Internationalizing a Broader View of Scholarship: An Exploratory Study of Faculty Publication Productivity in Boyer's Four Domains of Scholarship in English-speaking Universities

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Abstract

Boyer's four domains of scholarship provided the basis for a comparative investigation of the scholarly output of faculty members in 14 countries and at 100 English-speaking universities on the Times Higher Education World University Rankings (2013–2014) top-400 institutions. Full-time university faculty members who held tenured, tenure-track, and non-tenure-track academic appointments across three high-consensus and three low-consensus academic fields were the population of interest. The findings revealed that faculty members in US Research I and doctoral-granting universities and their international faculty counterparts in English-speaking universities publish relatively similar levels of scholarship directed toward application and discovery and have similar levels of inactivity in their publication of teaching-oriented scholarship. Tests for academic discipline-specific differences revealed little variation except for the finding that academic chemists tend to produce more publications in the application domain. Cross-national variation was also found in the publication of application-oriented scholarship. Suggestions for further research are proposed.

Keywords: faculty scholarship, Ernest Boyer, publication productivity, international faculty, university reward structure, Times Higher Education World University

Introduction

Received: 09/20/2019
Revised: 11/19/2019; 03/01/2020; 03/17/2020
Accepted: 03/20/2020
Published: 09/01/2020

In his landmark publication, *Scholarship Reconsidered: Priorities of the Professoriate*, Boyer (1990) proposed that a definition of scholarship within higher education institutions should go beyond the traditional emphasis on the scholarship of discovery and include the scholarships of application, teaching, and integration, which are often overlooked in institutional incentive structures. Boyer further argued that scholarship should be refined into four domains:

> (1) *discovery*, the advancement of knowledge . . . [that] comes closest to what is meant when academics speak of [academic] research; (2) *integration*, making connections across the disciplines, placing the specialties in larger context, [and] illuminating data in a revealing way; (3) *application*, a dynamic model of scholarship that both applies and contributes to human knowledge, beginning with the applied use of existing knowledge; and (4) *teaching*, a dynamic endeavor involving all the analogies, metaphors, and images that build bridges between the teacher's understanding and the student's learning. (pp. 17–21)

The US literature on the nature and the extent to which members of the professoriate conduct scholarship reflective of each of the four domains delineated by Boyer (1990) is growing (e.g., Austin, 2003; Austin & McDaniels, 2006; Boyd, 2013; Braxton et al., 2006; Braxton & Lyken-Segosebe, 2015; Colbeck & Michael, 2006; Doyle, 2006; Glassick, 2000, 2002; McKinney, 2006; Moser & Ream, 2015; O'Meara, 2006; Paulsen & Feldman, 2006). For example, Braxton et al. (2006) examined scholarly activities in the four domains in a sample of 1,424 full-time tenured and tenure-track college and university faculty members in five types of four-year US institutions of higher education and in four academic disciplines (biology, chemistry, history, and sociology). Later, Braxton and Lyken-Segosebe (2015) examined the same scholarly activities in the same four academic disciplines among a sample of 348 full-time faculty members in a national sample of US community colleges.

Boyer (1990) presented several reasons for his call to broaden the definition of scholarship beyond an emphasis on discovery to include application, integration, and teaching. Given the social and political problems that require expert advice and the need to improve undergraduate

instruction, realign the type of scholarship emphasized in the mission of an institution, and recognize the day-to-day activities of college and university faculty members, Boyer included the need for colleges and universities to serve society. Although these reasons arise from conditions within the US system of higher education, Boyer believes that his expanded definition also may hold relevance to the international context of higher education (Boyer et al., 1994).

Outside the United States, faculty members at international universities are engaging in critical research that informs policy and practice in their respective disciplines and countries. There is also a long-standing "international debate about the development of the scholarship of teaching" and the degree to which it should be located within the disciplines or primarily informed by the science of pedagogy (Healey, 2000, p. 169). Little is known, however, about the extent to which the scholarly output of faculty members at universities around the world reflects the various domains of scholarship beyond traditional discovery or the extent to which discovery informs the other domains, thus making this a valuable area of study.

The focus of this exploratory study was the scholarly activities of faculty members at English-speaking institutions in the Times Higher Education World University Rankings' (2013–2014) top-400 institutions. Our choice of these English-speaking institutions was based on the fact that the mission and scope of research at such universities are similar to those of doctoral universities of the United States. Within these constraints, we were also deliberate about sampling institutions with as broad an international distribution as possible. Universities are included in the Times Higher Education World University Rankings if they achieve an annual research output of at least 200 articles per year (Times Higher Education, 2014). While most rankings systems have continued to place increasing emphasis on metrics of research productivity (e.g. Shanghai Jintao) The Times Ranking has the longest established method of evaluating 'teaching/the learning environment' as one of the central functions of higher education institutions. At the time of this writing, it continues to occupy 30% of their methodological weighting, as it did with the dataset we assembled. Because US faculty members in Research I and doctoral-granting universities publish more scholarship reflective of the

scholarship domains of application, discovery, and integration than do their faculty counterparts in other types of US colleges and universities (Braxton et al., 2002), English-speaking universities from the Times Higher Education World University Rankings (2013–2014) top-400 institutions provide a suitable international context for our comparative study, which seeks to address four research questions.

Research Questions

1. What is the general level of publication productivity of international faculty members in each of Boyer's four domains of scholarship?
2. How does the level of publication productivity of international faculty members in each of Boyer's four domains of scholarship vary across the six different academic disciplines included in this study?
3. How does the level of publication productivity of international faculty members in each of Boyer's four domains of scholarship vary by their university's international institutional stature, as measured by its Times Higher Education Ranking (2013–2014)?
4. How does the level of publication productivity of international faculty members in each of Boyer's four domains of scholarship vary by the country of the university of their academic appointment?

Conceptual Framework

Blackburn and Lawrence (1995) found empirical backing for the influence of self-knowledge and social knowledge on general levels publication productivity. Self-knowledge entails an individual's awareness of their own values whereas social knowledge involves the individual's perception of the expectations for behavior held by their work environment conveyed through norms, values and expectations for performance (Blackburn & Lawrence, 1995). By extension, we posit that self-knowledge and social knowledge also influence the publication productivity of international faculty members in each of Boyer's four domains of scholarship: application, discovery, integration, and teaching.

Specifically, self-knowledge of individual international faculty members involves the cognizance of the values they espouse towards the goals of the scholarships of application, discovery, integration and teaching. Moreover, individual faculty members may vary in the value they place on the goals of these four domains of scholarship.

We also extend the work environment of international faculty members beyond the university of their academic appointment to include their academic discipline and the country of the university of their academic appointment. Each of these dimensions of the work environment communicate norms, values and expectations for publication productivity reflective of the scholarship of application, discovery, integration and teaching to international faculty members.

The norms, values and expectations for publication productivity regarding each of the four domains of scholarship may vary across English-speaking universities of varying degrees of international stature, across different academic disciplines, and across countries of their academic appointment. To elaborate, in their study of 1,424 full-time tenured and tenure-track college and university faculty members in five types of four-year US institutions of higher education (community colleges, four-year baccalaureate level colleges, master's colleges and universities, and research universities of very high research activity), Braxton et al. (2002) found variability in the publication of application, discovery and integration domains scholarship across these types of four-year institutions. Their findings suggest the possibility of differences in the publication of scholarship of the four domains across English-speaking universities of varying degrees of international stature. Moreover, Braxton et al. (2002) also found differences in the level of the publication of application and integration scholarship among the four academic disciplines included in their study. Hence, these findings suggest the possibility of differences in the publication of scholarship of the four domains across the academic disciplines of international faculty members in English-speaking universities. The publication of scholarship in each of the four domains may also vary across different countries of the world because of national priorities regarding the focus of scholarship, especially at institutions receiving public funding.

Significance of the Study

This study is significant for at least four reasons. First, it fills a gap in terms of research on comparative and international faculty scholarship. Second, this study extends the body of knowledge on the nature of scholarship pursued by faculty members at international universities beyond the traditional form of discovery scholarship. Third, the study extends Braxton et al.'s (2002) and Braxton and Lyken-Segosebe's (2015) investigation of Boyer's (1990) four domains of scholarship among faculty members at US colleges and universities to international faculty members in English-speaking universities of the world. To this end, the study utilized an adapted version of Braxton et al.'s (2002) Faculty Professional Performance Survey (FPPS) used for the study of the US professoriate and widened the number of disciplines studied to include two additional disciplines (economics and computer science) with the four academic disciplines (biology, chemistry, history, and sociology) used in earlier research.

Fourth, the study presents international equivalents to two institutional characteristics used to distinguish US universities, namely, institutional type and Carnegie classification. The study distinguished international universities by the country of their faculty members' institution of academic appointment rather than by the faculty members' type of college or university, as within the US higher education system. Moreover, the study used the Times Higher Education World University Rankings (2013–2014) as an indicator of the international institutional stature of the English-speaking universities of the world. Like the Carnegie Classification of Institutions used by Braxton et al. (2002) and Braxton and Lyken-Segosebe (2015), the Times Higher Education World University Ranking differentiates universities according to five dimensions that address the mission and performance of the universities of the world.

This research is important and timely because the work associated with the professorate (also often referred to as the 'academic profession' in the US and Canada) is currently experiencing fundamental shifts related to responsibilities, expectations, incentives, resources, and institutional influence. There is an expanding disconnection between the increasing pressures that are being

exerted on the professoriate and how individual faculty members react in their professional pursuits (Höhle & Teichler, 2013; Locke & Teichler, 2007). Faculty across Europe, in no small measure due to the Bologna Process, increasing administrative demands, and expanded teaching responsibilities, are experiencing more negative impacts on their work from the rise of managerialism (Dowling-Hetherington, 2013; Locke et al., 2011; Teelken, 2011). With dramatic geopolitical shifts toward less free inquiry (e.g. Turkey, Hungary, Venezuela, Ukraine, Ecuador and Azerbaijan), the national and structural contexts for faculty work (Finkelstein, 2015) are also shifting rapidly. At the same time, faculty research output is being evaluated by ever narrower standards of what constitutes research quality, prompting academicians to retreat from time-consuming scholarship that is more broadly engaged with social purposes but still strongly tied to their academic disciplines (Willlmott, 2011; Teodorescu, 2000).

These and similar shifts are resulting in higher stakes for the scholarship enterprise and rising "tension[s] between content of research and bureaucratic control" (Teelken, 2011, p. 16). Faculty professional activities are being more routinely quantified, and the pressure for higher perceived performance is causing significantly more stress on faculty productivity. Faculty also report having less academic freedom in response to strong institutional pressures to move away from basic research to more applied forms of scientific inquiry (Kogan & Teichler, 2007). "[Faculty show] a clear dislike of the growing administration, the increasing competition for research funding, the obligation to fill in time-consuming grant applications and the heavier workload. Examples of frustration and stress are omnipresent" (Teelken, 2011, p. 17). It is our hope that this study may help to advance a more complete analytical framework for understanding these tensions in the professoriate.

Literature Review

The endeavor, since the 1990s, to adequately assess cross-national variations in the professional activities of college and university faculty members has been particularly challenging for scholars. Boyer's (1994) special report for the Carnegie Foundation for the Advancement of Teaching

offered the most comprehensive, international examination at the time of the international professoriate. Utilizing data from the International Survey of the Academic Profession 1991–1993, Boyer provided detailed descriptive analyses of faculty demographics, professional activities, working conditions, governance perceptions, societal orientation, and internationalization.

In his examination of professional activities, Boyer (1994) attempted to gain an understanding of the relationship among teaching, research, and service, with an emphasis on the degree to which teaching and research were differently prioritized and considered complementary or in tension with one another. Boyer (1994) found a clear divide between faculty members in the 14 countries surveyed: "Commitment to teaching predominate[d] in five of the fourteen countries, [whereas] in the other nine countries, faculty interest lean[ed] toward research" (p. 11). Although he also found that a majority of faculty members in every country thought that teaching quality was not hindered by the pressure to publish, faculty across half of the countries in the sample (including the United States and United Kingdom) reported that they felt significant tensions between these activities.

Using the same dataset, Altbach and Lewis (1996) provided a deeper analysis at the individual-country level. Among their core findings was notable discontentment in nearly every country with the state of academic governance and commonly held perceptions regarding challenging, and changing, the academic profession. According to Altbach and Lewis (1996):

> This portrait of the academic profession in fourteen countries shows a complete web of attitudes and values. One cannot but be struck by the many similarities among the scholars and scientists in the diverse countries. It is with regard to those working conditions most affected by local political and cultural customs and policies that international differences are most apparent. (p. 47)

Despite the valuable insights that the Carnegie research studies (Altbach & Lewis 1996; Boyer, 1994) produced, especially related to the tensions between teaching and research as professional

priorities, these studies did not attempt to advance an empirically validated construct for measuring cross-national variability between faculty priorities.

From 2004 to 2013, the Changing Academic Profession (CAP) studies utilized a significant retooling of the Carnegie categories and included participants from 18 countries and territories. "Half of [these countries] had also participated in the Carnegie Study and thus provided the basis for the analysis, how the situation and views of the academic profession have changed over time" (Höhle & Teichler, 2013, p. 12). The CAP studies, for which each country team gathered its own data and conducted its own analyses, focused on academic governance issues as they relate to the changing work and allegiances of academicians. Cummings et al. (2011) presented their main findings as follows:

> On the research side, most academic systems have become more productive, at least as measured by the number of refereed articles written by their academic staff. However, the increases are least notable in those systems that have traditionally been regarded as the centers of learning—indeed, for the last 15 years there has been essentially no change in the total number of refereed articles written by US-based academics. (p. 10)

From another perspective, Teichler's (2013) CAP study indicated differences in the teaching-research foci of faculty that were significantly related to their academic discipline:

> The discipline is relevant for the orientation towards teaching and research. Actually, 62% of the academics in science and engineering—on average across countries—state a preference for research as compared to 56% of the academics in the humanities and social science. (p. 124)

Moreover, nearly 80% of the faculty surveyed also believe that "their research activities reinforce their teaching" (Teichler, 2013, p. 127). Finally, the most relevant aspect of this research to our current study is Teichler's findings on the "notions and approaches to research and scholarship" for which two survey items were developed to explore the "character" of faculty members' research (Teichler, 2013, p. 137). The first item, which pertained to faculty, was, "State whether research and

scholarship is to be understood ('is best defined') as original research, the synthesis of academic knowledge, and/or as the application of knowledge in real-life settings." The second item was more directly linked to their own activities—whether the research that they undertake is "basic/theoretical, practically oriented, international in scope and as mono-disciplinary or multidisciplinary" (Teichler, 2013, p. 137). Such macro-level findings are helpful for understanding the basic orientation of faculty priorities. According to Teichler (2013):

> Many academics do not see research to be geared in a single major direction. Rather, while three quarters of the respondents support the applied nature of academic research, two-thirds support the "basic" and "theoretical" character of research, and two-thirds also support the need for the synthesis of major findings. (p. 137)

Although these studies have significantly advanced our understanding of the degree to which faculty in different countries conceptualize and commit their time and resources to scholarly activities, they did not explore the degree to which faculty members participate in different forms of scholarly outputs. Specifically, they did not explore the extent to which faculty members conduct scholarship reflective of each of Boyer's (1990) four domains of scholarship: discovery, application, teaching, and integration scholarship.

Methodology

Sample and Data Collection

Our sample was constructed by randomly selecting 100 English-speaking (defined as language of instruction and/or administration) institutions from the Times Higher Education World University Rankings (2013–2014) top-400 institutions (Times Higher Education, 2014). Cluster sampling was then used to create a sample across institutional type that was randomized at the level of faculty discipline. Full-time faculty members who held tenured, tenure-track, and non-tenure-track academic appointments in the six academic disciplines of biology, chemistry, history, sociology, economics, and computer science constituted the population of interest for this study. A total of 14,181 faculty members were selected, using this cluster sampling design.

The Faculty Professional Performance Survey (FPPS) was emailed as an online survey, using Qualtrics Survey Software, to this sample of faculty members in spring 2015. The FPPS in its original form was developed by Braxton et al. (2002) for their research on faculty engagement in each of Boyer's (1990) four domains of scholarship in four-year colleges and universities in the United States. The survey was informed by the work of Boyer (1990), Braxton and Toombs (1982), and Pellino et al. (1984). Braxton et al. (2002) used two national experts on faculty scholarly performance to establish face validity for the various forms of scholarship contained in the FPPS. The survey was modified for use with international faculty members in this study. In addition to items that relate to characteristics of faculty members, such as full- or part-time status, academic rank, highest degree completed, and tenure status, the modified instrument was internationalized by including items related to the primary language of instruction, country and geographic region of the faculty member's work institution, and institution where the faculty member earned his or her highest degree. This research was approved for execution by the Institutional Review Board for the Protection of Human Subjects of Vanderbilt University, United States.

The initial sample comprised 14,181 faculty members, but, due to immediate opt-outs within Qualtrics, the email that contained a link to the FPPS was sent to 14,136 faculty members. Survey administration statistics provided by Qualtrics indicated that 3,694 faculty members actually received and opened the initial invitation. After the initial email and two additional emails to non-respondents, a total of 690 faculty members started the survey, and 358 faculty members (9.7% of those who opened the email) completed the online survey instrument. From the 358 who completed the survey, 318 identified as full-time faculty members who held tenured, tenure-track, and non-tenure-track academic appointments in one or more of the six academic disciplines of biology, chemistry, history, sociology, economics, and computer science. This sample of 318 international faculty members constituted the population of inference.

Given the low response rate, a wave analysis that used t-tests was conducted for the three administrations of our emailed survey to check for the possibility of response bias. Our results

confirmed that there were no significant differences in the mailing waves. Thus, little or no bias exists in our sample of international faculty members, despite the low response rate to the FPPS.

Our final sample comprised 40% female and 60% male faculty members. With regard to their academic rank, 5% of respondents classified themselves as distinguished professors, 34% as professors, 23% as associate professors, and 8% as assistant professors. Further, 86% were tenured faculty, 7% were untenured but on the tenure track, and 7% were not on the tenure track.

Table 1 shows the disciplinary orientation of the faculty members in the study sample, using Biglan's (1973a, 1973b) classification of academic disciplines as hard-soft, pure-applied disciplines. Most of the study respondents originated from the pure, hard disciplines of biology and chemistry, while the lowest response rate was found among faculty members in the soft, applied discipline of economics.

Table 1

Composition of the Study's Sample

Field	Hard Disciplines		Soft Disciplines		Total
	Discipline	Faculty Members (*n*)	Discipline	Faculty Members (*n*)	Faculty Members (*n*)
Pure	Biology	109	Sociology	40	250
	Chemistry	64	History	37	
Applied	Computer Science	38	Economics	30	68
Total		211		107	318

Given our English language criterion for language of instruction and/or administration of the faculty member's institution, our final sample included faculty members from 14 countries. The total analytical sample of 318 faculty members in 14 countries provided the basis for our exploratory study. Table 2 presents the country location distribution of faculty members in the study sample across the six disciplines of interest.

Table 2

Distribution of Faculty Members by Country of University

Country of University	Faculty Members (*n*)
Australia	52
Belgium	2
Canada	91

Denmark	6
Finland	8
Hong Kong	3
Iceland	5
Netherlands	13
New Zealand	9
Norway	3
Singapore	6
South Africa	4
Sweden	12
United Kingdom	104
Total	318

The research design utilized three independent and four dependent variables. Table 3 presents the measurement of each of the independent variables, derived from faculty responses to FPPS items, and the four dependent variables and their associated professional behaviors.

Table 3

Operational Definition of the Variables

Variable	Operational Definition
Independent	
Academic discipline	Academic disciplines were coded as 1 = biology, 2 = chemistry, 3 = history, 4 = sociology, 5 = economics, 6 = computer science.
International institutional stature	International institutional stature was based on the ranking of institutions in the Times Higher Education World University Rankings (2013–2014) and coded as 1 = 1–100, 2 = 101–200, 3 = 201–300, 4 = 301–400.
Country of university of academic appointment	The country of faculty members' university of academic appointment was based on institutions with 10 or more international faculty members who responded to *The Faculty Professional Performance Survey*. This measure was coded as 1 = Australia, 2 = Canada, 3 = The Netherlands, 4 = Sweden, 5 = The United Kingdom.
Dependent	
Publications oriented toward the scholarship of application	Composite of five items measuring publications reporting the outcomes of engagement in the scholarship of application: an article that outlines a new research problem identified through your application of the knowledge and skill of your academic discipline to a practical problem; an article that describes new knowledge you obtained through your application of the knowledge and skill of your academic discipline to a practical problem; an article that applies new disciplinary knowledge to a practical problem; an article that proposes an approach to the bridging of theory and practice; and a refereed journal article reporting findings of research designed to solve a practical problem. Respondents used a five-point scale to indicate their degree of performance during the past three years of the forms of scholarship measured by the seven dependent variables: 1 = none, 2 = 1–2, 3 = 3–5, 4 = 6–10, and 5 = 11+ times.
Publications oriented toward the	Composite of five items measuring publications oriented toward the scholarship of discovery: a book chapter describing a new theory developed by you; a refereed journal article reporting findings of research

scholarship of discovery	designed to gain new knowledge; a book reporting findings of research designed to gain new knowledge; a book describing a new theory developed by you; and a refereed journal article describing a new theory developed by you. Respondents used a five-point scale to indicate their degree of performance during the past three years of the forms of scholarship measured by the seven dependent variables: 1 = none, 2 = 1–2, 3 = 3–5, 4 = 6–10, and 5 = 11+ times.
Publications oriented towards the scholarship of integration	Composite of twenty items measuring publications reporting the outcomes of engagement in the scholarship of integration: a review of literature on a disciplinary topic; a review essay of two or more books on similar topics; an article on the application of a research method borrowed from another academic discipline to your discipline; a book chapter on the application of a research method borrowed from another academic discipline to your discipline; an article on the application of a theory borrowed from another academic discipline to your discipline; a book chapter on the application of a theory borrowed from another academic discipline to your discipline; a critical book review published in an academic or professional journal; a critical book review published in a newsletter of a professional association; an article addressing current disciplinary topics published by the popular press; an article addressing a disciplinary/interdisciplinary topic published by the popular press; an article that crosses subject matter areas; a book that crosses subject matter areas; a critical book review published in the popular press; a review of literature on an interdisciplinary topic; the number of the following you have published within the past 3 years: edited books, textbooks, and books reporting research to the lay reader; and the number of articles on a current topic in your discipline you have published within the past 3 years in a local newspaper, a college or university publication, or a national magazine of the popular press. Respondents used a five-point scale to indicate their degree of performance during the past three years of the forms of scholarship measured by the seven dependent variables: 1= none, 2 = 1–2, 3 = 3–5, 4 = 6–10, and 5 = 11+ times.
Publications oriented towards the scholarship of teaching	Composite of eight items measuring publications reporting the outcomes of engagement in the scholarship of teaching: a publication listing resource materials for a course; a publication on the use of a new instructional method; a publication reporting a new teaching approach developed by you; a publication on a new instructional method or approach developed by you; a publication on a new approach or strategy for dealing with class-management problems faced in teaching a particular type of course; a publication on a new approach or strategy to help students to think critically about course concepts; a publication reporting the development of methods to make ungraded assessments of student learning of course content; and a publication on the use of a new instructional practice and the alterations made to make it successful. Respondents used a five-point scale to indicate their degree of performance during the past three years of the forms of scholarship measured by the seven dependent variables: 1 = none, 2 = 1–2, 3 = 3–5, 4 = 6–10, and 5 = 11+ times.

Independent Variables

The three independent variables are academic discipline, international institutional stature, and country of faculty members' university of academic appointment, each of which is discussed below.

Academic Discipline

The six academic disciplines included in this study were biology, chemistry, computer science, economics, history, and sociology. According to Biglan's (1973a, 1973b) schema for the classification of academic subject matter, biology, chemistry, and computer science constitute hard paradigmatic academic fields, whereas economics and sociology are soft paradigmatic fields. Moreover, biology, chemistry, history, and sociology are considered to have a pure orientation, in contrast with computer science and economics, which have an applied orientation (Biglan, 1973a, 1973b). Paradigmatic development refers to the degree of consensus within a field regarding its theoretical orientation, appropriate research methods, and the importance of various research questions (Biglan, 1973a, 1973b; Kuhn, 1970; Lodahl & Gordon, 1972).

International institutional stature

The Times Higher Education World University Rankings (2013–2014) of the top-400 institutions was used to measure international institutional stature. This ranking utilizes 13 performance indicators across five main areas with the following values for that period: teaching indicators of the learning environment (30%); research indicators, including volume, income, and reputation (30%); citation indicators associated with research influence (30%); industry income metrics as a measure of innovation (2.5%); and international outlook focused on staff, students, and research (7.5%) (Times Higher Education, 2014). Taken together, these different dimensions of institutional stature were used to construct a composite scale with values that ranged from 1 to 400. Universities in the 1–100 category constituted the universities with the greatest degree of international institutional stature, whereas universities in the 301–400 category had the lowest degree of international institutional stature.

Country of university of academic appointment

This variable pertains to the country in which the English-speaking university of a given individual international faculty member was located. As noted, 14 countries were represented among the English-speaking universities of the international faculty members who responded to the FPPS. To construct this variable, however, we used only those countries for which at least 10 international faculty members responded to the survey. As a consequence, the following five countries were used in the construction of this variable: Australia, Canada, the Netherlands, Sweden, and the United Kingdom.

Dependent Variables

Using items included in the FPPS, we constructed the four composite variables that constituted the dependent variables. These four composite variables measure publication productivity in each of the four domains of scholarship - application, discovery, integration, and teaching - which are the four dependent variables. The specific professional behaviors included in publications oriented toward application relate to the application of disciplinary knowledge and skills to address important societal and institutional problems (Boyer, 1990) as the thrust of the scholarship of application. The acquisition of knowledge for its own sake constitutes the primary goal of the scholarship of discovery (Boyer, 1990). Generating and testing of theory is an additional critical element of this domain of scholarship (Boyer, 1990).

The specific forms of publication included in the dependent variable publications oriented toward the scholarship of discovery parallel the goals of the scholarship of discovery. The specific forms of publication included in the dependent variable publications oriented toward the scholarship of integration echo the scholarship of integration as involving interpretation and "fitting one's own work and the work of others into larger intellectual patterns" (Boyer, 1990, p. 19). The scholarship of teaching seeks to develop and improve pedagogical practices (Braxton et al., 2002). The forms of publication included in the dependent variable publications oriented toward the scholarship of teaching reflect this goal of the scholarship of teaching.

We computed the four dependent variables by summing individual responses to specific professional behaviors that reflect the goals of scholarship of the focal domain and then dividing this sum by the total number of specific types of professional behavior subsumed under each dependent variable. Respondents to the FPPS used a 5-point Likert-type scale to indicate their degree of performance of the applicable specific professional behaviors during the past three years (1 = none, 2 = 1–2, 3 = 3–5, 4 = 6–10, and 5 = 11+ times). A mean score for each of these four dependent variables of greater than 1.00 indicated that individuals have reported their engagement in one or more of the specific behaviors that comprise a given dependent variable.

Results

The findings are organized according to the four research questions that guided this study. For each research question, we describe the statistical procedures used to address the question.

Research Question 1: What is the general level of publication productivity of international faculty members in each of Boyer's four domains of scholarship?

To address this question, we used the means computed for each of the seven dependent variables. As seen in Table 4, during the past three years of this survey, international faculty members in English-speaking universities published between one and two pieces of scholarship reflective of the domains of application (mean = 1.50) and discovery (mean = 1.41). In contrast, international faculty members reported few or no publications oriented toward the scholarship of integration (mean = 1.05) or the scholarship of teaching (mean = 1.02).

Table 4

International Faculty Publication Productivity in Each of the Four Domains

Variable	Mean	Standard Deviation
Publications oriented toward the scholarship of application	1.50	0.81
Publications oriented toward the scholarship of discovery	1.41	0.52
Publications oriented toward the scholarship of integration	1.05	0.25
Publications oriented toward the scholarship of teaching	1.02	0.14

Here, our interest is in how these patterns compare with those of faculty members in US institutions of higher education. Using data derived from the research of Braxton et al. (2002), we derived the mean levels of publication productivity in the four dependent variables for faculty members in US Research I and doctoral-granting universities.

As seen in Table 5, US faculty members in Research I and doctoral-granting universities and their international faculty counterparts in English-speaking universities published relatively similar levels of scholarship directed toward application and discovery as well as similar degrees of inactivity in their publication of teaching-oriented scholarship. US faculty, however, published between one and two pieces of scholarship reflective of integration, compared to few or no such publications by international faculty members in English-speaking universities.

Table 5

US Research I and Doctoral-Granting VS International Universities

Variable	International (*n* = 318)	US Research I and Doctoral-granting (*n* = 524)
	Mean	Mean
Publications oriented toward the scholarship of application	1.50	1.48
Publications oriented toward the scholarship of discovery	1.41	1.69
Publications oriented toward the scholarship of integration	1.05	1.26
Publications oriented toward the scholarship of teaching	1.02	1.10

Research Question 2: How does the level of publication productivity of international faculty members in each of Boyer's four domains of scholarship vary across the six different academic disciplines included in this study?

We conducted four one-factor analyses of variance to address disciplinary variation across the four measures of publication productivity among international faculty members. The following six academic disciplines constituted the levels of the one-factor analysis of variance: biology, chemistry, history, sociology, computer science, and economics. Prior to executing the analysis of

variance, the homogeneity of variance assumption was tested using the Levene test of homogeneity, and heterogeneous variances were detected. The one-factor analyses were conducted, using the .025 level of statistical significance to reduce the probability of committing a Type I error. Table 6 shows the results of the four analyses of variance.

Table 6

Faculty Publication Productivity by Academic Disciplines

Domain/Form of Engagement	*F*-ratio	Mean						Post Hoc Mean Comparisons
		Biology	Chemistry	History	Sociology	Economics	Computer Science	
Publications oriented toward the scholarship of application	4.08**	1.61	1.78	1.18	1.43	1.66	1.22	Chemistry greater than history and computer science
Publications oriented toward the scholarship of discovery	1.59	1.44	1.55	1.32	1.4	1.45	1.28	ns
Publications oriented toward the scholarship of integration	0.81	1.06	1.02	1.09	1.08	1.0	1.03	ns
Publications oriented toward the scholarship of teaching	0.49	1.03	1.03	1.03	1.0	1.03	1.0	ns

*$p < .05$, **$p < .01$, ***$p < .001$

Of the four measures of faculty publication productivity in the four domains of scholarship, statistically significant disciplinary differences occurred for only one. The probability of the *F*-ratio for publications oriented toward the scholarship of application fell below the .025 level of statistical significance, and, as a result, the Scheffe method of post hoc mean comparisons was used to identify disciplines that differed in a statistically reliable way. To further reduce the probability of committing

Type I errors, we used the .01 level of statistical significance to delineate statistically significant mean differences identified through the Scheffe method. These results indicated that international faculty members in English-speaking universities who were chemists produced more publications oriented toward the scholarship of application (mean = 1.78) than did their international faculty member counterparts who were historians (mean = 1.18) or computer scientists (mean = 1.22). Moreover, international faculty members who were biologists, sociologists, and economists had levels of publications focused on the scholarship of application similar to those of their international faculty colleagues who were chemists.

Research Question 3: How does the level of publication productivity of international faculty members in each of Boyer's four domains of scholarship vary by their university's international institutional stature, as measured by its Times Higher Education Ranking (2013–2014)?

To address this research question, we used four categories of the Times Higher Education (2014) rankings to measure international institutional stature. These four categories comprised the four levels of the factors of international institutional stature used in the one-way analyses of variance. When a statistically significant overall *F*-ratio resulted, the Scheffe method of post hoc mean comparison was used to identify rankings that differed in a statistically reliable way. Table 7 presents the results of these four analyses of variance.

Table 7

Faculty Publication Productivity in Domains of Scholarship by Times Higher Education Rankings

Domain/Form of Engagement	*F*-ratio	Mean				Post Hoc Mean Comparisons
		1–100	101–200	201–300	301–400	
Publications oriented toward the scholarship of application	0.62	1.47	1.56	1.60	1.44	ns
Publications oriented toward the scholarship of discovery	3.01*	1.37	1.47	1.53	1.27	ns

Publications oriented toward the scholarship of integration	1.15	1.04	1.08	1.05	1.02	ns
Publications oriented toward the scholarship of teaching	1.49	1.03	1.01	1.0	1.05	ns

*p < .05, **p < .01, ***p < .001

Similar levels of publication productivity in all four measures of performance in Boyer's (1990) domains of scholarship by international faculty members were found, regardless of the category of the rankings of their English-speaking university. Although the post-hoc mean comparisons failed to identify statistically significant differences among the four categories of the rankings and the production of discovery-oriented publications, the overall statistical significance (p < .05) of the factor of international institutional stature suggests that some non-orthogonal differences may be occurring. To examine this, we conducted a series of independent t-tests between combinations of these four categories. From these tests, we found that the mean number of publications reflective of discovery scholarship performed by international faculty members in universities within the 301–400 ranking (mean = 1.27) was lower than the aggregated mean (mean = 1.44) for universities in all other rankings. In other words, international faculty members in universities of the lowest level of international institutional stature generated fewer publications directed toward the scholarship of discovery than did their international faculty colleagues in universities of higher international stature.

Research Question 4: How does the level of publication productivity of international faculty members in each of Boyer's four domains of scholarship vary by the country of the university of their academic appointment?

For this research question, we conducted four one-way analyses of variance with the country of the university of the international faculty member as the factor. This factor consists of five levels, corresponding to Australia, Canada, Sweden, the Netherlands, and the United Kingdom.

Prior to executing the analysis of variance, the homogeneity of variance assumption was tested, using the Levene test of homogeneity, and heterogeneous variances were detected. The one-factor analyses were conducted, using the .025 level of statistical significance, to reduce the probability of committing a Type I error. The Scheffe method was used to identify countries that differed in a statistically reliable way. We present the results of these analyses of variance in Table 8, which reveals that similar levels of publication productivity for the discovery, integration, and teaching domains of scholarship occurred across the seven nations. There were, however, cross-national differences for the scholarship of application. Specifically, international faculty members with their academic appointment in Australia (mean = 1.86) tended to publish more application-oriented scholarship than did their faculty counterparts in Canada (mean = 1.41).

Table 8

Analysis of Variance Results for Faculty Publication Productivity by Country of Faculty Member's Present Institution

Domain/Form of Engagement	*F*-ratio	Mean					Post Hoc Mean Comparisons
		Australia	Canada	Sweden	The Netherlands	United Kingdom	
Publications oriented toward the scholarship of application	3.26*	1.86	1.41	1.10	1.44	1.57	Australia greater than Canada
Publications oriented toward the scholarship of discovery	2.36*	1.55	1.36	1.10	1.44	1.48	ns
Publications oriented toward the scholarship of integration	0.22	1.04	1.06	1.00	1.06	1.07	ns
Publications oriented toward the scholarship of teaching	0.22	1.02	1.02	1.00	1.00	1.03	ns

*$p < .05$, **$p < .01$, ***$p < .001$

Discussion

Comparative differences in the publication of integration-oriented scholarship were found between US and international faculty members in English-speaking universities. US faculty members published between one and two pieces of scholarship reflective of integration, compared to few or no such publications by international faculty members in English-speaking universities. One possible explanation pertains to the academic reward systems of these universities. It may be that publications oriented toward the scholarship of integration receive little or no weight in the reward systems of these universities. If we use Boyer's (1990) working definition that the scholarship of integration primarily involves "making connections across the disciplines [and] placing the specialties in larger context" (p. 18), then it might be the case that such interdisciplinary approaches to scholarship have not become quite as mainstream in some countries as in the United States.

It also may be that the scholarship conducted by faculty members in other countries could still exhibit greater fidelity to strict disciplinary approaches. In 2015, Elsevier's Analytical Services team conducted a nine-country comparison of interdisciplinary research (IDR), using a unique computational method that allowed the team to study the occurrence of IDR beyond typical subject classification systems (Pan et al., 2015). One of their key findings may offer support for this reasoning: IDR was associated with a lower citation impact for the world as a whole and for the nine countries studied. The differing rates of participation in the scholarship of integration makes sense one when considers that the US higher education system already possesses a strong emphasis on interdisciplinarity, whereas IDR is routinely practiced across many academic disciplines; and countries that are trying to gain research advantage and prestige, such as China, are pursuing higher citation impact research (of discovery). As such, the scholarship of integration may be emerging for much of global higher education.

We also found that, among international faculty in English-speaking universities, faculty members in chemistry tended to produce more publications oriented toward the scholarship of

application than did their international faculty member counterparts in history and computer science. Applying Biglan's (1973a, 1973b) classification of academic disciplines, chemistry constitutes a pure-hard discipline, whereas history and computer science constitute pure-soft and applied-hard disciplines, respectively. The difference in publication productivity in application scholarship may reflect the higher paradigmatic development in the chemistry discipline at the international level. Further, among international scholars, there may be higher levels of agreement among chemistry researchers regarding issues such as appropriate applied research topics and methods (Braxton & Hargens 1996).

Our finding of lower discovery-oriented scholarship among lower ranked universities in the Times Higher Education World University Rankings (2013–2014) of top-400 institutions is in keeping with the weights that Times Higher Education (2014) accords to institutional performance in terms of research indicators, including volume, income, and reputation (30%), and citation indicators associated with research influence (30%; Times Higher Education, 2014). Universities ranked with higher international stature would have acquired higher weights in these performance areas.

Our finding of higher publications that are reflective of application scholarship among faculty members in Australia compared to faculty members in other countries, especially Canada, may be due to country-specific factors to which the study researchers were not privy. The findings also may reflect the marketization of the Australian Higher Education Sector (AHES) ushered in by public policy changes in that country that emphasized efficiency, economies of scale, rationalization, increased private contribution for public universities, and the development of greater market responsiveness (Guthrie & Neumann, 2007; Neumann & Guthrie, 2002; Parker, 2011). As a result of reductions in public funding, public universities have moved from being fully funded to partially subsidized and toward market-driven approaches (Guthrie & Neumann, 2007). In an era of performance-related funding, measurable output tends to be in the form of "articles in refereed journals from 'new' sources of inputs such as industry collaborative schemes" and oriented towards applied research" (Neumann & Guthrie, 2002, p. 725).

Limitations and Future Research

Our study is subject to at least three limitations. One limitation pertains to the low response rate to the online administration of the FPPS. Nevertheless, our mailing wave analyses indicated no differences in the mean values of the study's variables across the mailing waves. Moreover, the size of our final sample was sufficient to conduct our statistical analyses.

Restrictions to our sampling design created additional limitations. The first restriction pertained to our random selection of English-speaking universities of the world; the second, to our choice to select universities from only the Times Higher Education World University Rankings (2013–2014) top-400 institutions. The third limitation related to our decision to sample international faculty members in English-speaking universities from the following six academic disciplines: biology, chemistry, computer science, economics, history, and sociology. A selection of faculty members from non-English speaking universities not included in the top-400 institutions of the world might yield a different pattern of findings than those obtained for this study. Likewise, a different set of academic disciplines also might produce a different pattern of results.

Based on the limitations of this study, particularly its exploratory nature, the following are areas for future research:

1. This research should be replicated and include a greater sample size, a higher rate of response to the FPPS, [But this could not be guaranteed going into the study] and additional international faculty members per country of the university of appointment.
2. This research should be replicated in English-speaking institutions of higher education other than those in the Times Higher Education World University Rankings (2013–2014) top-400 list of institutions. Doing so would open this research to greater variation in institutional typology and, therefore, the research foci and preferences of faculty members in those institutions. With such variation in institutional functions, we would likely gain an additional perspective on the extent to which the scholarships of integration, application, and teaching hold sway for international faculty members.

3. This research also needs to be replicated in non-English speaking universities of the world. This present research was limited by our ability to provide adequate translations of our instrument into other languages. Extending this research to non-English countries that possess some of the greatest research universities in the world, i.e., China, Germany, France, Switzerland, Denmark, Italy, Japan, Spain, and South Korea, will illuminate whether this present research is biased by the linguistic and socio-cultural traditions of English-language-dominant universities.

Conclusions

This exploratory study sought to investigate the extent to which the scholarly output of faculty members in English-speaking universities around the world reflect Boyer's (1990) four domains of scholarship. We found that international faculty members exhibit some degree of publication productivity in two of the four domains of scholarship described by Boyer (1990): application and discovery. Moreover, international faculty members exhibit little or no publication productivity in the scholarships of integration and teaching. Faculty members in US universities, however, demonstrate some publication productivity in three of the four domains of scholarship—application, discovery, and integration—but also show little or no publication productivity in the scholarship of teaching (Braxton et al., 2002). Accordingly, we offer two heuristic conclusions that await further research.

First, the scholarships of application and discovery tend to prevail as the domains of scholarship pursued by faculty members in English-speaking universities of the world, whereas the scholarship of teaching receives scant attention. Second, Boyer's (1990) domains of scholarship tend to more fully capture the research and scholarship role performance of US faculty members than do that of their international faculty counterparts. Faculty members in US universities contribute to the goals of the scholarships of application, discovery, and integration, whereas international faculty members in English-speaking universities contribute to the goals of the scholarship of application and discovery but not to those of integration.

Based on our findings, we offer two additional tentative conclusions that await further research. Although publication performance in the scholarship domains of application and discovery are predominant among international faculty in English-speaking universities, cross-national differences exist in the degree to which international faculty members contribute to the achievement of the goals of the scholarship of application. This conclusion emerges from our finding that international faculty members in Australia publish more application-oriented scholarship than do their counterparts in Canada.

We also found that, in terms of the scholarship of application, international faculty members in English-speaking universities who are chemists tend to produce more publications than do their counterparts who are historians and computer scientists. Moreover, chemists in US institutions of higher education also tend to produce more application-oriented publications than do their colleagues in history and sociology (Braxton et al., 2002). These findings lead us to tentatively conclude that faculty members in the discipline of chemistry in English-speaking universities of the world place more emphasis on the goals of the scholarship of application than do their counterparts in other academic disciplines.

Hermanowicz (2017) asserts that the further advancement of international and comparative work on the professoriate requires the use of analytical concepts. Structural dimensions of the professoriate and scholarship, conceived as comprised of four domains, constitute two such ordering concepts. The academic discipline (the six disciplines represented in this study) and institutional type (Times Higher Education World University Rankings) comprise two differentiating dimensions of the structure of the professoriate (Ruscio, 1987) included in the current study. The pattern of findings of this study tentatively suggest that domains of scholarship work to further differentiate both dimensions. Moreover, the findings of this study also tentatively suggest a third differentiating dimension of the structure of the professoriate: the country of the academic appointment of international faculty members. The utility of these analytical concepts to the international and comparative study of the professoriate awaits further empirical work.

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