Different Geospatial Information Behaviors of New Domestic and International Graduate Students

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ABSTRACT
This paper presents the findings from an online survey investigating how new students seek geospatial information in an unfamiliar environment. By surveying 149 new graduate students at University of Maryland, College Park, this study identifies the geospatial information needs and information sources used during their adjustment in new environments, and examines the factors that may affect different geospatial information behaviors (GIBs) of new students, such as populosity of students’ countries of origin on campus, gender, age, and program level (Master’s, PhD). Findings include (1) international students’ greater emphases on survival-related geospatial information; (2) gender differences in the importance of navigational and transportation information and frequency of using navigational information sources during adjustment; (3) significant differences among socio-national and demographic groups for geospatial information needs and for the use of information sources. The findings are discussed in ways to further our understanding of new students’ GIB in unfamiliar environments and inform further research in human information behavior.

Keywords
Geospatial information, information behavior

INTRODUCTION
Every year many new students enter colleges and universities. While some come from the local area, they also come from other parts of the nation and the world (National Center for Education Statistics, 2014). For those coming from other areas or countries, the university environment is a new place where various challenges await. They need to decide where to live, identify where to eat and buy groceries, and learn how to move around an unfamiliar environment. These challenges are more difficult for new international students who come into a new environment with different cultures, people, systems, and contexts.

Information behavior models and theories identify that various social, cultural, demographical, and psychological factors must be taken into account when understanding human information behaviors (Burnett & Jaeger, 2011; Wilson, 1997). In light of these theories, this paper examines information behaviors of new students to understand how various contexts affect their information behavior in an unfamiliar geospatial environment. In this paper the term geospatial information is used not only to refer to location information found on a map, but also for information about places, space, routes, and transportation that newcomers use during their adjustment to a new environment. Specifically, this research aims to further our understanding of how people seek and use information while adapting in new geospatial environments by focusing on geospatial information behavior (GIB) of new graduate students who are from outside the local area and examining how their characteristics affect geospatial information needs and sources used during adjustment in a new area.

PREVIOUS WORK
There have been a number of studies in library and information science (LIS) that examine international students’ information behaviors (Allen, 1993; Jackson, 2005; Liu & Redfern, 1997), but most of those studies examined international students’ information behaviors in academic or library settings. While there are a growing number of studies about information behaviors of immigrants and sojourners outside libraries (Komito & Bates, 2011; Lingle, 2011), international students’ non-library information behaviors have, with few exceptions, been less studied (Oh, Butler, & Lee, 2014; Sin & Kim, 2013; Sin, 2015). Sin and Kim (2013) focused on international students’ use of social networking sites (SNSs) in their daily information seeking behavior, and Sin (2015) investigated demographic differences in international students’ daily information sources and challenges. Through a small scale, mixed method study, Oh et al. (2014) explored new international students’ GIB during their
adjustment and suggested potential influence of socio-national differences on new international students’ GIBs. The current study adds to this work by surveying the geospatial information needs and information sources of new students on a larger scale and by explicitly examining socio-national and demographic factors that may affect GIBs of new students. The research questions for this study are as follows:

RQ1: What geospatial information is important to new graduate students in an unfamiliar environment?
RQ2: What information sources are used to satisfy new graduate students’ geospatial information needs?
RQ3: What socio-national and demographic factors affect new graduate students’ geospatial information needs and behaviors?

METHODS
As part of a larger mixed-method research project to study GIB of new students, the current study conducted an online survey with 149 new graduate students at University of Maryland, College Park. To study GIB of those who are new to College Park area, first-year international students and first-year out-of-state students were recruited. Participants were students in graduate level programs since graduate students have been reported to have different information needs than undergraduate students (Sin & Kim, 2013), and because international students comprise greater proportion of graduate students than undergraduate students (about 12.4% nationally and 29.4% in UMD vs. about 3.5% nationally and 3.0% in UMD) (National Center for Education Statistics, 2014; University of Maryland, 2013). To answer questions about socio-national and demographic differences (National Center for Education Statistics, 2014; Oh et al., 2014), this study includes three groups of participants having different countries of origin: (1) International-populous (students from China, India, and Korea, top three countries of origin of international students in the U.S. and at UMD), (2) International-less-common (students from countries other than China, India, and Korea) and (3) Domestic-out-of-state (American students from states other than Maryland).

The survey questionnaire was developed based on previous studies of migrational individuals and international students’ information behaviors (Lingel, 2011; Oh, Butler, & Lee, 2014; Komito & Bates, 2011) and captured demographics, geospatial information needs, and information sources used. Participants used 7 point Likert scales to rate the perceived importance of 12 types of geospatial information during their adjustment and their frequencies of using 18 types of information sources. The survey was advertised through campus-wide email lists from October 2014 to March 2015.

FINDINGS
Of the 149 survey participants, 84 were new international students from 21 different countries: India (27), China (21), Korea (7), and 18 others (29) including Argentina, Greece, Sri Lanka, and Vietnam. The remaining 65 were U.S. students from outside Maryland. Overall, 80 participants were Masters students (female 53.75%, male 46.25%) and 69 were PhD students (female 53.62%, male 46.38%).

Perceived Importance of Each Type of Information
RQ1: What geospatial information is important to new graduate students in an unfamiliar environment?
Factor analysis of the 12 types of geospatial information and 18 information sources identified 7 underlying types of information needs and 10 types of information sources.

The most important geospatial information for participants was housing information, followed by information about public transportation, groceries/retail shopping, and new student essentials (school-related and health-related places, banks) (Figure 1). Information about café/restaurants and recreational places was perceived as least important during participants’ adjustment in the new area.

RQ3: What socio-national and demographic factors affect new graduate students’ geospatial information needs and behaviors?
ANOVA analysis found significant differences in perceived importance of several types of geospatial information between different socio-national groups. Compared to domestic out-of-state students, international students perceived many types of geospatial information as significantly more important including: housing $[F(1, 140) = 4.294, p = .040]$, public transportation $[F(1, 140) = 6.747, p = .010]$, groceries/retail shopping $[F(1, 140) = 6.086, p = .015]$, and new student essentials $[F(1, 140) = 15.231, p = .000]$. But for café/restaurants and recreational place information, no significant differences were found between out-of-state students and international students. When comparing between the international-populous and international-less-common groups, no significant differences were found for the perceived importance of geospatial information. Regarding gender differences, public transportation $[F(1, 140) = 4.143, p = .044]$ and routes/streets information $[F(1, 140) = 5.697, p = .018]$ were significantly more important for female students. There was no difference between masters and PhD students.

Figure 1. Perceived importance of each type of geospatial information
but older participants rated café/restaurant information more important \((M = 24.79, SD = 3.584, \text{Partial} \text{Eta Squared} = .051)\).

**Frequency of Using Information Sources**

**RQ2: What information sources are used to satisfy new graduate students’ geospatial information needs?**

The most frequently used information sources for geospatial information during adjustment were PC web and maps \((M = 5.50, SD = 1.04)\), followed by mobile maps and location-based services (LBS) apps \((M = 5.13, SD = 1.57)\), and co-national friends \((M = 4.22, SD = 1.58)\) (Figure 2). Neighbors \((M = 2.13, SD = 1.37)\), family \((M = 2.45, SD = 1.65)\), and offline university resources \((M = 2.99, SD = 1.24)\), such as bulletin boards, paper media, and staff/personnel, were among the least frequently used information sources during new students’ adjustment.

**RQ3: What socio-national and demographic factors affect new graduate students’ geospatial information needs and behaviors?**

Significant differences in frequency of information source use were found between both international and domestic out-of-state groups, and international-populous and international-less-common groups.

International students used PC web and maps \([F(1, 140) = 4.922, p = .028]\) and mobile (smartphone) maps and LBS apps \([F(1, 140) = 7.521, p = .007]\) more frequently than domestic out-of-state students. International students were also more frequent users of university online \([F(1, 140) = 7.252, p = .008]\) and offline resources \([F(1, 140) = 7.991, p = .005]\), friends from other countries \([F(1, 140) = 16.096, p = .000]\), neighbors \([F(1, 140) = 7.507, p = .007]\), online communities \([F(1, 140) = 14.672, p = .000]\), and wandering around the new area \([F(1, 140) = 7.154, p = .008]\).

International students’ GIB also differed based on their socio-national environment. Students in international-populous group (Chinese, Indian, and Korean, who comprise about 70% of international students on campus) (University of Maryland, 2013), who had relatively many co-national students in the new environment, frequently got geospatial information from co-national friends, a source that was significantly less used by students in the international-less-common group \([F(1, 75) = 55.960, p = .000]\). Those in the international-populous group also used online communities more \([F(1, 75) = 13.727, p = .000]\) than those in the international-less-common group. In addition, students in the international-populous group used mobile maps and LBS apps \([F(1, 75) = 5.403, p = .023]\), university offline resources \([F(1, 75) = 9.431, p = .003]\), and family \([F(1, 75) = 4.734, p = .033]\) significantly more frequently than international students from less common countries of origin. Gender differences were found only for PC web and maps \([F(1, 75) = 5.121, p = .025]\) and mobile maps and LBS apps \([F(1, 75) = 6.628, p = .011]\). Female students used those sources more frequently than male students. Only university offline resources were used more frequently by Masters students \([F(1, 75) = 5.665, p = .019]\) and there were no significant relationships between age and frequency of information source use.

**DISCUSSION**

**Survival First, Recreation Next - More Crucial for International Students**

Both international and domestic out-of-state students rated basic, survival-related geospatial information, such as housing and transportation, more important than café/restaurants and recreational place information. But international students find these types of basic, survival-related information significantly more important than domestic out-of-state students.

Especially, domestic students found geospatial information about new student essentials significantly less important \((M = 4.77, SD = 1.04)\) than international students \((M = 5.33, SD = 1.03)\) and perceived importance of new student essentials as low as café/restaurant information \((M = 4.72, SD = 1.13)\). This suggests that domestic out-of-state students are not as concerned as international students about basic geospatial information, possibly due to their knowledge of American systems for housing, groceries, banks, schools, and health-related places. Without much knowledge of these American systems, international students’ information need for basic, essential geospatial information seem significantly higher than domestic students’. This reflects the theme of “Survival first, recreation next” in international students’ GIBs found in Oh et al. (2014)’s earlier study, and indicates that geospatial information needs of international students differ from those of new domestic out-of-state students.

**Gender Differences in Use of Information Sources**

Female participants not only assigned higher importance ratings to navigational and transportation information (public transportation, routes/streets), but also more frequently used information sources (PC web and map, mobile map and LBS apps) that provide navigational and transportation information, assist with place searches, and support wayfinding in unfamiliar environments. This gender difference in GIB adds to the growing empirical literature on gender differences in wayfinding strategies and

![Figure 2. Frequency of using each type of information](image-url)
Spatial performance (Coluccia & Louse, 2004; Lawton, 1994) and can be further examined in future work.

**Small and Larger Influences Shaping GIBs**

The theory of information worlds argues that information behavior is shaped simultaneously by immediate influences (small worlds), such as friends and family, and by larger influences, such as institutions, media, politics, and other culture wide information worlds (Burnett & Jaeger, 2011). The current study examined both the immediate and larger influences affecting new students’ GIBs, and these small and larger influences interacted to shape new students’ GIBs in unfamiliar environments. One example is the different matriculation patterns for different socio-national groups (larger influence) affecting the presence of co-nationals (small world) which in turn leads to different patterns of information source use (small worlds).

Significant differences were found in the three different socio-national groups’ information source use. International students used 8 of 10 information sources more frequently than domestic-out-of-state students. The international-populous group used 5 of 10 information sources more frequently than the international-less-common group. The clearly significant differences (p < .01) in the frequency of using co-national friends \(F(1, 75) = 55.960, p = .000\) and online communities \(F(1, 75) = 13.727, p = .000\) imply that international students from less common countries of origin do not have many co-national friends or do not have much interaction with other co-national students on campus. They are less likely to get geospatial information from either online or offline social information sources during adjustment to an unfamiliar environment and they used non-social information sources (PC web and map) slightly more frequently than international students from the populous countries of origin. Educators and administrators providing information and programs to facilitate new student adjustment should attend to these differences in socio-national communities’ information behavior.

**CONCLUSION**

Whether they are from other parts of the nation or from other countries, adjusting in an unfamiliar environment can be challenging for students. This work identified geospatial information needs and information sources used by new students and examined the effects of socio-national and demographic factors on their GIBs during adjustment. Statistically significant differences were found among different socio-national groups for many types of geospatial information needs and information sources used while gender and program level differences were found only for a few types of geospatial information and information sources used. More research is needed to better understand the effects of different socio-national and cultural contexts of students in new environments and why these contexts affect their GIBs. Further empirical studies should also explore how GIBs develop over time and how the outcome of different information behaviors affect new students’ adjustment in new environments. We hope that this study will inform research in GIB and information behavior of newcomers who are relocated, whether locally or globally.

**REFERENCES**


