

Community Identity: Peer Prestige and Academic Hiring in the iSchools

Andrea Wiggins
Syracuse University
School of Information Studies
337 Hinds Hall
Syracuse, NY 13244-4100
1-315-558-0122
awiggins@syr.edu

Michael J. McQuaid
University of Michigan
School of Information
1085 S. University Ave
Ann Arbor, MI 48109-1107
1-734-647-9550
mcq@umich.edu

Lada A. Adamic
University of Michigan
School of Information
1085 S. University Ave.
Ann Arbor, MI 48109-1107
1-734-615-2132
ladamic@umich.edu

ABSTRACT

Exploring indicators of prestige in hiring networks as they relate to measures of prestige presented in peer ratings provides a new perspective on hiring and identity in the iSchools. This study examines a hiring network for the iSchool community and finds that the perception of prestige among iSchools, as represented by the US News & World Report (USNWR) graduate school ratings, may be improved by hiring choices that strengthen connections within the iSchool community, balanced by increasing the diversity of sources for new faculty. We compare the academic hiring network for the more established Computer Science discipline to the recently emergent iSchools to explore the relationship between peer prestige and community identity. We also discuss additional observations from the data relating to the interdisciplinary diversity of the iSchool community.

Topics

Nature and scope of *i*Schools and *i*Research

Keywords

iSchools, identity, peer prestige, hiring networks, academic hiring, diversity, social network analysis.

1. INTRODUCTION

Prestige ratings are a commonly consulted indicator of image and identity [1]; for a community in which identity is a matter of concern, inclusive prestige scores can position each school in a community context. Prestige ratings based on peer survey responses, published by such groups as USNWR and the National Research Council (NRC), imply a hierarchy of quality and prestige in the institutions reviewed [2, 3]. One target audience for the ratings is college-bound students, and as such the ratings project an important aspect of identity with respect to student recruitment. This gives us reason to question the value of the survey responses as indicators of academic program quality for

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the interdisciplinary iSchools, particularly because existing ratings such as the prevalent prestige ratings for library and information science (LIS) from USNWR do not include the entire community.

We begin with a brief review of the literature related to identity, prestige, and hiring in academia. We then discuss the methods we used to examine the relationship between prestige, as a proxy for identity within a community, and the exchange of social capital represented by academic hiring. We provide a descriptive comparison of the hiring networks for top-ranked Computer Science (CS) departments and the iSchools, and present the results of regression analysis on prestige ratings for each network. We also examine additional aspects of the iSchool community based on the composition of faculty, specifically the phenomenon of self-hiring and the diversity of disciplines represented by the faculty of the iSchools.

2. LITERATURE REVIEW

Growing interest in the formation of community identity in iSchools inspired conference papers on this theme at the 2005 iConference; some concerns included student recruitment and student placement, which are particularly challenging for a new academic discipline and are critical to the ongoing success of the iSchools [4, 5]. Identity is a clear root factor in these challenges, as a lack of awareness of the iSchool movement hinders student recruitment efforts, and program graduates must be able to clearly articulate the identity and value of their interdisciplinary studies to secure employment. Further challenges identified at the 2005 iConference pertain to the development of the scholarly community from the perspectives of publication, funding, and interdisciplinary research efforts [6]. In other recently established disciplines such as African-American studies, and professional fields such as MIS, concerns over organizational and disciplinary legitimacy play a strong role in the development of disciplinary identity [7, 8].

In academia, departmental prestige is often considered a reflection of identity. A variety of studies of academic prestige in the social sciences have shown that departmental prestige is related to faculty hiring practices [9-12]. When hiring is based on criteria such as prestige instead of more merit-based criteria, such as scholarly productivity, researchers are concerned about potentially detrimental effects to the field in the form of academic inbreeding and greater stratification of prestige [13, 14]. These prior studies of academic hiring have repeatedly shown PhD program prestige

to be much more relevant to post-PhD job placement prestige than scholarly productivity at the time of graduation, and while scholarly productivity has little influence on hiring, hiring has a strong effect on scholarly productivity [15, 16].

Evaluating faculty productivity for the iSchools proves difficult due to the interdisciplinarity of the community, particularly for comparison to prestige, as there are currently no ratings that are inclusive of the entire community. Although LIS research faculty productivity has previously been measured through publication and citation rates [17], increasing departmental interdisciplinarity and incompleteness of databases poses significant challenges to the validity of LIS faculty productivity studies [18]. In addition, evaluating LIS schools alone would exclude several iSchools that are not accredited by the ALA, and evaluating the iSchools based only on their LIS programs would not appropriately represent the breadth of the relevant faculty expertise. Accounting for the variations across iSchools that is introduced by their interdisciplinarity will remain a challenge in any attempt to rank these schools based on scholarly productivity.

3. METHODS

This study evaluates whether network measures of centrality can predict the peer survey prestige ratings that are a part of the community context of identity in an academic discipline. A network data set representing faculty hiring in the iSchools was generated through manual data collection. While this data would traditionally be collected through a survey of faculty, or from a directory that aggregates faculty survey data by department or academic field, either of these methods would be subject to an unacceptable level of bias due to inaccuracies and omissions. For this reason, the sampling frame was compiled from faculty rosters on institutional web sites, which are updated more frequently than published directories, and are considered the most authoritative public source for this information [17, 19].

3.1 Data Collection

The data set collected in January 2007 documents the educational pedigrees of the full-time professorial faculty members at iSchools. Faculty roles are variously defined among different schools, and roles such as *lecturer* or *associate in information studies* are not necessarily representative of the long-term intellectual investment in academic identity that the hiring network seeks to represent. In addition, *Professors emeritae* are more representative of the prior identity states of a school than its current state. We identified full-time professorial faculty by the standard academic titles of *professor*, *associate professor*, *assistant professor*, *associate dean* and *dean*. The data were collected from iSchool web sites, faculty web sites and CVs, and the UMI Dissertation Abstracts database. For each faculty member who could be identified at the time of data collection as meeting the job title criterion, the data collected included their graduate institution and faculty title, the year of their PhD, and the department or school granting the PhD. To address potential validity problems arising from data incompleteness in a relatively small population, the manual data collection took the form of a faculty census with a 100% response rate, yielding 693 terminal degrees held by 687 academics. After adjustments to maintain the PhD degree as the unit of analysis, a total of 674 data points remained.

A similar data set of hiring in top-ranked Computer Science (CS) departments was used to compare the findings for iSchools to a

more established academic discipline. Collected in 2005, these data provide the sources of PhD degrees granted to the faculty of 29 computer science and electrical engineering departments, summarizing 1121 faculty PhDs in 527 edges between 123 schools. The departments selected as egos for data collection in this network were the top-ranked 26 programs in the United States and three top Canadian institutions. Reputation survey ratings from USNWR and the NRC were also applied to the CS network data set for analysis of correlations between USNWR ratings and network statistics [2, 20].

3.2 Constructing Hiring Networks

To examine the relationship between hiring and peer prestige, we constructed an iSchool hiring network of institutional affiliations by combining ego networks for each iSchool institution. Ego networks are constructed based on the set of connections for a focal node, called an ego; each node directly connected to the ego is known as its alter. Connections between the schools are based on the institutions from which current iSchool faculty received their PhD degrees, using the university as the unit of analysis. Each connection between the schools is a weighted, directed link; these links are directed from the graduating institution to the employing institution for each faculty person. The weights for the links represent the number of academics who share these graduation and employment affiliations. Constructing the network unfortunately required merging the two iSchools at Indiana University in order to maintain the institution as the unit of analysis.

Since both the iSchool and CS networks are constructed in the same way, by merging ego networks, they are composed of a set of “inside” nodes for which we have incoming links (information on which other departments they hired from) and the remainder of the nodes for which there are no inbound edges. Those “outside” nodes have only outbound edges, and are included in the dataset if a graduate of the department was hired by one of the departments sampled. In the iSchool network, the inside nodes, or egos, are the iSchools and the outside nodes, or alters, are other institutions that do not have information schools affiliated with the I-School Caucus. In the computer science network, the inside nodes are the most highly ranked departments. This method produces a network with many leaf nodes, representing those schools that did not provide faculty to more than one inside node, and for which we did not gather information on current faculty.

Both the iSchools and CS departments are portions of the larger academic sphere from which we draw relational information. As ego networks, there is an inherent bias in these data; while we have complete information about the relationships between schools that are egos in the networks, we have incomplete information about those for which we only know that some of their graduates were hired into the academic units that were sampled. To compare measures of social and network prestige in these networks, hiring the graduate of an institution is considered an endorsement in which patterns of association indicate social exchange.

3.3 Measuring Diversity in Hiring Networks

Schools follow varying strategies to build a strong faculty; some are highly specialized while others are highly interdisciplinary. Two information entropy calculations provide measures of diversity in hiring sources and in areas of subject specialization, by applying the calculation from Shannon [21], $-f \cdot \log(f)$, where f

is the percentage of the faculty in a given category, either based on their area of expertise or the institution from which they received their degrees. When applied to the hiring data for each school, the hiring diversity measure reflects both the variety and strength of connections to other schools. Schools that hire preferentially from a small handful of highly-respected sources will have low hiring diversity scores and schools that hire from a wide variety of institutions without strong favorites will have high diversity scores. The hiring diversity measure was generated for both networks.

In addition to hiring diversity, an information entropy measure for disciplinary diversity was calculated for the iSchools. The same information entropy formula was applied to the percentage of faculty with degrees in each subject family. The resulting disciplinary diversity scores are highest for the most interdisciplinary schools and lowest for schools with a very strong disciplinary focus, as reflected in the subject areas studied by their faculty.

4. ANALYSIS AND DISCUSSION

The analysis and discussion of the data are presented in several parts. First, we compare the structures of the iSchool and CS hiring networks, which are similar with regard to their connectedness but demonstrate different hiring tendencies in each community. Next, we examine the relationship between peer prestige and hiring network statistics in both iSchools and CS departments using regression analysis. We also discuss the phenomenon of self-hiring in iSchools, and finally, we discuss the faculty areas of study and the related topic of disciplinary diversity in the iSchools

4.1 Comparing the iSchool and CS Networks

Several global network properties contribute to understanding the context of the interactions that each hiring network represents. The size of the network can be evaluated in several ways; the most apparent measures are the number of nodes and edges, and the ratio of edges to nodes, which gives the average degree of the nodes in the network. The networks statistics shown in Table 1 reveal that the iSchools network has a lower density, lower average degree, lower clustering coefficient, and lower average edge weight than the CS network. The number of degrees summarized in each network is the primary reason for this difference. While the number of egos in each network plays a significant role in determining these statistics, one notable difference between the two networks is seen in the ratio of alters to egos. The iSchools have more than twice as many alters for every ego as do the CS departments, indicating that the iSchools hire from a greater diversity of sources than the CS departments.

Table 1. Network properties for the CS and iSchool hiring networks.

Network Characteristic	CS Network	iSchools Network
Nodes	123	152
Egos	29	18
Alters	94	134
Ratio of Egos to Alters	3.2	7.4
Edges	572	429

Average Degree	4.7	2.9
Loops	26	17
Total PhD Degrees	1121	674
Average Edge Weight	1.96	1.57
Density	0.038	0.019
Betweenness Centralization	0.21	0.19
Average Distance	2.2	2.3
Diameter	5 (<i>random</i> = 7)	4 (<i>random</i> = 11)
Average Clustering Coefficient	0.23 (<i>random</i> = 0.05)	0.19 (<i>random</i> = 0.08)

Both the number of egos and the average node degree contribute to the difference in link density for the networks; the CS network represents 1121 doctoral degrees with more egos and fewer nodes than the iSchool network, which represents 674 faculty PhDs. The number of edges into which these degrees are summarized provides another point for comparison, shown in Table 1 as the average edge weight for the network, which indicates how strongly the schools in the network are linked. The difference in average edge weights between the networks may represent a number of factors, such as the longer tenure of the CS departments, which has allowed them to build stronger ties within their community over time. These statistics show that the iSchool network is more loosely coupled than the CS network, and continues to demonstrate the difference in hiring diversity between the networks. On average, the iSchools hire from more than twice as many alters as the CS departments.

We also find that both networks exhibit a low diameter and high clustering coefficient, shown in comparison to the statistics for comparable random Erdős-Rényi graphs in Table 1, which are key characteristics of small world networks [22]. Despite other structural differences, the two networks are remarkably alike in these small world characteristics, with very similar average distances, diameters, and average clustering coefficients. Combined with the comparable betweenness centralizations, this suggests that the iSchools network is structurally similar to the CS network in terms of graph connectedness, even though other aspects of the network structures indicate different strategies for hiring.

4.2 Prestige and USNWR Ratings

Regression on network prestige and centrality measures was applied to explain the variance in USNWR ratings. Ratings such as those presented by USNWR and the NRC are considered important as indicators of institutional identity within the larger academic community context. If hiring represents a contributing factor the school's identity, then the centrality measures for the hiring network may explain some of the differences in peer prestige perceptions as reported in the surveys that make up USNWR ratings. In this analysis, the USNWR ratings in LIS were matched to the iSchools for which they were available. Similarly, the USNWR ratings and NRC ratings for the CS departments were collected for the egos of the network.

4.2.1 Peer Prestige Ratings

The USNWR and NRC ratings are based on peer review; both originate from surveys sent to members of the academic community every few years, in which respondents provide ratings of perceived quality for the programs in their discipline. It is reasonable to expect that these data may be confounded by the respondents' preferences for their own alma maters, with the potential effect of inflating the prestige ratings for schools with larger numbers of graduates, simply by virtue of a greater number of their graduates being positioned to respond to the surveys.

The 2006 USNWR ratings used in this analysis were based on a 2005 survey in both CS and LIS, which had respective response rates of 52% and 51%. The USNWR questionnaires for CS were sent to the department heads and directors of graduate studies at sampled institutions. For the LIS survey, questionnaires were sent to deans, program directors, and senior faculty at 50 schools with ALA-accredited master's programs. The NRC and USNWR ratings for CS correlated very strongly, so only the USNWR ratings were used for analysis.

4.2.2 Regression Analysis

In the CS network, regression on indegree, weighted PageRank, and betweenness, explained 79% of the variance in USNWR ratings with strong significance, shown in Table 2. In the iSchools, regression on the number of graduates of each institution who are now on faculty at iSchools (output), weighted PageRank, betweenness, and hiring diversity explained 77% of the variance in USNWR ratings (Table 3).

Table 2. Regression analysis for the CS Network.

	<i>B</i>	SE <i>B</i>	<i>t</i>
cs-pagerankscore	11.223359	4.294460	2.613 *
cs-betweenness	0.006258	0.000670	9.340 ***
cs-indegree	-0.068210	0.011898	-5.733 ***

* $p < .05$, *** $p < .001$, $R^2 = .8121$, Adj. $R^2 = .7865$,

$F(3,22) = 31.7$ ***

Table 3. Regression analysis for the iSchool Network.

	<i>B</i>	SE <i>B</i>	<i>t</i>
lis-betweenness	-0.004923	0.001131	0.00481 **
lis-pagerankscore	12.604780	2.966607	0.00539 **
lis-output	0.053361	0.010957	0.00279 **
lis-hiringentropy	0.574079	0.247805	0.05972

$p < .1$, ** $p < .01$, $R^2 = .8605$, Adj. $R^2 = .7675$,

$F(4,6) = 9.251$ **

Several network measures were significant in explaining the variance in USNWR ratings, and one variable for each regression proved particularly interesting. The negative coefficient for indegree from the CS regression means that a higher indegree has a negative effect on a school's rating. In effect, the CS departments receive lower ratings if they choose to hire from a greater number of sources. While hiring diversity was rejected as a regression coefficient for the CS network, it was rejected because indegree provided a slightly stronger result, which can be

interpreted as evidence of prestige stratification in the network. In contrast, adding hiring diversity to the regression analysis explained an additional 15% of the variance in the iSchool USNWR ratings. Literally interpreted, this means that hiring faculty more evenly from a broader range of schools is a practice that is rewarded with higher prestige ratings in the iSchool network.

The regression results for these two networks reiterate the descriptive comparison of the network characteristics; while there are some structural similarities between them, the iSchools and CS departments differ with respect to the diversity of hiring sources accessed by the egos of each network. In the context of the academic communities of computer science and information, the amount of variance explained by regression and level of confidence are evidence that the hiring in CS departments forms a social exchange structure that is more cohesive and predictable than the iSchool community at this point in time. A much younger discipline, such as the emerging field of information, would not have the same context for describing itself through a peer evaluation as a more established discipline such as CS. In the case of the iSchools, these aggregated peer ratings only evaluate a portion of the community on a subset of its programs; however, the regression results indicate that being well connected to the community through diverse hiring practices improves the peer perception of prestige for iSchools.

4.3 Self-Hiring

The data also provide insight into the practice of self-hiring in the iSchools. Nearly all of the iSchools hire faculty from their own parent institution. There are at least two reasons for this phenomenon; first, the faculty may come from other departments within the institution, and second, the iSchools' hiring choices for faculty specializing in such areas as archives and librarianship are more constrained due to the relatively small number of PhD granting programs in these disciplines.

In the first case, where faculty are hired from other departments within the institution, the iSchool network departs significantly from the social science departments in Burris' study which hired from their own graduates [11]. Self-hiring in iSchools may in fact represent greater diversity in the interdisciplinary nature of these hires; Pennsylvania State University's iSchool was founded recently enough to have none of its own graduates on faculty, as is also the case for the University of Washington. At PSU, however, nearly 15% of faculty received their degree from PSU, where hiring from other departments in the university may support interdisciplinary diversity within the faculty of the iSchool. In contrast, Washington's faculty is comprised entirely of graduates of other institutions with no self-hires whatsoever, making their iSchool the single exception in the community in this regard.

The iSchools, on average, hired 13% of their faculty from their own institutions. For the iSchools that had hired faculty with a degree from their parent institution, approximately 64% of the self-hires were graduates of the program that now employs them, about 8% of the total population. In most cases, these are faculty with degrees in library science, supporting the idea that faculty specialization in this area is subject to greater hiring constraint. UCLA is an exception in that most of its self-hires were graduates of its education program, rather than library science.

Self-hiring is not necessarily a case of a school's graduates immediately joining the faculty of the school granting their

degrees, although such a scenario has occurred. It is more likely that a significant proportion of these individuals had their first tenure-track employment in academia with another institution and returned to their alma mater years later.

4.4 Faculty Areas of Study

The graduating department or program of study for the faculty of iSchools was a point of interest for two reasons. First, in the event of self-loops, where a university has hired its own graduates, we were interested to know whether these individuals were hired by the same department from which they had graduated, or from a different school within the university. A second reason to examine faculty areas of study is that identity characteristics for each iSchool, such as programs of study and courses, are both influenced by the areas of expertise represented on its faculty, and influential to hiring choices.

4.4.1 Classifying Faculty Degrees

The population of iSchool faculty included 674 PhD degrees in 172 distinct programs of study; these programs were coded according to the Classification of Instructional Programs (CIP) and further summarized to form 13 broad disciplinary categories, shown in Figure 1.

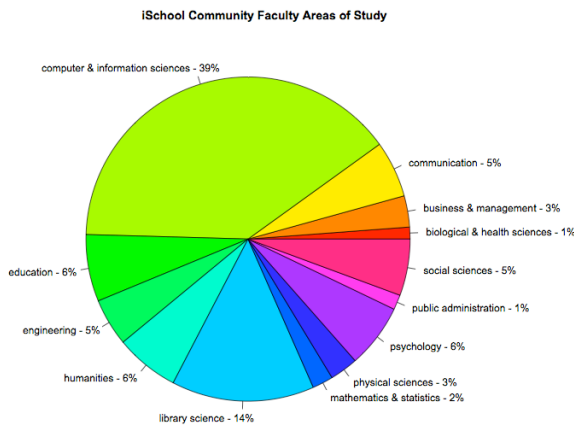


Figure 1. The iSchool community is composed of faculty from a broad range of academic disciplines.

There was some ambiguity regarding how to classify programs entitled *library and information science* or *information and library science*; these were all coded as *library science* because there was a substantial and clearly differentiated population of faculty with degrees in *information science*. The initial coding of the faculty areas of study to CIP families yielded 24 categories; however, some categories such as *family sciences* included very few individuals and other categories, such as *engineering* and *engineering technologies* were sufficiently similar as to provide little additional insight. For analysis purposes, the CIP categories were compressed into the 13 summary categories presented in Figure 1.

The majority of the faculty degrees in the population were in *computer and information sciences*, making up about 43% of the population. The next most common area of study, for 14% of the faculty, was *library science*. Some portion of those degrees classified in the former category might arguably have fit into the latter, if consistent detail about the program of study had been

available for faculty with degrees in such areas as *information studies*, but data at a level of granularity to allow discrimination between degree programs were not universally available.

As a community, the interdisciplinarity of the field is self-evident, although the iSchools have varying levels of focus on specific aspects of the information field, which seems to be a strategy by which schools differentiate themselves with respect to the community. While permitting the analysis, coding the faculty degree programs and departments into CIP families obscures the true diversity of the academic studies in iSchools, especially within the category of computer and information sciences. The breadth of the academic traditions represented in the schools currently granting degrees in information science or information studies means that the expertise of faculty with degrees in these areas may be very diverse as well.

4.4.2 Disciplinary Diversity in iSchools

While most of the faculty in iSchools studied *computer and information sciences* or *library science*, a full 47% of the faculty members studied in other fields, bringing great diversity to the iSchool community. We generated a continuous scale by which to evaluate the interdisciplinary diversity of faculty expertise at iSchools by using an information entropy measure based on the number of faculty with degrees from each disciplinary category [22]. This disciplinary diversity measure clearly distinguishes between hiring strategies that cultivate interdisciplinary diversity and strategies that pursue a rich but narrow focus. In terms of the diversity of faculty expertise, there is significant variation between schools, as shown in Table 4.

Table 4. Disciplinary diversity is measured using the information entropy function, converted to Z-scores.

iSchools, (N = 674)	Disciplinary Diversity
University of Michigan, n = 39	1.38
Syracuse University, n = 33	1.32
Indiana University, n = 87 (both schools together)	1.03
Pennsylvania State University, n = 48	0.95
University of Pittsburgh, n = 31	0.91
University of California - Los Angeles, n = 66	0.67
Rutgers University, n = 47	0.67
University of Maryland, n = 17	0.55
Florida State University, n = 25	-0.01
University of California - Berkeley, n = 12	-0.25
University of Washington, n = 29	-0.25
University of Illinois - Urbana-Champaign, n = 22	-0.31
Drexel University, n = 24	-0.32
University of Texas - Austin, n = 21	-0.46
University of California - Irvine, n = 56	-1.21

Georgia Institute of Technology, <i>n</i> = 78	-1.46
University of North Carolina - Chapel Hill, <i>n</i> = 24	-1.57
University of Toronto, <i>n</i> = 15	-1.66

One interpretation would gauge the interdisciplinarity of the schools by the distribution of faculty representing different areas of study; some schools have chosen to pursue a rich but narrow focus, such as the University of North Carolina, whose faculty's studies are strongly centered around library science and computer and information science. In contrast, schools such as the University of Michigan have made a specific goal of cultivating a broadly interdisciplinary faculty, and have hired academics representing 11 of the 13 aggregated CIP families. The disciplinary diversity measure seems to support this interpretation. Michigan and Syracuse stand out with the highest scores, indicating the greatest interdisciplinarity, while schools such as UNC and the University of Toronto cluster together with the lowest scores, indicating the greatest focus in subject specialization.

The variations in disciplinary diversity indicate different approaches to building an organizational identity through hiring practices at each iSchool, as each faculty represents a different composition of disciplinary expertise. Naturally, a small faculty will tend to represent fewer disciplines, but as Table 4 suggests, size and disciplinary diversity are not strongly correlated ($r = 0.18$). In the iSchools, a full-time faculty of 25 or fewer persons will most likely have faculty expertise in five or fewer broad disciplines; one notable exception is the University of Maryland, where a small faculty of seventeen individuals spanned eleven disciplines. Above the threshold of 25 full-time faculty members, the iSchools usually employ academics with expertise in eight or more academic areas of study.

5. CONCLUSIONS

Finding that peer prestige measures such as USNWR ratings can be predicted with hiring network statistics is reason to question what these ratings really mean to a school's identity. Peer ratings can play an important part in perceptions of a school's prestige and role in the academic community; as these ratings are targeted to prospective students, managing the prestige aspects of image and identity may be a matter of particular interest to iSchool administrators. The iSchool community itself has expressed concern over explaining the academic identity of the information field, a challenge that extends to the degree to which peer prestige ratings do or do not reflect the true community identity. Because the peer prestige ratings are currently subject to accreditation-based populations for sampling, an interdisciplinary community will continue to face challenges in achieving a useful summary representation of the relative identities of its constituents.

We intend to track the changes to iSchool faculty rosters on an annual basis, generating a series of data sets that reflect snapshots in the evolution of the hiring network structure. This research will monitor whether the interdisciplinary field of information is following the trend of most academic disciplines, in which a stratified prestige structure becomes one of the strongest determinants in the placement of graduates. Comparison to the CS hiring network shows some meaningful differences from this trend, suggesting that the interdisciplinarity of the iSchool

community could prevent the level of prestige-based academic inbreeding observed in other disciplines.

There are a number of additional possibilities for future research, such as generating a hiring network of all ALA-accredited institutions for comparison to the iSchools, which might highlight interesting differences between the hiring structures of traditional LIS programs and the interdisciplinary iSchools. In addition, the data from and results of this study could be compared to a complementary network representing iSchool PhD graduate placement. Finally, analysis merging iSchool hiring and PhD graduate placement data sets would offer a more holistic view of the interactions of intellectual exchange in the community.

As an artifact of the information school movement, this study holds a mirror up to the iSchool community, but it must be clear that there is no "fairest of them all" as suggested by prestige ratings. The multiplicity of criteria that are relevant to the true measures of success in an institution may be commonly held among many of the schools in the community, but the valuation of those factors is unique to each institutional context.

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