeking to gain access to the information.

Lacking subject knowledge created information gaps for some participants as undergraduates in China. For others, the intersection of the need for new information along with the interference to access information due to language (i.e. lack of available resources in Chinese) and governmental policies (i.e. China’s Internet filtering policies), created information gaps. The identification of these information gaps assists in providing a background to some of the challenges that participants in this Study experienced as undergraduates in China.

### 4.3.3 Bridges & Outcomes: China

In this section, *Bridges* and *Outcomes* are presented together because a bridge can lead to an outcome or another gap; presenting this relationship can assist with understanding the connection. Uncovering information uses to bridge participants' identified information gaps required tapping into the ways in which participants found assistance with progressing through their information problems.

The students interviewed mentioned using their personal networks of helps, such as professors, family and friends, and online resources. The types of questions used to uncover the bridges included: What assistance did you seek? What resources did you seek? And, what helped you to answer your question? Participants described seeking assistance from professors and advisors who provided resources, methods of searching, and additional directions for assignments.

Participants described struggling to find help with their information problems. Additionally, not all helps, or *Bridges*, resulted in satisfactory outcomes. As undergraduates in China, participants primarily sought information to support their completion of assignments related to computer programming, and the writing of reports. *Gaps* in information were sometimes related to a lack of subject knowledge, but were also caused by the lack of access to information due to barriers in the environment, such as limited access to English-language resources, or blocked Internet sites (i.e., Google Maps). As a result, participants used friends and family, as well as extended personal networks, to expand their access to information helps. While the outcomes of the bridges resulted in the completion of assignments, participants noted feelings ranging from contentment and success, to disappointment and regret.

For the participant seeking to complete an Ecommerce website, he/she shared seeking assistances from the professor:

“We talked to the professor many times when it started and was just assigned. We don’t actually dig in it just take a look and put it away for a few days and when we started to do it, we found it extremely difficult...Most of us can’t do it”.

The professor told the student to work independently. She/he felt that this was not adequate guidance. The participant was asked how that made them feel, and they said “bad.” Within Sense-Making, the *actor* defines their own *world*, the participant described their own personal perspective and context of the meaning of the response from this one incident from one professor:

“I’m Chinese. Usually you don’t get that but sometimes you do... it happens several times... In high school and primary school... When you are young you don’t have those feelings of being angry or mad ...You don’t know, you don’t tell me. So if I ask a professor something and if they don’t tell you, that’s it. That’s what happens in China.”

For the participant completing an Ecommerce website, they were asked what happened next and they shared how they progressed through their problem:

“ (The professor canceled the assignment)...he...she did two things, she put more grades on attendance and participation and then gave us an easy assignment like design an interface...Easier is good but I didn’t learn as much as I expected. For me, I need you to tell me how to do it and practice. But if you don’t teach me anything, just give me a hard one (question) and I can’t do it, so then she give me a like a “1+1=2”...Something you already know or you don’t put in a lot of time and you can finish it. That’s easy.”

The participant did not seem to express satisfaction with the solution the instructor of the course

provided to her/him in support of addressing the information gap.

For the participant seeking to learn a new programming language, she/he described utilizing a previous known help, online Internet forums for computer programming:

“I tried to find on the Internet if there were some forums to see if other people, what other people do...because it wasn't a new idea (Java) it's just new to me so I believe that people have already done these kinds of things. Usually, when I meet a problem in an assignment I always go to the Internet to check the forums. There are a lot of different forums and you can really find what you need. Sometimes you can directly find the solutions.”

Relying on previous experiences with searching for programming assistance, the participant sought out information online through a programming forum:

“I think that is my experience. I think before the project I like to stay on the Internet and see something new, something technical knowledge, technical news, what is that updated thing. Usually I can see those forums and people they are very professional. Different forums have different topics and each form I think there are several people that are professional and they like to post some new solutions for some kind of questions.”

The participants also stated seeking information from programming books at a library, as well as consulting his/her group partner:

“Also, I went to the library to borrow some books for the basic programing. Also, I had a partner so we could do the project together. Most of the time I searched by Internet and used Baidu and there is a lot of information I can get over there.”

The participant was asked how he/she knew the information found on the forums could be trusted, and they explained:

“Usually I have to try. Like the Java programing code usually, I post maybe 95% right things. Sometimes on the Internet when I copy and paste them in my compiler, if it does work, I have to fix this problems (sic). So I think most of them are right but (if not) I have to do something to fix it.”

Since the information retrieved online was used to perform a task, the participant knew that the information or code was satisfactory because it allowed the application to function. When the participant was asked by the researcher how he/she knew enough had been found, he/she said: “because I can what I want. Like java code and I can compile it successfully or I can reach the final...what I expect and I think it’s good and I am satisfied.” The participant, explained that the information found on the Internet forum answered his/her information problem and shared the results of the assignment: “[t]he professors gave us the grade and we finished...Not bad, it’s a good score for me.”

The undergraduate thesis is a degree requirement in Chinese universities (Wang, 2003, p.160). One participant shared with the researcher her/his process of learning to search for academic journals. The participant described not knowing how to search the academic databases and sought the assistance of their academic advisor:

“My advisor told me more skills for excel. When you input the paper, you think how can I get it faster and better and if you play on it you can get some tricks. Such as, you can narrow your searching to make sure the only papers appear between a time period or limit items in relevance. You just play with it like computer games and gradually you learn more about it.”

The participant described learning how to use the advance searching feature on an academic database from her/his adviser:

When asked by the researcher what other assistance the advisor provided, he/she said:

“In fact, I write one version. The first version and about 30,000 words and give it to my advisor and he said you should have a well formed paper and he told me how to form the paper...He said the teachers who are reading my paper, what their reading habit is and his experience of the criteria for reading the paper”

The participant sought the assistance of her/his advisor in developing the structure of a thesis.

The outcome of the assistance, and help given, was shared:

“(I) finished my paper and I got an excellent...I feel happy but I didn’t get the prize of excellent graduate because I didn’t enough scholarships in my third year. About 13 people of 92 got excellent. Yes, I feel successful, I finished everything.”

The participant described feeling successful in completing an undergraduate thesis through making use of the information searching and writing assistance provided by her/his undergraduate academic advisor.

Searching for information on academic databases appeared in another participant’s description of her/his information seeking situations. The participant described to the researcher that she/he was writing an essay on the topic of Enterprise 2.0, and was having difficulty finding material in mandarin:

“the topic and it is very new and can’t find a lot of materials in Chinese resources so we have to search English resources but we don’t (sic) familiar in the English database and in our library system we bought (access) EBSCO and other very major English database but we don’t know how to use it sometimes it is an English problem or we can’t access the resources easily.”

The researcher asked the participant what he/she did next, and they replied, “I think at that time we tried our best to search on Google and some English ( language) web page and some English (language) database but not very fluent or completely.” When asked by the researcher if he/she sought any assistance from a librarian with searching, the participant explained:

“We didn’t know we can ask the librarian because for students the first choice is to ask the professor because that may be the most familiar people and it is convenient, at class after class you can ask. But to ask a librarian, in China it’s a little weird, because we don’t have that kind of librarian like reference librarian, that faces students. Maybe you need to come to an office to ask this kind of question.”

The researcher then the participant how he/she identified the database he/she initially searched. He/she explained:

“First is from the school library has some bought from some foreigners. At that time we didn’t have many things to evaluate foreign database so we don’t evaluate a lot. So it showed a listed to resources and I used them and tried to search some web pages from the professors blogs.”

As a follow-up, the participant was asked how he/she knew that the information found on the blogs could be trusted, and the participant responded:

“In English (searching) and the search tips is easy and we don’t have to pay a lot of attention to know how to search but I think the evaluation. I think at that time the English articles were valuable for ourselves because English especially, America has the latest ideas for this topic ( Enterprise 2.0) so one we search for this kind of articles we just think it is valuable and we don’t evaluate.”

The assessment of the information retrieved online by the participant did not include an evaluation of validity or authoritativeness of the information. The participant responded:

“At that time we evaluate depending on the articles and compare with the Chinese articles and can see that the English articles gather more information, inspiration, details and the theory of this topic.”

Utilizing the information found in both academic databases, and online, the participant described a process of constructing a bridge, and completing their assignment. The participant described what happened next, “[m]y professor thought it was good and gave a high recommendation...He gave the grade.”

The participant was then asked whether he/she felt successful in completing this assignment and responded:

“Yes, cause the paper was complete and had an adaptable structure and give the reader a clear structure of the idea. Another this is the professor gave the comment and grade I studied a lot of things in this period of the paper”

From this, the researcher detected some uncertainty in the participant’s response and as a follow-up, asked whether he/she felt successful in their searching technique. The participant said:

“Then I thought I was successful but not I know there were a lot of short comes. I think if I doing this paper now, the first thing is to ask a librarian as many as possible and now I know a lot of access methods and not just limited to the database and by myself.”

Although the participant progressed through the information problem and found a solution, upon reflecting on the *bridge* constructed to assist them with overcoming the information problem, he/she would have sought out the assistance of an academic librarian.

In another situation involving a final project, a participant commented on the issue of Internet filtering and access to information. The participant was completing a final project on Google Maps, which is a blocked website in China. The participant described to the researcher what he/she first did to seek access to the website, explaining that:

“Firstly I used the proxy server which is given by my adviser and to search on Google and especially the developer forum and ask questions on that and wait for replies. Then I asked my classmates, my middle school classmate who was studying in Hong Kong and ask her whether or not she can find someone who was familiar with Google maps API but she tried but couldn’t find one. So, I still searched online and asked my friends if there was someone they know who can help me and indeed they found some of their friends to help me and got some very useful information from them and from my adviser and also from the Internet. So gather information from varies ways.”

The participant sought the help of a friend in Hong Kong because the server was located there; however, the friend did not have the necessary technology background, and was unable to assist. The participant then sought out help through Internet forums. This source of help was used for the following reasons: “Because I think there should be plenty of information online and expertise who can solve my problem because the Internet is just a cloud of people from all over the world.” When asked by the researcher how he/she knew that the information would be reliable, the participant responded:

“I will judge on the content and I find information from the website I think will be trustful. Also, I sent email to the developers who host on those forums and given by words I thought that maybe he or she is the expertise in this field so may he or she can solve my problem.”

The participant then proceeded to offer information on the individual that helped him/her to bridge their information gap:

“Actually the one who gave me many suggestions and instructions is my mom’s work mate. He’s working on my mother’s organization system and not only workmates but friends. So my mother asked him if he can give me some instructions because the projects in school must be easier for a man who have working experience in the working organization I can ask him if he had time to instruct her or give her some suggestions that uncle is really nice and he just ... You know we call mother and father’s friends uncle or aunt, not really relatives. That person gave me instructions that which really made my project a big progress and I can continue on it and I get an achievement on my project.”

The researcher asked the participant how he/she knew to ask for assistance through their parent:

“I told her, I said ‘hi mom, I don’t think I can handle it and I ask the ones who can help and I still can’t solve the problem. Do you know is there anyone that can give me some instructions because I don’t know who I can ask for’... Because she is my mother and she can help me to solve my problem because she doesn’t want to see her daughter worry about anything.”

Utilizing an extended network through a parent, the participant was able to identify a help to bridge their information gap, allowing for the completion of their project. The participant shared the result of the project with the researcher: “I gained one of the highest marks in my school and won the award of best project in the university.” The researcher asked the participant how this felt: “very proud of myself and also most important I thanked all the ones that helped me in those three months.” This participant was able to rely on a personal network for help in bridging

their information gap. Although not all helps sought were successful in bridging the gap, eventually, someone through an extended network was able to assist.

The helps, hurts, and behaviors utilized by participants to bridge their information gaps as undergraduates in China required a diverse set of knowledge and resources. The convenience of online searching, learned at an early age, seemed to be a readily sought after information help by participants. The mix of negative and positive associations with libraries and librarian proved to appear as sources of helps and hurts by participants. The use of personal networks of friends, family, and educators appears to have provided the bulk of helps sought after to bridge information gaps. The Discussion section will further discuss participants' undergraduate experiences, as differences, comparisons, similarities, and parallels with their graduate studies experiences are explored. In the following section, participants' information-seeking experiences as graduate students in the United States will be discussed.

#### **4.4 FIRST GRADUATE INFORMATION-SEEKING: UNITED STATES**

In this section, we look at the participants' experiences as graduate students in the United States using the SMM category, "*Situation*". Situations are the context and background for the information need or problem. To tap into participants' information problems, the following question was asked: *Can you please describe how you find information for an assignment now during your current study in the United States?* The participants described three types of situations, or contexts, related to their information-seeking processes in the United States. They are: programming tasks, writing tasks, and student life situations. The conceptual category of *Situation* is analyzed through these distinct lenses.

#### **4.4.1 Academic Information Environment**

The University of Pittsburgh is located in Pittsburgh, Pennsylvania, a city of 306,211 residents (United States Census Bureau, 2012). The main campus of the University of Pittsburgh is located in the neighborhood of Oakland. The Office of International Services (OIS) is responsible for the support of immigration issues for international students and scholars at the University. OIS also provides support through orientations supporting their acclimation to the University, the City, and cultural context of living in the United States. These orientation sessions are offered at the beginning of the semesters, as well as throughout the year.

The University of Pittsburgh Library System (ULS) offers both digital and physical library collections as part of its academic information resources, which were available to participants during their studies. Students can access electronic resources and collections such as e-books and online journals, through the EZproxy associated with their university user identification number. These resources can be accessed online from anywhere in the world.

At the time of data collection, the physical library spaces available to students included an Information Sciences (IS) Library located inside the School of Information Sciences (SIS) building. The collection of the IS Library included content for the three associated programs of the School of Information Sciences (Information Science & Technology, Library & Information Science, & Telecommunication & Networking) in addition to a special collection of children's literature. The library was staffed by one managerial librarian, one full-time paraprofessional who had an MLIS, and a number of student workers, many of whom were pursuing MLIS degrees. The IS Library offered instructional workshops on the ULS services and various academic databases. In the summer of 2012 the IS Library was closed permanently. The University's main library, Hillman Library, absorbed the IS Library collection.

Hillman Library serves as the main library for the ULS system. Several special collections, such as the East Asian Library, exist within Hillman Library. The East Asian Library is of significance to this study as its associated librarians have spoken fluency in a number of East Asian languages. They also offer specific library orientations in the form of library tours and bibliographic instruction (catalog, databases, and citation tools and writing resources) to international students in Asian languages, such as Mandarin and Japanese. The instruction sessions are marketed to students through the Office of International Services (OIS), which typically holds orientations at the beginning of a semester. At the time of the study, the East Asian Library was only offering their library workshops at the beginning of the fall semester. Another resource came from professors requesting that librarians provide instruction on the databases and the ULS services during class time.

#### **4.4.2 Information Tasks in Relation to Situations**

For this study, discussions of tasks were viewed in relation to the participant's sense-making process, and analysis of participants' information problems related to *situations* categorized as type of task. Participants primarily shared two types of information problems: those related to school tasks (i.e., assignments) and those related to activities encountered during everyday life, noted as Student Life Tasks. The following discusses tasks in relation to the participant's sense-making process.

School tasks fell into two types of assignments: writing assignments and computer programming assignments. Writing assignments are defined in this study as tasks requiring students to submit a written document for evaluation. A computer programming assignment is defined as a task resulting in the production of a computer application.

#### 4.4.3 Situations: Writing Assignments

The assessment of student learning through a written report can assess students' understanding of course learning objectives through the production of new ideas. At a graduate level, the role of writing assignments can serve as an external form of evidence that students utilize critical thinking skills. Of the twenty participants, four chose to recount instances when they sought information to complete a writing assignment. Two participants described an experimental research proposal structured as a group assignment for an Information Science course on Human Information Processing (HIP). The students needed to identify a problem related to a HIP method or theory and design a proposed study to solve or improve upon the identified problem. In addition, the proposal needed to take the tone of a research grant, and include APA citations and references for resources. An oral presentation of the paper was also required. One participant recalled the assignment:

“...Last semester I wrote some papers, one was a group assignment and one was personal and I need [sic] to find some material to write it...For the group project, we search [sic] the information together and then select [sic] the most valuable and read and then give out each one's idea and then collect them together. Each person write [sic] a part of the paper and then put them together to form a paper.”

Research papers, one discussing copyright, and another of writing a lesson plan were a few other types of writing assignments shared. “Let me think, I got one related to copyright topic paper,” recalled one participant. “That course assignment was copyright.” Another noted an experience writing a lesson plan:

“I just finished my assignment about one hour ago. It talks about, you should design lesson [sic] by ourselves and give your teacher the draft. But because I don't have teaching

experience, so I thought it was very difficult for me to write down the structure of the lesson plan.”

The variety of writing assignments shared by participants was reflected in the course work they were completing at the time of the study. The diverse subject matter of the assignments may be attributed to the differences between the various graduate degree programs that are under the umbrella of the School (SIS).

#### **4.4.4 Situations: Programming Assignments**

Five participants shared specific problems they encountered when searching for information to complete a computer programming assignment. Types of programming assignments included building applications, creating a website, and learning a new programming language.

A group assignment for a course on Adaptive Information Systems was mentioned by two participants. The assignment required students to draw upon theories learned in the course and demonstrate them in the design of a small adaptive system. Two participants described this situation:

“Let me think about it. One is an Information Science course called Adaptive Information System Design, and we need to build a system, which the system will use maybe some coding and also need data [sic], the data sometime we gain [sic] from API. You know API, so we try to search for API data...But we search for a lots of time [sic] but we cannot find a suitable API.”

“Last semester, in Adaptive Information System that was (name of professor), that was challenging for me cause [sic] I transferred from LIS (to IS). We didn’t need to do a lot of programming but in the first assignment and the final one, it was tough for me but at

least there was group work. The first one was a programming assignment and you can use any programming language you want. The TA provided us with information and several tools and go directly to use them [sic] and it was helpful to me.”

Other participants shared situations where they needed to create a website: “The project was to create a website issue used by all faculty and students at the School of Information Science,” or demonstrate a growing competency in the usage of programming languages and design:

“Like in the course of Java, each week we are assigned to do an assignment and about the assignment, most of us were not clear what we were supposed to do. Some of my classmates will work together to think about the words of the professor in class.”

Another programming situation shared by a participant involved creating a website: “The project was to create a website to be used by all faculty and students at the School of Information Science.”

Computer programming tasks may take on the form of solving a mathematical problem or equation. This was the case for one participant who sought help calculating a parameter to determine a design that would optimize a network. “The assignment was about calculate [sic] some parameters in the network to optimize the cost in the through-put in the whole network,” the student recalled: “I can’t remember the full question...It’s a mathematical problem on paper.”

These situations, related to completing a computer programming assignment seemed to be mostly reflective of students pursuing graduate degrees in IS. This can be attributed to the high number of participants in this study seeking graduate degrees in IS.

#### 4.4.5 Situations: Student Life Tasks

During the interviews, participants also shared information problems related to student life. They described situations secondary to their academic assignments, such as determining which courses to take, how courses relate to their field of study, and how to navigate the University's services. As one student noted, "In the first week I have attended six courses. But it's not my course in this semester. Second week, I wanted to drop one of them." Another shared a similar experience:

"You know, I have some little questions, there are two courses: one is Human Information Processes and the Human Factor. When I take that course, it's all about psychology. So I just wonder, 'how the psychology [sic] is related to the computer?'"

As well as, one participants' situation related to using the student services system and financial system:

"I don't know, I know there is Pitt Pay in our portal and it just list [sic] our tuition and fees. I can't exactly [sic], what the economic terms mean, like, 'deposit' or how to use the credit card to pay the tuition and just transfer the money from my bank account. I need to search it, and where to mail to China..."

These participants shared situations that reflect the concerns of students just beginning their studies, and learning how to navigate a new academic environment, education system, and area of study.

Another information-seeking issue centered around a participant sharing his/her situation related to their difficulties with English-language fluency, "I think it is about English because when I first came here (United States) sometimes, I know what it is in Chinese but I just don't know the English name..." This participant shared their situation as a ESL speaker struggling with language semantics.

One participant nearing the end of their degree shared their situation of trying to learn a new programming tool in support of job seeking:

“Yeah, to be honest, I have one thing that’s been going on lately, I have some specific questions on using some (programming) tools, but I just can’t find anyone to help me...Recently, I’ve been looking for jobs and the descriptions of the jobs said you need to know JEE (JAVA Entrance Exam); you need to know this tool, that tool. I know that’s [sic] the skills I need if I want to have a job.”

Although this participant was a current student, he/she was focused on the future challenge of gaining employment.

The situations shared by participants related to student life are not necessarily directly tied to completing a specific academic assignment. However, these situations shared suggest that international students experience additional information problems outside of the classroom that require information helps and assistance from their academic environment.

#### **4.5 GAPS: UNITED STATES**

Two primary types of *gaps* that led participants to seek information were caused by school assignment tasks, or tasks associated with living in a new country and pursuing studies at a higher-education institution in the United States. To tap into these gaps, the following questions were asked: What were you trying to solve? How did you know you had a need? How did you know what you were looking for? This section highlights three emergent themes related to gaps. They are: locating information, imposed queries, and awareness of helps.

### 4.5.1 Gaps: Writing

Two participants described their gap in information while writing an experimental paper similar to a research proposal. One participant recalled, “Yeah, the paper, you need to present an experiment to prove something about human information processing;” the second participant noted, “He need [sic] us to design an experiment and to confirm some condition or some, I cannot remember that word...theory? We need to confirm that (theory)...I need to find some material to write it.” These examples illustrate that the students had information gaps associated with both identifying a subject (a theory) for the paper and structuring a paper in the form of an experimental research proposal.

Participants commented on other information needs related to a writing assignment, including finding information appropriate to the task and topic of the assignment. “I searched for the books and articles...,” said one student. “This topic is a virtual topic and there is a lot of research on this topic so there is [sic] so many books.” Another participant related a situation in which “...it's very difficult to find such information on how to write lesson plan [sic].” Although the two participants were completing different types of writing tasks, they expressed that their information gap stemmed from the amount of information available on the subject. One experienced not being able to find specific-enough information, while another had difficulty processing the abundance of information. These participants shared difficulty in locating specific information for their assignments.

## 4.5.2 Gaps: Programming

The information needs identified by participants when completing a computer programming assignment created a variety of gaps. One participant described seeking code to build a system: “We need to build a system, which the system will use maybe some coding and also need data [sic], the data sometime [sic] we gain from API.” Another participant recalled having an information need based on an unfamiliarity with the task, and how to begin an assignment. “Never did anything like that before,” the student remembered. “It was an RSS reader and I didn’t know a lot about RSS file and at the very beginning I didn’t know anything.”

Another example in which the participant was tasked with solving a programming code error led a participant to seek information online on the Internet:

“I had to make a program executable and to function to help you do some task for your program...One of my co-workers on this project, she actually generated this idea. The project is based on PHP, HTML, CSS and we have to take care of the back-end to set of the servers and store any kind of information, and we have to design good user interface to manipulate all their tasks...The website wouldn’t show correctly and usually when I get stuck, I refer to the online resources.”

Another participant described a gap in understanding the instructions for an assignment:

“Generic Programming Java, so I think the proper assignment description, before I knew this I just knew generic. I just knew to deal with generic (programming language) so several of my classmates will get together to think about and double-check what we were supposed to do.”

Finally, another participant related the challenge of calculating a mathematical problem that caused great confusion:

“The assignment was about [sic] calculate some parameters in the network to optimize the cost in the through-put in the whole network...I can’t remember the full question...There is no solution to that question, the problem is like a disaster.”

The frustration of the gaps shared by participants provides an authentic expression of the stresses caused by imposed queries in the form of homework assignments. The gaps in information were not necessarily tied to a lack of knowledge that would be found in a single information resource, or even an information resource that would traditionally be found in academic scholarly resources, such as authoritative books or journals.

### **4.5.3 Gaps: Student Life**

Confusions and muddles encountered by participants in their ordinary daily life as students living in a new country, and navigating through graduate studies, presented a variety of information gaps. Doubt, confusion, and uncertainty were a few of the emotions expressed by the participants. One participant described several sources of confusions, created by living in a new country while navigating a new education system:

“I don’t know, I know there is Pitt Pay in our portal and it just list [sic] our tuition and fees. I can’t exactly [sic] what the economic terms mean. Like ‘deposit’ or how to use the credit card to pay the tuition and just transfer the money from my PNC bank account. I need to search it [sic] and where to mail (post office) to China and ask him to do something for me. I am still explore this campus...The health information, the insurance, the total fees for tuition and I don’t, if plus the insurance [sic] how much I should pay and about ...I need some information, I need some information but I haven’t tried them.”

This participant's description of being stuck in an information gap at the time of data collection was ongoing, and his/her progression through this problem was not captured as it was not yet resolved.

Feeling stuck in a problem with no awareness of available helps was also expressed by another participant. This student sought information to develop a new skill to enhance his/her employability:

“...I just can't find anyone to help me. I don't think any of the students, any of my classmates or professor knows, yeah, I doubt that...Just java eclipse, it has different versions. I just think no one else knows more than I do.”

Expressing feelings of doubt that no one could assist with the information need of learning a computer programming language highlights a gap, this gap in information was also accompanied by feelings of isolation from help, when the participant declared that “no one else” would know more than themselves.

The challenges faced when selecting courses caused one student to feel uncertainty, “I'm not sure which course I will drop because this course is all in time [sic]. I'm back and forth on how to select my course.” Confusion is another feeling that can occur when a lack of information takes the place of understanding. For example, one participant experienced confusion and a gap in understanding the relationship between two related academic disciplines: “Human Information Processes and the Human Factor, when I take that course, it's all about psychology. So I just wonder how the psychology [sic] is related to the computer?” This student's question, and confusion over the relationship between the two subjects', addresses the interdisciplinary approach of the course that may present an explicit connection.

Culturally dependent information can cause confusion and may be further fueled by semantics in language. One participant shared such a gap in information created by difficulty between Mandarin Chinese and English and the associated cultural differences:

“...I have to search what I want in Chinese no matter if it’s on Baidu or Google. It was common because sometimes the translation is different. Like I can give you an example, the names of movies is [sic] different (between Chinese and English)...It is hard for Chinese students to talk with people who speak native English, and we want to talk but we don’t know what they are talking about. I think they are talking about one movie we (Chinese students) have already watched and we know what they are talking about, but we can’t say anything in the talk. Feel bad because I want to talk...”

The angst the student felt over the gap in information was caused by the challenges associated with communicating in English, while also attempting to bridge culturally dependent information in support of socialization with classmates.

The information gaps participants shared in relation to student life experiences were broad; the students’ length of stay in the country varied from as little as a few weeks to more than a year. The gaps covered many aspects of daily life for international students living in a new country while pursuing graduate studies. A common theme presented with these gaps was the exposure to concepts, situations, and problems caused by the intersection of the presence of American culture and English language, which participants may have not previously experienced. Gaps with components related to culturally dependent information and contexts may have further complicated participants in the sense-making process, as they lacked awareness of the information helps and resources available to them as students.

## 4.6 BRIDGES & OUTCOMES: UNITED STATES

Within SMM, the *Bridge* represents the helps used in the sense-making and unmaking process. Detecting a participant's actions when addressing information needs, or gaps, may provide insight into how a person can, or cannot, progress through a problem. In this study, participants were asked to share what helps they used to progress through their information gaps. The following questions were asked in an effort to tap into participants' *Bridges*: What assistance did you seek? What resources did you seek? What helped you to answer your question? How did you access this resource/help?

Dervin (2008) defines the *Outcome* in the sense-making process as the result of the bridge; it can be an answer, solution, or another *Gap* or problem. *Bridges and Outcomes* are presented together in this section because an *Outcome* is the result of the *Bridge*. Examining the relationship between these two concepts helps solidify their connection. To tap into the *Outcomes* of participants, the following questions were asked: How did you know that your need was met? How did that information resolve your need/question? How did the information help/not help? How did that make you feel? How did this situation influence approach of investigating information?

### 4.6.1 Bridges & Outcomes: Writing

Writing assignments played an important role in charting the Bridges and Outcomes of this study. For international students, mastering a foreign language and successfully articulating thoughts through writing can prove challenging. Several students recalled experiences of seeking information when attempting to complete a written assignment. Their recollections offered

insight to the information-seeking behavior of PRC international students. For the participant in search of information in support of writing a lesson plan, he/she first sought information online. The participant explained why they first sought information on the Internet: “Well, it's easier and faster. I have a computer always. That's why I checked it online.” The outcome of this searching was shared: “when I check online, it's very difficult to find such information on how to write lesson plan. It's like if you check Google, it's easy for you because like some teachers will talk about it by PowerPoint and other things. But if you check our database like in PittCat, there is not a lot of information for this.”

Further discussion revealed that the participant's search strategy, using the library's online catalog, involved keyword searching and the use of the aggregator. “I just use ‘Find Articles’ (library aggregator) in the PittCat system (online library). So, I just input keywords ‘study’ and ‘lesson plan’ and tried to find some information.” The student then explained the decision to use the aggregator:

“Because, I think I assume I can find a lot of information. The aggregator combined the entire database together. So, it's easier for me and also there are other sources, like ‘the cloud’ (word cloud). You can choose which year, skill, particular search area. So it's better for me.”

The participant indicated that the outcome of searching the Library's collection through the use of an aggregator and selected keywords was unsuccessful; the information found did not help answer the information problem. The participant next turned to an Internet search:

“Go to Google...I found a lot of teachers' PPT talk about it (lesson plans). Although they are not scholarly resource, but I just want to know the structure of lessons, so it's OK for me. I can do that by myself.”

Here, the participant revealed that the PowerPoint presentations retrieved online provided the information needed to bridge the information gap:

“I just want to know the structure of how to arrange such a task plan, lesson plan, not to use the content of the lesson plan from other teachers, or from other books, or from other resources. So I want to know the structure.”

The assessment of the information retrieved by the participant involved a discussion of reliability through association. “Well, because they are professors from other universities and college,” the student explained, “I think they have the experience, teaching experience, to design the lesson. So that's why I trust them.” This comment indicates that the participant used the associations created by the academic institution, and the author’s job title/position as an educator, to determine the reliability of the information. When the participant was asked if he/she was satisfied with the information found, he/she responded:

“Because the teacher, I told you the requirements, it's also the teacher's requirement for my homework. I think I just make all points ask to do [sic]. So, now I feel satisfied but I don't know the outcome (of the assignment) yet.”

In the above situation, the participant had yet to identify the outcome of the information-seeking process. Expressing feelings of satisfaction with the information found enabled the student to comprehend the information gap and proceed through the requirements of the assignment task.

As noted in section 4.6.1, two participants shared their experiences of working on a group assignment of writing an experimental research proposal paper. The first participant shared a positive experience in which the steps of the projects, including selecting a partner, researching the topic and completing the assignment, were all done satisfactorily. Conversely, the second

example illustrates difficulties international students may have in seeking information at an American university.

The first participant's interview began by exploring the process of identifying a group member. "We [sic] two Chinese students and we play together and are familiar with each other, so we thought we should work together," remembered the student. After selecting a partner, the pair chose a topic for their assignment:

"I think she...we just discuss and we go through the book and see which topic is interesting. And, then we focused on two topics and she said maybe this one is better. Yes, our textbook...Because the teacher organized his course to reference the textbook." The pair then searched for information on the topic, "The Internet and a book the teacher recommend [sic]...Actually, he (the professor) recommend [sic] a number of books and one is the textbook and, if we have time, we can go through this book. It is helpful for our study."

When the participant was asked what information was sought in the textbook, he/she explained:

"I just extract [sic] information for our paper. Actually, we got the idea by sending the little paragraphs to the professor and he gave us feedback and thinks it's very great. The idea is very great so we continue [sic]...He need [sic] us to design an experiment and to confirm some condition or some, I cannot remember that word, theory. We need to confirm that (theory)."

The participant may have made sense of the information utilized in the textbook through the assurance provided by the professor's comments. In addition to utilizing the professor and the textbook as helps, the participant also sought feedback from a classmate, whom was selected

based upon specific qualifications. “We asked our classmate about our experiment,” the student recalled. “We ask the classmate who got ideas and got lots of ideas...He always good at study and do good [sic] in every course...He's my friend and we discuss [sic] the problem together.”

Soliciting assistance from a classmate whose academic performance was familiar, and with whom the students were sociable, further aided in the quest for information. At this point the participant explained the assignment requirements in more detail, and how the pair knew the requirements for the task were fulfilled. “We just need to design it and confirm it,” the participant stated. “Actually, in the book, the writer had design [sic] an experiment to test it but it wasn't perfect enough, so we made it more perfect.”

The participant was then asked how the pair knew that they had designed a “more perfect” experiment. “Because, during the presentation, the professor was very satisfy with our design because he applaud,” explained the student. The professor’s feedback appeared to provide the participant with the confirmation that the outcome of the assignment was positive.

The second participant that shared his/her information process for writing an experimental research proposal related to HIP described selecting a group member. “Maybe I choose randomly,” the student recalled. “They sit behind me and I said, ‘Can you be my partner?’ and they said ‘yeah.’” While the partner was also an international student, the pair did not share a native language or cultural background. The participant remembered the challenges associated with this difference, “...sometimes, I say something and she cannot understand me and sometimes she said something I could not understand her [sic].”

Working through the communication challenges, the pair progressed through the task of writing an experimental research proposal:

“I read the instructions and then the examples, and then discussed with my partner. And, all of do [sic] some research on Google and discuss again and decide what I should do and what should you do. After we finish the work, we come together to discuss again and finally we finish the work.”

The professor also provided students with information resources: “He (the professor) just provide examples of papers...He gave us the URL of those papers online.” Although the “papers” were not defined by the participant, it may be informed that they were electronic journal articles. The participant sought specific information in the articles and via Internet searches. These methods helped identify useful information for the project:

“Well, it makes me know how to design a psychology experiment since it is a psychology course, and it tells me the steps of the experiment and got some ideas from it and designed my own experiment...If the information could provide us with some ideas or specific information on what we want to do.”

Although the participant searched for information on Google, he/she was deterred by instances in which accessing proprietary information involved the use of the university library’s licensed databases. “I will try the online library on Pittsburgh (university’s databases),” the student stated. “And, if I really can’t (access it), then I will forget it.” When asked whether instruction on how to search the databases was provided, the participant replied, “There is some guy called (name of male library paraprofessional) in the third floor (School of Information Science Library), he’s the one to teach me how to use it (the) first semester I was here.”

A series of follow-up questions sought to identify the participant’s exposure to alternative search techniques and library services. The answers indicated that the student knew how to borrow books from other libraries, but not journal articles. After further discussion, the

participant also shared an absence of familiarity with advance limiting features on the databases, such as “full-text” or “Scholarly/Peer Review,” and did not participate in a formal library orientation. To this question the participant surprisingly replied, “Is there? I don’t know, how do I find this information?”

While the participant seemed to understand how to access the library’s electronic resources, utilizing all of the library’s services, or using electronic resources to their fullest extent, was beyond his/her knowledge. This demonstrates a lack of awareness of all the academic helps provided to students by the Library system.

During the interview, the participant expressed preferences for selecting the information resources used in the assignment:

“... I prefer the papers from the famous universities...Because I think that the famous universities always provide the more better [sic] resources...Cause [sic] better universities has better information resource, better students, better professors and then they should have better work...They should provide me those useful information and trustworthy [sic]...I don’t know how to judge this, I just kind of sense, for example, if the paper is from Harvard University, it must be good. Cause [sic] Harvard is the best university.”

This participant assumed the reputation of an institution and the sources of funding were good indicators of research quality.

Another participant also described his/her preference for selecting information resources based on a university’s ranking in the popular magazine, *US News & World Report*. The participant explained how, and why, he/she first came to use this resource as a rubric for assessing authority of education and scholarship:

“...Cause I need to the *US News* [sic] for the ranking (universities) information...I think the better rank can present a university as better funding, better education, and provide you more opportunities to find a job here (in the United States)...A friend taught me and provides this information.”

Finally, the participant was asked if additional helps were utilized for the assignment. “At the initial time, we were unclear what we should do,” recalled the student. “So, we asked the professor together and he said how to design the experiment and what is necessary in a psychology experiment. The professor is a nice guy.”

The participant, and his/her fellow group member wrote the experimental research proposal utilizing the professor’s initial instructions and secondary explanations, journal articles, and online searches. The participant negotiated with his/her group member and delegated tasks between themselves in order to complete their assignment and make sense of their information problem.

Another area in which a participant encountered barriers was when attempting to search for information for a written assignment on a topic they did not fully understand. This was the case for one participant who was writing a research paper on the topic of United States copyright and technology. A book was the first resource the student sought, because:

“Books is a structure literature [sic] and contains a lot of complete ideas on this topic and give you very complete and big outline [sic]...I think from professor that have recommended some books [sic] and we know the different characteristics for different material, and in my undergraduate [sic] we made a comparison between book, article, website.”

The participant also read research articles from a reference list provided by the professor. “From this reference list, I can find more information to give me deeper knowledge and inspiration of the topic, and try to find these articles in the database,” the student explained. A library orientation introduced the reference service, which the participant used in different modalities. “Beside to search in the Pitt database [sic], I ask the librarian and chat with the librarian online and they gave me another recommendation materials [sic],” recalled the student.

The chat reference service was easy to use. “It’s convenient,” the student noted. “You can chat from home 24/7.” And, the student opted for a familiar online librarian:

“I recall NY public library and some university librarians...I knew about NY public Library from China. We had to do a project and research, and New York Public Library, so I knew I could use this chat function. Now in American [sic], I use it directly. I know a lot of big universities have this...I just choose because NY Public Library is most familiar.”

When asked, the participant did not express concern asking a public librarian for assistance with an academic assignment. “That’s an issue I haven’t concern [sic].” The student also utilized university resources, “But I don’t just chat with the public librarian, I also chat with an academic librarian at University of Pittsburgh,” Consulting the text, and other resources suggested during chat reference sessions, aided in the search for information:

“Then I read it, to see if it was useful or not...Whether it could solve my confusions or my problems, and that was the first evaluation method. And, the second was to see the materials, it is a scholarly article, a review, instructions, something like that...It depends on my evaluation, the first: Can it answer my problem? And, second is if it is authorized...If it comes from a scholarly article, I can trust it. But if it comes from a

website, I think it might, in my opinion, is lower ...I look at the resource, what magazine it comes from and where the author is from.”

Evaluation of the information provided by the librarians included evaluating the relevance of the information, to the assignment and the identification of the authority of the information resources.

Fellow classmates also became a viable information resource for this participant:

“Some classmates I am familiar with and some are my friends...Because we have to do some projects together and that time we know her experience and outstanding ability related to some topic...From their views of the topic and classes’ expressions and writing essays you can evaluate...You can easily know this person in some aspect to know if they are outstanding or not. If this person expresses lots of ideas that are logical ideas for these things and you can think this a lot but they can [sic].”

Relying on friends, and academic individuals with a record of successful performance to identify a suitable classmate to turn to for help, the participant asked the classmate to clarify the paper’s subject matter and the writing process. “I wrote the outline for the paper to ask for advises [sic], and they gave me some additional ideas for this topic...I saw all of them and think that the additional concepts could help me to finish...benefit my paper,” the student explained. When asked how the participant knew the classmate’s suggestions satisfied the information need, the participant noted:

“First of all, I am not familiar with this topic. Then I read all the papers and get very confused and not get [sic] a very obvious structure for this topic. But that friend is very familiar with this topic and did a lot of research on this, so for their experience I trust them, and when I saw the advices I thought it was better than my opinions.”

The participant described the outcome of the assignment as a “so-so” grade, and noted a lack of understanding regarding the subject matter as a possible cause. The participant’s comparison between himself/ herself and a classmate indicates an awareness of this issue:

“I just can’t understand the levels, I can’t understand another level...When I communicate with other classmates and they can think of some other ideas for this topic and I can’t think of any...I think it comes from the level of knowledge accumulation and having the fundamental of this knowledge, and after you read this paper you are just very low understanding [sic]...You can just know some basic concept and basic direction, but you cannot think more.”

This response illustrates a lack of understanding linked directly to Dervin’s (2008) SMM bank of neutral open-ended interview questions in which she suggests asking participants to identify a better method of help. When asked, “If you could wave a magic wand, what would have helped?” the participant responded, “...to read more and ask more people for help.” Asked specifically whom he/she would have asked for help, the student responded “the professor.” The student said he/she did not ask for help because, “Shy ...maybe the language...maybe my language is confusing and I cannot express clearly.” This response may suggest that for this participant language and cultural differences prevented him/her from fully seeking out the help needed to support them in learning new subject matter.

The bridges, and their associated outcomes, suggest that participants in this study expressed contentment with the helps found to assist in making sense of information problems related to completing a writing assignment. However, for one participant the barrier to making sense of his/her information problem seemed rooted in language and culturally dependent information, and would have benefited from more communication with the instructor.

#### 4.6.2 Bridges & Outcomes: Programming

By restricting this study to students in the University of Pittsburgh's School of Information Sciences, many of the results focused on instances stemming from programming assignments. Assignments of this type produced a range of experiences, from needing more help from the professor, to finding the information needed by working with other classmates. In two instances, participants described episodes involving a programming assignment for an Information Science course, titled Adaptive Information Systems. The two students described seeking information for a group assignment requiring the construction of an adaptive information system. The first participant was asked how the group made sense of the assignment task:

“...So we have group [sic], we can discuss it about maybe something interesting to make. Finally, we found the topic by ourselves, the music station, so just we, so the instructor have talk with each group [sic] and he said this is OK, good for our course, and we start...The assignment, we built particular system, it can play music, can have personal service.”

The participant described seeking data, specifically, application programming interface (API) code, to create a system that could connect to an external website, and explained why the group decided to search to obtain the necessary code:

“You know API, so we try to search for API data. If we can find API, we don't need to collect data by ourselves. If they are maybe as much data they has [sic], if we have more data the better. But we search for a lots of time [sic] but we cannot find a suitable API.”

The group planned to build a music website based on content from Last.fm, an online music discovery website. API can be obtained online at no cost; the participant recalled searching for this data online using the search engines Google and Baidu.

“API, just search from Internet. Use Google and Baidu. Different search engine to search it. I don’t know how to say it, it is the things no school will offer. But some big website like Google or Twitter will they offer API always on website [sic]. Others, if we want data, they can copy API and use it. And we do with the music, so we want a music website can offer the API, which we can be use [sic].”

Unable to locate code that met the needs of the system being built, the group collected data themselves. “Actually, we found several API, but no one suitable for our system,” the student stated. “So we just quit it and collect data by ourselves.” When asked if other assistance was sought to help find the information needed, the participant shared a conversation with the professor:

“We ask for our professor. Just ask our professor. He has give [sic] me some help but at last, finally, we haven’t figure it out. He give me some more resources and ask you can try these. And, actually there is no detail requirements about you should find API [sic]. You also can collect data by yourself, just cost too much time. So we do what he had told us, but we haven’t finished it. So we just collect the data by ourselves.”

The help offered by the instructor was not useful in progressing through the task, and the group was unable to locate the API code needed to create their website. They proceeded by writing the code themselves:

“If we find the API, we don’t need to collect by ourselves, we just copy API and use it. It is music thing, so we need to find website, and we just need to find data of music. So,

since we cannot find API, we just search for the music website. We found one is called Last FM so they offer the free music download and all the information, the name, the artist, yes, something for the particular song. So we copy the data, and download music from this website. Just by hand, so it cost a lots [sic] of time.”

As a result of the extra time spent to complete the assignment, the group distributed the work as follows:

“Next step, yeah, we have three people in a group. So, one people, one person is deal [sic] with data collection. So, she goes to website and download music. And, at same time when download [sic], also copy the...make Excel for copy the main artist and the time, and some information about songs and make Excel on it.”

Another component of the assignment was a report that accompanied the website. As the student recalled, “This report is not important, so we don’t put much time. It just to describe all the system [sic].” The group determined the report was not important by evaluating the following factors:

“Because, I don’t know how to say [sic]. It just, we need to write, the system is the most important things. Report just a description of this system, because the instructor what to know [sic], yeah, maybe we cannot, when we demo it, we cannot describe it clearly, so the instructor want to have a report to read through and know all the system...Because Information Science course, the most important is how to build system [sic], the report is always...maybe not called report...it called [sic] description or demo, or introduction or something, just to describe the system.”

The participant’s opinion that the written component of the assignment was not as important as the program in the assessment process was supported by the length of the report submitted:

“Everyone says that...Everyone spends much time on system design, and maybe the last day or something, they finish it, and they also found need write something about what system do [sic]. What’s the function, maybe some including the coding or something. Just conclude what we have done in maybe two pages or three pages paper to write this [sic].”

The resources utilized, and time spent creating API code, supported the completion of the assignment task. The participant described how the group reconciled the evaluation process beyond the awarding of a grade:

“Evaluation, I think it is kind of our experience, because our Master and Information Science [sic], I think it is the course can be practical [sic]. Maybe in the future, we go to work, we have to do some particular system, now we have experience. So it is better.”

When asked how he/she felt about the outcome of the assignment, the participant explained:

“Yeah, give some feedback. Actually we have demo, and in the demo we first we give speech, then professor will ask some question [sic]. Yeah, and just like that...when I have finish something, maybe a paper or a system, I will feel happy. Because I done something [sic], and also I don’t know, also I can get good grade, this is good enough for me.”

Initially faced with an information gap when trying to locate the API code needed to complete the assignment, the group overcame this challenge by writing their own code. The participant expressed feelings of contentment after completing the assignment and received a positive evaluation.

A second participant, who had recently switched from Library and Information Science to Information Science, also described completing a programming assignment for the Adaptive

Information Systems course. This student was part of a group tasked with creating an RSS reader; he/she recalled selecting a group, “There were lots of Chinese people in the course, so just choose who you are familiar with.” Along with familiarity, the individual’s native language was a qualifier when identifying and selecting group members. According to the participant, there were “no language problems.”

The group relied on the teaching assistant (TA) as a resource when creating the website. “The TA went into detail about the resources and provided a lot of examples and several website to see as examples,” stated the student. “The professor said that the TA had a lot of experience about all these languages.”

The group was composed of three persons and, “we started to assign tasks...Maybe because the assignment can be split in three parts.” After the tasks were divided among the group, they consulted the resources provided by the TA:

“Start working on it and check out the website the TA provided and download the codes, but first chose the language (programming)...We three were familiar with...The websites web divided up by languages, so we just go to the one (associated with the language) we choose.”

In need of additional help, the group searched the Internet:

“We also Googled the same thing and tried to find something other resources...Cause [sic] we can’t just copy the example, we need to find out if there are other examples, and the examples did not provide all the ways to implement for the assignment.”

When asked why the group used Google as the search engine of choice, the participant responded, “I just have the feeling that Google can provide everything that you search for on the Internet.” The student reflected on his/her early usage of the Internet, and first introduction to

Google as a junior high school student in the early 2000s in China, as a main factor in the decision to use and trust Google as an all-knowing source.

The participant then described retrieval techniques and the search process in detail. “I first know what I am going to search and know very well and start searching,” the student recalled. A process for finding search terms also was determined. “Go to a dictionary or a wiki...It’s called Wikipedia...The old encyclopedias we have provided us all the information and you just trust them,” stated the participant.

This comment led to a series of questions addressing authority control and the accuracy of information on a wiki. “So edit by other people, so if one person makes a mistake, others will correct it,” the student noted. When asked how one could determine whether information was corrected, the student pondered, “Wow, I never thought of that...Never thought about that.” This revelation exemplifies how the SMM detects sense-making as well as the unmaking of sense. In this example, the participant reflected on past behavior and appeared to experience an unmaking of sense.

By using resources provided by the professor and TA, supplemented by information found online, the group built their website. “I reached my goal, which was implement [sic] all the functions in the program,” stated the student. “...It was the requirements of the assignment...The assignment was complete...Meet all the requirements and the grade was OK, full credit.” The participant felt “successful” after completing the assignment. Completing the assignment and receiving a positive grade seemed to support the participant’s successful feeling regarding the information-seeking process.

The next programming example highlighted a type of cultural barrier. The student encountered a gap when trying to understand the assignment instructions to perform a generic

programming task in Java. Assignments such as these can be viewed as *imposed queries*. This term refers to questions imposed on others that may be difficult to answer because they do not originate within the seeker (Gross, 2005, p.164). In such instances the question can become muddled and difficult to understand during the transmission of a query, from the creator, to a designee. The participant explained feeling this lack of clarity in trying to understand each week's assignment instructions.

“...each week we are assigned to do an assignment and about the assignment, most of us were not clear what we were supposed to do. Some of my classmates will work together to think about the words of the professor...Sometimes the professor is not clear about the instructions and makes mistake [sic], and even in this situation we have to discuss with classmates or ask the professor.”

The participant was asked what help he/she sought to overcome this muddle in the instruction:

“So, later on, I sent an email to my other classmates. Two of my other classmates gave me two different answers and I compared them in my mind and I did that...Sometimes I ask the professor directly and he will reply very quickly, but I think it's a kind of laziness to ask the teacher question in email.”

Based upon childhood experiences, the participant was reluctant to ask the professor clarifying questions because he/she perceived this as a form of “laziness” and a sign of “not listening in class.” Elaborating, the participant explained within a cultural context why he/she did not directly ask for the professor's help:

“No, I knew that if I ask for help I will get help, but I didn't want to tell that I wasn't aware about this. I think many Chinese students have the same problem as me...I talk to

my friends, if they were not the same way they would not check the assignment with me, they would check with the professor.”

Progressing through the information problem, the participant sought assistance from friends:

“When you are in trouble, you will go to your friends first because Chinese students are closer to you...Based on the language and cultural problems, you are more easy [sic] to get closer to Chinese students...I have friends from other nations, I have a friend who is Saudi and we work together a lot, and a classmate from Thailand and we work together a lot.”

Foremost, the participant sought the help of friends in the class who shared a native language and ethnic culture. For this assignment, though, the participant asked a friend from Thailand for help because, “the friend from Thailand always tells the right one (answer).”

“I did well,” recalled the student when asked about the outcome, “I got 10 out of 10.” The participant obtained clarification for the assignment instructions from a classmate and was able to bridge the information gap.

Problem-solving in tasks related to computer programming can sometimes take on the form of a mathematical problem or equation. This was the case for one participant who needed help calculating a parameter when developing a design to optimize a network. The participant shared his struggle to find help in solving the problem. His first source of assistance was the instructor, who, according to the student, responded, “If I can give you the answers, why would I give you questions?” This response created angst for the participant, who recalled thinking, “There is no solution to that question, the problem is like a disaster.” The participant then asked a classmate for assistance:

“We always discuss with each other, I thought he would have a better understanding of this topic because he has a better understanding in the classroom. He always gets out all the correct questions that satisfy the professor...I asked him to go ask the professor, and the professor told him the same thing.”

Unable to answer the questions on their own, the participant and classmate tried to problem-solve together. “Maybe we counted the answers that could be correct or partition [sic] that could be correct,” stated the student.

The pair decided not to consult any additional resources while attempting to solve the problem and they remained stuck in their gap. “No, because, since the professor said you can use the topic in the class slides and you can’t find enough information in the slides, so that’s all,” explained the student. After reviewing the course resources the participant sought further assistance through a friend with a background in mathematics:

“If this is a mathematical question, you cannot find the answers, work it out. No useful resources can be accessed. You should ask some guy who major in mathematics for help...This is just some mathematical problems and you don’t know how to model or list the equations. You should solve that you should ask mathematical guys for help [sic]. But if you can’t understand the question at all, you should find some resources in the textbook or reference book...I asked some mathematical guys for help...I just have a friend, he major [sic] in mathematics.”

Asking the mathematics major for help was not successful:

“Since the value he calculated out was ridiculous...Give up. If all these methods do work out; the professor, the textbook, the reference books, online resources, the mathematic

guys, if all of them can't help me, then I can't find another helpful method to deal with it.”

When asked if he/she had experienced difficulty completing an assignment before, the participant said the professor will provide the answer. “I feel, I've done enough to solve this problem and it still doesn't work out,” the student noted. “...If nobody work it out in class, he (the professor) will explain to us.”

However, others in the class were able to solve the problem. “Yes, some of them but I can't identify who can work out the answers,” recalled the student. In this instance, the participant was unable to resolve the information problem through utilizing the resources and helps present within their personal network of known helps. Asked whether changing an aspect of the information-seeking process might have helped solve the information problem, the student replied, “I think if the professor had more patients [sic] to explain his idea to us and give us more specific hints to understand the content of the slides that would be more helpful.” This example may demonstrate the importance of maintaining positive inclusive communication in support of aiding student learning.

Synthesizing multiple skill and knowledge sets is another problem-solving technique required in computer programming. One participant recalled creating a website with a group member that required the use of three programming languages. However, the website would not display or function according to the participant's design. The student explored several avenues to solve the problem:

“I guess I tried different ways. First, I looked in my textbook and notes because it's most familiar on-hand but if I don't find anything helpful I look online. But if I can't find it online, then I would have to turn to a friend. Programming is about experience, the more

experience, the more things you've done, the more flexible you will be...In terms of programming, the project we are working on, the instructor doesn't care about coding but he cares about the final product."

When asked how the pair determined who to ask for help, the participant said: "First, I go to friends I know... after that, through our discussion, it is always beneficial to go them [sic] with my problem...don't know, but usually we can find alternative or solutions." The group decided not to consult the instructor for assistance:

"The instructor doesn't get involved. Just gives us approval of the proposal and guidance...Because I think it's a project and it's not a simple mathematical problem with an answer. There is no right or wrong answer on a project. Only the co-workers who are devoted to the project can know that. The group members take care of the group project, and anyone outside of the group isn't involved, like the professor."

Ultimately, the participant completed the assignment using a variety of sources, including the textbook, online resources, and friends to help bridge the information gap. "Like problem-solving, there are multiple ways to do that and no one can figure it. So we tried it an alternative way and it worked," the student explained.

### **4.6.3 Bridges & Outcomes: Student Life Tasks**

In addition to problems encountered in the classroom, participants also experienced difficulties stemming from the need to explore secondary educational opportunities, and to acquire information related to future employment. This construct appeared in two participants' responses as they recalled their attempts to gain experience through internships, learn new computer-

programming skills identified in job advertisements, and read Internet forums on employment opportunities and advice.

One participant who was nearing the end of his/her studies described difficulty learning Java Eclipse, a computer-programming language identified as an employment requirement in many job postings.

“Recently I’ve been looking for jobs, and the descriptions of the jobs said you need to know JEE (JAVA Entrance Exam). You need to know this tool, that tool. I know that’s the skills I need if I want to have a job...Now, I haven’t gotten anyone to help me but I do know someone, a student that has graduated and go for a job [sic]. They may know better, but I don’t know if I can just ask them, because that may be a bother to them.”

When asked what other resources he/she might use to learn the program, the student responded:

“I just think, maybe I should read more books because books tell you more...I feel that no one can help me, why not try the books. Or, maybe it’s because lately I think besides what I wanted to learn from the books, I’ve got other information that I didn’t plan on getting from the book.”

The participant shared an instance in which books proved to be a helpful resource:

“Like, I was reading a book *Programming for Interview* and I was just looking for some data structure examples and interview questions. But after reading other chapters, like how could you react, those non-technical questions. I think it’s fantastic. It’s very useful. I couldn’t think of such questions, if you never read the book.”

Obtaining the books was a multistep process:

“...First, I searched our online library at our university and try that book, but I noticed that we don’t have that book. I noticed that our library doesn’t have books released in recent years. So, I will try Amazon. Of course, they have that book.”

The participant recalled a previous negative experience with a librarian as the reason for why he/she did not ask for help when the appropriate book could not be found:

“No, because I just realized that if I can’t find a book in the online system, and I turn to a librarian, what she or he does is just does the same thing I just did-search the system in our library (SIS). Actually, I wanted some type of suggestions but they just search the system and say what they have now and what they could give me, and give me the number like ‘q870’ (LC call number). And you can find this book experience, so I just assumed that if I asked them it would just be the same thing.”

The student then turned to a teaching assistant for help:

“Like I said, there is this one guy (teaching assistant) and he just told me this book is very good and I figure he might think of that and get that information from some professor or classmates and he told me that it’s very useful. Also, I draw my conclusion from what other people say about that book before I buy it. Although I find some people say that there are some errors, but I still think if someone recommend this book, I should at least look at this book.”

Conversely, the participant did not ask his/her advisor for help:

“No, because I have a feeling that they don’t want to be bothered...Because there was this one time, I have an advisor and he is in some type of special track and I asked him for suggestion [sic] that are not related to his track and he just ask me, ‘why didn’t you

chose my track?’ And, after that, I just felt that he didn’t pay enough attention to my question so I feel that I don’t want such an experience again.”

It appears that past experiences determined what sources the student turned to for help. While negative experiences with a librarian and an academic advisor created dismissive feelings when seeking future help, a positive past experience with a teaching assistant lead to assistance in this instance. The participant was still seeking help at the time of data collection and had yet to resolve the information problem.

In another example, a participant in his/her first semester of studies discussed difficulty understanding the relationship between psychology and computing, and why this muddle created angst:

“You know, we are just international students and not like American students. Maybe the only job qualified for us is coder. So, the only job I can do is coder. I heard that in America, international students after they graduate, some companies cannot give management position to international students.”

Asked where the participant learned of this information, and knew it was reliable, he/she responded:

“From other people...Lots of Chinese people go abroad and we talk to each other and some stay in American [sic] a long time...When people tell me something, I can’t trust them, but if lots of people tell me the same thing, I can trust them...All application, a website something about MSN, and also my friends. The information told me that international students can only get a job (as a coder).”

The participant was then asked how this information made him/her feel. “Make me feel?” the student replied. “I always feel nothing. I feel a little disappointed...Makes me want to make my background much more powerful, much more than my profession.”

Next, the student was asked if he/she sought clarification regarding the interdisciplinary nature of the course from a professor.

“Yes, he told me there is a link but really the link is not really big...My instructor said the link is not big but there is a relationship. He told me there is a link related to psychology in this course and program.”

While this participant was still making sense of the information problem at the time of data collection, it appeared that the gap in understanding and perceiving future employment prospects reached beyond the course work and into a deeper issue of cultural perceptions surrounding equality of employment in a global market.

Making academic curriculum decisions was an anxiety-causing situation for one participant who described the resources used in the process of making sense of the gap caused by selecting a course during his/her first semester of graduate studies in the United States :

“I’m not sure which course I will drop because this course is all in time. I’m back and forth on how to select my course. I talk to my advisor and three times about how to select my course. He gave me some advice...I just told him which class I have selected. He helped me to drop some course cause [sic] I applied to drop some foundation course cause [sic] some course I have done from my undergraduate study...but I have attended some of the class and it is useful, I have never learned.”

The participant indicated that he/she did not receive any advisement prior to signing up for courses:

“No, before I selected my courses, I say, I just say, I just talk with him (the advisor) and I select my course. He is very nice and I dropped his course and he said, ‘It’s up to you’...First time he give a list of around four classes, but it’s just a suggestion. He told me that I can select what I feel.”

At the time of data collection, the participant had not determined how to resolve this muddle and did not expand further on any other academic advisement resources he/she was planning to consult.

For international students who are not native English speakers, additional challenges may occur in both social and educational situations. One participant detailed challenges with English language fluency:

“Because nobody says it in real life. Like, when you are a kid and start to learn the new words. Sometimes they just know the words in the beginning but when the parents says the word in a sentence a lot, the kids can understand how to use the word. But when I studied English, most of the time I have to look it up in the dictionary, but half of the time I don’t know how to use the word. Sometimes when I hear Americans talk to say the sentence sometimes just once I can understand how to use the word.”

The participant expanded on this information language gap within a social context of speaking to classmates:

“Because it is hard for Chinese students to talk with people who speak native English, and we want to talk but we don’t know what they are talking about. I think they are talking about one movie we (Chinese students) have already watched and we know what they are talking about but we can’t say anything in the talk.”

The participant added that English language fluency can also cause difficulty in the writing process:

“That is difficult because sometimes when I write some essays I really want to use some difficult words like GRE level, but it is really hard for me to use them. Sometimes when I take the GRE test, I know the meaning of this word but I don’t know how to use it...I can’t talk about it in depth, so I know it’s about my working experience so sometimes I can’t understand or use my experience to discuss in the essay.”

This gap in English language fluency also seemed to hinder the student’s ability to make sense of their information problems when writing or engaging with unfamiliar subject areas. The participant described the following situation, “Like the Online Information Behavior (course), it true [sic] that I don’t have a lot of working experience. So, sometimes I write one thousand words and the grade is not good.”

The participant asked the instructor for assistance in order to more actively engage and participate in the course:

“I sent her an email and tried to schedule a time and he [sic] give me the address and I went to her office...I talked with her and tell her the problem I have and she can understand cause she knew I didn’t have enough working experience, and after every class she ask me whether I understand or not. I can feel pain in the class.”

Asked why the participant felt pain in the course, he/she said:

“Cause [sic] sometimes I can’t talk in the class like other people. They have the similar experience or they were in the same situation at work. I really wanted to say something...Like real experience, to share experience, but I don’t have that so I don’t feel very happy.”

The participant was asked if the instructor helped him/her to engage with the learning process and make sense of the course content. “I think she just try to...I don’t think she really assist me because nothing can help me with real working experience,” the student speculated. The participant felt that the instructor could not help him/her to gain a deeper knowledge of the course because:

“I think the working experience is different from the book. The knowledge you learn is the real thing when you are at work and how to deal with the relationship with your colleague or leader. Maybe you know how to deal with them, but it’s not a real experience.”

The participant decided not to seek additional information resources. “No, it’s useless to find assistance because I’m lacking so it’s useless to find others help,” stated the student, offering a suggestion for changing the situation. “I think she can lower the requirements for me because I think I should take this course later, but already [sic] took the class. I just think she need [sic] to lower the requirements for me.” This participant’s language difficulties appeared to create additional information gaps. Although the participant initially had difficulty conversing with classmates, the problem expanded, creating other problems in his/her academic studies.

#### **4.7 SUMMARY**

This chapter presented the findings from this study. Participants shared their sense-making process from their experiences as undergraduates in China and as graduate international students in the United States. Parallels were found in the *situations, gaps, bridges, and outcomes* that participants shared in describing information problems related to their studies, both in China and

the United States, in the form of assignments related to writing tasks and computer programming tasks. New *situations, gaps, bridges, and outcomes* appeared in relation to participants' experiences as graduate students in the United States and as sojourners learning to navigate a new country and educational system in a new cultural context.

Reliance on personal networks to help with navigating information problems was described by participants while undergraduates in China and as graduate students while studying in the United States. This parallel in behavior may support the importance of the role of personal networks of graduate international students in their information-seeking process as it relates to their studies. Related to participants' use of personal networks, was the possible lack of awareness of resources and helps outside of their networks.

As graduate students studying in the United States, having a narrow or limited network, seemed to cause participants difficulty in identifying unknown sources of help. This somewhat insular behavior might be tied to participants' assumptions and understanding of the process of identifying reliable information. Another parallel between participants' understanding of identifying and evaluating reliable and authoritative information as graduate students also appears to possibly be carried over from their undergraduate behavior in China. These emergent themes will be further explored in the Discussion section.

## **5.0 DISCUSSION & CONCLUSION**

This chapter provides recommendations and concluding remarks for this study. Section 5.1 discusses recommendations for library practitioners based on the findings of this study. Section 5.2 discusses the findings of this study as they relate to previous research and theories. 5.3 offers recommendations regarding Dervin's SMM and the utilization of cross-cultural interview protocols. Section 5.3 provides a conclusion by briefly re-stating the findings of the study in support of the main driving research question.

### **5.1 RECOMMENDATIONS FOR LIBRARY PRACTITIONERS**

Developing evidence-based models for detecting and evaluating student attitudes towards information may assist in the creation of more culturally responsive services and methods of instruction by librarians. Being able to detect student perceptions of information types, and information environments, may aid in identifying how an information provider is, and is not, supporting his/her constituencies or users. In this study, it was evident that participants were not fully aware of the information resources and services made available to them as graduate students. In addition, participants did not seem to possess an understanding of how to evaluate and determine the authority of the information resources that they were using to support their studies. Prior research, identified in the literature review, offers support for the need to advocate

for providing culturally responsive library instruction, services, and research to support international student populations (Lewis, 1969; Lopez, 1983; Lafon, 1992; Morrissey & Given, 2006). This study adds to this body of work, and indicates the importance of understanding why, and how, international students IB may be different from domestic non-international students.

This study offers support for the need of librarians to understand how the intersection of a task, and the information resource necessary to complete that task, may not necessarily be found in an academic library resource. Such was the case in this study when participants were seeking API data or computer programming trouble shooting. This is significant, as it suggests the need for library inclusion in curriculum processes. If a library's collections and services do not concurrently align with the curriculum and scholarship, it will not be able to support students in their studies, and the library will not serve an active role in student learning.

This study's findings provide evidence that international students' information needs extend beyond their academic studies to situations related to acculturation to a new country and academic administrative systems. In this process of trying to learn a new educational and social environment, these students may also have the added challenge of struggling to overcome their cultural assumptions towards North American culture, which might have prevented them from making sense of their situation. Studying IB may assist in detecting and understanding what assumptions students may have towards information, and the providers responsible for facilitating and promoting a collection. Using this evidence, one may be able to build more culturally responsive services and instructions, as well as support existing models and methods.

Based on the findings of this study, the researcher offers some practical suggestions on how academic librarians and libraries may better support to international students during their intercultural learning experience.

1. Support the development of cultural competencies through awareness of cultural differences in education systems. In order to gain perspective on similarities and differences in academic libraries and education systems, librarians can seek to investigate the countries and associated education systems that their institutions' international students are coming from. By doing so, librarians may gain an awareness of areas of need, and as a result, provide support that will better assist international students.
2. Support the development of cross-cultural communication through student engagement. Librarians may consider participating in outreach activities that involve supporting international students in their acquisition of learning to navigate their new education system. By understanding about the challenges students may face while learning to navigate a new education system, librarians might develop an awareness of international student needs, and obtain practice, in communicating with persons whom they might not share a similar cultural, ethnic, or linguistic background.
3. Provide culturally responsive library orientations and services. Librarians may seek to better understand the needs of international students, by soliciting from international students, what similarities, differences, or gaps they notice between their previous education experiences and their current ones. By creating this model of instruction, it may support cultural relevancy, and assist librarians in better understanding students' information needs. Facilitation of this model may be accomplished through student engagement, and liaison work with the student services responsible for assisting international students.

4. Create joint programming and establish liaison ties with other support services within an academic institution. Librarians can assist students in both their academic needs and everyday information need by promoting the appropriate resources, services, and collections. This could come in the form of sharing information resources with academic advisors, faculty, and career services. In addition with soliciting information problems and collection development suggestions from liaison partners.

The above suggestions are based upon reflection on the study's findings and previous literature on international students. In order for the above suggestions to be executed in practice, support must first come from the administration of an institution. Leadership must make it an initiative to address the information needs of international students; librarians should not be expected to work alone, or without institutional support.

Lastly, international students are an ever-changing population of students whose needs may reflect the countries from which they originated. There is no guarantee that all higher education institutions in the United States will have similar composition of students as those reflected in this study. Each institution should seek to investigate where their international students come from and how their unique needs may, or may not, be met.

## **5.2 IMPLICATIONS FOR THEORY**

This study sought to answer the question: *How do international graduate students from China make sense of the information they need in support of their intercultural learning experience?*

The participants in this study made sense of their intercultural learning experience by relying on previous information-seeking habits practiced as undergraduates in China, such as reliance on

personal networks, and assumptions towards authority of information. They sought, more readily, the help of their professors, and persons who demonstrated a mastery of subject knowledge i.e., “good grades,” rather than seeking out academic services such as libraries and librarians.

The participants in this study, shared with the researcher, first, their experiences in seeking information as undergraduates in their native country of China. These situations dealt primarily with completing school assignments related to computer programming and writing assignments, such as their undergraduate thesis. Participants did not describe or identify an information problem unrelated to an assignment, or outside the context of school studies.

As graduate students in the United States, participants, again, shared with the researcher, situations where they were seeking information related to computer programming and writing assignments; however, the scope of the situations broadened, as they also described situations related to acculturation and employment readiness. The emphasis of this study was on participants’ educational studies, however, they also expressed information needs for everyday living, such as job readiness, navigating a new country, culture, and education system.

Information gaps related to participants’ studies were not all directly caused by their assignment tasks. In two instances, participants expressed information gaps that were created by participants’ fear of judgment by their professors. One participant expressed her/his anxiety of judgment by the professor in relation to his/her ability to communicate clearly in English. Another participant expressed a concern with appearing lazy in the eyes of the professor by asking for clarification on a homework assignment’s instructions. Participants’ anxiety, and concern of possible judgment by their professors, appeared to prevent them from asking for help.

These instances align with the findings presented in Belle Wang's (2006) study of eight Chinese undergraduate and graduate students at Victoria University of Wellington, New Zealand. Wang (2006) cited students not asking for help from librarians out of fear of *losing face* and experiencing embarrassment. Although participants' anxiety of judgment by an educator was not specifically directed at a librarian in this study, the avoidance behavior was similar to that described by Wang's (2006) participants. This finding may suggest the need to investigate whether avoidance behavior that appears in the ISB of PRC international students is also present in other Western education environments.

Access to information was also a common theme in the gaps that participants shared. As undergraduates in China, inhibitors to the access of information included barriers created by Internet filtering by PRC government, as well as proprietary information (English language journals). Information gaps related to information access due to government control or proprietary access had not been identified in prior research. This may be attributed to the sample population of this study and may support the need to investigate specific international student populations' information environments prior to studying in the United States.

Personal Learning Networks (PLN) can be described as personalized networks of knowledge sources utilized in support of understanding and learning. PLN is not a new concept as people have been utilizing networks of information resources (friends, family, books, newspapers, radio, television, etc.) for years (Warlick, 2009). David Warlick (2009) described three types of PLNs: personally maintained synchronous connections, personally and socially maintained synchronous connections, and dynamically maintained asynchronous connections.

The importance of the three categories of PLNs described by Warlick (2009) is that the Internet has made it possible for individuals to have, and maintain, constant access to resources

and channels of help in using information, regardless of time and place. PLNs help people to acquire information outside of their physical or geographic location, and to access and solicit help from people and resources unknown to the individual. A limitation of PLNs can be the lack of diversity of knowledge and perspectives on information (Warlick, 2009), as this may prevent introduction to diverse concepts, perspectives, and unfamiliar helps.

As graduate students, access to information seemed to be created by participants' awareness of resources for helps. As undergraduates, participants turned to their personal learning networks (PLNs) that often included Internet message boards and fellow classmates, friends, and family. As graduate students, participants again relied on their PLNs that tended to include primarily fellow Mandarin speakers. As a result of the narrowness of their PLNs, participants expressed not knowing where to find help or information for new situations not previously experienced.

In sections 4.5.5 and 4.6.3, a participant described their information needs related to banking, international postal mailing, and health care, in support of living in a new country while navigating a new education system. The participant who shared these information needs was *stuck* at the time of the study and unsure of how or where she/he would find help to resolve their information problems. *Everyday life information seeking* (ELIS) has been described as “the acquisition of various informational (both cognitive and expressive) elements, which people employ to orient themselves in daily life or to solve problems not directly associated with the performance of occupational tasks” (Savolainen, 1995, pp. 266–267). The information needs of the participant above may suggest that further research is needed to investigate the ELIS of international students and if there is an intersection between their ISB related to their academic studies, and those of learning to navigate a new country and education system.

Students in this study also expressed to the researcher that they sought information for carrying out daily tasks that they experienced as a new student learning to navigate a new country and academic environment. The detection of this additional level of skills suggests that international students need more support in their educational learning process, beyond information skills that support academic work. Additional research investigating what information problems international students experience while pursuing their studies would assist in further understanding how these populations of students are being supported. This type of information would assist higher education institutions in identifying how information resources are being utilized. One method that supported the detection of the level of awareness of available academic helps to participants was found in their descriptions of libraries and librarians. Participants did not seem to extensively use their academic librarians for help with their information problems as graduate students. Although one participant sought out reference chat services, they did not follow up on their request for further assistance in spite of being stuck in their gap.

Although some participants described librarians at the University of Pittsburgh as helpful and knowledgeable, participants overall did not seem to fully understand the extent of academic support that they were offered by their Library system. Participants in this study shared with the researcher their opinions of libraries in China, which were similar to the opinions of participants in Hilary Hughes's (2010) doctoral research on international students in Australia. Hughes' participants from China reported not needing to use the library during their undergraduate studies, and described Chinese libraries as having collections that lacked currency. This study reported similar findings in participants' descriptions of their undergraduate libraries in China. This may suggest that these cultural differences need further investigation. These differences

may provide an area of discussion for academic librarians when engaging Chinese PRC graduate students in understanding the role of academic libraries and librarians in their education process.

Awareness and assessment of authoritative information appeared as a struggle for this participant population and brings into question the concept of information literacy (IL) within a Chinese context. IL is a cultural construct that currently does not have a uniform definition or set of standards in China (Li, X., 2006). This lack of uniformity may have influenced participants' perceptions of authority of information. In this study, participants primarily described using the reputation of an education institution as an indicator of authority, rather than the content, structure, and context of the information itself. This may be a reflection of Chinese higher education and its practices of distribution of financial support by the PRC government.

Higher education in China is managed and regulated by the Chinese government. The Ministry of Education manages the publication of textbooks and curriculum (Wang, 2003). The government also controls the publications of academic journals (Atwill, 2005) through their monitoring of news and publications in general. Although there are a few private universities, the majority of higher education institutions are regulated, ranked, and funded by the PRC government (Wang, 2003). This close relationship between research institutions and academic publications may give insight into the assumptions about academic information expressed by the PRC students in this study. Further research is needed to investigate what types of assumptions and feelings PRC students have towards academic information and if these assumptions affect their behavior.

PRC students' understanding of IL within a North American context needs further investigation in the area of copyright. On this study, participants shared responses with the researcher regarding awareness of copyright, and methods of providing attribution for usage of

intellectual property in school assignments. This finding differs from previous research on graduate PRC students in Canada that reported subjects not learning about plagiarism prior to studying in Canada (Morrissey & Given, 2006). This differing finding may suggest the need to further investigate the PRC students' understanding of plagiarism within a North American higher education environment.

Participants in this study described to the researcher how they navigated through their intercultural learning experience. They expressed a reliance on personal networks similar to their behavior as undergraduates in China, however, they tended to limit their networks in the United States to primarily include only other Chinese students, like themselves, due to language and cultural familiarity. By narrowing their networks they express feelings of lack of awareness of unknown helps. They expressed attitudes of assumptions towards identifying reliable information to support them in making sense of their information problems. Participants described progressing through their information problems and being stuck. Participant told the researcher about the positive and negative outcomes to their information problems. Ultimately, participants provided genuine insight into their ISB, which serves to identify areas of need for this growing population of international students in the United States.

### **5.3 RECOMMENDATIONS FOR METHODOLOGY**

Dervin's SMM appears as a straightforward method, however, this research did not find it to be so. In order for a researcher to successfully carry out a SMM study, the theoretical foundation which the methodology is built upon, must be fully understood. This understanding ensures a process where the participants possess the power to direct the study through the value placed on

their own words and experiences. In providing the participants with the freedom to construct their reality and perspective on a specific situation, they provide genuine and authentic insight into their information behavior. To negate the process of relinquishing control to the participant, would hinder the development of Praxis in the research (see section 1.5), and undermine the SMM methodology.

Those wishing to utilize the SMM and time-line interview method with participant populations that may not acknowledge having information problems, or who may be reluctant to share problems, may consider the following advice:

- Provide participants with interview questions ahead of time
- Explain the interview process and solicit for questions that they may have
- Explain that any questions or muddles that the interviewer can answer for them will be clarified during the debriefing process after the interview
- Provide continual affirmation that their confidentiality will be protected during the interview
- After the interview, express and acknowledge their contribution to your study and offer the option to have a copy of the interview recording or transcript

Communicating transparency, and the agenda of the study, is imperative to building the initial trust between the participant and the researcher. By establishing trust, and supporting a positive and welcoming environment, this researcher believes that it helps participants to feel at ease in the reflection process during the interview, which is necessary for Praxis. The self-reflection helps to identify hurts or problems in which some persons may have been taught to suppress or not share with strangers. Once these feelings of hurt are shared, it is important for the

researcher to acknowledge them, as it aids in both the communication process, and supports the participant in sharing.

## **5.4 RECOMMENDATIONS ON WORKING WITH AN INTERPRETER**

In this study, the researcher utilized an interpreter to assist in the process of qualitative interviews. The purpose of the interviews was to investigate the information-seeking behavior of international graduate student from China (PRC). Protecting participant data and confidentiality was a key ethical issue identified with using an interpreter from among a peer member. By having a peer present during the interview, participants could possibly feel threatened that any information would be compromised, and thus alter the accuracy of the data. Furthermore, by having an interpreter present, participants might feel that the research holds certain assumptions or biases against non-native English speakers. Those wishing to utilize an interpreter in conjunction with the SMM should consider how this may hinder the communication between the researcher and participant.

### **5.4.1 Theoretical Challenges**

The decision to have an interpreter available for student use during the interview was to support cross-cultural research protocol by supporting dialog, expression, and cultural context. However, the vulnerability in which the participants positioned themselves, in order to reveal their information behavior, was jeopardized by the loss of confidentiality with a peer present in the interview. Though the subject matter of the interview was not associated with posing any risk of

physical harm to the participants, there was an issue of possible socio-cultural status at jeopardy. Since the interpreter was a peer to the participants' with the same or similar linguistic ability and educational status, this might influence the participant's level of comfort during the interview by causing the participants to be defensive of the researcher who has imposed a bias against their ability to communicate in English.

#### **5.4.2 Logistical Challenges**

At the beginning of the research study, the researcher had planned to make the interpreter available for all interviews with the purpose of assisting in clear communication between participant and researcher. However, by the second interview, a few concerns arose related to the limitations of using an interpreter. First, participants in the research study did not necessarily need an interpreter depending on their level of fluency in spoken English. Since the participants in the study were current university level graduate students, they had some level of fluency in English.

Unlike previous research studies that have utilized interpreters to work with immigrant or refugee populations, international graduate students are sojourners that arrive to school with a certain expected amount of fluency of language, as denoted by some sort of entrance exam. Though, an exam score cannot guarantee fluency in a language, it does denote the student's ability to take course work in English at a graduate level. Taking this unique aspect into consideration, this supported the decision to make the interpreter optional. Additional logistical challenges identified with this study included difficulty in scheduling interviews due to the interpreter's availability. At the onset of the study the interpreter stated that he/she was available

to participate in the study any day of the week. However, once the study began, the interpreter changed his/her availability and limited his/her days available to assist in the study due to gaining an internship. The reduced availability of the interpreter limited the researcher in being able to proceed with scheduled interviews, and further supported the ultimate decision to make the interpreter optional upon request. For interviews where an interpreter was not present, a Chinese-English to English-Chinese Dictionary was provided. The dictionary was selected and provided on loan through the East Asian Studies collection at the University of Pittsburgh and utilized by two participants.

Once the interpreter was made optional, only two participants requested that the interpreter be present. For the interviews that the interpreter provided assistance, further work was performed in the role of translator. In the transcription of the audio, the interpreter translated the Mandarin into both English and Pinyin. The purpose of the Pinyin text, was to serve in the cross checking of the translation by another Mandarin speaker to verify that the conversation had been properly translated from Mandarin to English. In this capacity, the interpreter supported cross-cultural interview protocols.

It was the decision of the researcher to ultimately make the interpreter optional during the interviews. Ultimately the researcher did not detect any hindrance in the communication between the participants and herself. In one instance a participant responded back to the researcher in Mandarin. At that particular point in the interview the participant had become so comfortable with the researcher that when she affirmed a statement, confirmation of “yes” came out in Mandarin. The participant continued in the conversation without hesitation or halt. Future studies may want to consider having an interpreter, and a dictionary available, for interviewing participants who do not share the same native language as the researcher. However, one should

be privy to how it may impact intimacy and confidentiality of the interview. Future researchers wishing to interview participants whose native language is not shared with the participant population may have to ask for clarification from participants to ensure clarity of understanding.

Participants were given the option to utilize an interpreter or a dictionary. For the most part participants opted to not use the interpreter and did not express difficulty in conversing. However, some participants did have difficulty using pronouns which caused some confusion for the researcher, here is one such example:

“We, before you did this project, we knew nothing about this. You were just a major in this in Urban Planning and Environment. But after this situation you have a better knowledge about this.”

Clarity of the interviewees’ responses was supported with the assistance of both the interpreter and two additional native Mandarin speakers that assisted with the transcription process of the interview recordings. Through this extra effort of reviewing transcriptions, it supported the trustworthiness of the data and clarity of understanding.

## **5.5 CONCLUSION**

Understanding student perceptions and attitudes towards information provides librarians and educators insight into student information usage. In this study, participants’ perceptions of authority of information may assist in explaining why the majority of Chinese international students in this study did not explicitly report using the academic information resources and services to the fullest. By not using the library services and collections extensively, participants

in this study limited their options for addressing information problems and their associated information needs. Further research is needed to investigate the types of assumptions and feelings that may appear in the information behavior of Chinese international students as it relates to authority of information.

Future studies may want to investigate the information-behavior of other cultural groups of international graduate students in comparison to PRC students to determine if similar hindrances to information use are experienced. Further methods for investigating international students' PLNs might include ethnographic methods to studying their information-seeking behavior. Potential approaches may include qualitative data collection through reflective journaling, daily or weekly records of their use of information, and the use of other information institutions complementary to libraries. This may provide a deeper and richer understanding of international student's information behavior.

## APPENDIX A

### RESEARCH TOOL

#### **Research Tool**

Participant I.D.:

Part I) Questionnaire

\*Please complete this portion of information prior to your interview.\*

The questions below are to provide the researcher with some background information about your education, family, culture, and occupational experience. This information will help the researcher to understand your experiences that might have influenced your view of the world.

Demographic Information

Gender:

Age:

Place of Birth:

Native Language:

Other Spoken Languages (please list):

How long have you been here in the United States(months or years)?

Is this your first time studying in the U.S.?

If not, when, where, and for how long did you live in the United States previously?

Have you lived in other countries? If so, when, where, and for how long?

1. Familial Information

Highest Level of Education of Mother:

Highest Level of Education of Father:

Do you have siblings? If yes, how many, what are their gender, and what number are you in the positioning?

2. Educational Background

Place of Completion of Primary Education:

Place of Completion of Secondary Education:

Institution of Bachelor's Degree:

Degree Major:

Institution of Other Degrees:

Degree major:

### 3. Career Experience

What is your current profession?

How many years have you been in this profession?

Is this your first profession? If not, please list previous professions and years of activity.

#### Part II) Time-Line Interview

Main Research Question: How do international graduate students from China make sense of the information they need in support of their intercultural learning experience?

Interview Questions:

- 1.1. Situation: What kinds of information situations and challenges do students experience during their studies?
  - 1.1.1. Can you please describe how you found information for an assignment while you were a student in China (if student did not attend a Chinese institution for undergraduate education, then whatever institution they attended or an experience in their Secondary education)?
  - 1.1.2. Can you please describe how you find information for an assignment now during your current study in the U.S.?
- 1.2. Gap: What are the hindrances that prevent students from accessing or using information resources related to their education?
  - 1.2.1. What were you trying to solve?
  - 1.2.2. How did you know you had a need?
  - 1.2.3. How did you know what you were looking for?
- 1.3. Bridge (Help/Hurt): How do students overcome obstacles to access or use library resources? Sub-question: Do “gatekeepers” assist in this process?
  - 1.3.1. What assistance did you seek?
  - 1.3.2. What resources did you seek?
    - 1.3.2.1. Why did you trust this resource?
    - 1.3.2.2. Was this your first time using this resource?
  - 1.3.3. What helped you to answer your question?
    - 1.3.3.1. Why did it help you?
  - 1.3.4. How did you access this resource/help?
    - 1.3.4.1. Why did you do that?
    - 1.3.4.2. Why did you think it would help you?
    - 1.3.4.3. Was there a service to assist?
      - 1.3.4.3.1. Did someone help you to this service/ resource?
  - 1.3.5. How was the library utilized?
    - 1.3.5.1. Did you ever attend a library instructional session in China on how to search or find for resources? If so, can you please describe that experience? If did not attend an instructional session, what is the reason?

- 1.3.5.2. Have you ever attended a library instructional session here at the University of Pittsburgh? If so, can you please describe it and please tell me what language the session was in and which library it was at?
- 1.4. Outcome/Fulfillment/ Holding: Do international students feel successful in accessing and utilizing library resources? Do international students feel satisfied with the information they find?
  - 1.4.1. What was the outcome of this problem?
  - 1.4.2. How did this help/ hurt?
    - 1.4.2.1. Were there external forces or influences that encouraged this help/hurt?
  - 1.4.3. How did this outcome make you feel?
    - 1.4.3.1. Why do you think you felt this way?
  - 1.4.4. How did this experience make you feel successful?
    - 1.4.4.1. How do you define success?
  - 1.4.5. How did this (Bridge) help you evaluate information?
  - 1.4.6. Did this (bridge) lead you to resources you felt were authoritative?
    - 1.4.6.1. (If yes) What was it about this (bridge) that made you trust the authority of the information?
      - 1.4.6.1.1. How did you know this information was authoritative?
    - 1.4.6.2. Was the resource supported/ peer reviewed/ scholarly?
  - 1.4.7. Was this resource satisfactory?
    - 1.4.7.1. Why was it satisfactory?
    - 1.4.7.2. Have you ever felt “satisfied” with information retrieved to answer a question related to your studies?
    - 1.4.7.3. How did you know you were “satisfied”? What does “satisfaction” feel like?
  - 1.4.8. How confident were you looking for assistance or finding help?
  - 1.4.9. How did technology assist you in answering these questions?
  - 1.4.10. How was the writing process for you?
  - 1.4.11. How did you know if you properly attributed a resource or gave credit for that resource used?
  - 1.4.12. How satisfied were you with your outcome?
  - 1.4.13. What would have been more ideal in helping you with this problem?

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