

International Students' Perceptions of their Information Seeking Strategies

Abstract: This study explored the information needs and information seeking strategies of ten Asian graduate students at the University of Tennessee, Knoxville, Tennessee. Both quantitative and qualitative methods provided students' assessment of their use of information and communication technologies (search engines, Internet, library website, OPAC, online databases) to make recommendations for improving information support services and participants' cross-cultural learning process.

Résumé : Cette étude explore les besoins informationnels et les stratégies de recherche d'information de dix étudiants asiatiques de 3^e cycle de l'Université du Tennessee (Knoxville, Tennessee). Des méthodes quantitatives et qualitatives offrent une évaluation des étudiants de leur utilisation des technologies de l'information et des communications (moteurs de recherche, Internet, sites web de bibliothèques, catalogues interrogeables et bases de données en ligne) afin de faire des recommandations pour améliorer les services d'aide à l'information et les procédures d'apprentissage multiculturelles des participants.

INTRODUCTION

Trends in a global information revolution and the spread in networked information and communication technologies (ICTs) around the world call for innovative strategies to promote information sharing across geographically dispersed and culturally disparate participants in a macro community (Anchan and Halli, 2003). Such efforts need to reflect social equity and global equality in representation and acknowledge the perspectives of under-represented cultural constituents in the contemporary globally intertwined environment (Castells and Himanen, 2003). This is important to promote interconnectedness and interdependence and to project a more eco-centric (instead of an egocentric) world view in today's civil society (Mehra and Bishop, 2007). An eco-centric point of view will help develop cross-cultural bridges, facilitate information sharing, and build mutual trust and cross-cultural communication that may realize a shared dream of peaceful co-existence and reciprocal understanding (Hutton, 2003). In academic environments, building cross-cultural bridges begins with developing understanding of individuals of varied cultures and backgrounds, such as international students whose educational backgrounds and experiences may be totally alien to the normative American academic environments (Mehra and Papajohn, 2007).

Prior research shows that international students, particularly those from Asian countries, experience difficulties while in the United States in the areas of language barriers, academic performance, social adjustment, and adjustment to support services (Huntley, 1993). Many universities and colleges are making efforts to recognize the needs of international students and to internationalize their curricula and campuses to provide students with exposure to diversity (Hawkins and Haro, 1998).

* To whom all correspondence should be addressed.

Current trends show that the United States remains the world leader in international student enrollment, hosting 565,039 international students in 2004-2005 and reaching nearly a quarter of all international students worldwide (UNESCO, 2006). The University of Tennessee (UT) Fact Book, 2005-2006 (<http://oira.tennessee.edu/factbook/>) reports 1,146 international students (879 full-time and 267 part-time, 257 undergraduate and 889 graduate/professional) representing 4.028% in a total of 28,457 students on campus. Asian students represent a large proportion of international students at UT with China (301), India (187), South Korea (123), Canada (41), and Taiwan (38) as the five countries with highest student enrollment. UT recognizes the need to increase recruitment efforts to enroll and retain international students in order to compete with American universities and colleges.

UT's "Ready for the World: The International and Intercultural Awareness Initiative" (<http://www.utk.edu/readyfortheworld/>) is part of a long-term plan to transform the campus to a culture that appreciates and engages with diversity to effectively prepare students for a globalized workforce in the 21st century via internationalizing the curriculum, developing global competency of faculty and staff, and concentrating on intercultural issues of specific concern to the university. Understanding the experiences of international students, especially in relation to information seeking strategies and information behaviors will provide reliable and valid datasets that are low-cost, authentic, and trustworthy towards pursuing the UT Ready for the World objectives.

Institutional goals towards diversifying the student body and integrating multicultural academic curricula in American universities posits many questions about our understanding of how international students of varied cultures and backgrounds seek information and how they perceive their information needs and information seeking strategies. This study explored the information needs and information seeking strategies of ten Asian graduate students and assessed their experiences in using various ICTs to meet their needs during their academic study at UT.

RELEVANT LITERATURE

Existing literature on information seeking of international students has focused on adjustments to the American culture (Arthur, 2004), learning English as a second language (Liu, 1995), feelings of isolation (Hong, Fox, and Almarza, 2007), integration into the mainstream campus life (Andrade, 2006-2007), and on issues and challenges both inside and outside the classroom (Kwasi and Aman, 1998). A literature review on international students' experiences reveals a few studies relating to library use (Mehra, 2005a; Curry and Copeman, 2005; Liu and Redfern 1997). Findings in these studies identified similarities and differences between native and non-native English-speaking students in terms of use of academic libraries. Unlike American students, non-native speakers experienced library anxiety, language/communications barriers, and problems adjusting to both the American educational and library system (Onwuegbuzie and Jiao, 1997; Conteh-Morgan, 2002). International students also faced many ICT challenges such as use of web search engines, online databases, and online catalogs (Badke, 2002).

Another study of incoming international students explored the students' library and computer experience (Jackson, 2005). Based on the findings, the author suggested that libraries offer specialized information competency and computer orientation programs for the students. In fact, information literacy instruction has been shown to reduce the state of library anxiety among international students when given an assignment using library resources (Jiao and Onwuegbuzie, 2001; Battle, 2004). Additionally, information literacy programs such as summer courses, special seminars, and mentoring and systematic instruction may prove significant in helping international

students integrate information literacy skills into the research process in the American university (Korolev, 2001).

An important model for library skills training for international students proposes mapping the Association of College and Research Libraries (ACRL) Information Literacy Competency Standards with specific communication, educational, and cultural adjustments that international students experience when studying in the United States (Baron and Strout-Dapaz, 2001). For example, the Helping Hand Project, a collaborative effort between Oregon State University and the International Cultural Services Program, translated a two-page handout about library services into fourteen different languages to acquaint non-native English speakers with these services in a language they understand. Such efforts help to lessen language barriers for international students during their initial library use and may contribute to their retention in academic institutions (Chau, 2002-2003).

Library use strategies have focused on definite areas of application, such as teaching bibliographic instruction to improve international students' performance in writing research papers (Tao, 2005; Abdullah, 2000). A quantitative study on the information seeking behaviors of international students employed a web-based anonymous survey to compare American and international graduate students' information needs, general information searching patterns, and participation in library activities. In addition, it examined the relationships between English language proficiency and both length of stay in the United States and information seeking behaviors (Liao, Finn, and Lu, 2005). Findings showed that language, culture communication, and technology barriers to international students' access to libraries plummeted with length of stay. Students used various web-based searching tools and resources as often as their American counterparts due in part to the effective role academic libraries played in educating international students in library use. The authors made recommendations for improving education about library services and information literacy skills.

Most existing research employed quantitative methods. While valuable, these methods do not provide a deep understanding of the complex nuances of the experience of cross-cultural students such as those from Asian countries, especially in relation to how they interact with library and information systems that are alien to them (Mehra, 2005b). Research that employs qualitative and quantitative approaches is needed to obtain a rich data for constructing a holistic and rich view of international students' perceptions, needs, and experiences. How do international students interact with various ICTs for academic work? What problems do international students experience in interacting with these ICTs? What influence, if any, do the educational processes in international students' home countries have on their study in the United States? How do international students perceive their research skills and information needs?

Specific deficiencies found in prior studies make this study relevant in the context of new trends in the contemporary global information society. For example, most research on international students addressed the cross-cultural learners in terms of a "deficit" model that treats their experiences solely in terms of problems and needs, and suggested solutions to improve the effectiveness of the learners' interactions with library and information systems without gaining understanding of their perspectives in the mode of analysis. This is due to the fact that only quantitative methods were applied. Recent literature that employed surveys with open-ended questions has begun to offer more in-depth detail about the experiences of international students (Organization for Economic Co-operation and Development, 2006).

This study employed qualitative interviews to generate data that provides a rich view for constructing a profile of international students' information needs, research processes, and use of ICTs based on their day-to-day experiences and perceptions.

Results gained from this study will have implications for designing information literacy skills programs, cross-cultural system interfaces, and services that are highly supportive of international students.

RESEARCH QUESTIONS

This study addressed the following research questions.

1. What are the information needs of Asian graduate students in the United States?
2. How do Asian graduate students perceive their information seeking strategies in using ICTs, such as web search engines and the Internet?
3. How do international students perceive their information seeking strategies in using ICTs offered by the academic library, such as library's website, OPAC, and online databases?
4. How do international students' educational experiences in their home countries influence their perceptions of information seeking strategies in the United States?

METHODOLOGY

This study employed both quantitative and qualitative research methods. Documenting the perceptions and experiences of Asian graduate students was grounded in critical theory, which recognizes perspectives of all stakeholders in a particular situation (Habermas, 1993). This includes points of view of the under-represented in order to "do justice to a diversity of socially defined perspectives while providing grounding for the evaluation of controversial problems" (Endres, 1996, #24). The application of critical theory becomes a methodological strategy to represent global diversity and facilitate cross-cultural exchange.

Participants

Ten Asian graduate students participated in this study. They were recruited via institutional contacts at the UT's Center for International Education, through announcements in various electronic mailing lists and at popular student places (coffee shops, library), and through personal social networks and snowballing (asking initial participants to provide contact to other subjects who may participate in the study).

Instruments

Two instruments developed by the researchers were used for data collection: 1. an open-ended interview questionnaire that elicited qualitative data about the participants' use of ICTs, information seeking strategies, information needs, and the barriers and challenges they experienced during their academic study; and 2. a structured survey instrument that gathered demographic data about the participants' gender, age, length of stay in the United States, area of study, priority information needs, and the barriers and challenges they experienced in using ICTs to meet their needs.

Procedures

The data were collected in summer 2006 and spanned over ten days during the month of July. Each participant met with one of the researchers and was introduced to the purposes of the study and was asked to sign a consent form. Each interview took 60 to 90 minutes during which two data sets were collected, one set was generated from the open-ended interview questionnaire, and one set was gathered from the structured survey instrument. Both the researcher and a trained graduate teaching assistant in information sciences transcribed the participants' responses on the open-ended interview

questionnaire. The participants completed the structured survey instrument. A monetary incentive was given to each participant as a token of appreciation for his/her efforts.

Data Analysis

Data were analyzed using grounded theory principles to generate themes and patterns from the participants' responses via open, axial, and selective coding that accounted for concepts and relationships between categories and subcategories within the context of interview questions (Glaser and Strauss, 1967). Findings were verified and analyzed based on a triangulation and cross-referencing of data that were collected from the two instruments. The broader perspectives of the participants were collectively threaded together as a mode of data analysis and representation. In addition, descriptive statistics generated from the structured survey instrument provided quantitative assessment of the participants' cross-cultural experiences (Mehra and Bilal, in press).

FINDINGS

The findings in this study are reported within the context of the research questions posed. To gather background information about the participants, we asked them to provide demographic information in relation to different variables, such as age, length of stay, gender, area of study, and country of origin. The section below describes the participants' demographic information.

Participant Demographics

Five males and five females participated in this study. The youngest participant was 22 years old and the oldest was 39 years old. Three participants had been in the U.S. for nearly one year, four for one year, and three for two years. Fifty percent were majoring in electrical engineering, with one participant in each of the following disciplines: information sciences, management science, plant biotechnology, speech pathology, and child/family studies. Four participants were from China, three from India, and three from Taiwan.

Information Needs of Asian Students

Asian students were asked to articulate and rank their information needs. These needs were consolidated into eleven categories (Table 1). These needs were ranked from highest to lowest as follows by the participants: 1. details about academic programs and processes (e.g., course information, stages of progress and how to fulfill requirements during various stages), 2. local information to facilitate day-to-day living (e.g., grocery shopping, directions), 3. opportunities to experience American cultures and customs (e.g., etiquette and norms of behavior, lifestyle issues), 4. awareness of the American research processes and expectations (e.g., how to conduct research, role of faculty in research), 5. international rules and immigration regulations (e.g., visa requirements and time deadlines for special permissions), 6. language learning and conversational use (e.g., classes to improve language skills), 7. career and professional development information (e.g., financial aid opportunities), 8. familiarity with library services (e.g., online databases), 9. awareness of additional support services and resources (e.g., housing, health-related), 10. travel and leisure information (e.g., recreational facilities and vacation planning), and 11. support in using computers and Internet facilities (e.g., user accounts and user support services).

Rank	Information Need	Examples	Suggested Improvements	Number of Responses
1.	Academic programs	Course information; stages of progress and how to fulfill academic requirements.	Develop and communicate clear guidelines for making progress in academic programs; share details of course requirements, schedules, and importance of course in relation to goals of the program and potential student career paths.	6
2.	Daily local information	Grocery shopping; directions around campus and city.	Provide local information at popular student meeting places.	6
3.	American cultures and customs	Proper/impolite cultural norms; areas that deserve attention in social interactions; lifestyles issues; celebration on holidays.	Hire international and American students as mentors for new international students; more social (informal) interactions orchestrated between American and international students.	6
4.	Research process	How to conduct different kinds of research; role of advisor/faculty in the process.	Share details of expectations and create familiarity with the American research process.	3
5.	International rules and immigration regulations	Visa requirements; time deadlines for special permissions.	Provide regular updates on changing visa requirements and time deadlines for paperwork.	2
6.	Language learning and use	Classes to improve language skills.	More language classes and dialog experiences for international students to practice English speaking skills.	2
7.	Career and professional development	Financial support	Provide financial support opportunities (assistantships, hourly work) throughout the student's program of study; provide information about future career choices and "invisible" tracks in the program; provide advising support in making connections between current program experiences and future job opportunities.	2
8.	Library services	Online databases and interlibrary loan	Develop and proactively market user-centered training workshops in library use and available services.	1
9.	Support services and resources	Housing; health and medical services; counseling.	Staff should develop patience and communication skills in a non-condescending manner; develop empathy for cross-cultural students.	1
10.	Travel and leisure	Short-term and long-term vacation trips that are low-cost; recreational space usage	Organize travel groups during holidays and weekends.	1
11.	Computer and Internet facilities	User support	Improve delivery of user support services; staff should develop patience and communication skills.	1

Table 1. Information Needs and Recommendations for Meeting the Needs

Information Seeking Strategies in Using ICTs (Web Search Engines and the Internet)

Table 2 identifies and ranks key barriers and challenges the participants reported in using various ICTs (web search engines and the Internet). Ranked from highest to lowest, these barriers and challenges included: 1. lack of availability of multiple language interfaces, 2. poor searching skills, and limited vocabulary in the English language, 3. lack of critical reflection to become effective information consumers, 4. information clutter and low relevance of retrieved results, 5. distractive and time consuming search process, 6. unfriendliness of interfaces, 7. limited flexibility in search variation mechanisms, and 8. low speed access and limited computer availability.

The participants perceived the web as a great resource for establishing connections with individuals and agencies in the United States before their arrival on

campus. For example, three participants stated that securing housing at UT using the web and bulletin boards that were available in their native language (e.g., Mandarin) had helped them meet UT students online who became their initial hosts upon arrival to the University.

Rank	Barriers and Challenges	Number of Responses
1.	Lack of availability of multiple language interfaces	6
2.	Poor searching skills and limited keyword vocabulary	5
3.	Lack of critical reflection to become an effective information consumer	5
4.	Information clutter and low relevance of results	5
5.	Distractive and time consuming process to find “right” information	5
6.	Unfriendliness of interfaces	5
7.	Limited flexibility in search variation mechanisms	5
8.	Low speed access to the Internet and limited computer availability	4

Table 2. Barriers and Challenges in Using ICTs (Web Search Engines and the Internet).

Information Seeking Strategies in Using ICTs in the Library

The participants felt moderately successful in using ICTs offered by UT main library (e.g., library website, OPAC, and online databases). However, they faced barriers and challenges in using these ICTs effectively (Table 3). The participants ranked these barriers and challenges, from highest to lowest as follows: 1. limited searching skills, 2. poor search functionalities of the interfaces, 3. unfriendly technology support, 4. limited relevant search results, 5. limited electronic journals and full-text, and 6. cultural and psychological problems.

All the participants expressed initial hesitancy and fear to speak with the librarian due to cultural factors. Seven participants expressed unfamiliarity and limited use of large-scale library systems and services in their home countries such as the one at UT main campus. Three participants felt intimidated asking a librarian for assistance and preferred to communicate via email reference instead of face-to-face interactions. Over fifty-percent reported using various kinds of library systems and services on their own even when they experience difficulty finding the information sought. In fact, self-efficacy and motivation were the driving forces in pursuing their information needs.

The participants appreciated interlibrary loan services and the availability of library carrels and graduate study booths, which they used as personal spaces for academic study.

Rank	Barrier/Challenge	Examples	Number of Responses
1.	Limited searching skills of library website, OPAC, and online databases	Difficulty in category and keyword searching owing to language limitations; unfamiliarity with resources and their use.	16
2.	Poor search functionalities	Limited spelling options; minimal automatic tips for search methods; poor functionality to search multi-media items; poor searching support in non-English language; lack of natural language in most databases; lack of full-text in some databases.	14
3.	Unfriendly web design and technology	Difficulty in locating specific functions and information on the website; location of different libraries and online databases is unclear; book status not updated; unclear what databases are for specific disciplines; limited number of computers.	14
4.	Limited results	Ineffectiveness of search engines; poor results in subject category and keyword searching; time consuming to sort results.	11
Information Resource: Library Services			
5.	Limited scope of collections	Small collection on specific topics and electronic journals; outdated materials; time to get new books via interlibrary loan.	10
6.	Cultural and psychological problems	Anxiety in library use; lack of familiarity with library's role and services.	4

Table 3. Barriers and Challenges in Using ICTs in the Library

Prior Educational Experience and Information Seeking Strategies

The participants were asked about the educational system in their home countries, information seeking behaviors and research processes and how they varied from those at UT. They reported differences in relation to: 1. role of faculty, 2. role of the library, 3. technology use, 4. research process, and 5. educational process. These are described below.

Role of Faculty

In the participants' home countries, faculty played a more significant role in describing, detailing, and explaining nuances of the research process in introductory courses in their field of study in their home countries, as compared to the United States. For example, three participants from India reported that faculty initiated the students' research process beyond identifying the research problem, offered lists of articles as a starting point, and worked with students continuously over the course of an academic year to ensure adequate progress. Conversely, in the United States, professors did not give as much initial help. The participants believed that this could be due to the level of the degree (graduate vs. undergraduate) rather than the educational process.

Role of the Library

All participants reported that the library did not play as instrumental role in supporting the research process in their home countries as it did in the United States. For example, lack of interlibrary loan programs in home countries caused hardship because

the participants had to physically visit the library holding an item of interest. Additional differences were: a. less frequent computer use and technology-related opportunities (e.g., availability of fewer databases), b. lack of systematic training in using ICTs and library services for research, c. smaller collections and limited access to books (non-circulating collections), d. less friendly library staff, e. availability of interfaces in native languages, and f. limited use of the Internet.

Technology Use

The level of technology use in support of finding information for research purposes also varied between the participants' experiences in their home countries and the United States. Some differences included: a. slower and less effective online searching systems, b. less Internet-based research, c. less online availability of current research journals on different topics, d. limited access to computers, e. limited specialized databases, and f. limited technical and user support services.

Research Process

The participants noted similarities in the research process undertaken in their home countries and the United States. This was in relation to the large amount of time spent on searching and finding information. Their expected outcomes of the research process were also similar, especially in terms of finding relevant information that met their needs.

Differences in the research process included a focus on using journal articles in the United States, as opposed to emphasis on class notes and textbooks. Since they had limited access to various ICTs in their home countries, the participants noted that information literacy skills such as searching online systems were not as critical as they were in the United States.

Educational Process

The main difference that influenced the participants' academic experiences concerned a lack of exposure to the semester-based academic program. In their home countries, an academic program spanned over nine months and the participants took only one final examination at the end of the program. Under the semester-based system, the participants felt pressured and stressed out due to the cumulative work they had to achieve every semester. In order to cope with this new reality, the participants had to adjust their mental models to the new educational processes and seek help from peers, especially those from their own home countries and who had been in the same program of study.

DISCUSSION

This study revealed key aspects of the participants' information seeking strategies, information needs, and use of various ICTs. The participants needed greater support and guidance during their academic program, from selecting courses to using information throughout the program of study. This suggests that academic departments make efforts to communicate clear guidelines for academic advising.

The participants experienced difficulty in conducting research due to limited familiarity with the research process, cultural differences, and lack of efforts on the part of faculty to establish a clear understanding of the process. This implies that faculty needs to develop empathy for international students and recognize that they may need more assistance than their American counterparts. Similarly, library staff should make

extra efforts to provide specialized training programs for international students about the research process and how to use ICTs and library services.

The participants reported that they often found information of interest by chance about local activities, events, directions, and resources. These provided them with significant knowledge about daily life. They suggested dissemination of local information (e.g., grocery store locations, entertainment venues such as cinema halls, and bus schedules) at various popular student meeting places (e.g., coffee shops, library, sports facility) for awareness. Indeed, the UT International Student Association, the International House, and campus support units should provide such information online and across the campus.

Learning how to effectively communicate in the English language was critical to the participants. To enhance their language skills, they sought classes hosted by UT and participated in study groups, practice sessions, and role play experiences where students enacted different typical real-life situations such as visiting a restaurant, meeting a friend in a public place, and giving directions. They needed critical and frank assessment of their language speaking skills from academic advisors, peers, and friends, though most of them experienced situations where they did not obtain forthright opinions about this matter. The participants suggested a mentoring program of international and American students to help them acclimatize to the new culturally- alien information environment, and to orchestrate as many formal and informal interactions with students of various cultures and backgrounds.

Career and professional development goals necessitated seeking financial aids to support their education. They sought opportunities for gaining professional skills that would assist them in their future careers. The participants lacked an adequate level of knowledge of how to find financial support and suggested that such information be available in their academic departments and through their advisors and other faculty members.

The participants had limited awareness of the location of computer facilities, hours of operation, and how to benefit from existing computer services that support their cross-cultural and academic learning processes. In addition, they experienced problems seeking information on campus support services such as housing, health-related services, counseling, and other benefits offered to students at UT. This suggests more effective dissemination strategies about support services available for international students, especially during admission to academic programs and arrival on campus.

The barriers and challenges the participants experienced in using various ICTs provide several directions for both training and system design improvement. In terms of training, library information professionals should provide information materials in various languages, especially in those that are spoken by most of the international student community on campus. In addition, they should establish outreach programs with academic advisors in various departments to build awareness about library services available for international students.

Repeatedly, international students mentioned difficulty in using digital interfaces mainly due to their inadequate level of English language skills. Searching, browsing the hierarchical structure of web directories, understating the relationships between broad, narrow, and related terms, among others, were confusing to them. In addition, recalling keywords from limited vocabulary, and formulating effective search strategies surfaced as major problems. The participants called for web-based systems that allow natural language searching and that provide interfaces in multiple languages. The participants used Google, Yahoo, and specialized search engines and websites. Apparently, they lacked awareness of the multiple language interfaces provided by Google and foreign language resources available on the web. It is unclear whether the language factor and/or

whether the design of the interfaces they used impacted their information seeking strategies. Although the web is global in nature, the representation of information is based on western and European models of aesthetic and cultural values that limit its effective use by cross-cultural users around the world (Becker and Mottay, 2001).

CONCLUSIONS

Today's global information society presents opportunities and challenges in establishing intercultural awareness and appreciation of diversity. Documentation of international students' experiences and perceptions of their information needs, information seeking strategies, ICT use, and library and support services unveiled several problem areas faced by the students. Improving the quality of international students' experiences requires manifold efforts on the part of faculty, academic advisors, international student advisors, library staff, technology support staff, policy makers and administrators, and designers of web interfaces to provide appropriate and culturally-sensitive intervention programs to identify and meet the information needs of international students.

This study investigated Asian graduate students' perceptions and experiences in using various ICTs. Additional data is being analyzed and will be reported in future research. Use of qualitative research methods provided a rich and holistic understanding of the complex reality of cross-cultural education and learning that international students encountered in the United States. While valuable, the results of this study may not be generalized to the whole population of Asian students or the whole population of international students. Additional research that captures international students' naturalistic information seeking behaviors, and usability studies that assess the students' interaction with various ICTs are needed. Qualitative research is highly recommended to obtain deeper understanding of the experiences of international students. Future studies should include international students from different countries who are pursuing higher education at many other universities in the United States.

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