Information Exchange of Library and Information Science Doctoral Students with Faculty Advisors*

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ARTICLE INFO

ABSTRACT

Faculty advisors play a vital role in a learning and adjustment process of doctoral students at their work, department, university and discipline by sharing and exchanging relevant information and knowledge in the profession. Despite the important role of information practice in doctoral advising, few studies have investigated the informational aspects of faculty advisors and their students. Thus, this study aims to consider the distribution of information exchanged between faculty advisors and their doctoral students and relate them to doctoral students' demographic characteristics (gender, age, race and/or ethnicity, degree, and stage of doctoral work). The findings of this study show that overall information exchange is most frequent at the work level followed by the discipline, school/department, and university levels. In particular, information exchange at the work and discipline levels explains the characteristics of doctoral education, socializing students into both student and professional roles. In addition, there are statistically significant differences in information exchange along certain dimensions according to the advisee's gender, age, race and/or ethnicity, degree, and stage of doctoral study, suggesting that information needs and seeking behavior may vary according to the demographic characteristics of advisees.

1. Introduction

Doctoral students go through a socialization process during their doctoral education (Austin, 2002; Gardner, 2008a, 2010), which is a learning and adjustment process, to successfully conduct their work and research in schools/departments, universities, and profession for their future careers. In this process, the role of faculty advisors as primary socializing agents of their doctoral students

is significant (Girves & Wemmerus, 1988); it involves advising doctoral students to facilitate their professional and personal development (Schlosser et al., 2011a). Faculty advisors guide their students toward becoming adjusted and integrated into the profession by sharing and exchanging relevant profession information and knowledge, which could be beneficial to their advisees' careers. This reflects that such socialization entails cultures, norms, and experiences in the profession.

Despite the importance of information sharing and exchange in doctoral advising, few studies have examined the information-related behaviors of faculty advisors and advisees. Rather, most prior studies on doctoral advising have tended to address how advisee's or advisors' characteristics influence doctoral advising (*influences on advising*), practical aspects of advising, that is, behavioral characteristics of advisors (*advising practice*), and factors affecting the outcomes of doctoral advising (*outcomes*) (Barnes & Austin, 2009).

Recently, in the field of Library and Information Science (LIS), there have been some attempts to identify the topical or behavioral characteristics of information sharing and exchange in doctoral advising. Sugimoto (2012a) identified various types of mentors in doctoral education and presented topics of conversation in mentoring. Additionally, Sugimoto (2012b) described practices of advisors and advisees according to the four mentoring phases: initiation, cultivation, separation, and redefinition. Lee (2016a) explored characteristics of faculty advisors/mentors through interviews and a survey with LIS doctoral students in the United States and found that an ideal faculty mentor possesses both professional and interpersonal characteristics. This study is a partial report from Lee's line of research on doctoral advising, mainly focusing on information exchange between faculty advisors and advisees.

Information behavior research on graduate students has been limited to investigating "information-seeking" behaviors of graduate students; that is, purposeful behavior for finding written materials to solve academic or research problems so as to develop and improve library or information services (e.g., Barrett, 2005; Catalano, 2013; Ellis & Haugan, 1997; George et al., 2006). Such studies demonstrated the important role of interpersonal information sources such as faculty members and colleagues; however, their roles have been described typically as those of intermediaries who assist other individuals' information-seeking behaviors rather than as information providers (Lee & Burnett, 2015).

The proposed study, therefore, investigates information practice taking place in advisor–advisee relationships in doctoral education, aiming to promote advisees' professional and personal development. Specifically, this study aims to consider the distribution of information exchanged between faculty advisors and their doctoral students from the LIS programs in the U.S. and relate them to doctoral students' demographic characteristics such as gender, age, race and/or ethnicity, degree, and stage of doctoral work. We propose the following two research questions:

RQ 1. What types of information do doctoral students exchange with their faculty advisors?
RQ 2. To what degree does information exchange between faculty advisors and doctoral students differ according to the demographic characteristics of doctoral students?

As for types of information, we use a model of information dimensions in advising which includes 16 types of information exchanged between advisors and advisees in doctoral programs (see Fig. 1).

Lee (2018) proposed this framework based on a study of interviews with doctoral students from LIS programs in the U.S. Lee (2018) applied the Klein and Heuser (2008) content framework for organizational socialization when building the current model/framework of the information to investigate the information exchange between advisors and advisees in academic settings since there no content framework has been available previously for socialization of doctoral students. The current study is a follow-up study testing the framework by surveying doctoral students on types of information and comparing the survey findings across their demographic characteristics.

2. Related Work

2.1 Advising in Doctoral Education

Advising is defined as "a relationship that may be positive, neutral, or negative with regard to valence, and the content of said relationship will also vary based on the degree to which the advisor facilitates the advisee's professional development" (Schlosser et al., 2011a, p.7). In a doctoral program, advisors could facilitate the academic progress of a student such as course selection, preliminary, qualifying, or comprehensive examinations, and the dissertation proposal and defense in order to help them complete the academic program successfully. Moreover, an advisor could interact with a student in making decisions for building professional career such as developing a stream of research, obtaining a position in academia or industry, and promoting their research and career in the field (Schlosser et al., 2003; Schlosser et al. 2011a).

In doctoral advising, both advising and mentoring happen in the interactions between faculty advisors and advisees, although a mentoring relationship is closer and more committed than an advising relationship (Johnson, Rose, & Schlosser, 2007). While advisors are likely to take an administrative role, mentors perform more diverse roles, supporting professional socialization of advisees (Titus & Ballou, 2013). Furthermore, faculty mentors possess higher levels of professional and interpersonal characteristics (Lee, 2016a).

Advising in doctoral programs may not always occur smoothly or as the advisor or the advisee expects. Inman et al. (2011) found that some advisees in doctoral programs do not easily disclose themselves or their status in the program to their advisors because they may be afraid of ruining their current relationships with the advisors in that the advisors may think that they are unprofessional or that they lack the necessary knowledge to be a researcher. Additionally, communication issues such as (1) unclear expectations of advisees held by advisors, (2) lack of support from advisors, and (3) unavailability of advisors, cause advisees to shut advisors out, resulting in dissatisfaction with their advising relationships.

The challenges of building and cultivating advising relationships in doctoral programs have been studied in relation to the gender, racial, and cultural backgrounds of advisors and advisees. The "cloning" effect in academia describes scenarios in which mentors prefer to highly recommend those among their mentees who are identical to them for positions in the job market over others (Blackburn, Chapman, & Cameron, 1981). This effect may influence advising relationships in terms

of gender, race, and ethnicity (Schlosser et al., 2011b).

The sex or gender dynamics and combinations between advisors and advisees (e.g., male–male relationships, male–female relationships) and their potential advantages and disadvantages have been discussed in fields such as psychology (Sbaratta, Tirpak, & Schlosser, 2015) and science, technology, engineering, and math (STEM) (Dawson, Bernstein, & Bekki, 2015). In terms of initiation, duration, and outcomes of advising or mentoring, no statistically significant difference according to sex has been shown in most previous studies regarding same-sex advisors/advisees (Schlosser et al., 2011b).

Racial socialization has also been known as a factor that influences advising relationships. Schlosser et al. (2011b) indicates that students of "color" may have a number of challenges in finding a role model in an academic program since there are only a few tenured faculty members with the same racial background. They emphasized that both advisors and advisees of color should pay attention to the effect of "cultural mistrust" in advising relationships because students of color could be frustrated with the possibility that they could be discriminated against through racism or prejudice in the process of advising.

Regarding aspects of culture, Kent, Kochan, and Green (2013) conducted a comprehensive literature review on culture and mentoring in primary, secondary, and higher education settings and found that mentoring could be influenced by (1) cultural aspects of the relationship, (2) the impact of organizational structures on programs and relationships, and (3) the manner in which ethnicity and societal beliefs related to the proposes and structures of mentoring. International students' experiences on advising in doctoral programs in the U.S. have been investigated, as well. Knox et al. (2013) found that international students in psychology doctoral programs consider advising relationships with their faculty advisors to be positive overall but have challenges owing to relatively unreceptive environments to new cultures in academia.

Most of these previous studies mainly identified sexual, racial, or cultural factors that could influence differences between advisors and advisees. In the current study, we compare demographic backgrounds across different groups of advisees, considering their sexes, ages, race and/or ethnicity, degree, and stages in the program to determine whether there are things of which faculty advisors should be mindful when working with advisees of varied backgrounds.

3. Model of Information Dimensions in Advising

Lee (2018) explored types of information exchanged between faculty advisors and their doctoral students in Library and Information Science (LIS). In his work, Lee adopted the Klein and Heuser (2008) content framework for organizational socialization to investigate information dimensions in advising. Klein and Heuser's framework consists of twelve content dimensions, Language, History, Task Proficiency, Working Relationships, Social Relationships, Structure, Politics, Goals and Strategy, Culture and Values, Rules and Policies, Navigation, and Inducements, which are applicable to five different levels, job, work group, department, division/unit, and organization.

After interviewing LIS doctoral students in the United States, Lee (2018) proposed a modified Klein and Heuser content framework applicable to the context of doctoral education (Fig. 1).

Compared to Klein and Heuser's framework, Lee (2018) divided the dimension of Task Proficiency into Coursework, Research, Skills, and Teaching while combining Working and Social Relationships into Networking. He further separated the dimension of Goals and Strategy into two dimensions and added the dimension of Personal Life. Moreover, although the work group and division/unit levels were unobservable, Lee (2018) identified a new meaningful level, a discipline level. To sum up, this modified framework consists of sixteen types of information with four meaningful levels to which the information types can be applied.
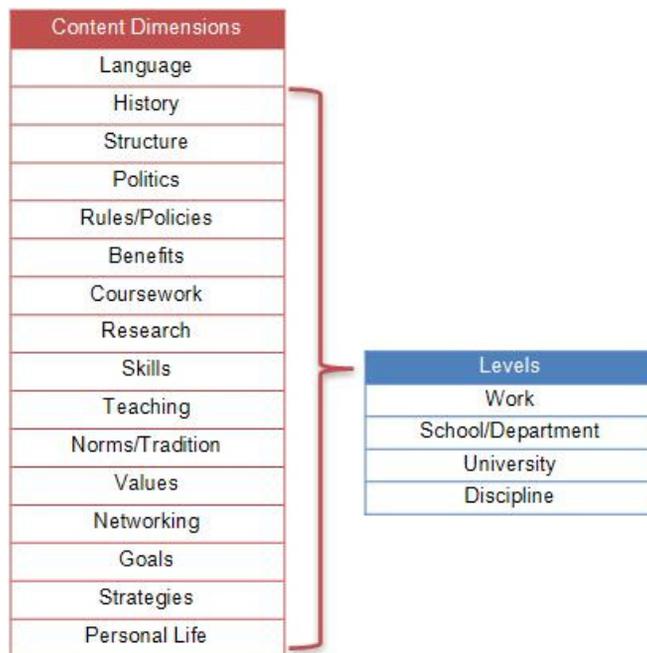
Fig. 1. Information dimensions in advisor–advisee relationships in doctoral education (Lee, 2018).

Information types indicates the kinds of information that has been exchanged between the advisors and advisees in academic settings. Advisors may provide information while advisees mainly accept and apply information to their personal situations. It could be vice-versa or, in most cases, interchangeable. Information types include:

- *Language*: Information exchange related to a field's specialized language such as technical language, acronyms, slang, and jargon
- *History*: Information exchange related to the history of doctoral students' department/school, university, or discipline
- *Structure*: Information exchange related to the organization of work, department/school, university, and discipline, including organizational hierarchy and task allocation of individuals in academic settings

- *Politics*: Information exchange related to informal power differences between individuals in academic settings
- *Rules/Policies*: Information exchange related to formally written statements that regulate the academic behaviors of doctoral students
- *Benefits*: Information exchange related to the benefits available to doctoral students during and after their doctoral work
- *Coursework*: Information exchange related to classes doctoral students take
- *Research*: Information exchange related to research in general, including theoretical discussion
- *Skills*: Information exchange related to the abilities doctoral students need to have in order to perform their tasks
- *Teaching*: Information exchange related to teaching in general
- *Norms/Tradition*: Information exchange related to behavioral expectations of doctoral students and their advisors in their institutions or disciplines and comprising longstanding norms
- *Networking*: Information exchange related to behavioral expectations of interacting with others
- *Goals*: Information exchange related to what doctoral students seek to accomplish during their doctoral work in order to assist in their future careers
- *Strategies*: Information exchange related to how to achieve the goals and future careers of doctoral students
- *Value*: Information exchange related to the importance of doctoral students' research or discipline
- *Personal Life*: Information exchange related to non-academic matters, including "small talk"

Levels indicate the four dimensions that advisors/advisees could be placed in and influenced by. They could be external factors that the advisors/advisees may not control while the types of information could be internal. The definitions of the four levels are:

- *Work level*: Information exchanged between doctoral students and their faculty advisors about their day-to-day work
- *School/Department level*: Information exchanged between doctoral students and their faculty advisors about their work related to the school or department
- *University level*: Information exchanged between doctoral students and their faculty advisors about their work related to the university
- *Discipline level*: Information exchanged between doctoral students and their faculty advisors about their work related to the discipline or profession

Lee (2018) further suggested factors that may influence information exchange, such as individual factors of advisees and advisors, relational factors, and contextual factors.; however, his previous study was limited to proposing a model of information dimensions rather than testing and generalizing it with a larger sample size.

4. Methods

The target population of this study was full-time doctoral students/candidates in the field of library and information science (LIS, including: information, information science, information studies, library science, information and library science, library and information studies, etc.) at U.S. institutions.

A questionnaire survey was developed based on his interview findings from a previous study (Lee, 2016b), investigating demographic characteristics of survey participants and their experiences of information exchange with advisors. A total of 64 measures (16 dimensions at the four levels) were proposed and the frequency of exchanging each type of information was tested with a five-point Likert-type scale (1- Never to 5- Very Frequently). To ensure the reliability and validity of the survey instrument, the techniques of "expert-driven pretests" and "respondent-driven pretests" were used (Ruel, Wagner, & Gillespie, 2015). In the expert-driven pretesting, four individuals who held a doctoral degree in the LIS discipline were asked to identify problems in the survey instrument, including the wording and order of the questions. In the respondent-driven pretesting, four LIS doctoral students were invited to a focus group discussion about the survey instrument.

An online survey tool, Qualtrics (http://www.qualtrics.com), was used to collect data over the course of three weeks (October 22 to November 13, 2015). The researcher incentivized responding to the survey by offering an Amazon gift card ($50) in a draw to ten random survey respondents. Multiple emailing sources were used for survey distribution: (1) a discipline-specific mailing list (JESSE Library and Information Science Information and Discussion List), (2) department mailing lists for doctoral students, and (3) individual email addresses, if available online. A graduate program coordinator or a doctoral student in each department/school was contacted individually and asked to place the survey invitation letter on their department mailing lists. The survey link was accessed 153 times. After excluding 15 partial responses and 6 responses from unqualified participants, 132 completed survey responses collected from 18 different universities were available for analysis.

For the data analysis, all data were downloaded as an SPSS file. We used descriptive statistics (e.g., mean, standard deviation) and non-parametric statistical tests (the Mann-Whitney U, the Friedman, and the Kruskal-Wallis H) to examine differences in the distributions of responses across items or between groups as the survey data were not normally distributed. In particular, we excluded groups that had a small number of responses when checking for statistical differences in the distribution of responses.

5. Findings

5.1 Demographic Characteristics of Survey Participants

One hundred thirty two participants from 18 universities answered all of the survey questions. The demographics of the participants are presented in Table 1. 64.4% were female and 30.3% were male, with a mean age of 36.5 years (*SD*=9.1, range 22−64) at the time of the survey. 37.1% were in their 30s, 27.3% were in their 20s, and 23.5% were in their 40s. The majority were Caucasian

(58.3%). The remainder were Asian/Pacific Islanders (23.5%), Mixed (6.1%), African American (2.3%), Hispanic/Latino (0.8%), and Other (0.8%); 11 participants preferred not to indicate their race and/or ethnicity.

One hundred and eight participants (81.8%) had a master's (or equivalent) degree in LIS, while 18.2% did not. With respect to the stage of doctoral work, 61 (46.2%) were pre-candidacy doctoral students, 17 of whom were in their first year (Stage 1), while 44 had yet to pass their preliminary/comprehensive exams (Stage 2). Seventy-one (53.8%) were doctoral candidates, 36 of whom had passed their preliminary/comprehensive exams but had not completed their prospectus/proposal (Stage 3). Thirty-four had completed their prospectus/proposal (Stage 4). One participant reported that he had defended his dissertation, and thus was categorized as Stage 4 in data analysis. Participants were asked to check all applicable options of work experience and 64.4% checked experience at academic institutions followed by corporations (53.0%), state/local government including public libraries (30.3%), and non-profit organizations (27.3%). 9.1% had no work experience.

Table 1. Demographic characteristics of survey participants (*N*=132)

Variables	Categories	Frequency	Percentage
Gender	Female	85	64.4%
	Male	40	30.3%
	Other (e.g., non-binary)	1	0.8%
	Prefer not to answer	6	4.5%
Age	Under 30	36	27.3%
	30−39	49	37.1%
	40−49	31	23.5%
	50−59	13	9.8%
	Over 60	2	1.5%
	Prefer not to answer	1	0.8%
Race and/or ethnicity	White	77	58.3%
	Hispanic or Latino	1	0.8%
	African American	3	2.3%
	Asian/Pacific Islander	31	23.5%
	Mixed	8	6.1%
	Other	1	0.8%
	Prefer not to answer	11	8.3%
MLIS or equivalent degree	Yes	108	81.8%
	No	24	18.2%
Stage of doctoral study	Doctoral student (first year)	17	12.9%
	Doctoral student (before passing preliminary or comprehensive exams)	44	33.3%
	Doctoral candidate (after passing preliminary or comprehensive exams; prospectus/proposal not completed)	36	27.3%
	Doctoral candidate (prospectus/proposal completed (ABD))	34	25.8%
	Other	1	0.8%

5.2 Information Exchanged in Doctoral Advising

The distributions of information types exchanged in doctoral mentoring are illustrated using mean scores (Table 2). The majority of most discussed information types (mean>=3.5) were related to the work level, such as Research, Goals, Strategies, Values, and Coursework. Research at the discipline level was the only type that did not belong to the work level. Fifteen types of information were somewhat frequently discussed (3.0<=mean<3.5) across the three levels (i.e., the work, school/department, and discipline levels) and each level included five types of information. Twenty-seven types of information were occasionally discussed (2.5<=mean<3.0); the work level included five types, the school/department level included 11 types, the university level included two types, and the discipline level included nine types. There were 15 types of information that were less or rarely discussed (mean<2.5) and all this information belonged to the university level.

Table 2 shows that survey participants answered questions about their information exchange experiences with their advisors using a Likert-type scale of 1 (*never*) to 5 (*very frequently*). Overall information exchange was most frequent at the work level (M=3.32), followed by the discipline level (M=3.00), the school/department level (M=2.85), and the university level (M=2.21) (Table 2). In other words, of the four socialization levels, participants reported being more socialized into the work and discipline levels than the school/department or the university levels.

The Friedman test was conducted to determine whether there were statistically significant differences in the distributions of frequency scores across the four levels. The statistical analysis reported that there is at least one significant difference between one of the levels ($x^2(3) = 217.222$, p <.001). Post hoc analysis using a Bonferroni correction with multiple comparisons revealed statistically significant differences between the work and school/department levels (p <.001), the work and university levels (p <.001), the work and discipline levels (p <.001), the department and university levels (p <.001), and the university and discipline levels (p <.001). However, there was no significant difference between the department and discipline levels.

The grand mean of all types of information exchange across the four levels was 2.77. We observed the types of information that exceeded this grand mean at each level (M > 2.77). Almost all information types at the work level (17 types) scored over 2.77 except for Norms/Tradition. At the discipline level, the second-greatest number of information exchange types (12 types) was over the grand mean. Eight types of information at the school/department level were identified to be scored over the grand mean. None of the types of information exchange at the university level were scored over the grand mean.

Research was either the most or the second-most frequently exchanged type of information across all four levels. When observing the types of information scored over their individual means, at the work level (M=3.32), Goals was the second-most frequently exchanged type of information, followed by Strategies, Skills, Value, Coursework, Structure, Language, and History. At the school/department level (M=2.85), Coursework was the second-most frequently exchanged type of information, followed by Rules/Policies, Skills, Benefits, Networking, and Teaching. At the university level

(M=2.21), Course Work was the most frequently exchanged type of information followed by Research, Rules/Policies, Networking, Skills, Benefits, Politics, and Teaching. At the discipline level (M=3.00). Research was followed by Skills, Language, History, Networking, and Coursework. The types of information that participants exchanged varied across the four levels.

Table 2. Types of information exchanged across the four levels

Levels Types	Work		School/Department		University		Discipline	
	M	SD	M	SD	M	SD	M	SD
Language	3.45	1.11	2.75	1.06	2.03	0.93	3.47	1.09
History	3.36	1.17	2.55	1.01	1.82	0.86	3.20	1.08
Structure	3.46	1.04	2.74	1.02	2.08	0.94	2.84	1.21
Politics	2.88	1.22	2.73	1.12	2.24	1.02	2.77	1.17
Rules/Policies	3.23	1.04	3.09	0.98	2.48	0.93	2.60	1.17
Benefits	2.83	1.09	2.87	1.05	2.31	1.05	2.88	1.27
Coursework	3.54	1.02	3.25	1.01	2.75	1.07	3.11	1.17
Research	4.28	0.87	3.30	1.07	2.61	1.10	3.79	1.27
Skills	3.55	1.07	3.02	1.09	2.39	1.08	3.47	1.21
Teaching	2.98	1.26	2.80	1.25	2.20	1.20	2.97	1.33
Norms/Tradition	2.73	1.23	2.77	1.20	2.01	1.04	2.73	1.21
Networking	3.02	1.11	2.80	1.14	2.41	1.07	3.13	1.23
Goals	3.72	1.03	2.60	1.17	1.81	0.89	2.89	1.18
Strategies	3.62	1.14	2.58	1.24	1.74	0.92	2.85	1.26
Value	3.54	1.06	2.67	1.24	1.99	1.03	2.89	1.26
Personal Life	2.91	1.14	3.07	1.13	2.43	1.15	2.47	1.27
Total Means	3.32	0.77	2.85	0.87	2.21	0.80	3.00	0.96

Note. Participants responded to five-point Likert-type questions (1=*never*, 2=*rarely*, 3=*occasionally*, 4=*frequently*, 5=*very frequently*); M=mean, SD = standard deviation.

5.3 Differences in Information Exchange by Demographic Characteristics of Advisees

The authors examined statistical differences in the types of information exchanged in doctoral advising by the advisees' demographic characteristics and found significant differences across certain information types in relation to gender, age, race and/or ethnicity, degree, and stage of doctoral work.

A Mann−Whitney U-test was used to investigate differences in the distribution of the frequency scores between the female (*N*=85) and male groups (*N*=40). Frequency scores for females were statistically higher than for males at the .05 level for nine information types (Table 3), reflecting that female participants exchanged more information than male students in Structure, Rules/Policies, Benefits, Teaching, Politics, and Goals.

Table 3. Information exchange by gender (*N*=125)

Level	Types	Category	M	SD	Mean Rank	Mann−Whitney U test		
						U	Z	Sig.
Work	Structure	Female	3.60	1.00	68.63	1,221.50	-2.640	.008*
		Male	3.10	1.03	51.04			
	Rules/Policies	Female	3.34	1.01	67.66	1,304.00	-2.196	.028*
		Male	2.90	1.03	53.10			
	Benefits	Female	2.99	1.11	68.02	1,273.50	-2.340	.019*
		Male	2.50	0.96	52.34			
	Teaching	Female	3.14	1.32	67.61	1,308.50	-2.125	.034*
		Male	2.63	1.05	53.21			
School/ Department	Structure	Female	2.88	0.98	68.20	1,258.00	-2.478	.013*
		Male	2.40	0.96	51.95			
	Politics	Female	2.87	1.09	68.69	1,216.50	-2.665	.008*
		Male	2.35	0.98	50.91			
University	Politics	Female	2.34	0.98	67.26	1,337.50	-2.023	.043*
		Male	1.98	0.89	53.94			
	Rules/Policies	Female	2.59	0.88	68.38	1,242.50	-2.570	.010*
		Male	2.15	0.83	51.56			
	Goals	Female	1.88	0.79	68.04	1,272.00	-2.439	.015*
		Male	1.55	0.81	52.30			

Note. Participants responded to five-point Likert-type questions (1=*never*, 2=*rarely*, 3=*occasionally*, 4=*frequently*, 5=*very frequently*); SD = standard deviation; * Significant at the .05 level (2-tailed).

Kendall's tau-*b* correlation coefficient was used to identify any statistically significant associations between age and information exchange. The associations were statistically significant for Language (τ_b = -.162, p = .015), Research (τ_b = -.166, p = .017), and Skills (τ_b = -.140, p = .036) at the work level, Language (τ_b = -.141, p = .034) and Skills (τ_b = -.170, p = .011) at the department level, and Language (τ_b = -.150, p = .025) at the discipline level. To summarize, age was negatively associated with the six information dimensions, meaning that older participants exchanged less information with their advisors.

We also compared differences in frequency scores between the groups of Caucasians and Asians/Pacific Islanders. A Mann−Whitney U-test was used to examine differences in the distribution of the frequency scores between the Caucasian group (*N*=77) and the Asian/Pacific Islander groups (*N*=31). There were statistically significant differences in seven information types, as reported in Table 4. This suggests that Caucasian participants exchanged more information with their advisors than Asian/Pacific Islander participants in Politics, Structure, Rules/Policies, and History.

Table 4. Information exchange by race and/or ethnicity (N=108)

Level	Types	Category	M	SD	Mean Rank	Mann−Whitney U test		
						U	Z	Sig.
Work	Politics	Caucasian	2.96	1.21	58.35	897.00	-2.083	.037*
		Asian/Pacific Islander	2.42	1.12	44.94			
School/ Department	Structure	Caucasian	2.81	1.00	58.16	911.50	-2.039	.041*
		Asian/Pacific Islander	2.42	0.81	45.40			
	Politics	Caucasian	2.79	1.14	58.55	881.50	-2.210	.027*
		Asian/Pacific Islander	2.35	0.75	44.44			
	Rules/Policies	Caucasian	3.14	0.98	59.04	844.00	-2.505	.012*
		Asian/Pacific Islander	2.71	0.82	43.23			
University	Politics	Caucasian	2.30	0.92	58.88	856.50	-2.434	.015*
		Asian/Pacific Islander	1.87	0.76	43.63			
Discipline	History	Caucasian	3.32	1.08	59.43	814.00	-2.712	.007*
		Asian/Pacific Islander	2.81	0.95	42.26			
	Politics	Caucasian	2.92	1.11	59.75	789.00	-2.871	.004*
		Asian/Pacific Islander	2.26	1.06	41.45			

Note. * Significant at the .05 level (2-tailed).

We further investigated statistical differences in information exchange between those with and without an MLIS or equivalent degree. Participants with an MLIS or equivalent degree exchanged more information with their advisors than those with other degrees in the fourteen types of information (Table 5).

Table 5. Information exchange by holders of an MLIS or equivalent degree (N=132)

Level	Type	MLIS or Equivalent Degree	M	SD	Mean Rank	Mann−Whitney U test		
						U	Z	Sig.
Work	Strategies	Yes	3.71	1.16	69.93	926.00	-2.259	.024*
		No	3.21	0.93	51.08			
	Personal life	Yes	3.04	1.15	70.80	832.00	-2.841	.004*
		No	2.33	0.87	47.17			
School/ Department	Personal life	Yes	3.16	1.16	69.51	970.50	-2.003	.045*
		No	2.67	0.92	52.94			

Level	Type	MLIS or Equivalent Degree	M	SD	Mean Rank	Mann−Whitney U test		
						U	Z	Sig.
University	Language	Yes	2.12	0.95	69.96	922.50	-2.326	.020*
		No	1.63	0.71	50.94			
	Structure	Yes	2.16	0.98	69.50	972.50	-2.017	.044*
		No	1.71	0.62	53.02			
	Benefits	Yes	2.42	1.08	70.17	899.50	-2.438	.015*
		No	1.83	0.76	49.98			
	Skills	Yes	2.49	1.09	69.79	941.00	-2.170	.030*
		No	1.96	0.91	51.71			
	Goals	Yes	1.91	0.93	70.28	888.00	-2.588	.010*
		No	1.38	0.49	49.50			
	Strategies	Yes	1.83	0.97	69.80	940.00	-2.293	.022*
		No	1.33	0.48	51.67			
	Personal life	Yes	2.53	1.14	69.72	948.00	-2.131	.033*
		No	2.00	1.14	52.00			
Discipline	Rules/Policies	Yes	2.70	1.19	69.74	946.50	-2.133	.033*
		No	2.13	0.95	51.94			
	Norms/Tradition	Yes	2.83	1.23	69.64	957.00	-2.078	.038*
		No	2.25	1.03	52.38			
	Values	Yes	3.01	1.23	69.86	933.00	-2.196	.028*
		No	2.38	1.24	51.38			
	Personal life	Yes	2.59	1.26	70.25	891.50	-2.465	.014*
		No	1.92	1.18	49.65			

Note. * Significant at the .05 level (2-tailed).

We examined whether the types of information exchanged between participants and their advisors are associated with participants' stage of doctoral work. The mean scores and the Kruskal−Wallis H tests were used to investigate differences between the four groups of participants: (1) first-year doctoral students (N=17, Stage 1), (2) doctoral students before preliminary/comprehensive exams (N=44, Stage 2), (3) doctoral students after preliminary/comprehensive exams but before a prospectus or proposal defense (N=36, Stage 3), and (4) doctoral students after a prospectus or proposal defense but before graduation (N=35, Stage 4).

As demonstrated in Table 6 and Fig. 2, there was an identifiable pattern in information exchange: the overall frequency of information exchange increased as participants moved forward from Stage 1 to Stage 2. However, it dropped from Stage 2 to Stage 3 and increased again from Stage 3 to Stage 4. The mean was the highest at Stage 2 and Stage 4, followed by Stage 3 and Stage 1. These findings suggest that the frequency of doctoral students' information exchange with their advisors does not increase consistently but changes with their situations.

Table 6. Information exchange at four levels across the stages of doctoral work.

| Stage	Stage 1 (N=17)		Stage 2 (N=44)		Stage 3 (N=36)		Stage 4 (N=35)	
Level	M	SD	M	SD	M	SD	M	SD
Work	3.07	0.68	3.42	0.82	3.16	0.69	3.48	0.78
School/Department	2.68	0.66	2.86	0.94	2.69	0.84	3.08	0.87
University	1.96	0.62	2.37	0.86	1.99	0.85	2.33	0.68
Discipline	2.53	0.73	3.14	1.06	2.92	0.88	3.14	0.94
Overall	2.56	0.67	2.95	0.92	2.69	0.82	3.01	0.82
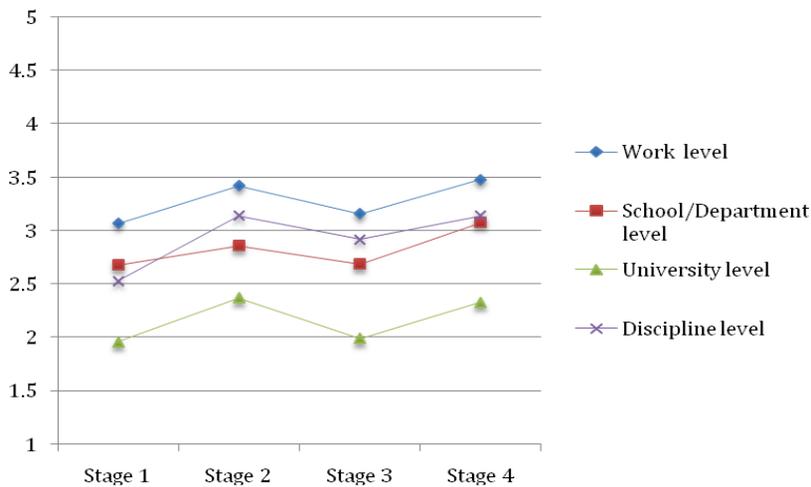
Fig. 2. Overall information exchange at four levels across the stages of doctoral work

When comparing the 18 types of information across the stages, there were statistically significantly differences in 15 types of information (Table 7). The results of the Kruskal−Wallis H tests showed that the distributions of mean scores were statistically significantly different across the stages in Coursework, Teaching, Strategies, and Values at the work level, in Skills and Teaching at the school/department level, in Politics, Rules/Policies, Benefits, Skills, and Teaching at the university level, and in Coursework, Research, Teaching, and Personal Life at the discipline level.

Table 7. Types of information exchanged across the stages of doctoral work

Level	Types	Stage 1 (N=17)		Stage 2 (N=44)		Stage 3 (N=36)		Stage 4 (N=35)		Kruskal−Wallis test		Dunn's Post hoc tests
		M	SD	M	SD	M	SD	M	SD	$x^2(3)$	Sig.	
work	Coursework	4.00	0.87	3.77	0.94	3.22	1.05	3.34	1.06	10.32	.016*	1 > 3
	Teaching	2.00	1.06	3.16	1.29	2.86	1.20	3.34	1.14	14.28	.003*	2, 4 > 1
	Strategies	3.24	0.97	3.70	1.05	3.36	1.13	3.97	1.25	9.32	.025*	-
	Values	3.06	1.03	3.55	1.15	3.39	0.87	3.91	1.04	9.51	.023*	4 > 1

Level	Stage Types	Stage 1 (*N*=17)		Stage 2 (*N*=44)		Stage 3 (*N*=36)		Stage 4 (*N*=35)		Kruskal−Wallis test		Dunn's Post hoc tests
		M	SD	M	SD	M	SD	M	SD	x^2(3)	Sig.	
school/ department	Skills	3.35	1.06	3.05	1.16	2.61	1.05	3.23	0.97	8.71	.033*	-
	Teaching	2.12	0.99	2.95	1.33	2.67	1.24	3.09	1.17	7.88	.049*	-
university	Politics	1.65	0.86	2.30	0.98	2.19	1.06	2.51	1.01	10.06	.018*	4 > 1
	Rules/ Policies	1.94	0.83	2.45	1.00	2.53	0.91	2.71	0.83	8.74	.033*	4 > 1
	Benefits	2.47	1.28	2.39	1.02	1.92	1.05	2.54	0.89	9.72	.021*	4 > 3
	Skills	2.18	1.07	2.61	1.15	2.00	1.07	2.63	0.88	10.81	.013*	2, 4 > 3
	Teaching	1.88	1.05	2.55	1.23	1.81	1.17	2.31	1.16	10.34	.016*	2 > 3
discipline	Coursework	2.71	0.99	3.48	1.23	2.97	1.08	3.00	1.19	8.29	.040*	-
	Research	3.06	1.43	4.14	1.17	3.67	1.22	3.83	1.22	10.11	.018*	2 > 1
	Teaching	1.94	0.97	3.25	1.35	2.83	1.32	3.26	1.24	14.24	.003*	2, 4> 1
	Personal Life	1.88	1.05	2.61	1.33	2.25	1.25	2.80	1.21	8.09	.044*	-

Note. * Significant at the .05 level (2-tailed).

Dunn's pairwise tests with adjustment using Bonferroni were conducted to identify which pairs of groups differed significantly. Students in Stage 1 looked for information on Coursework at the work level more frequently than those who were in the later stages, in particular in Stage 3. Students in Stage 2 sought information on Teaching at the school/department and university levels, Skills at the university level, and Research and Teaching at the discipline level more frequently than those who were in Stages 1 or 3. Students in Stage 4 exchanged information on Teaching and Values at the work level, Politics, Rules/Policies, Benefits Skills at the university level, and Teaching at the disciplinary level more frequently than those in Stages 1 or 3. Students in Stage 4 sought the number of types of information across the different levels.

6. Discussion

The overall frequency of information exchange was highest at the work level, followed by the discipline, school/department, and university levels. This was confirmed from the statistical tests in that information exchange at the work level was relatively more frequent than information exchange at the other three levels. These findings demonstrate that doctoral students most frequently discuss their day-to-day work with advisors. This could be mainly related to their adjustment to their doctoral program; for example, understanding the historical background, culture, language, coursework, teaching and research activities, and work required to obtain the doctorate degree as a final outcome. The second-most frequently exchanged information was about the discipline. This type of advising could implicate a process of training for doctoral students to become independent researchers as well as members of their profession. These two levels of information can explain that doctoral students experience a transition of their roles from being students to being professionals through the process of socialization and advising with their faculty members (Gardner, 2010; Golde,

1998; Mendoza, 2007).

At the work level, they are trained to satisfy the requirements for successfully completing their programs as doctoral students. At the discipline level, doctoral students learn from their advisors about the goals, values, rules, and politics associated with their profession. Information exchange at the school/department and university levels is relatively less frequent than that at the work or discipline levels, although it may be important to understand information exchange at the four levels holistically to successfully complete their programs.

Across all levels, Research was shown as the most or second-most frequently exchanged type of information; doctoral students are concerned with their research activities at all times during their student experiences. Besides Research, the distributions of the frequency of information types across the four levels vary widely. At the work level, doctoral students obtain information in relation to the skills and strategies for conducting research by setting appropriate goals and designing coursework in relation to their research. At the school/department level, doctoral students may adjust themselves to the program by seeking information about the rules/policies of the program and the benefits they can obtain and may build networks with their colleagues. At the university level, although there is not much information that students would frequently exchange, students may be concerned with university rules or policies which may impact their graduation. At the level of discipline, students may want to obtain information about the history and language in their profession and the teaching and research trends in the field to prepare themselves in the near future for the job market.

There are statistical differences in information exchange according to advisees' demographic characteristics. Female advisees exchange more information with their advisors than male advisees about Structure, Rules/Policies, Benefits, Teaching, Politics, and Goals. Age is negatively associated with information exchange in Language, Research, and Skills. Caucasian advisees are more likely to exchange information than Asian advisees about Politics, Structure, Rules/Policies, and History. Advisees with an MLIS or equivalent degree exchange more information than those with other degrees in Language, Structure, Benefits, Skills, Goals, Strategies, Rules/Policies, Norms/Tradition, Values, and Personal Life. Such differences in information exchange might be caused by a combination of factors such as degree of information needs, information-seeking styles, and prior knowledge, resulting in different experiences for doctoral students. The imbalance in information exchange could be prominent, depending on advisees' characteristics, as well. Thus, faculty members should consider advisees' demographic characteristics in exchanges of information with them.

Furthermore, differences in information exchange across the stages of doctoral work were analyzed. There was a changing pattern in the overall frequency of information exchange and in individual types of information. The overall frequency of information exchange increased from Stage 1 to Stage 2 and from Stage 3 to Stage 4 while it dropped from Stage 2 to Stage 3, indicating that doctoral students exchange less information with their advisors just after completing their preliminary/comprehensive exams. Lovitts (2001) characterized the stage of students who attained doctoral candidacy status as "the research stage," and Gardner (2008b) noted that students transition to independent scholars during this stage. Gardner (2008b) argued that if students develop a closer relationship with their advisors, the advisors might intentionally not share information in order to nurture

their students' independence. This may depend on the advising style of a faculty member; however, advisors should be aware of changing needs for information and respond to students' information inquiries accordingly. As shown in our findings, the greatest number of types of information across almost all levels is sought by students in Stage 4, the final stage.

7. Conclusions

Findings from our study provide insight as to the types of information doctoral students may be interested in most when going through their programs in order to successfully complete them, obtain the degrees for which they planned, and prepare themselves as professionals in the field of LIS. These could be foundations of understanding doctoral students' needs in the field and could be used to develop a guide for faculty members advising them.

Our study has a few limitations. First, although we considered demographic characteristics of doctoral students in the information exchange in mentoring, this may not fully represent the contexts that advising and mentoring happens, for example, social and affective aspects may influence the information exchange, warranting further investigations. Second, we investigated the information exchange between faculty and doctoral students from the LIS programs in the U.S. The advising and mentoring systems in the universities could differ by disciplines or by countries.

In the future study, we plan to expand the scope of the study and enhance the information model by adding multiple layers of contexts to fully understand the advising relationships. We will also investigate the information exchange between faculty and doctoral students in other disciplines and countries to compare the disciplinary and cultural differences in advising.

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