

Demographic Differences in International Students' information Source Uses and Everyday Information Seeking Challenges

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ABSTRACT

International students are a sizeable user group of academic libraries. However, their everyday life information seeking (ELIS) behavior is seldom studied. This hinders the planning of information services and information literacy training. In light of this gap, this study surveyed 112 international students in a U.S. public university on: (1) how frequently respondents used 11 information sources; (2) how difficult it was to find information in various domains; and (3) how much their ELIS was affected by various information seeking problems. Differences between gender-study level categories and problem solving styles were tested using ANOVAs. The study found that Web search engines, social networking sites, new friends, printed resources, and traditional mass media were the top sources for ELIS. Six everyday information domains (e.g., legal, financial, and personal development information) ranked more difficult to find than academic information. Non-credible, irrelevant, and outdated information were found to be the top problems. There were more statistically significant problem solving style differences (especially on the Problem Solving Confidence subscale) than gender-study level differences. Notable gender-study level differences were still found. Male undergraduate students, for example, were more affected by their reluctance to ask personal questions. Lastly, the implications to information literacy education were discussed.

Keywords

International students; Information sources; Information seeking challenges;
User characteristics

INTRODUCTION

Over 4.5 million students are pursuing a university-level education overseas (OECD, 2014). In the 2013-14 academic year, about 886,052 international students were studying in the United States (Institute of International Education, 2014b). While international students are a notable user group of academic libraries, their methods of seeking out and using information are not well understood (Liu & Winn, 2009). Cognizant that international students may have different information needs and behaviors than host-nation students (hereafter, also referred to as U.S. students), many academic librarians in the survey by Ishimura and Bartlett (2014) have expressed interest in participating in specialized training for providing services to international students.

To orient themselves in a new environment, international students often need to find and process a large amount of information (Ward, Bochner, & Furnham, 2001). Differences in culture, language, and life experience can also add complications to their information seeking in the host country (Liao, Finn, & Lu, 2007; Yi, 2007). Although the Internet and social media have increased the ease of information seeking for international students (Sin & Kim, 2013), the uncertain quality of information on the open Web can be problematic. Nowadays, students are exposed to a multitude of information sources. It is unclear to what extent international students are using these different sources, what types of information seeking challenges they have encountered, and whether there are demographic differences in source use and everyday life information seeking (ELIS) challenges. The dearth of research on this topic impedes the planning of information services and information literacy (IL) training for this user group.

In light of the research gap, this study seeks to examine the information behaviors of international students, particularly in the under-explored area of ELIS. ELIS is an area that has drawn increasing attention since the mid-1990s (Savolainen, 1995). Nowadays, it is widely recognized that IL encompasses not only a proficiency in academic information seeking, but in an individual's work and personal life as well (Association of College and Research Libraries, 2004). Being the principal provider of IL education

and information services on campus, academic libraries are poised to contribute to the growth and well-being of international students by preparing them to be proficient information seekers in both academic and everyday contexts. Analyses of international students' current information behavior and the challenges they experience would contribute towards further service planning for this population. Specifically, the study examines the following research questions (RQ):

- RQ1:** (a) How frequently do the respondents use a variety of sources and channels (e.g., libraries, Web search engines, social networking sites, social question and answer sites, and family members) for their ELIS?
- (b) Do the source uses differ by demographic (particularly by the gender-study level category and problem solving styles)?
- RQ2:** (a) How difficult is it to find information in various information domains (e.g., health, finance, and local news)?
- (b) Do the levels of difficulty differ by demographics?
- RQ3:** (a) To what extent is their ELIS affected by various problems (e.g., difficulties with computer systems, non-credible information)?
- (b) Do the levels of problem differ by demographics?

LITERATURE

Challenges in Information Seeking and Library Use

Higher education is a time of intense intellectual and personal growth. This can involve considerable information seeking for both host students and international students alike. The cross-cultural adjustment and new-comer information behavior literature suggest that international students likely have additional information needs related to their being new to the country (Ward et al., 2001). The effective acquisition of everyday life information is important to the students' cross-cultural transition and college adjustment (Shoham & Strauss, 2008).

Researchers have noted the dearth of recent studies on international students' information behavior (Liu & Winn, 2009). Research on international students'

everyday information seeking is even rarer. The extant studies have focused more on academic needs and library uses (Jackson, 2005; Liao et al., 2007; Liu & Redfern, 1997; Liu & Winn, 2009; Song, 2004; Yi, 2007). These studies have brought valuable insights on the barriers that international students may encounter in academic information seeking. Overall, the literature suggests the following challenges: language barriers, unfamiliarity with certain information technology and systems, varying awareness and perception of library services, and cultural differences. These challenges will be summarized below, as some of the problems affecting the academic information seeking of international students may also influence their ELIS.

The language barrier is an often discussed topic, especially in earlier studies (Amsberry, 2008; Bilal, 1989; Liu & Redfern, 1997). Onwuegbuzie and Jiao (1997), for example, found that non-native English speakers reported higher levels of library anxiety than native English speakers. An unfamiliarity with library jargon can add extra difficulties to international students' information seeking (Howze & Moore, 2003). Similarly, technological barriers were often found in earlier studies (Onwuegbuzie & Jiao, 1997). With the increasing access to information technology worldwide, recent studies suggest that among international students studying in the U.S. and Canada, technological difficulties may be less prevalent than before (Jackson, 2005; Liao et al., 2007; Liu & Winn, 2009; Yi, 2007). Similar to American students, international students nowadays are often found to frequently use Internet resources for information seeking. The uses of Web search engines are especially widespread among both international and U.S. students (Liao et al., 2007; Sin, Kim, Yang, Park, & Laugheed, 2011).

While students' familiarity with the Internet has generally increased, researchers continue to find some differences between U.S. and international students in their information behavior. For example, Liao and colleagues (2007) showed that a larger portion of the international students in their study initiated their search from the Internet, while more U.S. respondents began their search with the university's electronic resources. Song (2004) discussed that specific journal databases can still pose challenges to international students. This may stem in part from their varying prior experience with library and information retrieval systems (Song, 2004). A

positive finding is that the international students in some of the studies have expressed interest in learning more about database and Web searching strategies (Liao et al., 2007; Yi, 2007).

The literature also suggests another persistent challenge: international students are often found to not be fully aware of the whole range of library services available to them. Examples include reference services (especially virtual reference), library orientation, consultation sessions, and interlibrary loans (Jackson, 2005; Liao et al., 2007; Liu & Winn, 2009). Cultural differences also continue to be a factor. For example, some international students are more accustomed to trying to resolve problems on their own instead of asking for librarians' assistance (Liu & Winn, 2009).

Challenges in Everyday Information Seeking

The difficulties mentioned above focused on academic information needs and library use; however, some of these can similarly affect the ELIS of international students. Finding relevant and trustworthy daily life information can be challenging, even among U.S. students (Given, 2002; Head & Eisenberg, 2011; Sin, in press). Being relatively new to the country, international students may experience more pressing everyday information needs and challenges than U.S. students. In a survey of 188 international students by Sin and colleagues, respondents had more difficulty finding work and career, legal, financial, housing, and health information (Sin et al., 2011). Jeong's in-depth interviews of international graduate students and their spouses indicate that some respondents missed certain important daily life information due to language barriers (Jeong, 2004).

Source Uses in Everyday Information Seeking

U.S. students used the Internet frequently to seek everyday information. Head and Eisenberg (2011) found that Web search engines, friends and family, and Wikipedia were the most frequently used sources. Social networking sites (SNSs), such as Facebook, were not ranked in that analysis, but recent research suggests that SNSs are used frequently by U.S. students for ELIS (Kim, Sin, & Yoo-Lee, 2014). With regards to international students, their internet use is the area with stronger empirical evidence.

Most studies show that international students are frequent Internet users. Liao et al. (2007) found that the international students in their study used the university library and its services (such as searching academic resources, studying, and using the reserves collection) more frequently than U.S. students did. Beyond academic information seeking and library uses, however, it is unclear how international students are using different information resources (such as social media platforms, people sources, or traditional mass media) for ELIS.

It would be fruitful to investigate the use of a variety of information sources, as there is beginning evidence that some sources have a positive influence on the life of international students. Lin, Peng, Kim, Kim, and LaRose (2012) found that the social and college adjustments of international students were associated positively with the amount of time they spent on Facebook interacting with home-country friends. In comparison, the time spent on interacting with host-country friends through Facebook was positively related to social adjustment but not to college adjustment. In terms of informational outcome, Sin and Kim (2013) found that international students who used SNS for ELIS more frequently tended to perceive the information they found as more useful than did infrequent SNS users. This positive relationship held even after the analysis had accounted for gender and personality differences (the Big Five personality)(Sin & Kim, 2013). It is posited that certain types of information sources, such as SNS, may possess design features that better support the information seeking of international students (e.g., in reducing barriers caused by geographical distance). How international students are using various information sources is thus of interest.

Individual Differences

The knowledge of individual differences in information behavior will help inform the development of user-centered services. Prior research on international students sometimes discusses gender and study level differences. The results are not unanimous, but many studies suggest that women use libraries and SNSs more frequently than men (Onwuegbuzie, Jiao, & Bostick, 2004; Sin, 2012). In contrast, men seem to use Wikipedia and Internet forums more frequently (Kim, Sin, & Tsai, 2014; Lim & Kwon, 2010). In terms of study level, underclassmen and master's students were

found to report higher levels of difficulty in finding everyday information (Sin & Kim, 2014). More research is needed to ascertain whether a similar pattern is found among international students.

Beyond the demographic variables mentioned above, this study seeks to test the influence of problem solving styles. Problem solving styles capture the way in which an individual tends to respond to challenges. For example, when faced with challenging situations, some may tend towards solving the problem, but others may tend towards avoiding the problem (Lazarus, 1993). Problem solving styles have been found to affect information behavior. To illustrate, respondents rated low in the Personal Control (PC) scale tended to conduct more keyword searches and viewed more Web pages when conducting subject-searching tasks (Kim & Allen, 2002). When choosing what information source to use, low-PC respondents considered familiarity and ease of use to be more important than accuracy (Kim & Sin, 2011). As prior studies have found problem solving styles significant, this study tested whether these variables are similarly salient in international students' ELIS.

METHOD

This study used an online questionnaire to collect data, which included sections on the respondents' source uses, the level of difficulty experienced with different information domains, the types of challenges affecting their ELIS, and demographic questions. Problem solving styles were measured using the Problem Solving Inventory (PSI), which is a well-established psychometric instrument with 35 items. PSI measures three subscales: (1) Approach-Avoidance (AA), which measures whether respondents tend to approach or avoid problem solving activities; (2) Problem Solving Confidence (CON), which captures the extent to which respondents believe in their own abilities to cope with challenges; and (3) Personal Control (PC), which measures the extent to which respondents feel they are in control of their own emotions and behaviors when solving problems (Heppner, 1988; Heppner, Witty, & Dixon, 2004).

The sampling frame included undergraduates and graduate international students studying in a large public university in the Midwestern U.S. After the questionnaire

was pilot tested and finalized, invitations to participate in the survey were emailed to students through the university's mass emailing service. Participation was voluntary; therefore, the resultant sample is not representative of the university population. The findings should be interpreted with this caveat in mind.

The collected data were analyzed using ANOVA. ANOVA tests are robust against the normality assumption. Levene's test was used to test the homogeneity of variances assumption. Following recommended practices, when the assumption was not met, this study used the Welch's F test, which does not assume equal variance (Field, 2009). To obtain more robust estimates, bootstrapping was applied. Bootstrapping is useful when the data might deviate from the assumptions of the test (IBM Corp., 2011). The analyses were conducted with IBM SPSS 20.

RESULTS

Respondent Characteristics

The study collected 112 complete responses, and the sample included more women ($n = 67, 59.8\%$) than men ($n = 45, 40.2\%$). More graduate students ($n = 69, 61.6\%$) than undergraduates responded ($n = 43, 38.4\%$). The respondents were studying in a variety of fields; the top categories were computers and engineering (17.9%), social sciences (16.1%), education (13.4%), natural sciences (11.6%), and arts and humanities (9.8%). A majority of the respondents were from Asian countries (80%), while about 11% were from Europe, 4.5% were from South America, 3.6% were from North America, and 1% was from Oceania. In terms of the PSI subscale, the mean score of the 112 participants on the Approach-Avoidance (AA) subscale was 45.42, the mean on Problem Solving Confidence (CON) was 28.71, and the mean on Personal Control (PC) was 16.66. These sample means are quite similar to the sample means of the US college student normative sample presented in prior studies of PSI (Heppner, Witty, & Dixon, 2004; Sahin, Sahin, & Heppner, 1993).

In terms of the respondents' region of origin, the study used a non-probability sampling method, and the respondents are not representative of the university or the

US international student population. Statistics from the Institute of International Education on US international student composition are presented here for comparison. Overall, about 74% of international students in the US are from Asian countries. About 10% of the international students are from Europe, 8% are from Latin America, 4% are from Africa, 3% are from North America, and 1% are from Oceania (Institute of International Education, 2014a). Compared to the overall US international student population, the current study over-sampled Asian students by about 6% and European students by 1%. The proportion of North American and Oceanian students was similar to that of the overall US international student population. Africans and Latin Americans were under-sampled by about 4% and 3.5%, respectively.

RQ1a: Source Use

On average, Web search engines were used most frequently for ELIS (Table 1). On a scale of 1 (never) to 5 (all the time), the mean frequency for Web search engines was high ($M = 4.75$). The standard deviation was 0.56, which is the lowest among the 11 sources. These suggest that the respondents were rather similar in their frequent use of Web search engines. The second most frequently used source was SNSs ($M = 4.02$, $SD = 1.26$). This is followed by new friends (friends made after they moved to the city where the university is located) ($M = 3.85$, $SD = 0.98$), print resources ($M = 3.37$, $SD = 1.17$), and traditional mass media ($M = 3.29$, $SD = 1.27$). On average, libraries were used with moderate frequency ($M = 3.21$, $SD = 1.37$). Microblogs were used with the least frequency ($M = 2.31$, $SD = 1.42$).

Table 1Frequency of source use for ELIS ($N = 112$).

Rank	Source	Mean	SD
1	Web search engines	4.75	0.56
2	Social networking sites (SNS)	4.02	1.26
3	New friends	3.85	0.98
4	Print resources	3.37	1.17
5	Traditional mass media	3.29	1.27
6	Old friends	3.26	1.21
7	Family members and relatives	3.21	1.26
7	Libraries	3.21	1.37
9	Social Q&A sites	3.19	1.30
10	Professionals	2.42	1.12
11	Microblogs	2.31	1.42

The scale ranged from 1 (never) to 5 (all the time).

Table 2 shows the frequency of source use by PSI subscale categories. For each subscale, using the sample means of the three subscales as the cut-off points, respondents were classified into either the better appraisal or the poorer appraisal group. For example, using the Approach-Avoidance sample mean ($M = 45.42$) as the cut-off point, 52 of the 112 respondents were classified into the better appraisal category (the *Approach* group), and the remaining 60 were classified into the *Avoid* group. The size of the groups for CON and PC are shown in Table 2.

Table 2

Frequency of source use for ELIS, by PSI subgroups.

Rank	Source	Approach-Avoidance (AA)		Confidence (CON)		Personal Control (PC)	
		Approach (<i>n</i> = 52)	Avoid (<i>n</i> = 60)	High (<i>n</i> = 57)	Low (<i>n</i> = 55)	High (<i>n</i> = 52)	Low (<i>n</i> = 60)
1	Web search engines	4.87	4.65	4.81	4.69	4.81	4.70
2	Social networking sites	3.79	4.22	3.79	4.25	3.83	4.18
3	New friends	4.12	3.62	4.00	3.69	3.92	3.78
4	Print resources	3.56	3.20	3.60	3.13	3.56	3.20
5	Traditional mass media	3.29	3.28	3.30	3.27	3.13	3.42
6	Old friends	3.29	3.23	3.47	3.04	3.17	3.33
7	Family and relatives	3.38	3.07	3.32	3.11	3.25	3.18
7	Libraries	3.31	3.12	3.40	3.00	3.37	3.07
9	Social Q&A sites	3.00	3.35	2.98	3.40	2.94	3.40
10	Professionals	2.71	2.17	2.58	2.25	2.52	2.33
11	Microblogs	2.35	2.28	2.11	2.53	2.13	2.47

The scale ranged from 1 (never) to 5 (all the time). The group with a higher frequency of use is in bold.

The descriptive data show that respondents with better appraisal in AA and CON tended to use most sources more frequently than respondents in the avoid group or the low confidence group, respectively. Exceptions to the above pattern were found in the use of social media sources. For example, out of 11 sources, respondents in the low-CON group used three sources more than the high-CON group, the sources were: SNSs, Social Q&A sites, and microblogs. The results for PC were more diverse than that of AA and CON. High-PC respondents used six sources (e.g., Web search engines) more frequently than their counterparts, whereas the low-PC respondents used five sources (e.g., social networking sites) more frequently.

Figure 1 shows the descriptive mean scores by gender and study level combination. The four gender-study level categories were: female undergraduates (*n* = 28), male undergraduates (*n* = 15), female graduate students (*n* = 39) and male graduate students

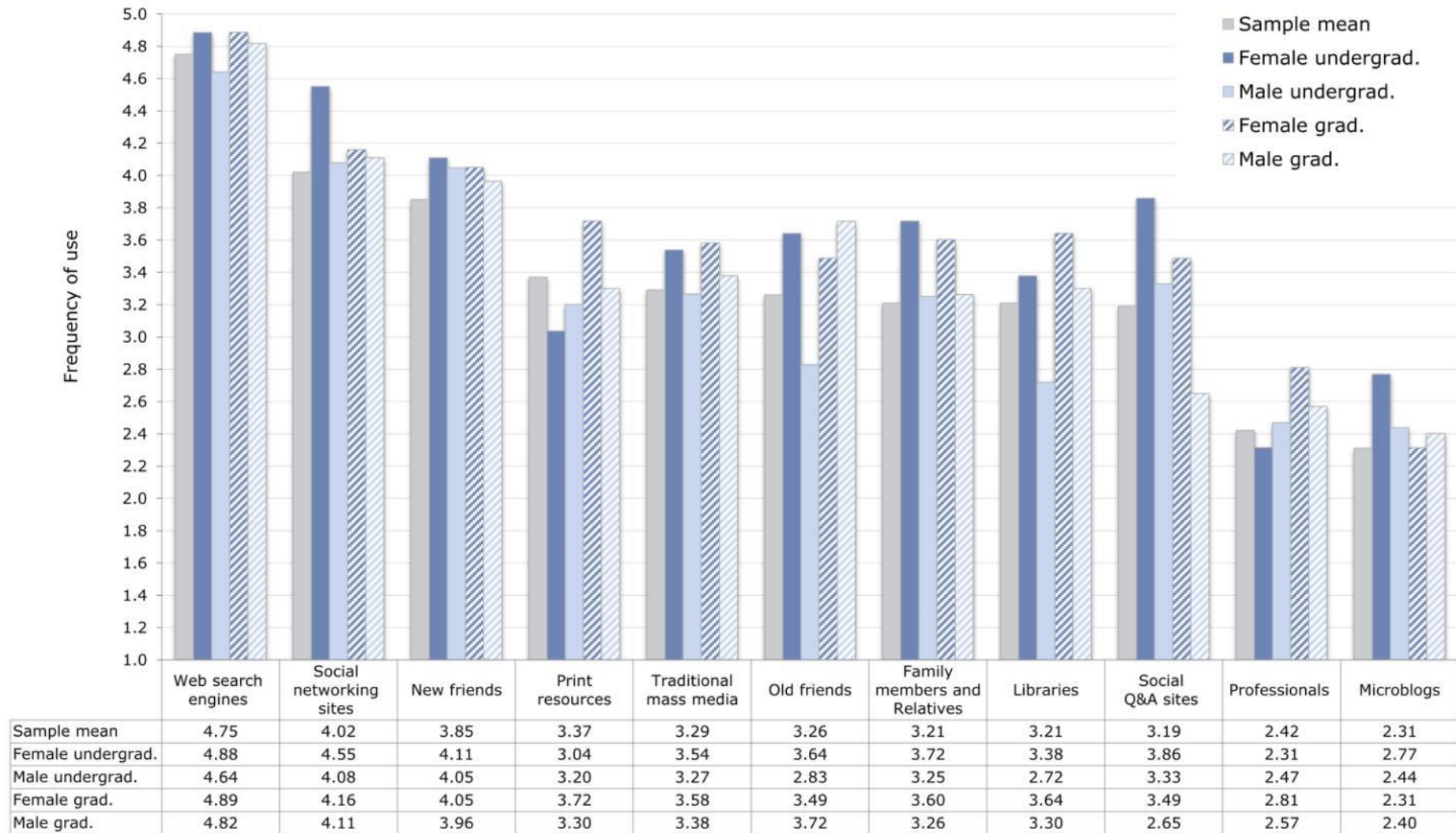


Fig. 1. RQ1a: Mean frequency of source use for ELIS, by gender-study level category.

($n = 30$). Averaged across 11 sources, female undergraduates, on average, used these sources for ELIS most frequently ($M = 3.47$, $SD = 0.56$). This is followed by female graduate students ($M = 3.42$, $SD = 0.55$) and male graduate students ($M = 3.24$, $SD = 0.47$). Male undergraduates, on average, used these sources for ELIS with the lowest frequency ($M = 3.19$, $SD = 0.34$).

RQ1b: Tests of Demographic Differences in Source Use

The one-way ANOVA tests showed no significant difference in the frequency of source uses across gender-study level groups. In contrast, regarding problem solving styles, AA was significant in the use of three sources: professionals, $M_{Approach} = 2.71$, $M_{Avoid} = 2.17$, Welch's $F(1,110) = 6.94$, $p = .010$; new friends, $M_{Approach} = 4.12$, $M_{Avoid} = 3.62$, Welch's $F(1,109.84) = 7.86$, $p = .006$; and Web search engines, $M_{Approach} = 4.87$, $M_{Avoid} = 4.65$, Welch's $F(1,98.76) = 4.51$, $p = .036$. In all three of the above significant relationships, respondents who tended to approach problems used the sources more frequently than did respondents who tended to avoid problems. CON was significant for printed materials: $F(1,110) = 4.65$, $p = .033$. Respondents with higher confidence in their problem solving tended to use print resources more frequently ($M = 3.60$) than did those with lower confidence ($M = 3.13$). PC was not significant.

RQ2a: Levels of Difficulty with Various Information Domains

Respondents rated how difficult it was to find information in 14 everyday information domains. For comparison purpose, they were also asked to rate how difficult it was to find academic information. Overall, everyday information was not perceived to be too difficult to find. On a range of 1 (not difficult at all) to 5 (very difficult), the sample mean across the 14 everyday domains was 2.42 ($SD = 0.58$). However, there were notable variations in the difficulty levels by domain (Fig. 2). Legal information ranked as the most difficult to find ($M = 3.45$, $SD = 1.11$). This is followed by financial information ($M = 2.96$, $SD = 1.19$) and information about personal development (e.g., self-identity, life goal setting) ($M = 2.76$, $SD = 1.21$). Information related to shopping was the least difficult to find ($M = 1.83$, $SD = 0.99$).

The mean difficult level of finding academic information was 2.54 ($SD = 1.12$), which ranked seventh. The six everyday information domains that were ranked more difficult than education information were: Legal, financial, and personal development information mentioned above, as well as information about building and maintaining interpersonal relationships ($M = 2.72$, $SD = 1.25$), housing information ($M = 2.68$, $SD = 1.15$), and information about culture and norms ($M = 2.60$, $SD = 1.08$).

Table 3

Levels of difficulty with information domains, by PSI subgroups.

Domain	AA		CON		PC	
	Approach	Avoid	High	Low	High	Low
Legal information	3.37	3.52	3.40	3.49	3.50	3.40
Financial information	2.83	3.08	2.84	3.09	2.90	3.02
Personal development	2.77	2.75	2.54	2.98	2.83	2.70
Interpersonal relationships	2.60	2.83	2.46	3.00	2.56	2.87
Housing	2.60	2.75	2.56	2.80	2.73	2.63
Culture and norms	2.60	2.61	2.40	2.81	2.52	2.68
Academic information	2.48	2.60	2.33	2.76	2.56	2.53
Family-related information	2.27	2.55	2.23	2.62	2.38	2.45
Health and wellness	2.31	2.43	2.13	2.62	2.33	2.42
Transportation	2.12	2.20	2.14	2.18	1.86	2.42
News about home country	2.13	2.03	1.95	2.22	2.00	2.15
Entertainment and hobbies	1.83	2.10	1.75	2.20	1.87	2.07
Local news	1.67	2.12	1.60	2.24	1.79	2.02
Food and drink	1.77	2.00	1.77	2.02	1.94	1.85
Shopping	1.79	1.87	1.81	1.85	1.827	1.833

The scale ranged from 1 (not difficult at all) to 5 (very difficult). The group with a higher mean is in bold.

Table 3 shows the statistical breakdowns by PSI subgroups. The CON subscale showed a clear pattern. The low-CON group had higher difficult levels than the high-CON group on all 15 domains. The results for AA were slightly mixed. The Avoid group had higher difficulty with 13 of the 15 groups (the two exceptions were on personal development information and news about home country). The results for PC were also

mixed. The low-PC group reported higher difficulty levels on a larger number of domains (10 domains) than the high-PC group (5 domains). Figure 2 shows the

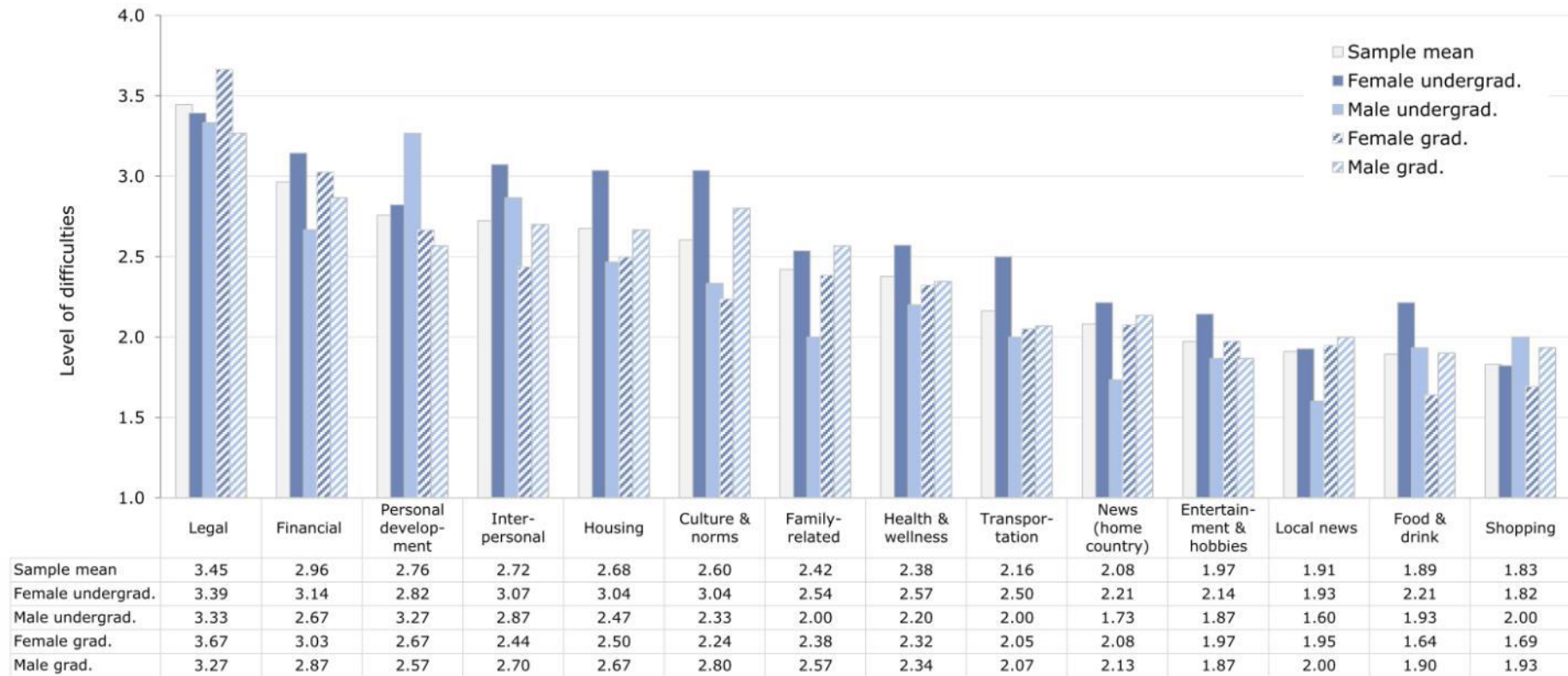


Fig. 2. RQ2a: Levels of difficulty with information domains, by gender-study level category.

difficulty levels by gender-study level category. Overall, female undergraduates reported higher levels of difficulty on a larger number of domains (9 out of 15 domains). In comparison, male undergraduates had higher difficulty with three domains, male graduate students with two, and female graduate students with one.

RQ2b: Tests of Demographic Differences in Difficulty Levels

The one-way ANOVA tests showed that there was a significant gender-study level difference in finding information about culture and norms, $F(3,101) = 3.91, p = .011$. A post hoc Bonferroni pairwise comparison showed that female undergraduate students reported significantly higher difficulties with culture and norms information ($M = 3.04$) than did female graduate students ($M = 2.24$).

Problem solving styles also emerged to be salient. Six significant relationships were found in total. The CON subscale had more significant relationships than the AA and PC subscales. CON showed significant differences on four sources: building and maintaining interpersonal relationships, $F(1,103) = 4.08, p = .046$; entertainment and hobbies, $F(1,103) = 5.41, p = .022$; health and wellness, $F(1,103) = 4.99, p = .028$; and local news, Welch's $F(1,94.31) = 13.00, p = .001$. AA showed one significant difference, which was in local news, $F(1,103) = 5.93, p = .017$. The PC subscale also showed one significant difference, which was in the domain of transportation information, Welch's $F(1,102.50) = 5.96, p = .016$. In all of the aforementioned significant relationships, a lower level of difficulty was reported by participants with better appraisals on the respective subscales (i.e., for AA, tend to approach problems; for CON, more confident; and for PC, higher personal control). The mean statistics of the PSI subgroups are shown in Table 3.

In terms of the difficulty in finding academic information, CON was significant, $F(1,110) = 4.24, p = .042$. Respondents in the low-CON group reported higher levels of difficulties ($M = 2.76$) than those in the high-CON group ($M = 2.33$). Gender-study level category, AA, and PC were not significant.

RQ3a: Types of Problems Affecting ELIS

Respondents rated the extent to which various information seeking problems have affected their ELIS. The scale ranged from 1 (not affected at all) to 5 (very much affected). The top problems affecting their ELIS were: the information they found was non-credible ($M = 3.37, SD = 1.14$), the information found was not relevant to one's needs ($M = 3.34, SD = 1.07$), the information found was outdated ($M = 3.24, SD = 1.19$), the information found was conflicting ($M = 3.12, SD = 1.13$), and that the respondents were uncertain how to evaluate the quality of the information ($M = 3.07, SD = 1.22$). Among 17 problems, difficulties with computer and information systems had the least impact on their ELIS ($M = 1.90, SD = 1.25$).

Table 4 shows the descriptive data by PSI subgroups. The Low-CON and Low-PC groups reported higher levels of difficulty on all 17 problems than their counterparts. The results for AA were more mixed. The Avoid group had higher levels of difficulty in 11 problems and the Approach group had six. Figure 3 shows the extent to which different problems affect ELIS by gender-study level category. Among the four categories, male undergraduates had the highest levels of difficulty on a wider range of problems (9 problems). This is followed by female undergraduates (5 problems) and male graduate students (3 students).

RQ3b: Tests of Demographic Differences in the Impact of Problems

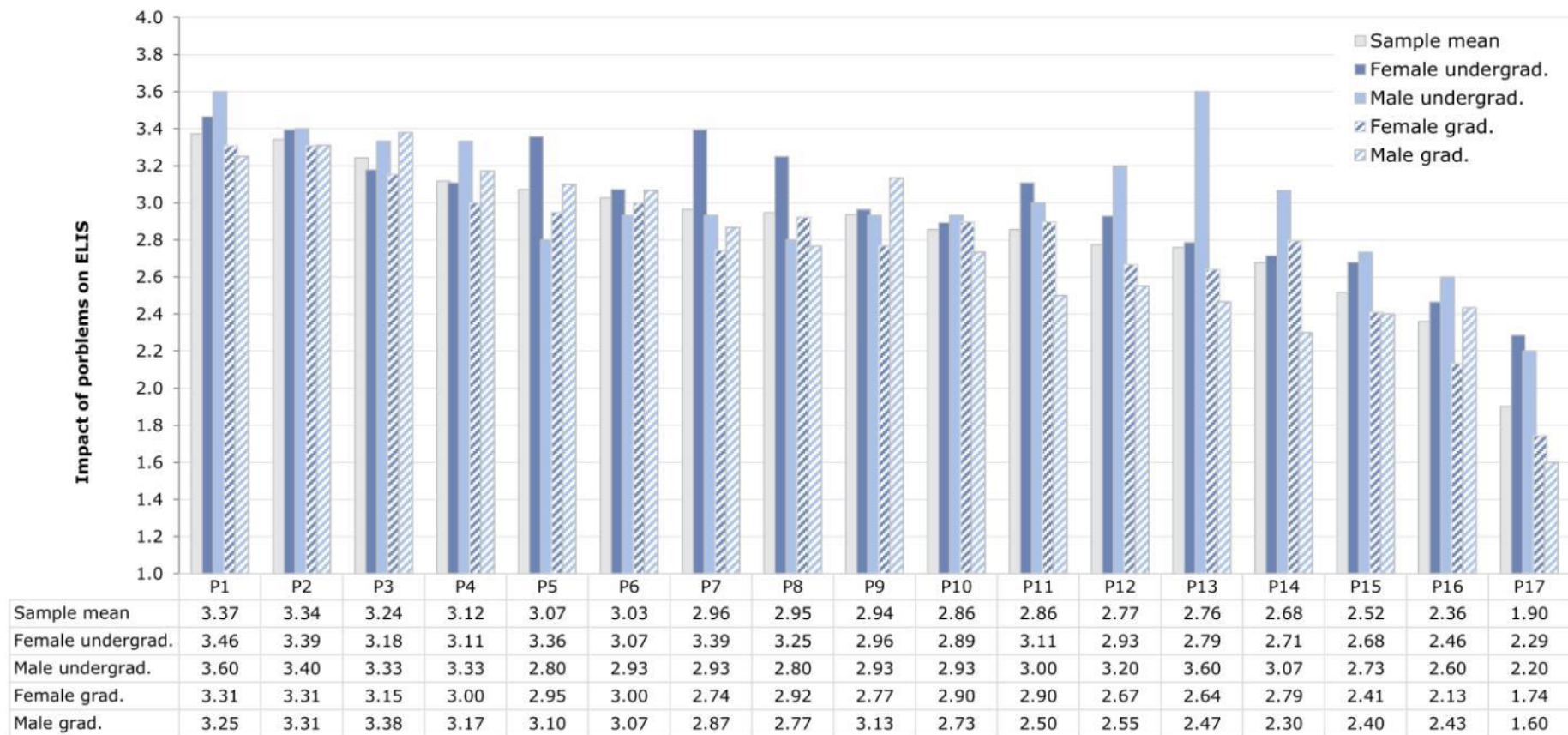
In terms of the extent in which different types of problems affect respondents' ELIS, the one-way ANOVA showed a significant gender-study level difference in one problem: the reluctance to ask personal questions, $F(3,108) = 2.77, p = .045$. The Bonferroni pairwise comparison showed that male undergraduates scored significantly higher on this item ($M = 3.60$) than did male graduate students ($M = 2.47$). In contrast, there were no statistically significant problem solving style differences.

Table 4

Impact of problems on ELIS, by PSI subgroups.

Problem	AA		CON		PC	
	Approach	Avoid	High	Low	High	Low
P1. Information found is of questionable credibility	3.51	3.25	3.31	3.44	3.29	3.44
P2. Information found is not relevant to your needs	3.41	3.28	3.29	3.40	3.22	3.45
P3. Information found is outdated	3.20	3.28	3.14	3.35	3.18	3.30
P4. Information found is conflicting	3.14	3.10	3.07	3.16	2.94	3.27
P5. Uncertainty about how to evaluate the quality of information	3.17	2.98	3.04	3.11	2.92	3.20
P6. Uncertainty about what information sources are available	3.10	2.97	2.98	3.07	2.88	3.15
P7. Searching for information is too time consuming	2.71	3.18	2.63	3.31	2.79	3.12
P8. Found too much information	2.85	3.03	2.70	3.20	2.71	3.15
P9. Uncertainty about what search terms to use	2.75	3.10	2.63	3.25	2.79	3.07
P10. Uncertainty about which source to start first	2.73	2.97	2.58	3.15	2.69	3.00
P11. Uncertainty about what services are available via the library	2.83	2.88	2.67	3.05	2.60	3.08
P12. Found too little information	2.71	2.83	2.64	2.91	2.47	3.03
P13. Prefer not to ask personal questions	2.71	2.80	2.49	3.04	2.38	3.08
P14. Cultural differences	2.73	2.63	2.42	2.95	2.33	2.98
P15. Language differences	2.38	2.63	2.28	2.76	2.15	2.83
P16. Information is expensive to find or obtain	2.12	2.58	2.02	2.72	2.13	2.56
P17. Computer and Internet systems are difficult to use	1.65	2.12	1.56	2.25	1.71	2.07

The scale ranged from 1 (not affected at all) to 5 (very much affected).



Notes: P1. Information found is of questionable credibility. P2. Information found is not relevant to your needs. P3. Information found is outdated. P4. Information found is conflicting. P5. Uncertainty about how to evaluate the quality of information. P6. Uncertainty about what information sources are available. P7. Searching for information is too time consuming. P8. Found too much information. P9. Uncertainty about what search terms to use. P10. Uncertainty about which source to start first. P11. Uncertainty about what services are available via the library. P12. Found too little information. P13. Prefer not to ask personal questions. P14. Cultural differences. P15. Language differences. P16. Information is expensive to find or obtain. P17. Computer and Internet systems are difficult to use.

Fig 3. RQ3a: Impact of problems on ELIS, by gender-study level category.

DISCUSSION

This study found that the Internet plays a considerable role in the respondents' everyday information seeking. The pervasiveness of Web search engines is notable (average 4.75 out of 5), while the SNSs ranked second, which is slightly higher than the results from an earlier study (Sin et al., 2011). This suggests that SNSs may have become more and more integral to students' information environments over the years. The use and impact of SNSs on individuals thus warrants attention. In contrast, the other social media platforms tested here (Social Q&A sites and microblogs) were less frequently used. The lesser uses of these two sources seem not to be unique to international students. These two platforms were also used less frequently than SNSs in the U.S. population in general, and for information seeking in particular (Duggan, Ellison, Lampe, Lenhart, & Madden, 2015; Sin & Kim, 2014).

Friends and family were found to rank rather high in the list of sources (3rd, 6th, and 7th). This is less discussed in prior studies of international students' information seeking, as most studies have focused on academic tasks. Another interesting finding is that the frequent use of new media notwithstanding, print resources and traditional mass media including TV and radio were still rather frequently used (ranked 4th and 5th). The implication is that while new media has understandably gained attention in recent literature, students' information behavior regarding more traditional sources and people cannot be ignored. Since the respondents are still using these traditional channels with some frequency, they would benefit from IL training that covers these sources.

Six everyday domains were ranked more difficult to find than academic information. This indicates a need for IL training in everyday information seeking. Several specialized information domains, including legal and financial information, were found to be more difficult to locate. These two domains, ranked first and second in this study, were also in the top three most difficult domains in a previous study of international student's information needs (Sin et al., 2011). Academic libraries can help students tackle these challenges. For example, IL training may include a session on authoritative and relevant legal and financial information sources. Information related

to personal development, interpersonal relationships, and culture and customs was also ranked high in difficulty in this study. Academic libraries may provide more resources in these areas.

In terms of the types of difficulties, non-credible and irrelevant information were the top issues for the respondents. Uncertainty about how to evaluate the quality of information ranked among the top five for the respondents of this study. A possible explanation is that evaluating ELIS information sources can be more challenging than evaluating academic sources, as the former often lack the cues provided in academic sources (e.g., whether a source is peer-reviewed). International students are likely to be less familiar with some of the sources in the host country. They may lack the background knowledge about the history of an information source to accurately evaluate its trustworthiness. IL educators may help identify different reputable non-academic information sources for this user group, and provide more training on the ways to assess the credibility of non-academic sources.

Individual differences were found to be significant. Based on the findings on differences in problem solving styles, IL educators can provide more tailored IL strategies that take into account these differences. For example, respondents in the *Avoid* group tended to use authoritative sources such as libraries and professionals less frequently than respondents in the *Approach* group. IL educators may encourage the former group to consult these quality resources by demonstrating that these sources are not too overwhelming or taxing to use.

Among the different individual variables, problem solving styles, especially the Problem Solving Confidence (CON) subscale, showed more statistically significant univariate relationships with source use and ELIS challenges than gender-study level differences did. A possible explanation is that the study focused on everyday information, and as such, the potential differences related to study level were less salient when compared to studies of academic information seeking. However, several gender-study level differences were still observed. Female undergraduates reported higher difficulties with information about culture and norms, while the ELIS of male undergraduates were more affected by a reluctance to ask personal questions. IL

educators may explore ways to help users address these problems. The descriptive statistics also indicate that male undergraduates had lower library usage. They seem to be a potential group for library outreach efforts.

In terms of practical implications, the university and libraries may use these findings on international students' source use and information-seeking challenges to inform the provision of information services, IL training, and library outreach. The university may also consider including surveys of information needs and related challenges in their orientation programs for incoming international students. This could serve as an assessment of user needs and provide information for further service planning.

It is hypothesized that some of the information needs and challenges found in this sample may also be found among international students in other U.S. universities, particularly large public universities with sizable international student populations. Some differences are expected across universities due to factors such as differences in the size and composition of the international student population as well as the availability of diverse information resources in the town and city in which the university is located. Libraries in different universities may survey their users on their experiences concerning the difficult information domains and ELIS challenges found in this study. Further studies in different regions of the U.S. and in different types of universities are encouraged. This will help test the similarities and differences in information seeking among international students across the U.S.

Another area of investigation is the comparison of information seeking between U.S. and international students. Some commonalities may exist in the difficulties the students face in regard to specific information domains and the types of ELIS challenges. Among U.S. students, for example, irrelevant and non-credible information have been found to be top issues (Head & Eisenberg, 2011). This is similar to the responses of the international student respondents in this study. Thus, further research should be conducted on both populations to test the extent to which their ELIS experiences and challenges may coincide.

The significant differences in problem solving styles indicate a broader implication for IL research. Respondents who tend to approach problems consulted a variety of information sources more frequently. Respondents with better appraisal in the PSI subscales reported fewer difficulties with specific information domains. This suggests that beyond ascribed demographics (such as gender), cognitive abilities, and search and evaluation skills, which are more often studied in IL, individual problem solving styles and affective factors can be salient and warrant attention. IL professionals have been advocating a more holistic approach towards IL education. The importance of higher-order thinking skills, rather than simply technological skills, has been well recognized (Mackey & Jacobson, 2011). The findings here suggest that IL educators may also encourage students in cultivating another area of life skills, that of their approach towards problem solving.

The significant findings on individual differences in the respondents' ELIS experiences and challenges also indicate that students' ELIS is a promising area of research that would benefit our understanding of the information needs and behavior of our users, adding to the knowledge of the LIS field. We propose a few lines of inquiry. First, the commonalities and uniqueness of ELIS and challenges between U.S. and international students across different universities should be tested. As noted earlier, this would help illuminate the similarity or uniqueness of the students' experiences. Moreover, this would provide a better sense of the generalizability of the study's finding and provide bases for further hypothesis testing and eventual theory development. Second, researchers may test the salience of international student status as an explanatory factor of individual differences in information behavior and experience, vis-à-vis other factors such as gender, country of origin, problem-solving styles, and disciplinary background. This would provide insight into the factors and mechanisms affecting users' information seeking. Lastly, researchers may further investigate the outcome of students' ELIS. Scholars have pointed out that there is a dearth of research on how information seeking and use affects the lives of users, such as in changes in attitudes and life experiences (Case & O'Connor, 2015; Vakkari, 1997, 2008). In the context of students' ELIS, researchers may test how students' everyday information-seeking

behavior contributes towards their college adjustment, sense of well-being, and quality of life.

CONCLUSION

This study examined international students' source use and ELIS challenges. It found that while some online sources (e.g., Web search engines) were frequently used, sources considered to be traditional (e.g., print and mass media) were also often-used. Thus, the latter still warrants coverage in IL training. Difficult information domains (e.g., legal information) and types of challenges (e.g., non-credible information) were identified. These findings suggest areas in which IL educators can help students overcome difficulty. The ANOVA inferential testing showed gender-study level and problem solving style differences, which highlights the importance of IL education that is sensitive to individual differences. Further research in other universities would help test the prevalence of the patterns found in this analysis. With more understanding of international students' information seeking experiences and challenges, academic libraries and IL educators can play an even more vital role in facilitating their information seeking and their personal and academic growth.

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