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Using Social Network Analysis to Investigate Potential Bias in Editorial Peer Review in Core Journals of Comparative/ International Education

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USING SOCIAL NETWORK ANALYSIS TO INVESTIGATE POTENTIAL BIAS IN EDITORIAL PEER REVIEW IN CORE JOURNALS OF COMPARATIVE/INTERNATIONAL EDUCATION

by

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As chair of the candidate's graduate committee, I have read the dissertation of Biao Cheng in its final form and have found that (1) its format, citations, and bibliographical style are consistent and acceptable and fulfill university and department style requirements; (2) its illustrative materials including figures, tables, and charts are in place; and (3) the final manuscript is satisfactory to the graduate committee and is ready for sub-mission to the university library.

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ABSTRACT

USING SOCIAL NETWORK ANALYSIS TO INVESTIGATE POTENTIAL BIAS IN EDITORIAL PEER REVIEW IN CORE JOURNALS OF COMPARATIVE/INTERNATIONAL EDUCATION

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This study explores potential bias in the editorial peer-review system within the context of the field of comparative and international education. Assuming the role as "Guardian of Science" and "social status judge" (Zuckerman & Merton, 1971), peer-review, the quality control system of science, directly affects the growth of science, scientists' academic career and their institutions. The very basic tenet of the peer review system is its assumed objectivity. Bias in editorial peer review process, however, is inevitable. The constitution of the blind peer review mechanism is *itself* a simply undeniable acknowledgement of that fact.

Therefore, this study investigated potential peer-review bias by examining the core peer-reviewed academic journal publications of the field between 1994 and 2003, through the methods of social network analysis. In addition to some descriptive analysis on the overall state of the field, based on the criterion of centrality, focus was specifically given to two networks (co-authorship network and institutional network) and the network structure for patterns that might indicate bias in terms of author, gender, author-affiliated institution, country, number of articles published and number of journals in which the author published.

Findings of this research revealed no discernable patterns nor network-wide centralization in either the co-authorship network or the institution network. Thus, no reason exists to suspect the objectivity of the peer-review process of the five core academic journals of comparative and international education 1994 – 2003 on the base of centrality. Further descriptive analyses, however, did reveal patterns that may represent norms of the field and, thus, may suggest potential sources of bias. Findings indicated that 1) scholars of the field tend to research independently and publish in relative isolation, and single-authored journal articles are the norm of the field; 2) the field is dominated by the scholars and institutions of Western countries, especially the U.K and the U.S; and 3) journals of the field tend to publish more authors from the hosting countries of the journal. The implications of these findings were also discussed.

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CHAPTER ONE

INTRODUCTION

Editorial peer review is generally referred as the use of experts to help judge the value of submitted scientific manuscripts for decisions on publishability. Some form of peer review emerged with the publication of the first scientific journal over 300 years ago (Zuckerman & Merton, 1971). Institutionalized since the 1940s, peer review has grown over time to be a quality control system for advancement of science (Berkenkotter, 1995). Peer reviewers are regarded as "gatekeepers of science" (Crane, 1967) and their objective authorization and authentication on new findings entering the discipline generates great impact on the body of scientific knowledge.

Beyond its profound effect on the growth of scientific knowledge, peer reviewers also affect the more immediate and practical considerations of reward and resource allocation of scientists and their employing academic institutions (Chubin & Hackett, 1990). As the current definition of scholarship in American higher education has been narrowly defined as publication in prestigious peer-reviewed journals (Boyer, 1990; Glassick, Huber, & Maeroff, 1997), the advancement of a scientist's career in terms of tenure and promotion, and rewards in terms of salary and prestige have become largely dependent on the healthy operation of the editorial peer review system. Ultimately, the same peer review system serves as a proxy for judging and establishing the ranking and prestige of the employing institutions as well.

The very basic tenet of the peer review system is its assumed objectivity: no factors other than the quality of the manuscript should be considered for decisions about paper acceptance. However, a significant body of literature suggests that particularistic criteria may have played a role in evaluative decision, and the integrity of the peer-review process has been seriously questioned (Rennie, 1999; Weller, 2001). Since the advancement of scientific knowledge and scientists career has become so highly dependent on this system, a careful inquiry into the actual nature of journal peer review is clearly justified.

Brief History of Editorial Peer Review

Scholarly journals are the major venue through which scientists disseminate their findings, register priority of their work, and establish and amass credits and prestige for their career (Campanario, 1998a; Chubin & Hackett, 1990). The reason people place trust and confidence in a journal lies in the pre-publication evaluation system established as part of the journal publication process – the peer review system. Today peer review is embedded into the structures and processes of virtually all academic journals across most disciplines. It was however not always so in the history of scholarly communications.

Zuckerman and Merton (1971) concluded that journal peer review evolved in response to the development of scholarly societies and the scientific journals. The newly established scientific societies and academies of the 17th century provided initial ground for the social innovation of scientific journals. Journals began to grow and take the place of personal letters and books, which were previously the only system of scholarly communications. The practice three

centuries ago of having manuscripts legitimized prior to publication through evaluation by other apparently competent reviewers (peers) of the organization of scientists laid the foundation of journal peer review of today.

Some form of journal peer review began almost simultaneously with appearance of the first scientific journal in the world – *Philosophical Transactions* of the Royal Society of London, which was published in 1665 (Chubin & Hackett, 1990; Houghton, 1975). As publications in a journal affiliated with a scientific society carried the explicit approval of the society, a measure of quality assurance emerged.

While some practice of peer review can be traced back to the 17th century, well-established editorial peer review system did not become universally accepted and institutionalized until after the Second World War (Burnham, 1990; Manske, 1997). Nowadays peer review has become an essential and integral part of the process of consensus building and is inherent and necessary to the growth of scientific knowledge (Kronick, 1990).

The current process of the peer review system is well defined. It is hoped that through this rigorous screening process, the very best articles will be accepted into the body of scientific knowledge and the less worthy be sifted out. The referees (editors and peer reviewers) in this peer review process are actually granted the authority to certify new knowledge entering the field. The significant role of editorial peer review in the growth of science can never be exaggerated too much.

Peer-Reviewed Journal Publication and American Higher Education

As an indispensable part of the fabric of scholarly inquiry, peer-reviewed publication today has also gained in the academy a position of particular importance. Peer review is seen as a social mechanism through which referees – the experts of the discipline – maintain quality control, conferring authority and authenticity upon new knowledge entering the discipline (Zuckerman & Merton, 1971). Referees of this peer review system are therefore virtually charged with the evaluation of role performance (journal publications) of faculty as well as their employing institutions and the allocation of rewards (tenure, promotion, salary, prestige, rankings, etc.) for that performance.

A review of literature suggests that in American universities scholarship has been equated with research as measured by publication, and become the most important criterion upon which faculty evaluations are based (Boyer, 1990). A close look at the history of American university, however, reveals that this has not always been the case.

Mission Changes of American Higher Education

The mission of American higher education has been advancement, transmission and application of knowledge – research, teaching and public service (Bogue & Aper, 2000; Boyer, 1990; Goodchild, 2002; Perkins, 1966). Yet these three aspects of mission have not always been given equal emphasis throughout history. One of the aspects was emphasized at a given historical time, determined by the nature of the social environment that prevailed at that time (Perkins, 1966). Boyer (1990) and others (Bogue & Aper, 2000; Brubacher & Rudy, 1997) argue

that scholarship in American higher education has gone through three distinct yet overlapping phases – moving from teaching, to service and then to research.

In the early colonial period, the basic mission of colleges was teaching in service of preparing religious leadership (Bogue & Aper, 2000; Boyer, 1990; Brubacher & Rudy, 1997). Historians agreed that the mission of colonial American college was preparing men for ministering to their own community and educating the colonists to become a "lettered" people. "To these fundamental policies it held steadfastly and without essential change for nearly 200 years" (Brubacher & Rudy, 1997, p. 23).

In the middle of nineteenth century, public service was added as a university mission. Public service played a decisive role in the advancement of American democracy, furnished the professional training needed by a growing nation and contributed to the efficiency of its economy by making possible the specialization required by a technological age, thus, increased the health, wealth and power of the United States (Brubacher & Rudy, 1997).

The establishment of Johns Hopkins University in 1887 declared the introduction of the German model of higher education to the United States and research was added as a mission of the university. History has shown that the rise of American universities to a position of world preeminence was achieved primarily through engagement of research (Graham & Diamond, 1997).

By the early years of the twentieth century, with the mission of advancement of knowledge through research taken firm root in the U.S. universities, American higher education completed its tripartite mission structure

of knowledge discovery, transmission and application. An enduring pattern of American higher education had been established (Boyer, 1990; Cohen, 1998; Veysey, 1965). Paradoxically, "as the mission of American higher education was expanding, the standards used to measure academic prestige continued to be narrowed" (Boyer, 1990, p. 12).

Peer-reviewed Publication and American Higher Education

Although the current mission of universities continues to be teaching, research and service, many studies (Boyer, 1990; Brown, 1997; Wisniewski & Ducharme, 1989) suggest that the current definition of scholarship in most American universities has, de facto, become narrowly defined as research leading to publication. Findings from previous research suggest that faculty at all types of institutions of higher learning are spending increasingly more time in activities associated with research and publication, and as a result, research productivity at all types of institutions has been steadily increasing over time (Bentley & Blackburn, 1990; Dey, Milem, & Berger, 1997).

"Institutional isomorphism" (DiMaggio & Powell, 1983; Scott, 1992) has been argued to be the reason behind this phenomenon in American higher education. It means that as institutions seeking greater status and prestige, they become increasingly homogenized by attempting to resemble more closely those elite institutions that have already established their high ranking position in the institutional hierarchy through faculty research productivity.

To secure a position in a virtuous circle, administrators and faculty in all types of institutions have therefore formulated similar research oriented rewarding

policy in hiring and in evaluating existing faculty. As a result, publishing research in peer-reviewed journals has become crucially important to individual faculty member in terms of salary, tenure, and academic promotion (Boyer, 1990; Centra, 1977; Grange, 2003; O'Neill & Sachis, 1994; Suppa & Zirkel, 1983; Thyer, 1994). Peer review has virtually become the singular "touch-stone" used to allocate rewards and resources in American higher education.

Research Publication and Faculty Rewards

Studies have shown that the faculty evaluation and reward system in terms of salary, tenure and promotion has been determined by research productivity of faculty. In a series of studies using longitudinal data from the National Survey of Postsecondary Faculty, Fairweather (1994, 1996, 1997) found through the 1980s and 1990s, that the most prestigious activity in 4-year institutions was research, teaching was at best a neutral, more often a negative, factor in faculty pay. Faculty who spent more time doing research receives higher salary than their colleagues who devoted more time and effort to teaching.

Two national surveys conducted in 1969 and 1989 by the Carnegie Foundation for the Advancement of Teaching revealed that the percentage of the faculty who strongly agreed that it is difficult to achieve tenure without publishing doubled in twenty years. The change is especially dramatic at comprehensive colleges and liberal arts colleges where teaching has been the top priority (Boyer, 1990). A more recent National Survey of Faculty, conducted in 1997 also by The Carnegie Foundation, confirmed the same high expectation and emphasis of universities on research.

It is clear that scholarly journal publication occupies a position in the academy of particular importance. Under the current reward system in American higher education, the security and advancement of a faculty's position hinges upon academic publication. Research productivity is also a crucial indicator used to measure the ranking a department and a university, which in turn affects the enrollment and resources available to that institution. "Publish or Perish" is, without doubt, the truism and reality in today's institutions of higher learning.

Bias in Journal Peer Review System

Although the peer review process is now an established part of the majority of highly valued scientific journals, criticisms against this system have never been stopped (Rennie, 1999; Weller, 2001). This study will focus on the potential flaw of biases, as it is central to the purpose of this project.

The very basic tenet of the peer review system is its assumed objectivity. Ideally, a credible peer review system should provide expert and impartial evaluation of manuscripts that would sift the wheat from the chaff to ensure high standards for published scientific research. However, a substantial body of literature suggests that particularistic criteria may indeed influence many evaluative decisions (Campanario, 1998b; Rennie, 1999; Weller, 2001).

Two types of biases, those that are based on the cognitive attributes of the submitted articles (e.g., in favor or against certain paradigms, scientific technique, or ideological views presented in the manuscript) and those that reflect a referee's pre-existing views about the source of a manuscript (its authors, affiliated

institutions, etc.) have been identified as the primary source of prejudice in editorial peer review system (Abramowitz, Gomes, & Abramowitz, 1975; Goodstein & Brazis, 1970; Peters & Ceci, 1982; Rosenthal, 1982). Though double blind review is argued to be the only way to assure that a review is based solely on the merits of the research and not on other factors as the prestige, institutional affiliation, many authors showed that it has little effect in achieving what it supposed to achieve (Ceci & Peters, 1984).

Peer review bias that is based on particularistic traits irrelevant with the study would cultivate inequality in the scientific community by giving cumulative advantage to a group of elite scholars and is unfair to the young, the unknown, or the first-time authors. By giving preference to prominent scholars, authors from prestigious institutions, or authors from the same institution or school of thought with which the referees were affiliated, a biased peer review system would create a social network of scientists who exercise considerable influence over the discipline (Price, 1986). This elite group of scholars have often been referred to as an "invisible college" (Crane, 1972) or "old boy network" (Crandall, 1982).

The review of literature revealed a large number of published articles on bias in journal peer review. Most studies on reviewer bias, however, predominantly focused on examining the process of peer review, often seeking evidence of bias under blind or anonymous conditions (Weller, 2001). One of the major limitations to many of these studies involves the ethical issue of using fabricated manuscripts or resubmission of previously published manuscripts with slight modification. Serious concern regarding validity also exists in studies that

seek evidence of bias through investigating reviewer's ability to identify author's name and institutions. In addition, previous studies on peer review bias did not account for the role of the editor who is potentially a primary source of bias.

It is clear that the grave problems of ethics and validity in previous research have greatly impaired their accumulated impact. Given the insurmountable obstacle in data collection, there appears to be little point in pursuing one more similar study. A new perspective to look at this old problem of peer review bias is necessary.

This study will use Social Network Analysis (SNA) to investigate the potential bias of peer review system that may have influenced the patterns of author interactions as demonstrated in five leading comparative/international journals between 1994 and 2003. Instead of focusing on the process of editorial peer review as most of previous research has done, this study will turn to the published journal articles that have gone through the scrutiny of editorial peer review and are presumed to be free of peer review bias. SNA is specifically designed to delineate the structure and patterns of interactions among actors of the network. Any bias implies a decision based on some criteria, which in the case of peer reviewed research publications, can be captured and demonstrated through the social network analysis as patterns of interactions between scholars.

Analyzing journal publications with SNA provides us with a new perspective and potentially powerful technique to address the potential issue of peer review bias. By taking advantage of readily available data from open sources and including all actors of peer review system into analysis, this study will

provide an ethical and valid approach that is capable of depicting a valuable picture of scholarly interactions of the field.

Brief Introduction to Social Network Analysis

Generally speaking, a network is a set of units and the relationships of specific types that occur among them (Scott, 2000; Wasserman & Faust, 1994). Social Network Analysis is a set of research methods specifically designed to analyze social networks with relational data and describe the network as patterns or regularities in relationships among interacting units and the implications of these relationships (Wasserman & Faust, 1994).

Several key concepts are fundamental to the discussion of network analysis. Network data are defined by individual social entities and the linkages among them. These individual entities are called *actors*, and the linkage between them are called *ties*. A *dyad* is a pair of actors and the (possible) tie(s) between them. Likewise, a subset of three actors and the (possible) tie(s) among them are called a *triad*. Larger subsets with more actors and ties among them are called *subgroups*. Relationships aggregate into ties, and patterns of ties reveal social networks.

There are two approaches to analyzing a network, reflecting two different kinds of data: ego network analysis and whole network analysis (Scott, 2000; Wasserman & Faust, 1994). *Ego-centric network* data views the network from the perspective of one actor in the network. *Whole network analysis*, on the other hand, describes the ties that all actors within a population maintain with all the other actors.

Graph theory and matrix operations are the primary tools used for a complete and rigorous description of relationship between interacting actors. They enable people to map and visually see the structure that may not have occurred if the descriptions are only presented in words. The mathematical properties of graphs and matrices also help more precisely measure and quantify the properties of a social structure, and facilitate the analysis of large data with computer (Wasserman & Faust, 1994).

The application of social network analysis in scholarly communication is called co-authorship analysis. Co-authorship of a journal paper can be thought of as documenting a collaboration between two or more authors (Genest & Thibault, 2001; Newman, 2004; Persson, 1996). The set of these collaborations within or across journals can form a *Co-authorship Network*, in which the actors are authors and a tie between two actors is established by their co-authorship of journal papers. Co-authorship associations between scholars acknowledge both intellectual and personal relationships, and thus provide an opportunity to identify and measure social activity and influence within a specialty (Peters & Van Raan, 1991; Stokes & Hartley, 1989). Examination of co-authorship network ties among authors can reveal that those authors working in the same cognitive area, such as the discipline of comparative/international education, may demonstrate collaborative efforts of varying size and cohesion. Analysis of these patterns can help answer questions such as which authors play more important roles and who connects different collaborative groups in the network. Thus network methods can be a useful perspective from which to inspect the state of the field.

As introduced previously, a biased peer review system would create an "invisible college" (Crane, 1972; Price & Beaver, 1966). "Literature on the invisible college suggests that it consists of a small, homogeneous group with high density and intensity of ties in which direct and indirect contact is frequent and the relations are highly reciprocal" (Willis & McNamee, 1990). Thus, to detect potential bias as demonstrated by patterns of scholarly interactions within a social network, social network analysis which is capable of revealing patterning of relations among social actors of a social network appears to be the right tool of research.

This study will use social network analysis to investigate the potential bias of peer review system that may have influenced the patterns of publication in five leading comparative/ international journals between 1994 and 2003. The assumption is that if a discernable pattern (such as a heavy concentration of authors in a few top ranking universities or a strong institutional link between certain group of authors and journal editors) exists, then one implication would be that particularistic criteria, rather than universalistic criteria, may have played a role in the publication of articles in those five journals. On the other hand, if no particular patterns is detected and all author collaborations are found to be random, then there would be no reason to suspect the existence of bias in the editorial peer review process of those five journals.

Statement of the Problem

The lack of careful scrutiny into the actual nature of the peer-review system of publication in scholarly journals, combined with the near total

dependence on this system in higher education in judging professorial competence and qualifications has created a potentially fatal condition in the American academy. Without some valid and reliable inquiry supporting this system, science and scientists could easily find themselves in the problematic condition of relying almost entirely on a quality control and performance evaluation system that is mistakenly dependent exclusively on the belief in a system that may in fact demonstrate little or no compliance with its most basic tenets.

Context of this Study

This study is to be conducted in the discipline of Comparative/ International Education. Five journals considered to be the top English-language publications in the field of Comparative and International Education (Bray & Gui, 2001) during the most recent ten years (1994-2003) are chosen. These five journals are: *Comparative Education Review*, *Comparative Education*, *Compare*, *International Journal of Educational Development* and *International Review of Education*. All articles published in these five journals are subject to peer review.

Statement of the Purpose

The purpose of this study is to investigate the potential bias in the editorial peer review in five leading journals in the field of Comparative and International Education during the most recent ten years (1994-2003).

Research Questions

1. To what extent do publication patterns generate a central core & periphery in terms of authors, and author's institutional affiliations?

2. How can the potential publication patterns be explained?
3. How objective is the academic publication process in the field of Comparative/ International education?

CHAPTER TWO

REVIEW OF THE LITERATURE

Some practice of peer review – using experts to help judge the value of scientific manuscripts – has been part of the journal production since the first academic journals appeared three hundred years ago (Zuckerman & Merton, 1971). Institutionalized since the 1940s, editorial peer review has grown over time to be a quality control system for the advancement of science. Peer reviewers thus assume the role of "gatekeepers of science" (Crane, 1967), conferring authority and authenticity upon new knowledge entering the discipline. The peer review system is the reason people place trust in claims advanced in a journal.

Publication in a prestigious peer-reviewed journal not only is given much credence by the general public, but also has become central to the reward and resource allocation systems for scientists and their academic institutions (Chubin & Hackett, 1990). Studies have shown that the current state of assessing and asserting scholarly achievement and prominence in American higher education has settled on a fairly singular indicator – publication in peer-reviewed journals (Boyer, 1990; Glassick, Huber, & Maeroff, 1997). Referees in the editorial peer review system, therefore, through their roles as "social status judges" (Zuckerman & Merton, 1971) are virtually charged with the primary evaluation of role performance (journal publications) of faculty and the subsequent allocation of rewards (tenure, promotion, salary, reputation, etc.) for that performance. Ultimately, this serves as a proxy for judging and establishing the rankings and prestige of the employing institutions as well.

The very basic tenet of the peer review system is its assumed objectivity: no factors other than the quality of the manuscript should be considered for decisions about paper acceptance. However, a significant body of literature suggests that particularistic criteria may have played a role in evaluative decision, and the integrity of the peer-review process has been seriously questioned (Rennie, 1999; Weller, 2001). Since the advancement of science and scientists career has become so highly dependent on this system, a careful inquiry into the actual nature of journal peer review is clearly justified.

The purpose of this review of literature is four-fold: 1) to present a brief review of the history of editorial peer review; 2) to review the importance of peer-reviewed journal publication in the assessment of scholarship in American higher education; 3) to examine biases existing in the editorial peer review; and 4) to introduce social network analysis and its use in this study as an empirical technique for investigating the potential biases in editorial peer review.

The Evolution of Editorial Peer Review

Academic publication is the lifeblood of the academy, unceasingly supplying nutrients of new insights and advances in research to the healthy growth of academic enterprise (Chubin & Hackett, 1990). Compared with other forms of publication, scholarly journals are the major venue through which scientists disseminate their findings, register priority of their work, and exchange critical scrutiny on published works. Furthermore, academic journals are the primary means by which the scientific community certifies new additions to the body of knowledge, and the means by which scholars establish and amass credits,

prestige and recognition for their career (Berkenkotter, 1995; Campanario, 1998a). Science as we know it today is scarcely imaginable without the scholarly journal. The reason academic journals are entrusted with these important functions lies in the pre-publication evaluation system established as part of the journal publication process – the peer review.

Kronick (1990) claimed that

> In the broadest sense of the term, peer review can be said to have existed ever since people began to identify and communicate knowledge. . . . because peer review (whether it occurs before or after publication) is an essential and integral part of the process of consensus building and is inherent and necessary to the growth of scientific knowledge. (p. 1321)

In a narrower sense, however, peer review is generally defined as the process of using acknowledged experts to review the value of submitted manuscript for decisions on publishability. Today peer review is embedded into the structures and processes of virtually all academic journals across most disciplines. It was however not always so in the history of scholarly communications.

Zuckerman and Merton (1971), in their classic study of patterns of evaluation in science, concluded that journal peer review evolved in response to the development of scholarly societies and the scientific journals. The practice three centuries ago of having manuscripts legitimized prior to publication through evaluation by other apparently competent reviewers (peers) of the organization of scientists laid the foundation of journal peer review of today.

Scholarly Communications Prior to the 17th Century

Although scientific study itself has a long history, until the last few centuries the body of scientific information was so small that there was no need for a formal medium of communication. The ancient Greeks, who did considerable scientific work, until the time of Aristotle relied mostly on oral methods of handing down knowledge. As the number of scientists and the amount of scientific work grew large, the oral method of communication became inadequate and a new form of scientific communication became a necessity (Garfield, 1980).

Personal correspondence and books emerged as the major means of communication between scientists in the fifteenth century. "Many Renaissance scientists satisfied their thirst for news by voluminous correspondence" (Vickery, 2000, p. 69).

> The erudite letter was used more as a form of exchange for ideas and news of the learned world, as well as a form of primary 'publication'. Leibniz, for example, wrote a complete treatise on philosophy in one series of letters. (Kronick, 1962, p. 53)

This use of letter writing to share subjects of technical and professional interests continued as one medium for scientific communication well into the eighteenth century. However, although some criticisms and debates did happen through exchange of letters, the function of using personal correspondence to report one's scientific experiment was severely limited by the number of people it could reach. As a result, unfounded or relatively untested theories frequently survived without challenge (Garfield, 1980).

Though less used, books were a more public medium. A scientist who chose to publish his findings in books, however, had to wait until enough materials had accumulated to warrant publication. As a result, books often reported a lifetime of work on a subject and contained so many ideas that they were difficult for other scientists to evaluate. Like the research spread through letters, many ideas in books went unchallenged during the lifetime of the authors (Garfield, 1980).

The development and acceptance of experimental methods as the new norm of scientific investigation in the 17th century required scientists to work collectively, and gradually saw the emergence of the very first scholarly societies (Vickery, 2000). One of the purposes of these new societies was to sponsor public demonstration of experiments, which called for a form of reporting that was available for public scrutiny. Gradually, publication in a format of journal under the auspices of a scientific society and guidance of an editor replaced the relatively haphazard circulation of letters and books. The widespread use of printing technology and the emergence of an efficient and reliable postal system in Europe prior to the scientific revolution greatly facilitated the development of scientific journals. The newly-formed scholarly societies offered the scientists a way to legitimize findings and to communicate those findings to other scientists in a timely fashion. Members of those scholarly societies in the seventeenth century provided the structure of authority to scientific works and gave tangible meaning to the concept of peer review.

The Emergence of Editorial Peer Review

The *Journal des Scavans* associated with the *Academie des Sciences* in Paris, and *Philosophical Transactions* of the Royal Society of London, both published in 1665, were generally cited as the first scientific journals in the world (Chubin & Hackett, 1990; Houghton, 1975). *Transactions*, excluding legal and theological questions that included in *Journal*, contained more scientific articles than did the *Journal*, and some form of journal peer review began almost simultaneously with its first publication (Houghton, 1975; Zuckerman & Merton, 1971).

Henry Oldenburg, the then secretary of the Royal Society Council was given the primary responsibility for this new publication and was "ordered" that the *Transactions* "be printed the first Monday of every month, if he have sufficient matter for it; and [after it was] first reviewed by some of the members of the same [council]" (Zuckerman & Merton, 1971, p. 68-69). One hundred years later in 1752 when *Transactions* became the official publication of the Royal Society, a "Committee on Papers" was established to review all articles that were published in the *Transactions*. The committee was also empowered to call on "any other members of the Society who are knowing and well skilled in that particular branch of Science that shall happen to be the subject matter of any paper which shall be then to come under their deliberations" (Kronick, 1990, p. 1321). As publications in a journal affiliated with a scientific society carried the explicit approval of the society, a measure of quality assurance emerged.

By the early eighteenth century, according to Zuckerman and Merton (1971),

> the constituted representatives of the Royal Society, looking to its reputation, were in their turn motivated to institute and maintain arrangements for adequately assessing communications, before having them recorded in the *Transactions*. They repeatedly expressed an awareness that to retain the confidence of scientists they must arrange for the critical sifting of materials which in effect carry the imprimatur of the Society. (p. 73)

The Society also began to distinguish in print between evaluated and unevaluated work. Pieces that had not been reviewed by the Society often carried the notation: "Sit penes authorem fides (let the author take responsibility for it): we only set it down, as it was related to us, without putting any weight upon it" (Zuckerman & Merton, 1971, p. 73).

Kronick (1990) cited an example of blind peer review in the 18th century. The *Medical Essays and Observations* under the Royal Society of Edinburgh in its first volume published in 1731 clearly stated the society's editorial policy and objectives. The practice described by the journal resembles the blind peer review of today: "Memoirs sent by correspondence are distributed according to the subject matter to those members who are most versed in these matters. The report of their identity is not known to the author" (p. 1321).

Development of Editorial Peer Review in the18th and 19th Centuries

Though some practice of peer review can be traced back to the 17th century with the publication of the earliest academic journals, peer review was not generally accepted in the two centuries followed. Burnham (1990) summarized information on the transition to editorial peer review by a number of journals in the 19th century and early 20th century, and concluded that journal peer review during that period time appeared to have developed in a disorderly fashion. Many journal editors had little appreciation of peer review as most journals at that time followed the model of newspapers and much of the content was written by the editors themselves. Themselves considered as the experts in the subject matter, editors had no incentive to consult outside referees to judge the merits of articles. Those editors who did send manuscripts to external reviewers did it because they were not sure about the manuscripts or had too much to do, not because a clear convention existed that this was the proper way to judge scientific work. In 1905, the editors of *Surgery, Gynecology, and Obstetrics* announced that "practical surgeon, gynecologists, and obstetricians will direct editorially the trend of policy" (p. 1324) for the journal. As pointed out by Burnham, "direct editorially" meant that any reviewing would be carried out by the in-house staff. Whereas the *British Medical Journal* adopted the outside expert review system as early as 1890s, *Journal of the American Medical Association* (*JAMA*), the most prominent journal of the field in America today, still relied, through the 1930s and 1940s, on a small internal staff for editorial decisions.

Institutionalization of Editorial Peer Review

Editorial peer review did not become universally accepted and institutionalized until after the Second World War, some 200 years after its inception (Burnham, 1990; Manske, 1997). With the rapid development of science and technology, knowledge became more fragmented and increasingly specialized, and no one editor possessed thoroughly comprehensive knowledge about all aspects of a field, necessitating recourse to outside peer reviewers. Also, as journals received more manuscripts than they could publish, the need for selection of the most suitable and rejection of the rest increased the pressure for seeking the advice of expert reviewers. Today scientists would not bother to even cast an eye on research papers published in a non-peer-reviewed journal. Peer review has become the "Guardian of Science" (Daniel, 1993) – a mechanism of quality control in science.

Current Practice of Editorial Peer Review

The current process of the peer review system is well defined. A scholarly journal that uses peer review sends out submitted manuscripts to (usually) several outside reviewers with presumptive expertise in the subject area of the article. After a thorough assessment of the manuscript, the experts return the manuscript with a recommendation to accept, accept with revisions, or reject the manuscript. The editor then decides if s/he will accept the recommendation of the reviewers. The editor may subject the manuscript to another round of reviews, or adjudicate, deciding without further review if the manuscript should be accepted or rejected (Weller, 2001). It is hoped that through this rigorous screening process, an

accepted scientific manuscript will be transformed into consensual "knowledge" and enduring testimony to the skills (or shortcomings) of its author (Chubin & Hackett, 1990), and the less worthy be sifted out.

It can be seen that in this peer review process, the referees (editors and peer reviewers) are actually granted the authority to certify new knowledge entering the field. Ziman (1968) stated "referee is the linchpin about which the whole business of Science is pivoted" (p. 111). Others have referred referees as "gatekeepers of science" (Crane, 1967; Glogoff, 1988; Pipke, 1984). The significant role of editorial peer review in the growth of scientific knowledge can never be exaggerated too much.

Importance of Peer-Reviewed Publication in American Higher Education

As an indispensable part of the fabric of scholarly inquiry, peer-reviewed publication today has also gained in the academy a position of particular importance. Knoll (1990) argued that "editorial peer review is a social process, not a technical one" (p. 1330). Peer review can therefore be seen as a social mechanism through which referees – the experts of the discipline – maintain quality control, conferring authority and authenticity upon new knowledge entering the discipline. Zuckerman and Merton (1971) illustrated this point well,

> The referee system in science involves systematic use of judges to access the acceptability of manuscripts submitted for publication. The referee is thus an example of status judges who are charged with evaluating the quality of role-performance in a social system. They are found in every institutional sphere . . . . Status judges are integral to any system of social

> control through their evaluation of role performance and their allocation of rewards for that performance. They influence the motivation to maintain or to raise standards of performance. . . . In the case of scientific and scholarly journals, the significant status judges are the editors and referees. (p. 66)

Indeed, those referees not only have had great impact on the creation and dissemination of knowledge, but also assuming their role as "social status judges," are central to the reward and resource allocation of American higher education system. Through establishing priority and apportioning credit, referees of this peer review system are virtually charged with the evaluation of role performance (journal publications) of faculty as well as their employing institutions and the allocation of rewards (tenure, promotion, salary, prestige, rankings, etc.) for that performance.

Charles Glassick, the primary author of the influential book *Scholarship Assessed: Evaluation of the Professoriate* and past president of the Carnegie Foundation, made the following incisive comment on the current state of scholarship in higher education:

> The current definition of scholarship that is rewarded in most of our universities is essentially research; is essentially research followed by publication; is essentially research followed by publication in a refereed journal. (Glassick, 1998, p. 2)

Indeed, a review of literature suggests that in American universities scholarship has been equated with research as measured by publication, and become the most

important criterion upon which faculty evaluations are based (Boyer, 1990). A close look at the history of American university, however, reveals that this has not always been the case.

Mission Changes of American Higher Education

The mission of American higher education since the establishment of Harvard, the very first colonial college in 1636, has been advancement, transmission and application of knowledge – research, teaching and public service (Bogue & Aper, 2000; Boyer, 1990; Goodchild, 2002; Perkins, 1966). Yet these three aspects of mission have not always been given equal emphasis throughout history. One of the aspects was emphasized at a given historical time, determined by the nature of the social environment that prevailed at that time (Perkins, 1966). Boyer (1990) and others (Bogue & Aper, 2000; Brubacher & Rudy, 1997) argue that scholarship in American higher education has gone through three distinct yet overlapping phases – moving from teaching, to service and then to research.

Mission of teaching. "For the first 200 years of American higher education, from the middle of the seventeenth century to the middle of the nineteenth century, the principal focus was on the instruction mission" (Bogue & Aper, 2000, p. 19). In the early colonial period, the basic mission of colleges was teaching in service of preparing religious leadership (Bogue & Aper, 2000; Boyer, 1990; Brubacher & Rudy, 1997). The earliest colleges established in the colonies were without exception modeled on the institutions in Western Europe, especially Britain, where the earliest settlers originally came from. Oxford and Cambridge furnished the original model which the colonial colleges sought to copy. The

earliest Harvard College statutes, for example, were taken directly from the Elizabethan statutes of the University of Cambridge (Brubacher & Rudy, 1997). According to Brubacher and Rudy (1997), although many of the early college charters announced their interest in the advancement of knowledge, as well as its transmission, the emphasis of those old-time colleges was primarily involved in the conserving and transmitting of existing knowledge to the next generation rather than the original research for new knowledge. Facing the vast and wild land in the new continent, those early settlers were more deeply concerned with the forming of character of their children and training of a special elite for community leadership than producing new knowledge. Another reason behind this preference was that the philosophy of higher education at that time was largely political, which following the European origins, looked to colleges as the suppliers of needed churchmen, schoolmasters, lawyers, and doctors. Scholarly or scientific research was not considered the major purpose of an institution of higher education. Even Oxford and Cambridge, on which the new colonial American colleges closely modeled, made few contributions to original learning. Historians agreed that the mission of colonial American college was preparing men for ministering to their own community and educating the colonists to become a "lettered" people. "To these fundamental policies it held steadfastly and without essential change for nearly 200 years" (Brubacher & Rudy, 1997, p. 23).

Mission of service. The tradition of giving centrality to teaching persisted well into the middle of nineteenth century, when "higher education's focus began to shift from the shaping of young lives to the building of a nation" (Boyer, 1990,

p. 4), public service was added as a university mission. To meet the demand of nation-building, new type of colleges, like Rensselaer Polytechnic Institute founded in 1824, the first technical school of the nation, were established for the sole purpose of training practical talents for the industry. Universities old and new started to incorporate new fields of knowledge such as science and modern languages into the curriculum to serve the requirements of an expanding society (Brubacher & Rudy, 1997). In 1846, for example, Yale University created a professorship of agricultural chemistry and animal and vegetable physiology, and Harvard president Edward Everett in the same decade stressed his institution's role in the service of business and economic prosperity (Boyer, 1990). The passage of the Morrill Land-Grant Acts of 1862 and 1890, and the Hatch Act of 1887 provided great amount of federal financial support to institutions which offered specialized courses in many practical fields of agriculture, mining, mechanical and military. Harvard President Charles Eliot (1908) depicted the situation of American higher education at that time,

> At bottom most of the American institutions of higher education are filled with the modern democratic spirit of serviceableness. Teachers and students alike are profoundly moved by the desire to serve the democratic community . . . All the colleges boast of the serviceable men they have trained and regard the serviceable patriot as their ideal product. (p. 227-28)

Many would argue that while the instructional and research missions are ideas transported from England and Germany respectively, the public service mission

of higher education is uniquely American in its origins, intent, and content (Bogue & Aper, 2000; Brubacher & Rudy, 1997; Cohen, 1998; Veysey, 1965). There seems to be little doubt that American institutes of higher learning realized their ideal of service. They played a decisive role in the advancement of American democracy, furnished the professional training needed by a growing nation and contributed to the efficiency of its economy by making possible the specialization required by a technological age, thus, increased the health, wealth and power of the United States (Brubacher & Rudy, 1997).

Mission of research. Concomitant with the emergence of the service mission came the emergence of research mission of American university. Beginning in 1810 with the founding of the University of Berlin, Germany's universities became famous for their single-minded focus on intended value-free research and the advancement of pure scientific and humanistic knowledge. Some 9,000 U.S. students went to German universities during the nineteenth century to attend lectures and seminars from leading scholars, gain research training, and earn Ph.D. degrees (Goodchild, 2002). As American students returned to the United States, they clamored for greater academic freedom by demanding that their own institutions emulate their German counterparts. The establishment of Johns Hopkins University in 1876, the first U.S. institution focused primarily on research and graduate studies, was hailed as "perhaps the single, most decisive event in the history of learning in the Western hemisphere" (Boyer, 1990, p. 9), and declared the insertion of research mission to American higher education. Johns Hopkins University offered doctoral degrees in nineteen humanistic and

scientific areas, launched the first U.S. research journals, and created national disciplinary associations. Soon many other prominent universities like Pennsylvania, Harvard, Columbia and Princeton began to follow suite by adding graduate programs leading to Ph.D. degrees. Indeed, the president of University of Chicago established in 1891, intended that "each appointee to sign an agreement that his promotions in rank and salary would depend chiefly upon his research productivity" (Boyer, 1990, p. 9).

The rise of American universities to a position of world preeminence was not achieved until after World War II, and it was achieved primarily through engagement of research and the great amount of financial support from federal government (Graham & Diamond, 1997). In 1945, Vannevar Bush, then president of MIT, declared "Science, by itself, provides no panacea for individual, social and economic ills. . . . But without scientific progress no amount of achievement in other directions can insure our health, prosperity, and security as a nation in the modern world" (as quoted in Boyer, 1990). This accent on scientific research gained international preeminence of American universities. During the 1950s American scientists not only won more Nobel prizes than any other nation, they won more than all other nations combined. By the mid-1970s the United States had more Nobel laureates than any other country, having won ninety-one prizes between 1943 and 1976 (Graham & Diamond, 1997).

By the early years of the twentieth century, with the mission of advancement of knowledge through research taken firm root in the U.S. universities, American higher education completed its tripartite mission structure

of knowledge discovery, transmission and application. An enduring pattern of American higher education had been established (Boyer, 1990; Cohen, 1998; Veysey, 1965). Paradoxically, "as the mission of American higher education was expanding, the standards used to measure academic prestige continued to be narrowed" (Boyer, 1990, p. 12).

Peer-reviewed Publication and American Higher Education

Although the current proclaimed mission of universities continues to be teaching, research and service, many studies (Boyer, 1990; Brown, 1997; Wisniewski & Ducharme, 1989) show that the current definition of scholarship in most American universities has, de facto, become narrowly defined as research leading to publication. Findings from previous research suggest that faculty at all types of institutions of higher learning are spending increasingly more time in activities associated with research and publication, and as a result, research productivity at all types of institutions has been steadily increasing over time (Bentley & Blackburn, 1990; Dey, Milem, & Berger, 1997).

Attempts have been made to decipher this phenomenon in American higher education. Trow (1984) explains that the ranking of a college or a university is a measurement of "prestige status based on its perceived quality and distinction as an academic institution" (p. 135). This prestige ranking is of crucial importance to any institution in its ability to compete in several markets which are national, for high-quality students, faculty and financial support. The success in those markets will in turn determine the reputational standing of the institution over the long run, thus forming a "virtuous cycle" or "vicious cycle" (Baughman

& Goldman, 1999) for that institution. Since most of the prestigious universities in the United States are research universities which have achieved their prestige primarily through generation of new knowledge, institutions located in the middle and lower levels of the hierarchy of American higher education seeking higher prestige ranking and more resources set out to emulate those universities at the top by copying the faculty characteristics of those universities – through more research publication. This pervasive trend which is known as "institutional isomorphism," "institutional drift" or "institutional homogenization" explains the overall increase of research productivity in American higher education (DiMaggio & Powell, 1983; Scott, 1992). "Institutional isomorphism" means that as institutions seeking greater status and prestige, they become increasingly homogenized by attempting to resemble more closely those elite institutions that have already established their high ranking position in the institutional hierarchy through faculty research productivity.

To secure a position in a virtuous circle, administrators and faculty in all types of institutions have therefore formulated similar research oriented rewarding policy in hiring and in evaluating existing faculty. As a result, publishing research in peer-reviewed journals becomes crucially important to individual faculty member in terms of salary, tenure, and academic promotion (Boyer, 1990; Centra, 1977; Grange, 2003; O'Neill & Sachis, 1994; Suppa & Zirkel, 1983; Thyer, 1994). Highest rewards are given to the small number of scholars on each campus whose research publication earned outside funding and prestige. Under this reward system which gave more emphasis to research than teaching and service,

faculty priorities shifted accordingly. "Young professors seeking status and mobility found it more rewarding – in a quite literal sense – to deliver papers at national meetings than to teach undergraduates" (Glassick et al., 1997, p. 7). Peer review has virtually become the singular "touch-stone" used to allocate rewards and resources in American higher education.

Suppa and Zirkel (1983) in a national survey of the institutional representatives of the American Association of Colleges for Teacher Education, concluded that scholarship in the form of publications has become increasingly important. The largest proportion (89%) of the respondents regarded articles in refereed journals as significant evidence for making promotion and tenure decisions. This finding was confirmed to be a continuing trend well into 1980s and 1990s.

In a national study in which over 500 faculty members and administrators from dozens of diverse colleges and universities were interviewed, Schuster and Bowen (1985) reported "campus after campus has been moving aggressively to upgrade the importance of scholarly productivity as a criterion for academic personnel decisions" (p. 15). What the authors found alarming was that the "research surge" existed not only in research universities where the stress on research had traditionally been a stated mission, it existed in other types of institutions where research had previously been of low priority and where effective teaching had been historically the dominant criterion by which faculty were rewarded. They expressed doubts that this rapid shift in values was conducive to the interests of those institutions and the needs of the nation.

Sundre (1992) examined the definition of scholarship used in research literature and found that scholarship has become synonymous with such terms as "research," "research productivity," "publications," "faculty productivity," "scholarly works," and "publication productivity," to mention a few. It is evident that these terms are closely associated with research and publications.

Research Publication and Faculty Rewards

With the current definition of scholarship narrowed on research and publications, the faculty reward system in terms of salary, tenure and promotion becomes consequently determined by research productivity of faculty.

The most prominent studies on faculty work were conducted by James S. Fairweather. In a series of studies using longitudinal data from the National Survey of Postsecondary Faculty (1987-1988), Fairweather (1994, 1996) found that the most prestigious activity in 4-year institutions was research, or "more specifically, research which is valued by academic peers through a peer review system of publishing and grant awarding" (Fairweather, 1996, p. 6). Research productivity, among all aspects of faculty work, was the key determinant of faculty pay in the late 1980s. Faculty who taught less and published more in the late 1980s received the highest average salaries irrespective of type of institution or discipline. Teaching was at best a neutral, more often a negative, factor in faculty pay. What is alarming is that this pursuit of research is apparent in all types of 4-year institutions, not just major research universities, including those traditionally devoted to teaching. In a follow-up study five years later using the 1992-93 National Survey of Postsecondary Faculty, Fairweather (1997) found that

the same trend of emphasizing research did not change. Faculty who spent more time doing research receives higher salary than their colleagues who devoted more time and effort to teaching.

The importance of refereed publications in tenure and promotion decisions was the subject of a study conducted by O'Neill and Sachis (1994). In a survey to 26 graduate colleges and schools within both master and doctoral degree-granting institutions in Canada, respondents were asked to rate the importance of different journal publications on tenure and promotion decisions. The study revealed that publications in refereed journals were significantly more important than those in non-refereed journals.

Two national surveys conducted in 1969 and 1989 by the Carnegie Foundation for the Advancement of Teaching vividly revealed this shift of expectations (Boyer, 1990). As shown in Table 1, under the question statement "In my department it is difficult for a person to achieve tenure if he or she does not publish.," 21% of the faculty surveyed in 1969 strongly agreed that it is difficult to achieve tenure without publishing. By 1989, the number had doubled, to 42%. The change at comprehensive colleges – from 6% to 43% – is especially noteworthy since these institutions have virtually no doctoral programs and only limited resources for research. Even at liberal arts colleges, where teaching has always been highly prized, nearly one in four faculty strongly agreed in 1989 that it is difficult to get tenure without publishing (Boyer, 1990).

Table 1

Response to Survey Question on Publication and Tenure

(*Percentage Saying "Strongly Agree"*)

	1969	1989
All Respondents	21%	42%
Research	44	83
Doctorate-granting	27	71
Comprehensive	6	43
Liberal Arts	6	24
Two-Year	3	4

Source: The Carnegie Foundation for the Advancement of Teaching, 1969 and 1989 National Survey of Faculty (Boyer, 1990, p.12)

A more recent National Survey of Faculty, conducted in 1997 also by The Carnegie Foundation for the Advancement of Teaching, confirmed similarly high expectation and emphasis of universities on research. As it can be seen in Table 2, under the question statement "In my academic position at this institution regular research activity is expected," more than two-thirds of faculty in comprehensive colleges in 1997 are found to be expected to conduct research. Even at liberal arts

Table 2

Response to Survey Question on Expectation of Research

	Yes	No
All Faculty	53%	47%
Research	92	8
Doctoral (Doctorate-granting)	84	16
Master's (Comprehensive)	69	31
Baccalaureate (Liberal Arts)	50	50
Associate of Arts (Two-Year)	5	95

Source: The Carnegie Foundation for the Advancement of Teaching, 1997 National Survey of Faculty (Huber, 1998).

colleges where teaching is supposed to be top priority, half of the faculty in 1997 are expected to engage in regular research activities.

Furthermore, the role of research seems to continue to rise in importance. As shown in Table 3, when asked "Thinking about your own situation, do research and/or other creative work count more or less for purposes of faculty advancement today than they did five years ago?," about one third of the faculty report that research counts more today than it did five years ago at research universities (where research has long been important) and at baccalaureate colleges (where it has mattered less). And at master's and doctoral institutions, the proportion reporting that research counts more now is over 40%. Across the board, very few say research and/or creative work counts less. The overwhelming emphasis on research in the evaluation of faculty work is illustrated vividly by Caplow and McGee (1958):

> For most members of the profession, the real strain in the academic role arises from the fact that they are, in essence, paid to do one job, whereas the worth of their service is evaluated on the basis of how well they do another. The work assignment, for which the vast majority of professors are paid, is that of teaching. . . . When they are evaluated, however, as candidates for promotion, the evaluation is made principally in terms of their research contributions to their disciplines. (p. 82)

Table 3

Response to Survey Qeustion on Research and Career Advancement

	Count more Today	Count less today	Count about the same as five years ago	Don't know
All Faculty	27%	9%	41%	23%
Research	32	10	49	10
Doctoral (Doctorate-granting)	42	9	36	13
Master's (Comprehensive)	41	11	32	17
Baccalaureate (Liberal Arts)	35	8	37	20
Associate of Arts (Two-Year)	8	8	43	41

Source: The Carnegie Foundation for the Advancement of Teaching, 1997 National Survey of Faculty (Huber, 1998).

On a more mercenary level, publication of research can also bring financial gains to individual faculty members. The research by Gomez-Mejia and Balkin (1992) shows that the one of the two primary determinants of faculty pay, in both institutions that grant doctorates and others, is the number of top-tier journal publications a faculty member has authored. Kirk and Corcoran (1989) estimated that a published article that earns an initial one percent merit raise for an assistant professor would result in more than $12,800 over 25 years of his/her academic career.

It is clear that peer-reviewed journal publication occupies a position in the academy of particular importance. Under the current reward system in American higher education, the security and advancement of a faculty's position hinges upon academic publication. Research productivity is also a crucial indicator used to measure the ranking a department and a university, which in turn affects the

enrollment and resources available to that institution. And finally, monetary rewards "pay off" the efforts of productive researchers. "Publish or Perish" is, without doubt, the truism and reality in today's institutions of higher learning.

Bias in Editorial Peer Review

Although the peer review process is now an established part of the majority of highly valued scientific journals, criticisms against this system have never been stopped. Like any other human activities, referees (editors and reviewers) in the editorial peer review system "may be partial, biased, jealous, ignorant, incompetent, malicious, corrupt or incapacitated by conflict of interest" (Rennie, 1999, p. 9), and thus could abuse their power with impunity under the shield of anonymity and eventually cripple the effectiveness of the system. Literally thousands of articles on peer review system have been written in the past decades, with allegations leveled against every component of the system.

Rennie (1999, ps. 9 -10) provided an excellent summary of assumed flaws of peer review:

1. Peer review is unreliable, unfair, and fails to validate or authenticate.
2. Peer review is unstandardized, and in the absence of clear standards and structure, is idiosyncratic and open to every sort of bias.
3. Peer review's secrecy leads to irresponsibility, insulates reviewers from unaccountability, and invites malice.
4. Peer review stifles innovation, perpetuates the status quo and rewards the prominent.
5. Peer review lends a spurious authority to reviewers.

6. Peer review must fail because only reviewers close to the subject are knowledgeable enough to review, but these, being competitors, are disqualified by their conflict of interest.
7. Peer review causes unnecessary delay in publication.
8. Peer review is very expensive.
9. Science is scarcely benefited because authors usually ignore reviewers' comments if their manuscript has been rejected.
10. Peer review is insufficiently tested.

While a discussion of each of these potential flaws could be undertaken, the particular emphasis of this project does not support such an immense endeavor. Rather, this study will focus on the potential flaw of biases, as it is central to the purpose of this project.

The very basic tenet of the peer review system is its assumed objectivity. When prestige of one's work needs evidence and difficult decisions are at stake, the phrase "peer review" is used to reassure and impress. Peer review has become a short hand for fairness and objectivity (Rennie, 1999). Ideally, a credible peer review system should provide expert and impartial evaluation of manuscripts that would sift the wheat from the chaff to ensure high standards for published scientific research. In this process, no factors other than the quality and importance of the manuscript should be considered for decisions about paper acceptance. In other words, information such as an author's prestige, institutional affiliation, membership in a particular social organization, country, gender, ethnicity, source of funding, or any information irrelevant to the research itself

should never affect the referees' comments and recommendations, nor should the reviewers' personal research agendas or particular views on a given topic. However, a substantial body of literature suggests that particularistic criteria may indeed influence many evaluative decisions (Campanario, 1998b; Rennie, 1999; Weller, 2001). These biases include those that are based on the cognitive attributes of the submitted articles (e.g., in favor or against certain paradigms, scientific technique, or ideological views presented in the manuscript) and those that reflect a referee's pre-existing views about the source of a manuscript (its authors, affiliated institutions, etc.).

Paradigm/Ideological Bias

Studies have shown that referees have bias against "negative" results (Hunt, 1975; Reid, Soley, & Wimmer, 1981), and replication studies (Furchtgott, 1984; Sommer & Sommer, 1984). It is also evidenced that referees may reject a paper when a particular ideology, paradigm or scientific technique presented in the manuscript conflicts with their own. Goodstein and Brazis (1970) investigated reviewers' bias by asking reviewers to evaluate one of the two fabricated abstracts in astrology, one with positive findings and the other negative. They found that reviewers rated more favorably the study that rejected the relationship than the one that confirmed the relationship. Abramowitz, Gomes, and Abramowitz (1975) sent to two groups of liberal and less-liberal psychologists two manuscripts that only differ in political point of view. The result showed that referees were strongly biased against the findings that contradict with their own belief. The chance a paper would be published "was a good deal greater when it was sent out

to an ideologically sympathetic referee . . . than to an unsympathetic one" (p. 196). In two separate but similar studies on reviewers' bias, Gordon (1977) and Mahoney (1977) concluded that reviewers were strongly biased and consistently rejected manuscripts that contained theoretical framework contrary to their own. "Under some circumstances, referees were inclined to justify their decisions on methodological bases although they were actually biased by their beliefs" (Campanario, 1998b, p. 282).

Not all scholars agree that bias based on the cognitive characteristics of the article is unfair. Cole (2000), citing views of social constructivists, argued that it is impossible and wrong for a reviewer to be tolerant to a paper that has the cognitive characteristics (methodological, theoretical or substantive) that are fundamentally intellectually flawed as to one which the reviewer believes is sound. He asserted that peer review that "involves cognitive bias should not be viewed as a deviant violation of the norm of universalism, an aberration that should be done away with; but as an inherent aspect of debates which occur at the research frontiers" (p. 116).

Prestige Bias/Institutional Favoritism

Though it is less clear as to whether peer review decisions based on cognitive characteristics constitutes unfair treatment towards submitted articles, there is no disagreement that it is wrong to evaluate a manuscript based on the author's personal traits. In editorial peer review process, biases occur whenever the verdict of the referees is affected, not by "the nature of the cargo" but "the pier at which it docks" (Vaisrub, 1978, p. 197). "All authors are not created

equal" (Fye, 1990, p. 321) in the eyes of the referees. Those established authors who have had record of high quality papers in prestigious journals and those who are affiliated with world-renowned universities are more likely to get preferential treatment from referees (Fye, 1990; Garfield, 1986; Morton & Price, 1986). A survey by the American Council of Learned Societies indicates that a great number of scholars in seven disciplines think the peer-review system for deciding what gets published in scholarly journals is biased in favor of established researchers, scholars from prestigious institutions, and those who use fashionable approaches to their subjects (Jacobson, 1986). In their survey to editors and advisory board members of 19 leading management and social science journals, Kerr, Tolliver, and Petree (1977) found that one of the three important determinants of reviewer acceptance is strong author reputation in the area of interest.

The study that is most frequently cited to demonstrate peer review biases against non-eminent authors was the quasi-experiment conducted by Peters and Ceci (1982). In this study, twelve articles that had already been published in prestigious psychology journals were resubmitted to the same journals where they had been published, with slight alteration of author names, titles, and institutions (from prestigious to non-prestigious). Three journals recognized the articles as resubmission of previous work. Of the other nine articles, only one was accepted. None of the eight rejections was on grounds of lack of originality, but of poor study design, inadequate statistical analysis, or poor quality. The authors concluded that this study showed strong evidence of bias in favor of papers from prestigious universities and against those from unknown institutions.

Some true personal experience may illustrate better the existence of institutional favoritism in peer review. Robert Rosenthal (1982), a psychologist of Harvard, said when he was a young member of the psychology faculty at the University of North Dakota, he was unable to publish 15 to 20 articles in mainstream journals. Within a few months of his move to Harvard, however, most of these articles were published in the same journals that had previously rejected them.

In an attempt to eliminate biases in the peer review process, many journals have adopted the double blind review system, keeping the names and affiliations of both authors and the referees confidential. It is argued that double blind review is the only way to assure that a review is based solely on the merits of the research and not on other factors as the prestige, institutional affiliation. However, many authors argued that double blind review has little effect in achieving what it supposed to achieve. For one reason, for a certain percentage of manuscripts, it is impossible to remove all traces of the authors' identity. Another reason is that reviewers can often successfully guess the names of the authors. In some highly specialized disciplines, in which a handful of researchers dominate a research front, the research methods, writing style, citations (especially self-citations), and other hints can almost automatically reveal an author's identity to an experienced referee. In a survey to a random sample of members of the American Psychological Association (APA), respondents estimated that reviewers of journals using blind review could identify the authors about 72% of the time (Ceci & Peters, 1984).

Peer Review Bias and "Invisible College"

Peer review bias that is based on particularistic traits irrelevant with the study would cultivate inequality in the scientific community by giving cumulative advantage to a group of elite scholars and is unfair to the young, the unknown, or the first-time authors. A consequence of this type of bias over the long run would be "the Matthew Effect" (Merton, 1968), in which the "rich get richer" and the "poor get poorer." By giving preference to prominent scholars, authors from prestigious institutions, or authors from the same institution or school of thought with which the referees were affiliated, a biased peer review system would create a social network of scientists who exercise considerable influence over the discipline (Price, 1986). Publication in leading academic journals would be predominated by those scholars in the network, many of whom would come from prestigious institutions, and leading scholars of the network are in the position of centrality, defining the directions and focus of research front for the discipline. This elite group of scholars have often been referred to as an "invisible college" (Crane, 1972) or "old boy network" (Crandall, 1982).

Studies have shown that the "invisible college" not only reflects a stratification of scholars, but also reinforces it. As scholars of this "invisible college" network mainly centered in a small number of prestigious institutions, the disciples of those scholars who are new additions to the network also come from these institutions. Price (1986) contents that the "invisible college" are maintained by the process of "sponsored mobility," in which preference is given to graduates of the prestigious institutions of the invisible college in hiring for

academic positions, appointment to editorial positions in the core journals and publication in these core journals. Over time members of the invisible college network may dominate the editorial positions on, and consequently the scholarly contributions to, the leading journals of the discipline. The acceptance rate of articles may be higher for scholars within this network than those who are outside the network, and consequently less likely to be accepted and less productive in those core journals. A network is thus perpetuated.

Peer Review Bias Defined in This Study

Although the possibility of achieving, especially in social sciences, a pure objectivity and impartial perspective is still in dispute, this study defines bias in editorial peer-review process as decisions on publicibility of articles based on the author's personal traits (an author's prestige, institutional affiliation, membership in a particular social organization, country, gender, ethnicity, source of funding, or any information irrelevant to the research itself). The bias defined in this study does not include those that are based upon the cognitive attributes of the submitted articles (e.g., in favor or against certain paradigms, scientific technique/ methodology/substance or ideological views presented in the manuscript).

Previous Research on Peer Review Bias

Bias in editorial peer review process is inevitable. There are probably limitless ways to bring some degree and type of bias into the evaluation of a manuscript. The constitution of the blind peer-review mechanism is ***itself*** a powerful and simply undeniable acknowledgement of that fact. The question is

not so much a bias per se, but the nature of the bias, and to what extent an article is published (or not) because of that bias.

The review of literature revealed a large number (over 100) of published articles on bias in journal peer review. Most studies on reviewer bias, however, predominantly focused on examining the process of peer review, often seeking evidence of bias under blind or anonymous conditions (Weller, 2001). There are studies that tested blind reviewing – the ability of reviewers to identify authors when authors' names and institutions have been removed from manuscripts (e.g., Fisher, Friedman, & Strauss, 1994; Parker, 1986; Rosenblatt & KirK, 1980), studies that used fabricated abstracts or manuscripts to seek evidence that reviewers' recommendations are influenced by their ideological views (e.g., Epstein, 1990; Ernst, Resch, & Uher, 1992; Goodstein & Brazis, 1970), and studies that attempted to detect gender or ethnicity biases in blind and non-blind conditions (e.g., Goldberg, 1968; Lloyd, 1990; Ward, 1981).

One of the major limitations to many of these studies is their design in using fabricated manuscripts or resubmission of previously published manuscripts with slight modification. Fabrication will always by nature bring up ethical issues of the presentation of false data and waste of editor's and reviewer's time (Weller, 2001). Also, a serious concern regarding validity exists in studies that seek evidence of bias through investigating reviewer's ability to identify author's name and institutions. As pointed out by Weller, "identification of an author by a reviewer is not *ipso facto* proof that there is any reviewer bias that might unjustly affect the outcome of a manuscript" (p. 239). In addition, previous studies on peer

review bias failed to account for the role of the editor, who has the absolute and final power in decisions on a manuscript's fate, and thus potentially a primary source of bias.

It is clear that the grave problems of ethics and validity in previous research have greatly impaired their accumulated impact, making them functionally insufficient to convince us that this problem even exists in the field. Admittedly, conducting empirical studies on peer review bias through examining the peer review process is difficult. The confidential nature of editorial peer review process and the "detective" nature of the research predetermined that data on the components and process of editorial peer review are extremely hard to come by. Given this insurmountable obstacle in data collection, adding one more similar study (a pebble, so to speak) to the enormous pile of previous, unpersuasive studies really presents no reasonable possibility of improving that condition (the plausible believability of the existence of bias in the process). A new perspective to look at this old problem of peer review bias seems necessary.

The Use of Social Network Analysis in This Study

This study will use Social Network Analysis (SNA) to investigate the potential bias of peer review system that may have influenced the patterns of author interactions as demonstrated in five leading comparative/international journals between 1994 and 2003. Social network analysis, which will be introduced in more detail in the next section, is a set of tools specifically designed to study networks through analyzing interactions among the components of the network (Scott, 2000; Wasserman & Faust, 1994). Instead of focusing on the

process of editorial peer review as most of previous research has done, this study will turn to the published journal articles that have gone through the scrutiny of editorial peer review and are presumed to be free of peer review bias. As previously introduced, a biased peer review system would create an "invisible college" (Crane, 1972) that would have frequent interactions among its members involving the exchange of ideas, information and, possibly, favoritism in publication decisions. "Literature on the invisible college suggests that it consists of a small, homogeneous group with high density and intensity of ties in which direct and indirect contact is frequent and the relations are highly reciprocal" (Willis & McNamee, 1990). Thus, for this study to investigate the patterns of scholarly interaction, social network analysis – the disciplined inquiry into the patterning of relations among social actors – is definitely the right tool.

The issue of appropriateness in using SNA is based on the primary design of this approach. SNA is specifically designed to delineate the structure and patterns of interactions among actors of the network (e.g., *personal*, *institutional*, *thematic*, etc.). Any bias implies a decision based on some criteria, which in the case of peer reviewed research publications, can be captured and demonstrated through the social network analysis as patterns of interactions between scholars. The assumption is that if a discernable pattern (such as a heavy concentration of authors in a few top ranking universities or a strong institutional link between certain group of authors and journal editors) exists, then one implication would be that particularistic criteria (such as personal favoritism or thematic preference, etc.), rather than universalistic criteria, may have played a role in the publication

of articles in those five journals. On the other hand, if no particular patterns is detected and all author collaborations are found to be random, then there would be no reason to suspect the existence of bias in the editorial peer review process of those five journals.

Analyzing journal publications with SNA provides us with a new perspective and potentially powerful technique to address the issue of potential peer review bias. With readily available data from open sources, this study will be devoid of the same difficulty in data collection that obsessed most of previous studies, and consequently free from the ethical and validity problems suffered by those studies. Furthermore, by incorporating all actors (including the editors) of peer review system into analysis, this study will be in a better position to depict a more complete picture of scholarly interactions of the field and detect traces of peer review bias of any kind.

Investigating Potential Bias in Editorial Peer Review through Social Network Analysis

Co-authorship network analysis, the primary research method to be used in this study, is an application in literature analysis of a more broad strategy for investigating social structures – Social Network Analysis. This section will present a brief introduction to some fundamental concepts of Social Network Analysis and its relevance to this study.

Network and Network Analysis Methods

Generally speaking, a network is a set of units (or actors) and the relationships (or ties) of specific types that occur among them (Scott, 2000;

Wasserman & Faust, 1994). The concept of network emphasizes the fact that each individual has ties to other individuals, each of whom in turn is tied to a few, some or many others, and that a social structure can be expressed as patterns or regularities in relationships among those interacting units. Social Network Analysis is the study of social relations among the set of actors, focusing on uncovering the patterns of interactions among individual units. The relationships between actors are the first priority in social network perspective, and the characteristics of individual units are only secondary. Social network analysis is distinct from traditional individualistic theory of data analysis in that "the unit of analysis in network analysis is not the individual, but an entity consisting of a collection of individuals and the linkages among them" (Wasserman & Faust, 1994, p. 5).

Social network analysis has developed over the past four decades out of a number of diverse, intersected strands of social theory and application, mathematics, statistics and computing methodology (Scott, 2000; Wasserman & Faust, 1994). Graph theory and matrix operations have been used for a complete and rigorous description of relationship between interacting actors. In graphical form, for example, social networks can be compared readily to physical networks such as roads. Just as roads structure the flow of resources between cities, relationships structure the flow of resources or influence in a social environment. Graphs in social network approach are like a road map in the physical world. Graphical and matrix forms are important in social network analysis for at least three reasons (Wasserman & Faust, 1994). First, they provide a vocabulary which

can be used to compactly and systematically represent the descriptions of network through labeling and denoting many properties of the social structure. In other words, they enable people to map and visually see the structure that may not have occurred if the descriptions are only presented in words; Second, graphs and matrices give us mathematical operations that can help measure and quantify the properties of a social structure; Third, mathematical representations also allow us to apply computers to the analysis of network data, which greatly facilitates the analytical work of some large projects with enormous amount of data.

Fundamental Elements in Network Analysis

Several key concepts are fundamental to the discussion of network analysis. A critical issue is the level of analysis. These include actor, tie, dyad, triad, egocentric network and whole network. Network data are defined by individual social entities and the linkages among them. These individual entities are "discrete individual, corporate, or collective social units" (Wasserman & Faust, 1994, p. 17) which are called *actors*, and the linkage between them are called *ties*. A *dyad* is a pair of actors and the (possible) tie(s) between them. Many approaches in network analysis take dyad as the unit of analysis. Likewise, a subset of three actors and the (possible) tie(s) among them are called a *triad*. Larger subsets with more actors and ties among them are called *subgroups*. Relationships aggregate into ties, and patterns of ties reveal social networks.

There are two approaches to analyzing a network, reflecting two different kinds of data: ego network analysis and whole network analysis (Scott, 2000; Wasserman & Faust, 1994). *Ego-centric network* data views the network from the

perspective of one actor in the network. It delineates a picture of a typical actor among the population of actors and shows how many ties this individual actor has to others, what types of ties the actor maintains, and what kind of network content (e.g. resources, influence, information) the actor gives to and receives from others in their network. This approach is particularly useful when the population is large or the boundaries of the population are hard to define. Analytically, ego-centric network analysis is extremely convenient because it can be used in conjunction with sampling strategies which can enable classical statistical techniques to be used to test hypotheses.

Whole network analysis, on the other hand, describes the ties that all actors within a population maintain with all the other actors. Ideally, this approach requires obtaining all the relationships among a set of actors or respondents, such as all the friendships among employees of a given company. Analysis techniques of subgroups, equivalence and centrality all require whole network data.

Social network analysis enables us to know how information flows through social ties, how people acquire resources, exert and receive influence, and how coalitions operate. With network analysis, patterns can be seen, quantified and tracked. Social network analysis provides the framework to understand, the tools to visualize and the language to talk about large-scale group interactions (Scott, 2000; Wasserman & Faust, 1994).

Summary

Editorial peer review is employed as a quality control mechanism of science and plays a role of crucial importance in the scientific community. One of

the reasons that peer review has been trusted is the very basic principle of objectivity that underlines the structure and operation of the system. A significant body of literature in the past decades, however, suggests that some particularistic criteria rather than the universalism may have played a role in the peer review of submitted manuscripts. Prestige/institutional favorism that gives preference to eminent authors or scholars from prestigious institutions cultivates inequality in scientific community and creates a network of privileged scholars. Using the methods of social network analysis, this study attempts to investigate potential bias of this type in the context of the field of comparative/international education by examining the core journals of the filed in the past ten years, 1994 to 2003.

CHAPTER THREE

RESEARCH METHODS AND PROCEDURES

This study attempts to investigate the potential biases and particularistic criteria in editorial peer review system within the context of the field of comparative/international education. The issue of bias in editorial peer review has been examined by a considerable amount of literature in the past decades (Speck, 1993; Weller, 2001). Most of these studies, however, predominantly focused on examining the process of peer review. Due to the insurmountable difficulty in securing necessary data, most of these studies suffered from the problems of ethnics or validity, and thus functionally insufficient in presenting us valid results on issues in question.

In this study, the methods of Social Network Analysis will be used to answer the research question of interest. Social Network Analysis is a set of research methods specifically designed to analyze social networks with relational data and describe the network as patterns or regularities in relationships among interacting units and the implications of these relationships (Wasserman & Faust, 1994). One of the applications of social network analysis in scholarly communication is co-authorship analysis. Co-authorship analysis is based on the principle that when two or more researchers jointly write a paper, intellectual and social links can be assumed to exist between them (Peters & Van Raan, 1991; Stokes & Hartley, 1989). Co-authorship analysis analyzes the exchanges that occur between actors, which are demonstrated through graphs. Linking demographic information of authors with the corresponding coauthors, articles

and journals can provide an even more detailed picture of many aspects of scientific exchanges. Co-authorship analysis thus helps identify the principal partners of research activities while providing a detailed picture of the formal network of collaboration within which exchanges take place (Persson, 1996; Price & Beaver, 1966). In this chapter, research methods and procedures of social network analysis will be addressed in terms of specific methods to be used, the research design, data collection and data analysis.

Research Methods

Social network analysis is not considered as a substantive theory but a collection of methods for the analysis of social structures, especially the relational aspects of these structures (Scott, 2000). The focus on relations and patterns of relations requires a set of concepts and analytic methods distinct from the techniques of traditional statistics and data analysis. This section will briefly introduce some key concepts and methods of social network analysis and their applications in this study.

Social Network and Social Network Analysis

A social network is a set of individual social entities and the relationships of specific types that occur among them (Scott, 2000; Wasserman & Faust, 1994). Those individual units are called *actors* or *nodes* in the language of social network analysis, and the relationships *ties*. An actor can be "discrete individual, corporate, or collective social units" (Wasserman & Faust, 1994, p. 17), such as people, a company or nation-states. A tie can be friendship between a group of people, business relationship between companies or trading ties between nations.

Social network analysis examines a specific set of ties among a defined set of actors so that the patterns and implications of these ties as a whole may be used to interpret the social behavior of the actors involved (Mitchell, 1969). In other words, distinct from traditional data analysis that relies on independent attribute data like individual behaviors, attitudes, and beliefs, "social network analysis focuses its attention on social entities or actors in interaction with one another and on how these interactions constitute a framework or structure that can be studied in its own right" (Wasserman & Galaskiewicz, 1994, p. xii). In addition to the use of relational concepts, the social network analysis makes the following assumptions about actors, relations and network structure (Wasserman & Faust, 1994, p. 4):

- Actors and their actions are viewed as interdependent rather than independent, autonomous units.
- Relational ties (linkages) between actors are channels for transfer or "flow" of resources (either material, like money, or nonmaterial, like information, political support, friendship, or respect).
- Network models focusing on individuals view the network structural environment as providing opportunities for or constraints on individual action.
- Network models conceptualize structure (whether social, economic, political, and so forth) as enduring patterns of relations among actors.

In network analysis, the unit of analysis "is not the individual, but an entity

consisting of a collection of individuals and the linkages among them" (Wasserman & Faust, 1994, p. 5).

Levels of Analysis & Use of Graphs

The most basic level of analysis in social network analysis is a *dyad* – a pair of actors and all possible ties between them. Likewise, three actors and the possible ties among them form a *triad*, and a *subgroup* can be defined as more than three actors and all ties among them. The relationship between two actors creates a tie and then, the set of ties aggregate into larger patterns of ties that reveal the structure and patterns of the social network. There are two approaches to analyzing a network. One approach is called *Ego-centric Network Analysis*, which views the network from the perspective of one actor in the network. The other approach is called *Whole Network Analysis*, which investigates the whole structure of the network (Scott, 2000; Wasserman & Faust, 1994).

Patterns of network structure in social network analysis are delineated through graphs and matrices (Scott, 2000; Wasserman & Faust, 1994). As graphs, a social network can be readily pictured as a road map, in which the actors are towns and cities that are linked together into a network by roads between them (Haythornthwaite, 1996). In a network, some actors are more central than others. A large and important city (a more central, major network actor) usually has more and direct accesses (ties) to other places (actors) than a small city (a minor network actor), and can consequently exercise more power and influence in the network. The location of actors in a network also plays a role in shaping the network. In the same way the geographic positions of cities and towns can

determine the flow and shape of a road network, the positions of actors in a social network that are closely or loosely connected with other actors of the network are, respectively, central or peripheral to the flow of power and influence (Haythornthwaite, 1996).

Network Analysis Methods

Social network analysis comprises of a variety of methods designed for analyzing different levels and properties of a social network. "Network methods are usually appropriate for concepts at certain levels of analysis" (Wasserman & Faust, 1994, p. 25). In this study, one attribute of networks – actor centrality – will be analyzed. Centrality measures the extent to which an actor is more extensively involved in relationships than other actors. An actor is considered prominent if the ties of this actor make the actor particularly visible to the other actors in the network (Wasserman & Faust, 1994). An individual who is more closely connected to another actor, or who has a strong or relationally-embedded tie with that actor (Hite, 2003; Uzzi, 1996), has a more intimate tie and generally has more power to influence the other actors.

In a network, people are often interested in identifying the most prominent actor(s). Centrality is the measure that quantifies the prominence of an individual actor embedded in a network. The three most widely used actor centrality indices are degree, closeness, and betweenness (Degenne & Forse, 1999; Scott, 2000; Wasserman & Faust, 1994).

Degree centrality. Degree centrality is simply measured by counting the number of relationships maintained by each actor in a network. In a graph, this

can be achieved by counting the number of ties or lines into or out of a particular node. The actor with the most lines has the highest degree and therefore is most central. In Figure 1, for example, Actor A is most central with six lines connecting to others, thus having a degree of 6. The central position of Actor A creates a star structure providing a great deal of access to resources from others in the network. This central figure can also facilitate or prevent the flow of resources between other actors in the network.

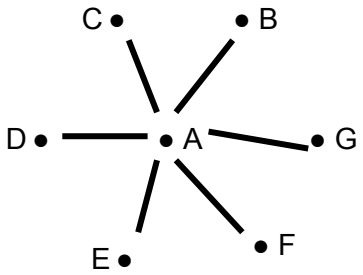

Figure 1. Network centrality.

Closeness centrality. As its name suggests, closeness centrality evaluates centrality by making a judgment of an actor's closeness to others. This centrality is measured as the number of path lengths or steps required for one actor to reach all other actors in the network. Actors who are able to reach all other actors with shorter path lengths, or who are more reachable by other actors at shorter path lengths, are in an advantageous position and generally have more power and influence within the network. In Figure 1, Actor A has the highest closeness centrality as it is the closest to all others in the network, with a total of only six path lengths or steps to reach all others. Each other actor is at a geodesic distance of two from all other actors. For example, Actor B requires 11 path lengths or steps to reach all other actors. The communication between other actors will have

to go through Actor A, thus they depend on A for reaching others or being reached.

Betweenness centrality. This centrality index offers a more precise way of measuring an actor's centrality (Degenne & Forse, 1999). It measures centrality by examining the extent to which a particular actor lies "between" the various other actors in the network. Actor A in Figure 1 is central because it lies between each other pair of actors, and no other actors lie between A and other actors. Actor A has direct access to all other actors while others must go through A to contact each other. This gives A the capacity to broker contacts among other actors. Being between other actors gives actor A structural advantage of being in high demand.

Identifying within a discipline central figures as measured by the centrality indices of co-authorship analysis is of great importance in knowing the state of the field and investigating potential bias in journal peer review. Authors in a position of high centrality are usually the leading scholars who define the theme and direction of research front, and thus have more power and influence, and access to resources and information within a network. By facilitating, controlling, or inhibiting the flow of power/influence, or resources and information from one actor to another, central actors can maintain, create or prevent the construction of a scholar network (Haythornthwaite, 1996). Scholars who are isolated on the periphery of the network may become less productive in the core journals whose editorial positions are occupied by the key members of the network. If, however, a high or low centrality as revealed through co-authorship analysis turns out to be a

consequence of a scholar's personal traits such as his/her institutional affiliation, school of thought as a result of academic training, or connection with referees, one of the implications would be the existence of bias in the peer review process.

Social Network Analysis in Literature Analysis – Co-authorship Analysis

Social network analysis has been widely used in social and behavioral disciplines in the past decades (Degenne & Forse, 1999; Scott, 2000; Wasserman & Faust, 1994). One particular application of social network analysis probes collaboration networks, which are typically affiliation networks in which participants collaborate in groups of one kind or another, and ties between pairs of actors are established by common group membership, such as clubs, teams or schools. When techniques of social network analysis is applied to explore one type of affiliation network documented in journal publications, it is called Co-authorship Network Analysis, which is the research tool used in this study.

Co-authorship of a journal paper can be thought of as documenting a collaboration between two or more authors (Genest & Thibault, 2001; Newman, 2004; Persson, 1996). The set of these collaborations within or across journals can form a Co-authorship Network, in which the actors are authors and a tie between two actors is established by their co-authorship of journal papers. Co-authorship associations between scholars acknowledge both intellectual and personal relationships, and thus provide an opportunity to identify and measure social activity and influence within a specialty (Peters & Van Raan, 1991; Stokes & Hartley, 1989). Examination of co-authorship network ties among authors can reveal that those authors working in the same cognitive area, such as the

discipline of comparative/international education, may demonstrate collaborative efforts of varying size and cohesion – some interconnected, others isolated from others. Analysis of these patterns can help answer questions such as which authors play more important roles and who connects different collaborative groups in the network. Thus network methods can be a useful perspective from which to inspect the state of the field – to examine if the patterns revealed through the analysis may indicate the existence of particular criteria or potential biases that may have influenced the editorial peer review process.

Research Design

Population & Network Boundary

Network analysis examines the relationships within an entire bounded population or sub-population rather than a sample of a population. Thus, network boundaries establish the population of actors. This co-authorship network study will be conducted within the discipline of Comparative/International Education as represented by the five field journals, which provides the basis for the population inclusion criteria and network boundary.

The co-authorship network boundary is confined to actors who have published at least one article in at least one of five journals that are considered to be among the top English-language publications in the field of Comparative and International Education (Bray & Gui, 2001) during the most recent ten years: 1994-2003, inclusive. These five journals are: *Comparative Education Review, Comparative Education, Compare, International Journal of Educational Development* and *International Review of Education*. All of the articles published

in these five journals are subject to peer review. Other documents in the journals, such as editorials, letters to the editor, corrections, bibliographical items, book reviews, conference abstracts, and news items are excluded as they are not peer-reviewed or considered to convey relevant scientific information related to original research results.

Network Construction

Within this population of actors, data will be collected to construct a co-authorship network. The authors represent the network actors, and a network tie exists between two authors if they have coauthored one or more papers in any one of those five journals within the ten-year time frame.

Attributional data regarding the actors enables more discrete data analysis. Thus, demographic data regarding each author, such as their current institutional affiliation, will also be collected. In addition, for each of the five journals, information regarding the names and current institutional affiliations of journal editors, associate editors, assistant editors, members of editorial board or advisory editors, and external peer reviewers will also be collected, whenever available. This data will be used to provide potential attributional data for the population of authors, for example, whether an author is also an assistant editor.

Network Data Collection

Network data differ from traditional data in that network data contain relations measured among a set of actors. This relational nature of network data determines that at least two basic data elements need to be collected: actors and ties, which in the context of co-authorship network in this study are authors and

co-authorship association. This section will illustrate how these relational data will be collected, stored and prepared for network analysis.

Collection & Organization of Actors

All authors who have published at least one academic article in at least one of five journals (1994-2003) in the field of comparative/international education will be manually recorded into the spreadsheet software – Microsoft Excel. With its powerful functions for data management, Excel is an ideal tool to store and organize relational data and to prepare these data in files readable to other specialist program packages. All five journals within the specified time frame are available either physically in or electronically through the Harold B. Lee Library of Brigham Young University.

From the journals, author data will be collected from which an *Author Attribute Table* will be constructed. In this table, each row represents an author and each column represents characteristics of that author – for example, their last name and first name, gender, current institutional affiliation, highest degree received, institution where the highest degree was received, whether s/he is an editor of one or more of the five journals, whether s/he is on the board of editors, or whether s/he was an external reviewer for one or more of those five journals etc. In the case that some of the above information may not be readily available from the journals themselves, best efforts will be made to collect them through other channels, such as the web sites of the authors or institutions, directories of university faculties, personal contact or acquaintance contact. A sample of this *Author Attribute Table* is demonstrated in Table 4.

Table 4

Actor Attribute Table

Author ID	Last Name	First Name	Gender	Institutional Affiliation	Ph.D. Institution	Editor Journal #1	Editor Journal #2
01	Smith	Alan	M	Michigan University	Harvard University	Yes	No
02	Clark	Alice	F	Univ. of HK	UCLA	No	Yes
03	Howard	White	M	Sanwan Univ.	Idaho Univ.	No	No
04	McKay	Catherine	F	Univ. of London	Cambridge Univ.	No	No
05	Hoffman	John	M	Univ. of Minnesota	Oxford Univ.	No	No

Collection & Organization of Ties

A tie between two authors is established if they coauthored at least one journal article in at least one of the five journals within the specified time frame. All these ties will be recorded manually into Microsoft Excel spreadsheet. From the journals, co-authorship data will be collected from which a *Co-authorship Tie List* will be created, in which each row represents a co-authorship tie, and the columns represent characteristics of that tie, such as in which journal and year the co-authorship occurred, number of articles coauthored, etc. A sample of this *Co-authorship Tie List* is demonstrated in Table 5.

Table 5

Co-authorship Tie List

Author A	Author B	Tie	Total Ties	Jr. #1	Jr.#2	Year	Total # Authors
01	05	1	1	1	0	2000	1
06	18	1	2	2	0	2001	1
09	22	1	1	1	0	1998	2
07	06	1	1	1	0	1996	3
40	87	1	4	2	2	1997	2

Edgelist Construction & UCINET

As a next step, data from Co-authorship Tie List will be used to create an edgelist which will be imported into UCINET, which is a comprehensive computer program for the analysis of social networks (Borgatti, Everett, & Freeman, 1999). An edgelist is simply a list of ties derived from the *Co-authorship Tie List*. It consists of information of dyads (relationships between a pair of actors): two coded actors and a variable describing an aspect of their relationship. In this study, the relationship will be described in terms of the number of co-authorship associations between them. A sample of this edgelist is shown as Table 6.

Table 6

Edge-list

Tie ID	Author A	Author B	Total Ties
01	01	05	1
02	06	18	2
03	09	22	1
04	07	06	1

The numerical values contained in the edgelist will then be imported into UCINET, which contains dozens of network analytic routines and gives us a powerful way of doing sophisticated network analysis, allowing precise measurements of network characteristics. NetDraw (Borgatti, 2002), which is a graph drawing program that comes with UCINET, can map networks for visual display and analysis.

Network Data Analysis

This study will focus on the analysis of one network attribute – actor centrality – within two networks: co-authorship network and author-affiliated institution network. In addition, some other general properties of network structure, such as Core/Periphery, Components, Clusters/Subgroups, Isolates and Density, may also be examined briefly. This section will describe in technical detail how these network attributes will be measured and analyzed with UCINET and NETDRAW.

Analyzing Centrality with UCINET and NETDRAW

When the edgelist (as in Table 6) is imported into UCINET, a matrix is created. A matrix is a rectangular arrangement of a set of numbers that represent the information on the ties between each pair of actors (Hanneman & Riddle, 2005). The most common matrix in social network analysis is the square matrix that has as many row and columns as there are actors in the data set (Hanneman & Riddle, 2005). Table 7 shows an example of such a matrix, in which if a tie (or ties) between two actors is present, a number representing the frequency of the tie(s) is entered in a cell and if there is no tie, a zero is entered. The program will analyze this matrix of the whole network and produce three indices of centrality: degree, closeness, and betweenness. These indices produce centrality scores for each actor. UCINET's centrality indices are located in the "Network/Centrality" drop-box.

Table 7

Network Matrix with Node ID as Row and Column Labels

	01	05	06	07	09	18	22
01		1	0	0	0	0	0
05	1		0	0	0	0	0
06	0	0		1	0	2	0
07	0	0	1		0	0	0
09	0	0	0	0		0	1
18	0	0	2	0	0		0
22	0	0	0	0	1	0	

Degree centrality. Actor-level degree centrality is simply each actor's number of degrees in a non-directed graph. Considering the fact that the size of the network may make a difference in calculating an actor's centrality (that is, a central actor with a degree of 25 in a network of 100 actors is not as central as one with a degree of 25 in a network of 30 actors), and that networks of different sizes (n) can be compared, degree centrality index of node *i* is standardized or normalized by dividing the absolute degree centrality of the node (indicated as C_{AD_i}) by the maximum possible in-degrees (n-1 nodes), and expresses the result as either a proportion or percentage (Degenne & Forse, 1999):

$$C_{ND_i} = C_{AD_i} /(n-1) \qquad (1)$$

That is why the degree centrality index varies between 0 and 1, with 0 indicating no centrality and 1 maximum centrality.

Closeness centrality. A central actor in the closeness concept has minimum path distances from n-1 others, quickly interacting and communicating with few intermediaries involved. Thus, if two actors are not adjacent, needing only a small number of steps to reach another is important to attain higher closeness centrality. Actor closeness centrality is the inverse of the sum of shortest path length (geodesic) from actor i to the n-1 other actors (Degenne & Forse, 1999).

$$C_{APi} = \left[\sum_{j=1}^{n} d_{ij} \right]^{-1} \qquad (2)$$

For the same reason the degree centrality is standardized, a closeness index can be normalized by dividing it by a maximum possible distance expressed as a proportion or percentage. UCINET computes its network closeness centralization of a binary network similar to its degree measure.

Betweenness centrality. A central actor occupies a "between" position in the paths connecting many pairs of other actors in the network. "The between centrality of actor A is defined as the number of shortest paths between other pairs of nodes that pass through A" (Newman, 2004, p. 11). As a cut-point in the shortest path connecting other nodes, the between actor has the power to control the flow of information or exchange of resources, perhaps in a position as an editor of a journal taking control of an author's access to resources (e.g., publication) by maintaining, facilitating or preventing the flow of information between the author and the reviewers. If more than one geodesic links a pair of actors, each of these shortest paths has an equal probability of being used.

Actor betweenness centrality for actor *i* is the sum of the probabilities, for all pairs of actors j and k, that actor i is involved in the pair's shortest path length (geodesic) (Degenne & Forse, 1999).

$$C_{ABi} = \sum_{j}^{n} \sum_{k}^{n} \left(\frac{g_{jk}(i)}{g_{jk}} \right), \; j \neq k \neq i \text{ and } j < k \qquad (3)$$

As with the other centrality standardizations, the betweenness centrality scores are normalized by dividing them by the maximum possible betweenness, expressed as proportion or percentage.

Research has shown that the three centrality measures are highly correlated and give similar results in identifying the most important actors in a network (Degenne & Forse, 1999). To obtain a more complete picture on central actors of the field, all three centrality indices for each actor will be produced both within individual journals as well as for all journals combined.

Given that these centrality indices are on individual level, we treat them as personal attribute information and add them to actor attributes data as respondent-level data. This enables us to analyze the implications of individual attributes for collaboration behavior of scholars. This can be achieved by importing centrality indices from UCINET into the Statistical Package for the Social Sciences (SPSS).

The co-authorship matrix will then be imported into NETDRAW, a graphical software package for visualization of social network, where a graph with dots representing actors and lines representing connections will be produced to illustrate the overall structure of the network. Visual analysis of this graphical network map allows for identification of structural network patterns as well as the

differentiation of actors based on actor attributes to further identify patterns that may reveal potential biases in co-authorship structures.

Analyzing Other Properties of Network Structure

In addition to the primary analysis on actor centrality and strength of ties, this study may also briefly explore other network structural issues that include Core/Periphery, Cluster/Subgroups, Components, and Density. All analysis on these network attributes will be conducted with UCINET and NETDRAW. This section will only provide a general description of concepts of these terms.

Core/periphery. A formal model of core/periphery structures was proposed by Borgatti and Everett (1999). In their model, a network has a core/ periphery structure if the network can be partitioned into two sets: a core whose members are densely tied to each other, and a periphery whose members have more ties to core members than to each other. Centrality indices identify peripheral actors at the same time they determine the central actors in a network. Those actors with the lowest centrality scores can be regarded as periphery in a network.

Density. Density is a measure of the level of connectivity within the network. It reflects the actual number of links as a proportion of total possible links. It can be calculated using the equation $l/(n(n-1)/2)$, where l is the total number of lines, and n is the total number of nodes. The density of a network (e.g. the co-authorship network and institution network) may give us insights into such phenomena as the speed at which information diffuses among the actors (authors and institutions), and the extent to which the actors (authors and institutions) have high levels of social capital (Hanneman & Riddle, 2005). It is important to know

that when comparing different networks, larger networks will almost invariably be less dense. Density may be useful for calculating changes in a network over time or comparing similar sized networks.

Components and isolates. These two concepts indicate the extent to which the network actors are connected. A component exists when a set of actors in the network are connected within themselves but the set is disconnected from others in the network. When an actor is not connected to any other actor, the actor is an "*isolates*," which is a simple form of component.

Subgroup/clusters. They indicate areas of density within the network. These subgroups may indicate patterns of co-authoring that may inform the research questions.

Limitations of Research

There are several limitations in this study. First, this is an exploratory study that is designed to describe and explain potential patterns of co-authoring presented in journal publications. It is not a study to test theory, draw causal-effect relations or make generalizations. Second, only five journals of the discipline are included in this study. Since not all authors in the discipline are included, conclusions of this study only reflect characteristics of scholars as demonstrated in these five journals. Third, this study only covers journals published in the period of 1994-2003. Collaborations of authors outside this time frame are unfortunately excluded. And fourth, authors are not weighted by the order of authorship within in a co-authorship relation. As a result, all coauthor relationships are considered equally.

CHAPTER FOUR

RESEARCH FINDINGS

The purpose of this study was to investigate the potential biases that may exist in the editorial peer review system within the context of five top-tier peer-reviewed journals in the field of comparative/international education. Using the methods of social network analysis, the study delineated a graphical map of the field through the construction of the co-authorship network and the institution network created from articles published between 1994 – 2003 in the five core journals of the field. The research questions of interest were addressed through analyzing these relational data to detect among interacting units patterns or regularities whose implications may suggest potential biases in the editorial peer review system.

This chapter presents the findings from this investigation. A quantitative summary of the characteristics of authors and co-authorship network is reported first, which is followed by a summary of the characteristics of the author-affiliated institutions and the institution network. The implications of these findings will be discussed in the following chapter.

Characteristics of Articles and Authors

Articles and their associated authors are the fundamental elements of any academic journal and the basic structural units of co-authorship and institutional networks. This research shows that, between 1994 – 2003, a total of 1,791 authors from 80 countries/regions published 1,234 articles in the five journals of *Comparative Education Review* (CER), *Comparative Education* (CE), *Compare*,

International Journal of Educational Development (IJED) and *International Review of Education* (IRE).

Articles. Table 8 and Figure 2 present detailed information of these 1,234 articles. It can be seen that the total number of articles published by each journal over the ten-year time frame is not evenly distributed. Of the five journals, IJED published most, a total of 347 articles, making up over a quarter (28%) of total

Table 8

Overview of Articles by Journal, Year and Number of Authors per Article

Journal Name	CER	COMPARE	CE	IRE	IJED	TOTAL(mean)
1994	17	18	18	31	33	117 (23)
1995	18	18	20	25	33	114 (23)
1996	17	19	20	29	37	122 (24)
1997	16	16	21	32	36	121 (24)
1998	18	19	20	26	34	117 (23)
1999	17	21	21	31	31	121 (24)
2000	14	24	31	30	26	125 (25)
2001	18	20	26	28	35	127 (25)
2002	13	23	27	25	42	130 (26)
2003	14	28	30	28	40	140 (28)
Ten-Year Total	162	206	234	285	347	1234
Sole author	97 (60%)	141 (68%)	167 (71%)	214 (75%)	238 (69%)	857 (70%)
2 authors	39 (24%)	46 (22%)	52 (23%)	52 (18%)	76 (22%)	265 (21%)
3 authors	20 (12%)	15 (8%)	8 (3%)	12 (4%)	20 (6%)	75 (6%)
More than 3	6 (4%)	4 (2%)	7 (3%)	7 (3%)	13 (3%)	37 (3%)

articles published, while CER published least, only 162 articles, which is 13% of the total and less than half of that of IJED. The number of articles published by the other three journals falls in between. The pattern of CER publishing least and IJED publishing most is true not only in total output across years but also in each individual year. When the overall average number of articles published per year per journal, which is between 23 and 28 over the years, is used as a reference

point, the position of the journals in terms of annual articles, in ascending order, is CER, COMPARE, CE, IRE and IJED. Noticeably, CER and COMPARE are always no greater than the average, while IRE and IJED are always no smaller than the average.

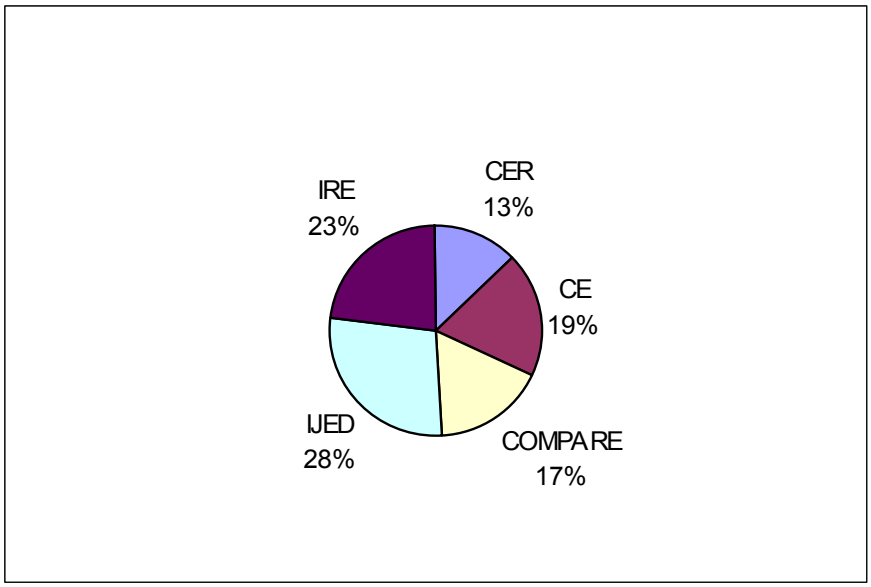

Figure 2. Distribution of articles by journal.

Combining the journals, the total number of articles published per year is generally on the increase, from the lowest number of 114 in 1995 to the highest of 140 in 2003. Examining the journals individually shows, however, that the annual output of CER and IRE over the years has remained fairly constant with even a slight decrease evident. The largest increase occurred in CE with an increment of 12 over the years, followed by Compare (10) and IJED (7).

In regard to the number of authors per article, 70% of the articles (857) were written by one single author, 21% by two authors (265) and less than 10% by more than two authors (112). In terms of the variation of sole-author rate among the five journals, CER has the lowest sole-author rate (60%) while IRE has

the highest (75%). The fact that more than two-thirds of the articles were accomplished by a single author reveals one singular characteristic of the field of comparative/international education: researchers tend to work independently with little apparent collaboration. This phenomenon, which is not uncommon in the social sciences, is in sharp contrast to the fields in the natural sciences where collaboration is always expected and consequently the majority of journal articles are published by more than one author (Bordons & Gomez, 2000).

Authors. The total of 1,791 authors represents the raw number of authors in which each author is counted for each article; thus, authors may be counted more than once if they have published more than once. Of these 1,791 authors, 248 authored more than one article within the ten-year time frame. Therefore, 1,331 individual authors are actually found publishing at least one article in at least one of the journals within the specified time frame. These 1,331 authors are the basis for the following summary of author characteristics and represent the actors in the co-authoring network. Within this population of 1,331 actors, 934 are coauthors of the 377 articles and 802 are unique co-authors that constitute the nodes of this co-authorship network. Figure 3 provides an illustration of this author structure. More detailed information about the authors across journals is provided in subsequent tables.

Table 9 shows the break-down of authors by journal and by gender. IJED has the largest number of authors (n=513) and CER has the smallest (n=266), which corresponds to the fact that these two journals published the most and least number of articles over the years. In terms of gender, more male authors (60%)

than female authors (40%) are found across journals, with little variation among five journals in terms of this gender ratio.

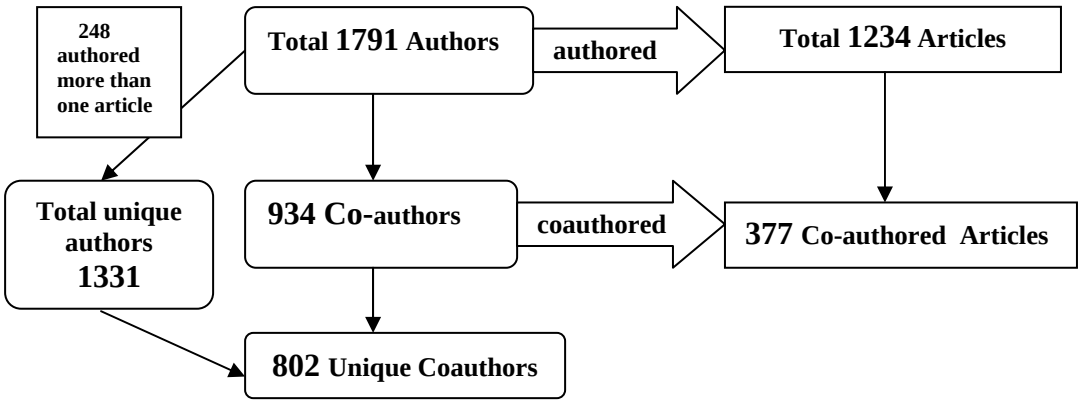

Figure 3. Illustration of author structure.

Table 9

Authors by Gender

	CER	COMPARE	CE	IRE	IJED	TOTAL
Male	155	160	219	248	296	1078 (60%)
Female	111	140	110	135	217	713 (40%)
Total Authors	266	300	329	383	513	1791

As shown in Table 10, scholars from the U.K and the U.S predominated the field in terms of total author numbers, accounting for 22% and 19% of total authors respectively, each leading the other countries by a large margin. Authors from these two countries combined make up 41% of all published authors in these journals. In addition, authors from the 10 most frequent countries/regions accounted for over two-thirds (69%) of all published authors in these five journals within the specified time frame. A closer look at the 10 most frequent countries/ regions reveals that 80% of them can be classified as so-called "Western

countries", which "refer to the societies of Europe and their close genealogical, linguistic, and philosophical colonial descendants, typically included are those countries whose dominant culture is derived from European culture" ("Western World," 2006, "Definition," # 1), such as North America, South Africa, Australia and Hong Kong. This apparent fact on author countries provides evidence that in the field of comparative and international education there may be a potential Eurocentric bias, which, consciously or otherwise, places "emphasis on European (and, generally, Western) concerns, culture and values at the expense of those of other cultures" ("Eureocentrism," 2006, "Definition," # 1).

Table 10

All Unique Authors by Country/Region (First 10 Most Frequent)

Order	Country	No. of Authors	Percentage
1	UK	295	22%
2	USA	257	19%
3	South Africa	78	6%
4	Australia	66	5%
5	Canada	63	5%
6	The Netherlands	48	4%
7	Hong Kong	42	3%
8	Germany	25	2%
9	Israel	21	2%
10	India	20	2%
Total		915	69%

In each of the five journals, authors from the U.K and the U.S have the highest number of authors, leading the other countries/regions by a considerable margin, as demonstrated in Table 11. The distribution of countries of authors in each individual journal is closely related with the journals' backgrounds. Though CER is the journal of the Comparative and International Education Society (CIES), it is published by the University of Chicago Press with its editors rotating among

the U.S scholars. It is seen from Table 11 that 45% of all published authors are U.S scholars, while the authors from U.K, the distant second largest contributing country, are only 4.5%, about one-tenth of the U.S scholars. *Compare*, on the other hand, is the official journal of the British Comparative and International Education Society, and its editors are all U.K scholars. As indicated in Table 11, about 32% of all authors of *Compare* are from U.K, compared to the 8% from the U.S.

Table 11

Authors by Country across Journals (First 10 Most Frequent)

	CER	CE	COMPARE	IJED	IRE	Total
UK	12 (4.5%)	102 (34%)	104 (32%)	107 (28%)	36 (7%)	361
USA	120 (45%)	35 (12%)	26 (8%)	75 (20%)	57 (11%)	313
South Africa	4	14	10	48	11	87
Australia	9	19	11	18	28	85
Canada	11	12	7	14	29	73
Netherlands	11	14	7	13	7	52
Hong Kong	7	20	13	11	9	60
Germany	2	0	4	0	19	25
Israel	11	0	4	3	5	23
India	0	6	3	4	7	20
Total from top 10 countries	187	222	189	293	208	1099
Proportion of authors from 10 most frequent countries	70%	74%	57%	77%	41%	61%
Total Authors per Journal	266	300	329	383	513	1791

IRE is edited by the UNESCO Institute for Education with members of editorial board from diverse countries. This nature of the journal is reflected in its diverse distribution of author countries. Although the U.K and the U.S still lead the other countries in the number of authors, the margins here are considerably smaller, compared to the other journals. Also, the number of authors from the most frequent 10 countries in IRE makes up about 41% of total authors, a much

smaller proportion compared to the high percentages (57% - 77%) in other journals, indicating a more diversified source of authors in IRE.

An interesting relationship between articles and their authors is reported in Table 12. Of the total 1,331 unique authors, over 80% (1,083) published only one article in one of the five journals 1994 – 2003. There are 248 authors (19% of total) who published more than one article within the specified time frame. Twenty-four authors are considered most productive, with each publishing 5 or more articles during this period of time.

Table 12

The Number of Articles Published by the Number of Authors 1994 – 2003

Number of Articles Published	Number of Authors	Percentage
1	1083	81%
2	148	11%
3	44	3%
4	32	2%
5	7	0.5%
6	8	0.6%
7	3	0.2%
8	3	0.2%
9	3	0.2%
Total	1331	100%

Similarly, a quantitative summary of relationship between authors and the journals in which they published is presented in Table 13. The majority of authors (87%), from 1994 – 2003, published their articles in only one journal. This is also reflective of the fact that many of these authors only published one article. However, while some authors did publish multiple articles, they only published them in one journal. There are 172 authors (13% of the total) who published in

more than one journal during the ten year time frame of this study. Only one author published in all five journals during the specified period of time.

Table 13

The Number of Authors Published in the Number of Journals 1994 – 2003

Number of Journals	Number of Authors	Percentage
1	1159	87%
2	135	10%
3	26	2%
4	10	0.7%
5	1	0.08%
Total	1331	100%

Structure of Co-authorship Network

There are 1,331 unique authors who published at least one article in at least one of the five journals within the ten-year time frame. These authors, the articles they published and those with whom they co-authored were used to create a network structure of co-authoring relations. The set of authors represent actors (nodes) within this network structure and their co-authoring relations represent the ties (lines) between authors. This network was created, as described in Chapter 3, and graphically displayed using NetDraw (Borgatti, 2002). As introduced in the previous chapter, a network graph representing the information about the relations among nodes provides an important and informative tool in social network analysis.

As an efficient way of depicting the co-authorship network, the following network graphs immediately suggest some of the most important features of the overall network structure. Figure 4 depicts the entire co-authorship network structure. When the network is not completely connected with ties, or demonstrates separate network clusters, these clusters are called components. This

co-authorship network depicts that there is no overall network-wide connections of nodes nor any centralization of some particular actors. The whole network of co-authors is composed of small isolated sub-networks that are formed primarily by multiple authors of one single article or by two or three small groups of authors joined together by their respective articles. The network includes 267 different components, which is more highly disconnected than expected. Figure 4 depicts components of different sizes with different colors. The 529 isolates are not shown in the graph. Figure 5 demonstrates these same components or subgroups with the dyads and other small-sized components removed, leaving only components consisting of 7 nodes or more.

Some basic statistics on the co-authorship network in Figures 4 and 5 are presented in Table 14. These 802 nodes formed 267 components, which are groups of nodes that are completely disconnected with other parts of the network. These components include 161 dyads (ties between 2 nodes), 50 triads (ties between 3 nodes), 24 quadrads (ties between 4 nodes) and 10 subgroups (ties between more than 7 nodes), as detailed in Table 14.

Table 14

Distribution of Components in Co-authorship Network

Component Type	Number of Components	Percent Out of Total Components	Percent Out of Total Nodes
Dyad	161	60%	40%
Triad	50	19%	19%
Quadrad	24	9%	12%
5-node	13	5%	8%
6-node	5	2%	4%
7-node	4	1%	3%
Subgroups	10	4%	14%
Total Components	267	100%	100%

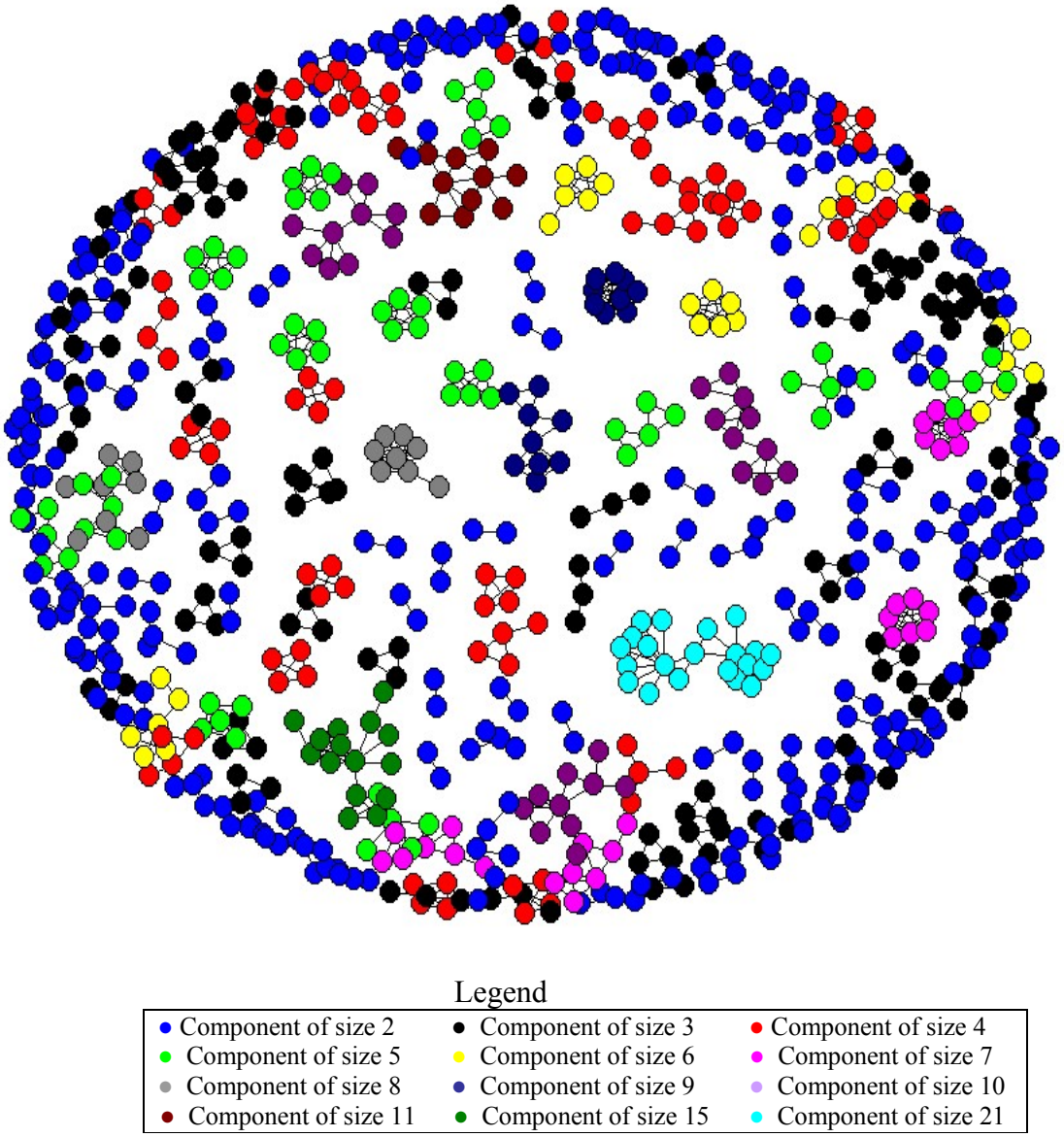

Figure 4. Co-authorship network with 267 components colored by component size.

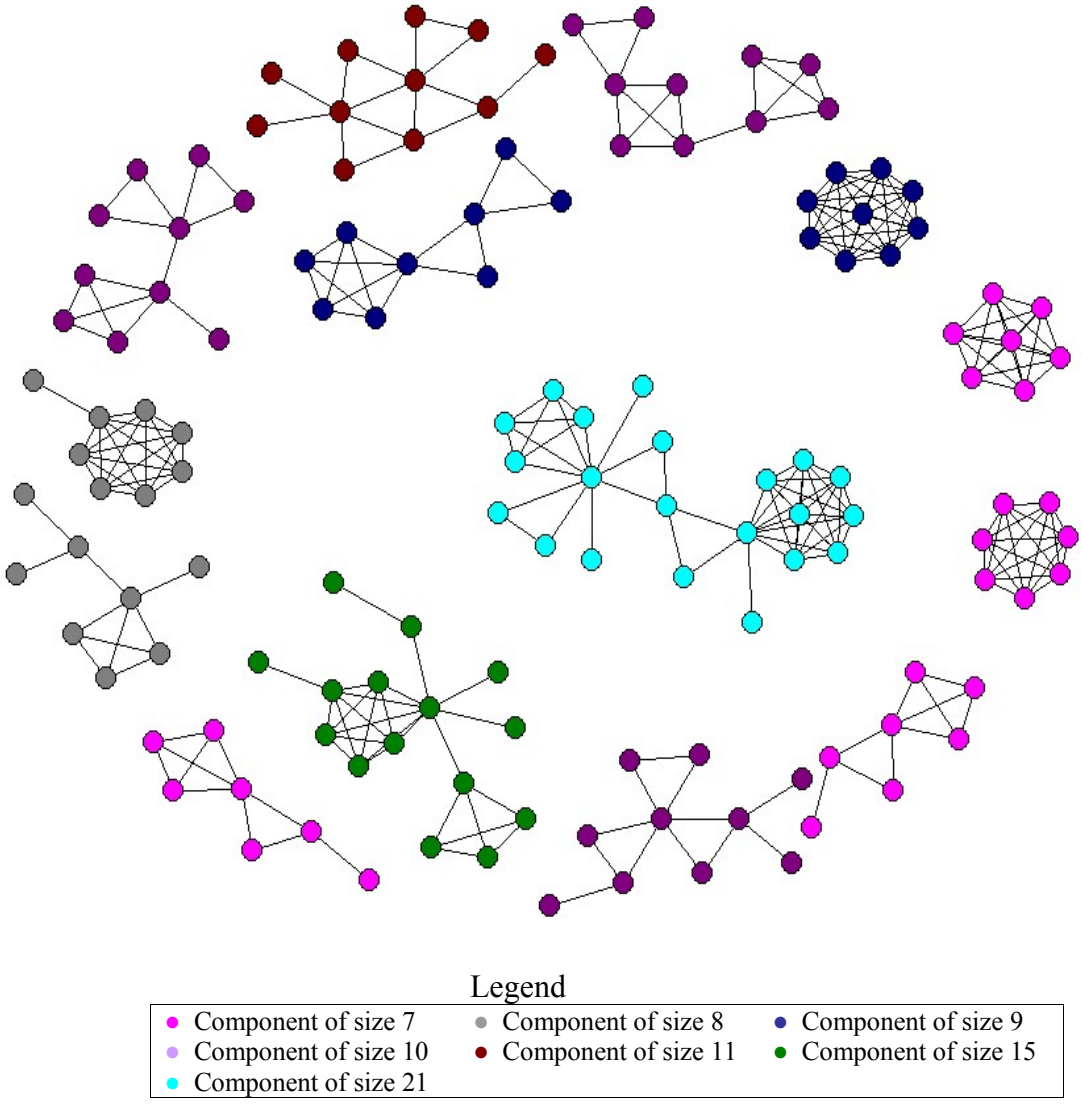

Figure 5. Co-authorship sub-networks of components (of size 7 and more) colored by component size.

The network statistics indicate that 60% of the components are dyads. Small-scaled components of dyads, triads and quadrads make up 88% (235) of all components and include 71% of all authors (network nodes). Components, or sub-networks, of a larger size (7 nodes or more) only account for 5% (14) of total components or 17% of network nodes. This high proportion of small components demonstrates that the co-authorship network is highly disjointed.

Detecting Patterns in Co-authorship Network

Given that particular publishing patterns may be associated with different attributes of scholars, this research examined whether author attributes were associated with particular patterns of peer reviewed research publication. Specifically, this research examined whether author attributes of gender, country, number of articles, or number of different journals provided evidence of publishing patterns.

Gender. In Figure 6, components of size 7 and more are colored by gender. Gender seems to be fairly evenly distributed across and within components without showing any particular patterns. If homogeneity is defined as all actors of the same gender, further gender analysis on all components (Table 15) suggests that all components except dyads tend to be mixed gender rather than homogenously all male or female. Dyads leaned slightly towards being homogenously male. Thus, while the network is disconnected, each component seems well represented on the basis of gender, indicating that scholars seem to be comfortable collaborating with co-authors of different gender. The greater number of homogenous male components (33%) than female (14%) is likely simply a

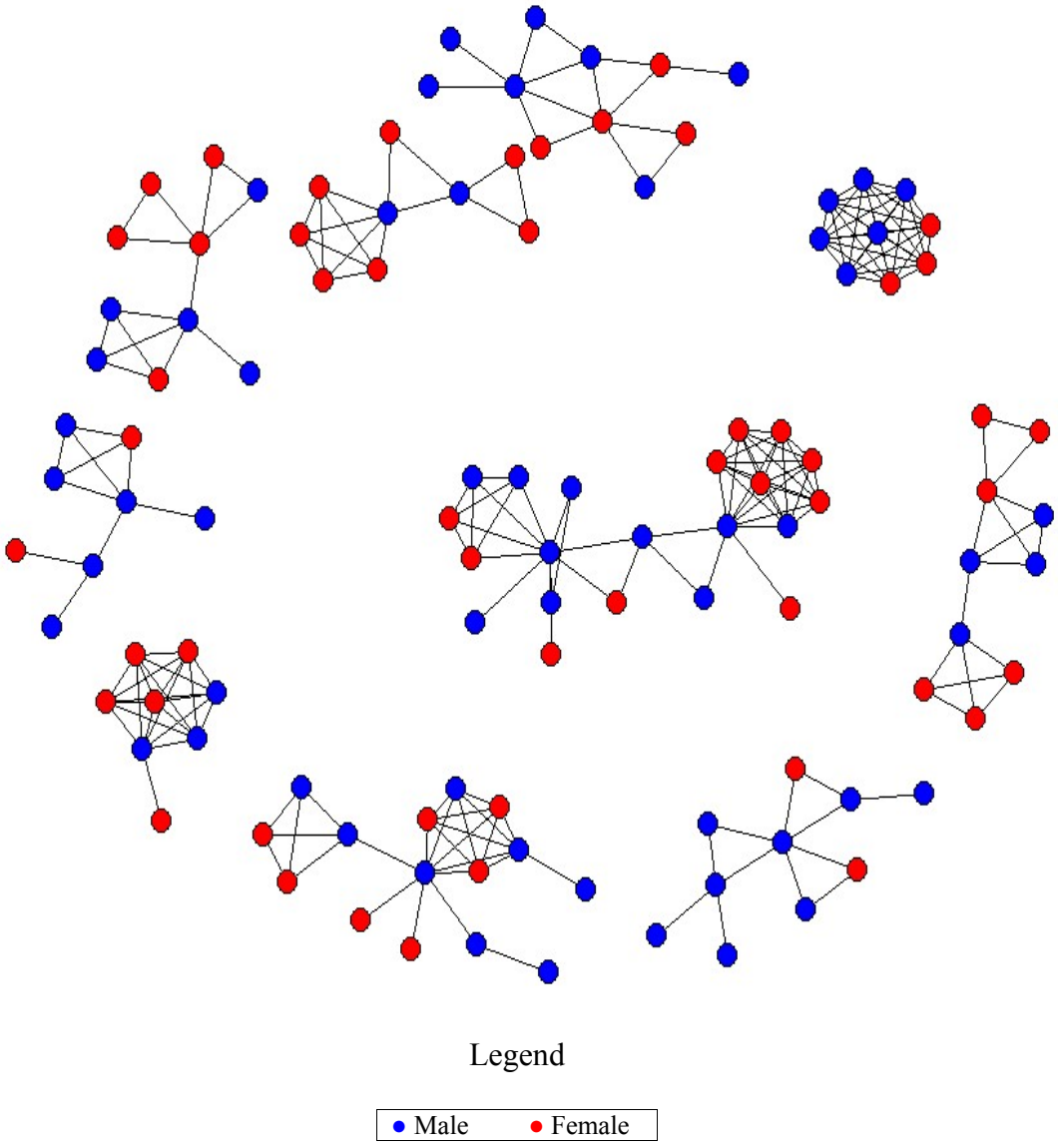

Figure 6. Co-authorship sub-networks of components (of size 7 and more) colored by gender.

reflection of fact that the total number of male authors is greater than that of female authors.

Table 15

Gender Associated Components

	Homogeneity of Male	Homogeneity of Female	Mixed	Total
Dyad	68(42%)	31(19%)	62(39%)	161
Triad	15(30%)	5 (10%)	30(60%)	50
Quadrad	4(17%)	1(4%)	19(79%)	24
5-node	1(8%)	0	12(92%)	13
6-node	1(20%)	0	4(80%)	5
7-node	0	0	4(100%)	4
Subgroups	0	0	10(100%)	10
Total	89(33%)	37(14%)	141(53%)	267

Country. A second author attribute is the country in which the authors are working and publishing. In Figure 7, components of size 7 and more are colored by country. Thirteen different countries are represented in these larger components, along with 3 unknown countries. Authors from the U.S and the U.K, the two countries with the highest number of authors in the co-author network (see Table 4), are each represented in 9 of 14 (64%) of these larger components, and all components include either U.S or U.K authors. Thus, one pattern clearly shows that there is more involvement of U.S and U.K authors in larger well-connected co-authoring networks than that of authors from other countries. However, given the high proportion of authors from the U.S and the U.K, the findings would be expected to demonstrate an even higher percentage than 64% of components with U.S or U.K representation.

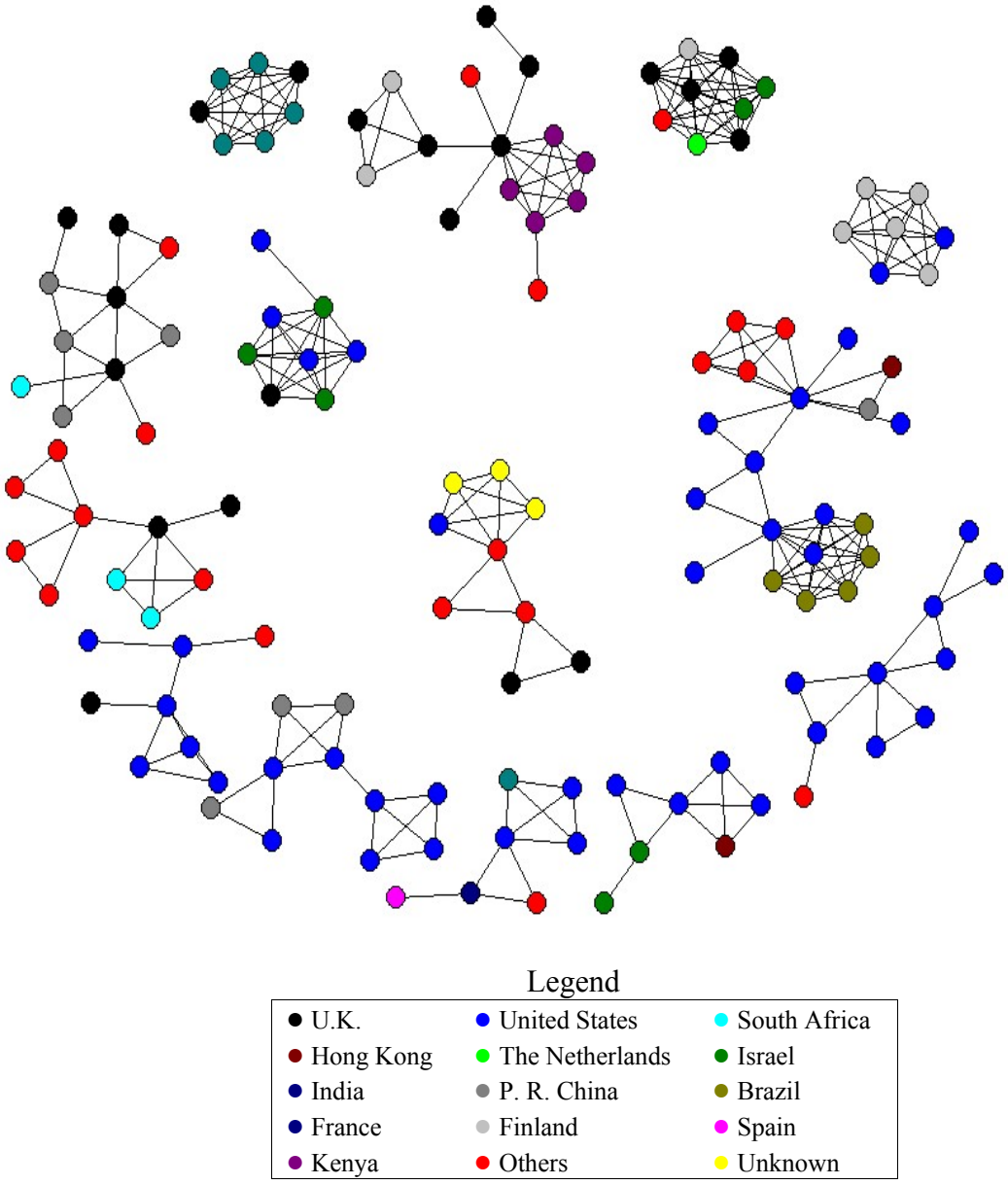

Figure 7. Co-authorship sub-networks of components (of size 7 and more) colored by country.

A second pattern by author attribute of country is that the components are well mixed. Not one component is homogenous to a single country. Table 16 demonstrates that smaller components may tend to be more homogenous and that as the size of the components increase, the proportions of co-authors from different countries also increase. For example, within dyads over two-thirds of the co-authorship ties are between co-authors of the same country whereas in the larger components (7 authors or more) they are all heterogeneous.

Table 16

Country Associated Components

	Homogeneity of country	Mixed	Total
Dyad	111(69%)	50(31%)	161
Triad	26(52%)	24(48%)	50
Quadrad	9(38%)	15(63%)	24
5-node	1(8%)	12(92%)	13
6-node	2(40%)	3(60%)	5
7-node	0	4(100%)	4
Subgroups	0	10(100%)	10
Total	149(56%)	118(44%)	267

Number of articles published. A third author attribute examined in relation to the co-authoring network structure is the number of articles that each author published. In Figure 8, components of size 7 and more are colored by number of articles published. Note that authors that have published 4 or more articles often appear to be central within their network components. In addition, the graphical network demonstrates that authors who only published a single article tended to do so with co-authors for whom this was their only article also. This is seen in the high number of ties between blue (single article) nodes.

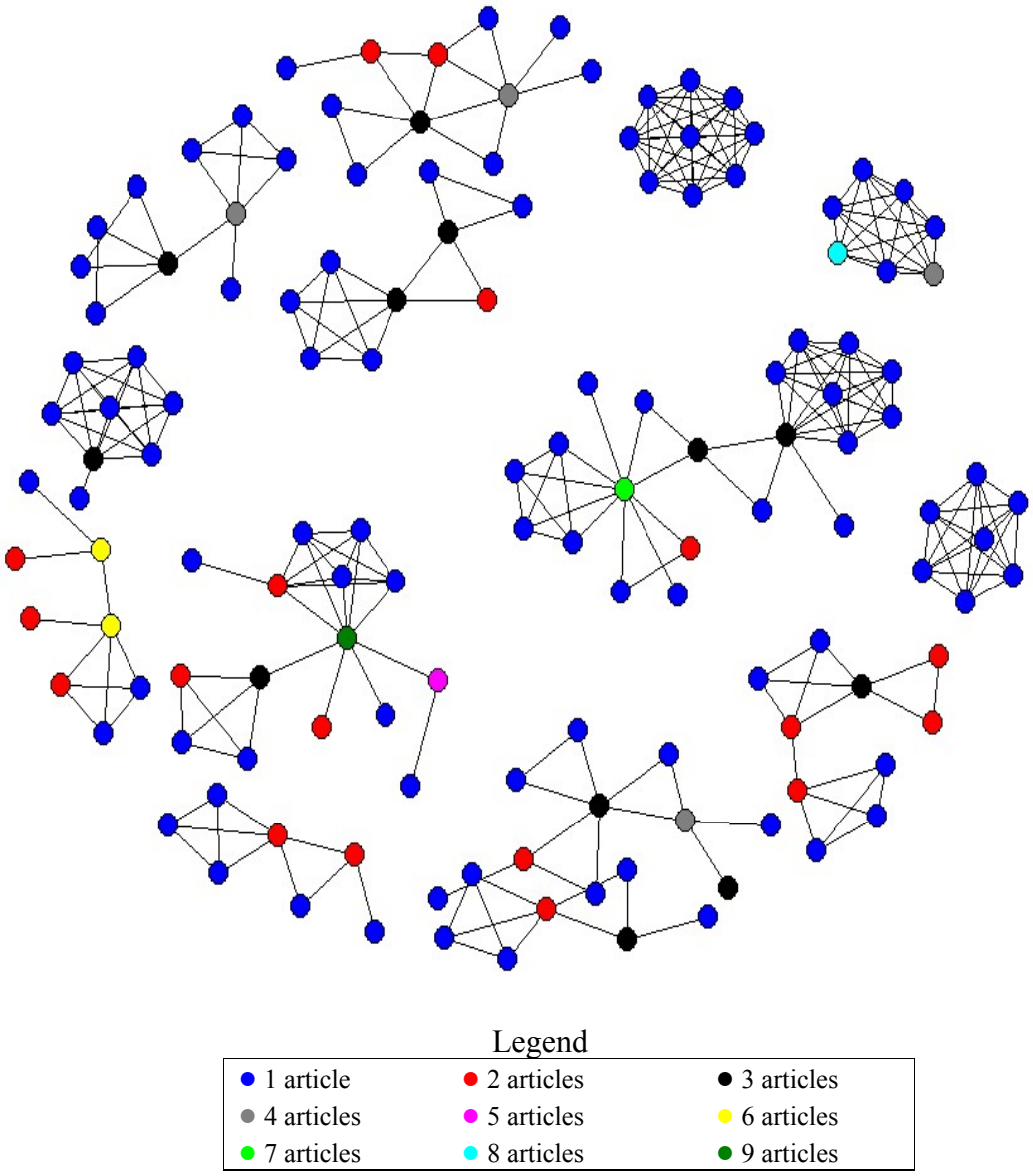

Figure 8. Co-authorship sub-networks of components (of size 7 and more) colored by number of articles published.

Number of journals in which the author published. The fourth author attribute examined in relation to co-authoring network structure is the number of different journals in which each author published. In Figure 9, components of size 7 and more are colored by number of journals the author published. Obviously, authors who only published one article would also only have published in one journal. In fact, the two components that are the most dense are all single journal (on the right side of the graph) to each represent this case, each reflecting only one article with a high number of co-authors. In addition, of the authors that published in more journals (three or more; n=3), 2 of the 3 are highly central within their component. Combining both number of articles and number of journals, one pattern that the data suggest is that authors who publish more articles and publish in more journals may become more central within their co-authoring network within this field.

Characteristics of Author-Affiliated Institutions

Institution-wise, the 1,331 unique authors are affiliated with 568 different institutions in 80 countries/regions around the world. Based on a rank ordering of countries by the number of institutions, table 17 presents 10 countries with the most institutions. Like the situation of the authors, institutions of the U.S and the U.K accounted for over one-third of all author-affiliated institutions, reaffirming the fact on the predominance of the U.S and the U.K in the field.

Table 17 also indicates that 337 (59%) institutions were from these 10 most frequent countries/regions, most of which are “Western countries”. This dominance of Western countries in institutional network reconfirms the same

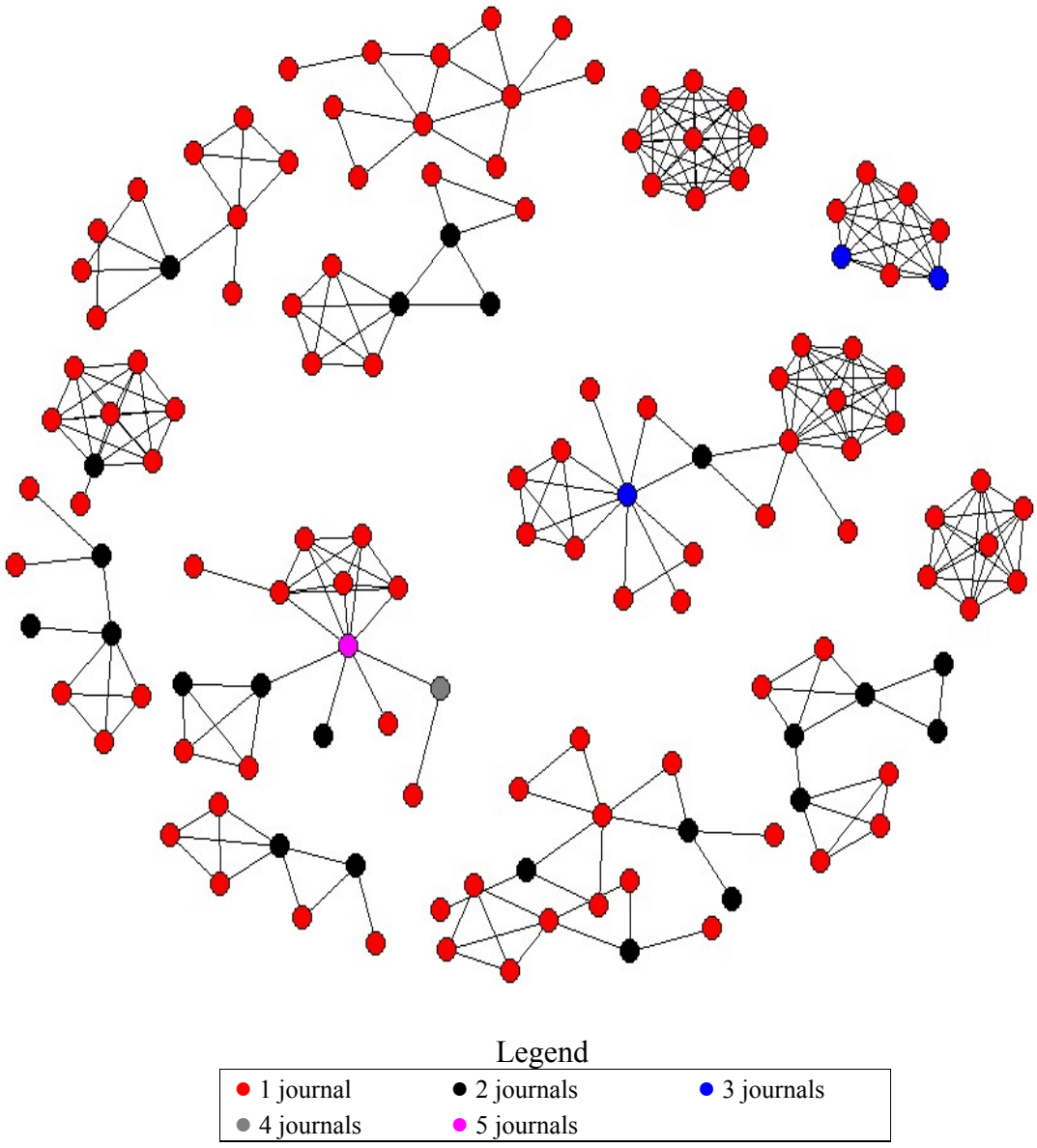

Figure 9. Co-authorship sub-networks of components (of size 7 and more) colored by number of journals in which the author published.

predominant presence of scholars from Western countries in co-authorship network and provides evidence of the potential presence of a Eurocentric bias in the field.

Table 17

Institutions by Country

Order	Country	No. of Institutions	Percentage
1	U.S.A.	114	20%
2	U.K.	79	14%
3	Australia	28	5%
4	Canada	24	4%
5	South Africa	23	4%
6	Germany	16	3%
7	The Netherlands	15	3%
8	Brazil	13	2%
9	Japan	13	2%
10	India	12	2%
Total		337	59%

Structure of Co-Authoring Institutions Network

The 568 different author-affiliated institutions constitute the nodes of the co-authoring network of author-affiliated institutions. In this network, all authors are aggregated to their institution, and an institution represents one network node. Given the existence of publishing ties between authors within the same institution, 360 institutions are recognized as unique nodes of the network. These 360 nodes formed 108 components that include 49 isolates, 39 dyads, 12 triads and 1 sub-network that is composed of 150 nodes (see Table 18).

Table 18

Distribution of Components in Institution Network

Component Type	Number of Components	Percent Out of Total Components	Percent Out of Total Nodes
Isolates	49	45%	14%
Dyads	39	36%	22%
Triads	12	11%	10%
Quadrads	2	2%	2%
5 nodes	1	1%	1%
7 nodes	1	1%	2%
8 nodes	1	1%	2%
9 nodes	1	1%	3%
10 nodes	1	1%	3%
150 nodes	1	1%	42%
Total Components	108	100%	100%

Overall, the network graph for the entire institution network, like the co-authorship network, is also highly disconnected. Figure 10 depicts the entire network structure that includes all 108 components, with components of different sizes represented by different colors. Noticeably, almost half (45%) of the components are isolate institutions, meaning that authors at these 49 institutions were either sole authors or only co-authored with others at the same institution. Thus, there are no co-authoring ties to other institutions within the group of isolates.

Detecting Patterns in Institutional Network

Dyad components, representing co-authoring ties between two institutions, make up 36% of the network components. Additional small components are reflected in this graph. However, the component that is distinctly the largest connects 150 (42%) different institutions. Thus, the institution network is considered to be structured in two ways.

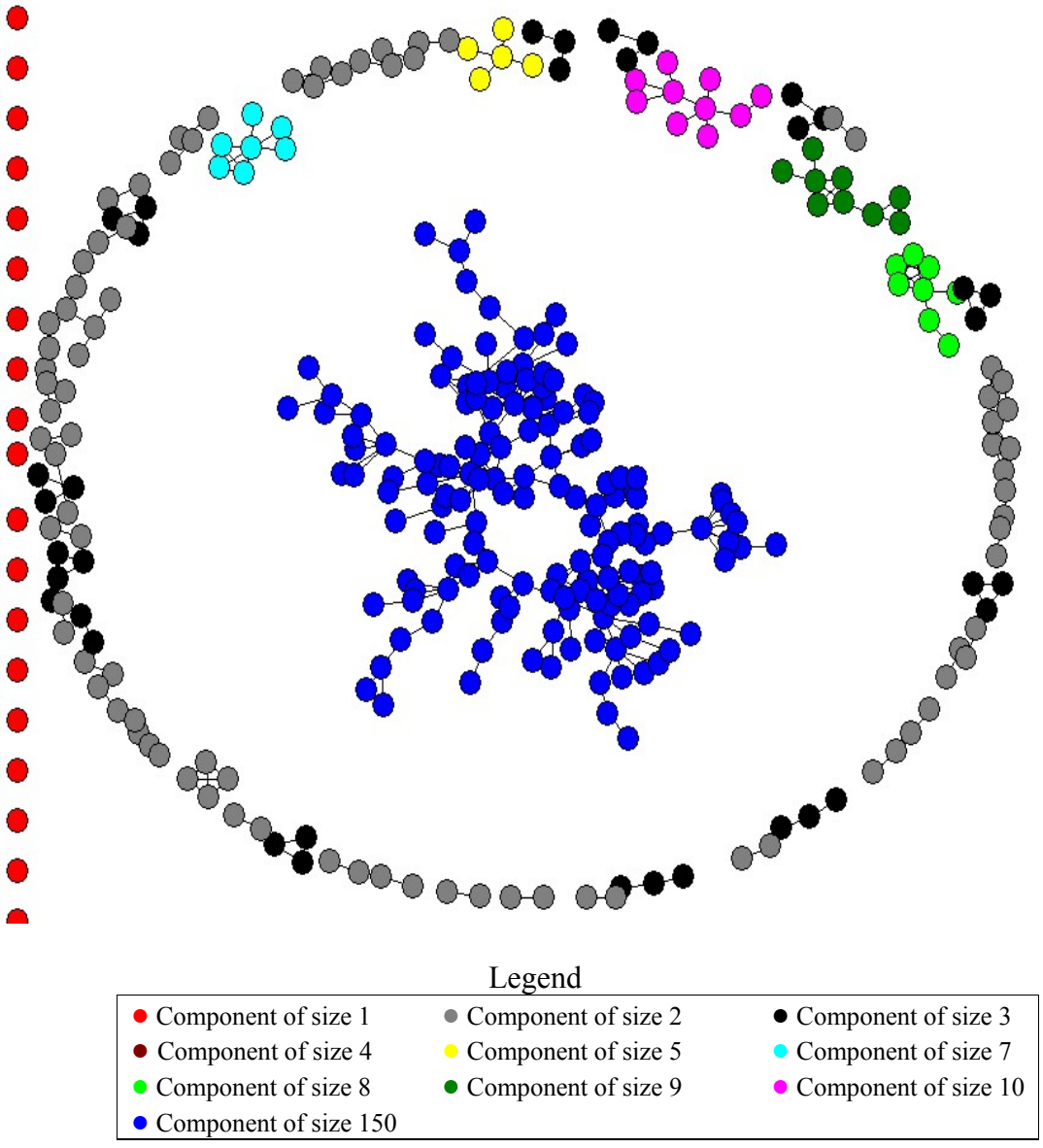

Figure 10. Author-affiliated institution network colored by component types.

Nearly 60% of the network is made up of highly disconnected components of isolates, dyads and a few small-sized subgroups. The other 40% of the network is one single connected component or sub-network. This pattern suggests that there is a large subgroup of institutions that may be more connected to or focused on the research and conversations within the field, while other institutions (and their authors) may be contributing more tangentially.

Given the structure of this network, further analysis completed on the institutional network focused only on this large connected sub-network that contains over 40% of the institutions. With isolates and other small sized components removed, the network graph in Figure 11 reflects the structure of this largest 150-node component of the network. While all the institutions are connected to this network structure, certain institutions are more centrally located while others are in a more peripheral position. Structurally, the graph reflects two circular cores with 9 institutions that span both cores. Network connections between institutions represents co-authoring that occurred between authors at these institutions. These ties suggest that information may flow between these institutions regarding research in the field. Thus, the 9 institutions that have co-authoring connections in both cores may play a brokering role in transmitting information from one core to the other.

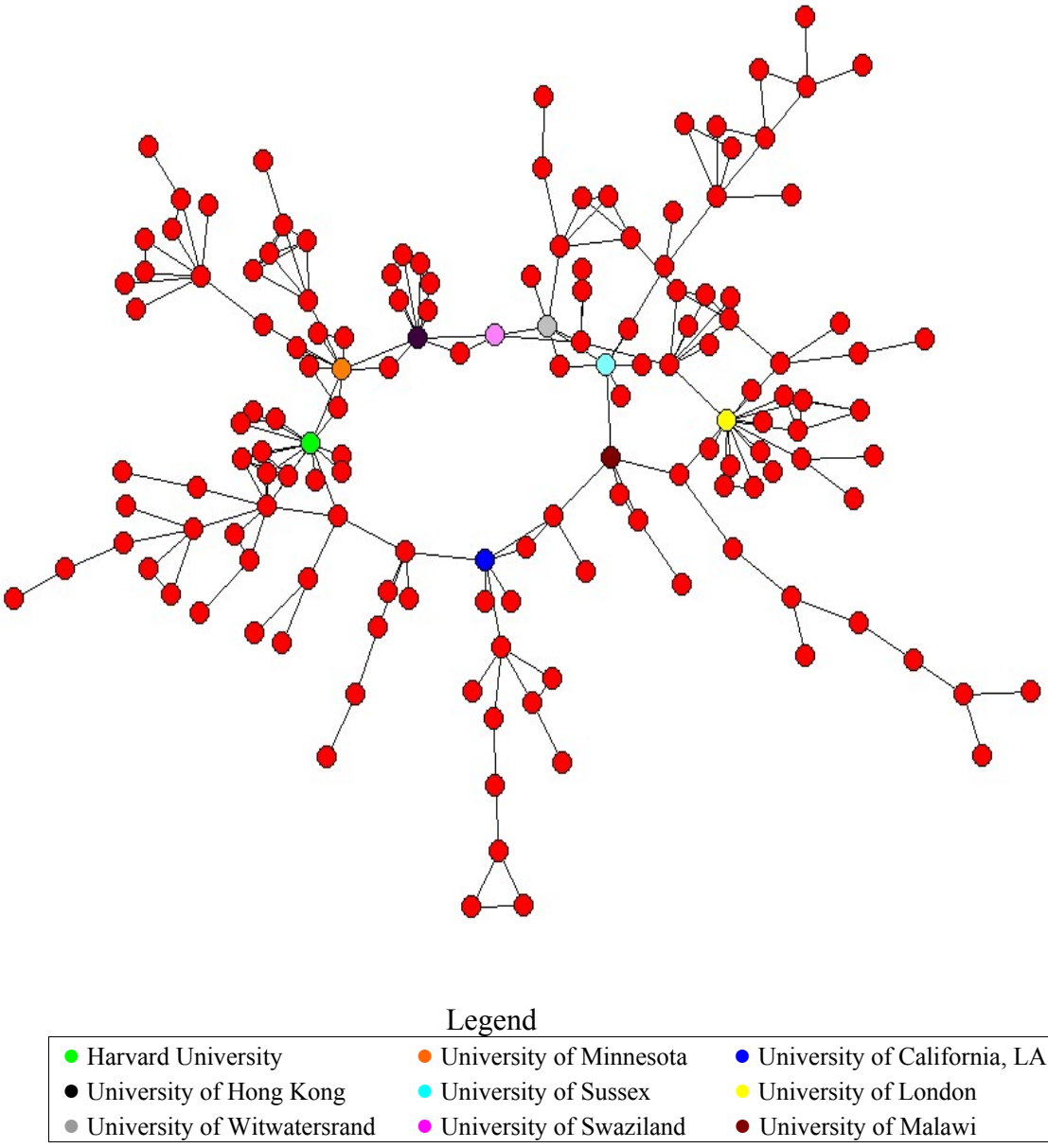

Figure 11. The largest component of the author-affiliated institution network (150 nodes) with 9 most central universities represented by different colors.

Network centrality suggests that more central nodes (in this case, institutions), possessing more and direct accesses to other actors and/or more advantageous positions in the network, may have greater power and influence than other network nodes (institutions) within the network. Three commonly used indices of centrality are degree, closeness and betweenness, as introduced in Chapter 3. These measures are most often highly correlated (Wasserman and Faust, 1994). Table 19 presents the institutions whose centrality measures are the highest within this institution network.

Within this large component in the institution network the nine universities in Table 19 likely have greater power/influence than other institutions in this component. Degree centrality indicates a greater number of ties to other institutions; closeness centrality indicates a greater ability to reach more institutions with fewer intermediaries; betweenness centrality indicates that these institutions lie between other institutions such that they may have a gate-keeping role in the flow of information throughout the component.

Table 19

Institutional Network Centrality: First 9 Most Central Institutions in the Largest Component

	Institutions	Degree	Closeness	Betweenness
Highest across all 3 indices	Harvard University (U.S)	10.1	20.4	27.9
	University of Minnesota (U.S)	6.7	21.4	39.8
	University of California, LA (U.S)	4.0	20.5	27.0
	University of Hong Kong (H.K)	6.7	21.6	33.8
	University of Sussex (U.K)	4.7	21.0	24.8
Highest in 2 of 3 indices	University of London (U.K)	10.1	*	26.3
	University of Witwatersrand (S. Africa)	4.0	21.7	*
	University of Swaziland (Swaziland)	*	21.9	30.0
	University of Malawi (Malawi)	*	21.3	28.9

Summary of Research Findings

This chapter has presented the descriptive author, institution and network findings that addressed the research questions dealing with detecting potential patterns in co-authorship network and author-affiliated institution network structures. In descriptive analysis, the study found that the majority (70%) of the articles in the top five journals of comparative/international education were published by sole authors and less than 10% of articles were published by more than three co-authors. Western countries, especially the U.K and the U.S, predominated the field in both the total number of authors who published in these journals in this time frame as well as the number of author-affiliated institutions. In addition, the country affiliation of authors published in each journal appears to be associated with the hosting country of the journal.

In network analysis, both co-authorship network and institution network are highly disconnected and primarily composed of small-sized sub-networks as a result of co-authorship of one or two articles. In co-authorship network, U.S and U.K authors are more involved in larger well-connected co-authoring networks than authors from other countries/regions. Within each component, the attribute of author country is well mixed, indicating that though collaboration among scholars of the field, though limited, is international. In addition, it is apparent that more productive authors tend appear to be more central within their network components. In institutional network, some institutions in the field appear to be more connected than others, indicating the sharing and flow of information are more intense in those well-connected institutions than others.

The following chapter provides a discussion of these findings. Theoretical and practical implications, limitations, and suggestions for future research are also addressed.

CHAPTER FIVE

DISCUSSION

Editorial peer-review came into being with the appearance of the first academic journals three hundred years ago (Zuckerman & Merton, 1971). Since the peer-review system was institutionalized in the 1940s, referees (editors and peer-reviewers) have been hailed as "gatekeepers of science" (Crane, 1967; Glogoff, 1988; Pipke, 1984), assuming the responsibility of conferring authority and authenticity upon new knowledge entering a discipline, and consequently the virtual roles as "social status judges" (Zuckerman & Merton, 1971) allocating rewards (tenure, salary, promotion, reputations, funding, ranking, etc.) to scholars as well as their affiliated institutions, based on their research performance (as measured primarily by journal publications). The significant role of editorial peer-review cannot be over-exaggerated, academically or socially.

The very basic tenet of the peer review system is its assumed objectivity: no factors other than the quality of the manuscript should be considered for decisions about paper acceptance. Bias in editorial peer review process, however, is inevitable. The constitution of the blind peer review mechanism is *itself* a simply undeniable acknowledgement of that fact. The question is not so much a bias per se, but the nature of the bias, the extent to which an article is published because of the bias, and how to detect bias with valid and reliable scientific methods.

This study was initiated to explore potential bias in the editorial peer-review system within the context of the field of comparative and international

education by examining the core peer-reviewed academic journal publications of the field through the lens of social network analysis. Published journal articles that have gone through the scrutiny of editorial peer review are presumed to be free of peer-review-related bias. Any such bias implies a decision based on some criteria unrelated to the quality of the article and, if in existence in the collaborations among scholars, may be captured and demonstrated through the methods of co-authorship network analysis as patterns of interactions. The potential patterns or lack of patterns in the co-authorship network and institution network provided empirical evidence to address the research questions. The overarching premise was that since editorial peer-review assumes the role as "Guardian of Science" (Daniel, 1993), a valid and reliable empirical inquiry into this quality control system of science will help ensure its compliance with its most basic tenet of objectivity.

Findings on Research Questions

To address the purpose of this study, the following three research questions were pursued:

1. To what extent do publication patterns generate a central core & periphery in terms of authors and author's institutional affiliations?
2. How can the potential publication patterns be explained?
3. How objective is the academic publication process in the field of Comparative/International education?

Author level network structure. The first research question examined the author-level network structure in terms of core and periphery. Data on articles

including co-authoring ties between authors in the top five peer-reviewed journals of comparative and international education 1994 – 2003 delineated a vivid social fabric of the field. At the author level, the extent to which co-authoring patterns generated a core/periphery structure can be readily seen in Figures 4 and 5. The entire co-authorship network is highly disconnected. There is no overall network-wide connection of nodes nor any centralization of some particular actors. The whole network of co-authors is composed of small isolated sub-networks that are formed primarily by multiple authors of one single article or by two or three small groups of authors joined together by their respective articles.

The overall lack of connections between authors and consequent absence of central figures indicate that in the field of comparative and international education the overwhelming majority of scholars tend to work independently with little apparent collaboration, and they publish in relative isolation. The field demonstrates the characteristics of a closed system where scholarly communications that allow for sharing of information, competence, and other resources appear non-existent or at least are very limited within small isolated groups of scholars. Given the potential intensity of modern research collaboration, one could have reasonably expected the international community of authors could have been more tightly knit than demonstrated, but the evidence provided by the network analysis does not support this belief. This apparent norm of the field is also confirmed by the fact that, of the total 1,234 articles published in the five journals in the ten-year time frame, over two-thirds (70%) of them were accomplished by one single author and less than 10% by more than two authors.

Whether intentional or unintentional, this preference of publishing articles by sole authors prompts one to wonder if this is a choice of the authors, referees (editors and peer reviewers), or the nature of the field. The answers to these questions will largely decide the nature of this evident norm of the field. Future research should also be carried out to see if the same norm also holds in other areas of science.

Institution level network structure. The first research question also addressed the network structure of core and periphery at the institution level. As demonstrated by Figures 10 and 11, the entire author-affiliated institution network can be considered to be formed by two parts. Nearly 60% of the network is made up of highly disconnected components of isolates, dyads and a few small-sized subgroups. The other 40% of the network, however, is a densely connected sub-network. Thus, the majority of institutions are not well connected to each other.

Further analysis on the composition of this largest cluster of institutions explains the core/periphery structure of the institutional network. Table 20 presents the 9 most central institutions (from Table 19) embedded in the network and compares them with the 10 most influential universities as listed in the study of Cook, Hite and Epstein (2004).

It can be seen that most (7 of 9) of the central network institutions are highly-reputed universities from Westernized countries/region. Three of the 9 most central universities (Harvard, UCLA, and Univ. of London) are also among the 10 most influential universities in the field of comparative education. Through collaborations with authors from other institutions/countries, elite scholars from the prestigious universities can take advantage of their central positions to

control, facilitate or optimize all sorts of resources, enhance their influence and power, and consequently increase their productivity. On the other hand, by being associated with scholars from the prominent universities, scholars from other institutions also receive the benefits of sharing hard-to-get resources, obtaining high visibility, and increasing their chance to be published.

Table 20

Comparison of the Most Central Universities and Most Influential Universities

The 10 Most Influential Universities in Comparative Education		The 9 Most Central Universities in Institution Network
Stanford University (U.S)		University of Sussex (U.K)
Columbia University (U.S)		University of Minnesota (U.S)
Harvard University (U.S)	↔↔↔↔↔↔↔↔	Harvard University (U.S)
University of Chicago (U.S)		University of Hong Kong (H.K)
University of California, LA (U.S)	↔↔↔↔↔↔↔↔	University of California, LA (U.S)
University of London Institute of Education and Kings College (U.K)	↔ ↔↔↔↔↔↔↔	University of London (U.K)
University of Pittsburgh (U.S)		University of Witwatersrand (S. Africa)
University of Toronto, Ontario Institute for Studies in Education (Canada)		University of Swaziland (Swaziland)
State University of New York—Buffalo (U.S)		University of Malawi (Malawi)
Florida State University (U.S)		

Note: The 10 most influential universities in Cook, Hite and Epstein (2004) are rank ordered; The 9 most central universities are not rank ordered.

Peer review bias. The third research question examined whether the academic publication process in the field of comparative/international education appears to be free of peer-review bias. This study specifically examined the network structure for patterns that might indicate bias in terms of author, gender, author-affiliated institution, country, number of articles published and number of journals in which the author published. The existence of suspected bias was defined as creating, through factors unrelated with the quality of the paper, the

opportunity for more publishing for certain authors over others. Publishing more articles would increase the potential for network degree centrality (number of co-author ties).

This study revealed no discernable patterns nor centralization in the co-authorship network. Therefore, no support exists for evidence of bias at the author level using the criterion of centrality. In the institution network, while some institutions were more central in the sub-network, no clear patterns were found to explain this centrality. This lack of patterns implies that no network-based evidence exists that the peer-review process in the five core academic journals of comparative and international education 1994 – 2003 is biased based upon the criterion of centrality. Thus, based on the results of this study, no reason exists to suspect the objectivity of peer-review process of the five core academic journals of comparative and international education 1994 – 2003.

However, given the high level of disconnectedness within the two networks, the analysis broadened beyond only network centrality which is based on co-authoring relationships. In doing so, further descriptive analyses did reveal patterns that are worth attention as they may suggest patterns that represent norms of the field and, thus, may suggest potential sources of bias.

1) Single-authored journal articles are the norm of the field of comparative and international education. This preference of the field is evident from the fact that 70% of all articles published in the five journals in the ten-year time frame were accomplished by one single author and less than 10% by more than two authors. It is not clear whether this preference is intentional (i.e. it is the choice of

the editors/peer reviewers) or unintentional (i.e. it is the choice decided by the nature of the field).

2) The field of comparative and international education is predominated by Western countries (in terms of both the number of authors and author-affiliated institutions), especially the U.K and the U.S. The study shows that nearly 70% of the total authors are from the first 10 most productive countries, the majority of them are Western countries. Europe and North America are the largest sources of authors and institutions in the five journals in the specified time frame. As shown in Tables 21 and 22, these two continents combined account for over 60% of total published authors and 57% of author-affiliated institutions in the five journals. The most typical representatives of those Western countries are the U.K and the U.S. As presented in Tables 10 and 17, these two countries make up over 40% of total authors and more than 30% of the total institutions, each leading the other countries by a considerable margin.

Table 21

Authors by Continent

Continent	Number of Authors	Percentage
Europe	497	37%
North America	320	24%
Africa	173	13%
Asia	172	13%
Oceania	77	6%
South America	35	3%
Central America	15	1%
International Org.	8	1%
Others	34	3%
Total	1331	100%

Table 22

Author-affiliated Institutions by Continent

Country	Number of Institutions	Percentage
Europe	187	33%
North America	138	24%
Asia	93	16%
Africa	65	11%
South America	19	6%
Central America	15	3%
Oceania	34	6%
Others	17	3%
Total	568	100%

3) Another obvious pattern is that journals in comparative/international education tend to publish more authors from the hosting countries of the journal. CER, for example, with its editors rotating exclusively among the U.S scholars, saw 45% of its published authors from the U.S, ten times as many as those from the U.K, the distant, but second largest contributing country. *Compare*, on the other hand, with all the U.K scholars as its editors, witnessed 32% of all published authors as the U.K scholars, compared to the 8% from the U.S. The exception to this pattern is *IRE,* which may be due to the fact that it is edited by the UNESCO Institute for Education with members of editorial board from diverse countries. *IRE*, in contrast, had a much wider range of author countries than any other four journals. In addition, *IRE* published fewer authors from the first 10 most frequent countries (41%) than the other four journals (range 57% - 77%).

Theoretical Implications

A good tool for exploring potential peer-review bias implicated by possible patterns in scholarly collaborations, co-authorship analysis achieves this goal by virtually examining the state of the field. Rich theories in network

analysis provided illuminating explanations to the findings of this study, which are presented in this section.

Network theory. A core aim of this study was to explore actor and institutional centrality in the co-authoring network under the assumption of a clear core/periphery structure (Borgatti and Everett, 1999). A network has a core/periphery structure if the network can be partitioned into two sets: a core whose members are densely tied to each other, and a periphery whose members have more ties to core members than to each other.

Social network theory asserts that an optimal social structure is one generated by building dense, interconnected networks (Coleman, 1988). In this study, however, the co-authorship network was highly fragmented. The entire network was composed of dozens of small-sized components and a myriad of dyads and triads, without any core figures in centralized positions. This high degree of fragmentation showed that the field of comparative and international education is likely in a state of lower levels of direct collaboration and lower degree of inter-exchange and, therefore, may not be moving forward as quickly as might otherwise be the case with higher direct collaboration between actors (Powell, Kogut & Smith-Doerr, 1996).

At the institutional level, though the overall network was also highly disconnected with 60% of nodes being isolates and small-sized components, a densely-connected cluster existed that constituted 40% of the nodes. This component indicates sufficient connectedness to expect network content to flow within this component. This finding suggests that while co-authoring ties

themselves do not create a core structure, many of these actors are co-authoring across institutions and, thus, creating a central set of institutional actors in the field. This centrality at the institutional level may be providing the structural means for the flow of network content within this field. Thus, the network findings suggest that the flow of information and collaboration in this field may demonstrate a two-tiered system. Formal co-authoring may be creating network conduits between institutions, while informal collaboration among actors within the institutions may be facilitating the flow of information between actors. As this study did not capture informal collaboration within institutions, future research should consider examining network relationships and content at both within and across institutions.

Peer-review bias. The findings do not suggest, based on the criterion of centrality, evidence of peer-review bias at the actor level among these journals in terms of gender, country, the number of articles published and the number of journals in which the author published. At the institutional level, despite the overall disconnectedness of the network, there was one cluster of nodes that were densely connected. Most of the institutions in centrality were from Westernized countries, as shown in Table 19.

It is clear that potential geographical implications were demonstrated at both author and institution levels. At the turn of the century (1994-2003), the field of comparative and international education was predominated by a so-called Euro-centric bias (Editorial Introduction, 2002). Many scholars in the field originated in the West, and many non-Western researchers were trained in Western institutions

(even those who were educated in their original countries were from countries/ regions (Hong Kong and South Africa) that for a long period of time were heavily influenced by a Western country). With the presence of this historical Eurocentric bias, the philosophical and theoretical norms and approaches of the field would likely be decided and directed by those of the West, and research interests would be, for the most part, motivated by the normative concerns to improve one's own educational system and modernist desires to help the undeveloped countries to achieve development (Editorial Introduction, 2002). Future research should further examine the evolution and the current patterns of this Eurocentric bias and how it may become the potential for bias based upon geographical regions.

Practical Implications

The findings of this study could from a practical standpoint enable scholars and involved institutions in the field of comparative and international education to be more aware of the current state of the field and make informed choices as they research and publish. Some potential practical implications of the findings are presented here.

Implications for authors. This study has shown that there was a serious lack of scholarly collaborations in the field of comparative and international education. Studies in social network analysis, however, have shown that by being a member of a rich and densely connected scholarly community, the actors (authors) of the network can not only enjoy the benefits of sharing information, ideas, skills, and other physical or economical resources, but also increase their visibility, productivity and publication quality (Coleman, 1988; Gomez-Mejia &

Balkin, 1992; Bordons & Gomez, 2000). Along with high visibility and productivity also comes the social capital built on reputation, recognition, critical influence and power in the field (McNamee & Willis, 1994; Stokes & Hartley, 1989). Authors in comparative and international education may need to be aware that the process of conducting and reporting research is a social process, the success of which depends more on the acquisition and accumulation of those components of social capital than individual personal characteristics (e.g., intelligence, hard work, etc.). Consciously creating and actively participating in an optimal scholarly network can help in the creation of higher social capital. Authors in the field may want to make efforts to consciously and strategically broaden their co-authoring network ties so as to take advantage of those benefits of networking that could ultimately benefit their academic career.

Authors in comparative and international education also need to be aware of the fact that single-authored journal articles are the norm of the field. This preference of the field may be unintentional, as a result of the nature of the field that requires little dependence on sophisticated and specialized expertise, equipment and management. On the other hand, this preference may be implicitly intentional as a consequence of the referees' judgments that sole-authored articles are of better quality. In either case, increased awareness of this facet of the field may help scholars to increase publications through sole authoring. Yet, while sole authoring is the most prevalent author structure for articles in the field, ironically, this very pattern may be minimizing the potential for increased social capital and knowledge creation within the field.

Authors of the field may also want to be sensitive to the dominance of Westernized countries and, consequently, a potential Eurocentric bias in the field. The dominance of scholars and institutions from Westernized countries in essence constitutes a critical influence in the field. This influence likely defines the philosophical norms and decides the theoretical themes of the field, thus directing the important research issues for the field. Scholars who are not from Westernized countries may be less aware of the accepted norms and orientations and, therefore, may have less chance of being published or of exerting influence to the development of the field. Thus, a challenging condition for non-western scholars may exist. Scholars who were educated and worked in the non-western countries would be especially vulnerable. Awareness of this potential bias may help them consciously choose to adapt to the dominant norms in reporting their research. A choice like this, however, may result in the field becoming increasingly homogenous reflecting westernized perspectives. For this field in particular, such increasing homogeneity would seem at odds to the goals of addressing education in a heterogeneous world. An interesting and illuminating variable to be included in similar studies in the future is the percentage of authors who were trained and worked in non-western countries.

Authors of the field may also need to be aware that journals tend to publish more authors from the country that hosts the journal. Awareness of this (intentional or unintentional) preference of the journal may help the authors with their choice of journals. However, again, as authors seek to publish in journals that are more likely to publish their articles given their country affiliation, this may also increase the homogeneity within journals.

Implications for institutions. Collaboration is as relevant for institutions as it is for scholars. The rich benefits reaped as a result of networking among scholars also apply to institutions. Policy makers and institutional administrators need to be aware of those advantages of collaboration and consciously promote a healthy growth of such networking to better serve the interests of the institution.

This study has shown that a two-tiered system of authors and institutions exists within the field. The central set of densely connected institutions in the institutional network was in sharp contrast to the isolated and disconnected actors in the author network. Thus, while formal co-authoring may be creating network conduits between institutions, collaboration within the field may be dependent upon informal collaboration among scholars within these institutions. Awareness of this two-tiered system may help institutional administrators foster both more formal links between the institutions as well as collaboration within the institution to facilitate the flow of information within the field.

Limitations

This research examined publication outcomes in the core journals of comparative and international education over a ten-year time span from 1994 to 2003. Several limitations of this study should be noted. First, this is an exploratory study that is designed to describe and explain potential patterns presented in journal publications. It is not a study to test theory, draw cause and effect relationships or make generalizations beyond the journals and specific years of study. Second, there is one validity issue to be noted when using co-authorships as an indicator of scientific collaboration. In the same way that

collaborations do not necessarily lead to co-authored papers, co-authorship may occur for reasons other than academic collaboration. In addition, even though writing is still an activity performed individually, collaborations in the field may very well be taking on other forms that cannot be measured by co-authorship analysis, such as participation in conferences and seminars, co-direction of theses and co-publishing of books or book chapters. More research is needed to gain insight into the different forms of research collaboration in the field. Third, only five journals of the discipline are included in this study. Since not all authors in the discipline are included in these journals, the conclusions of this study only reflect characteristics of scholars as demonstrated in these five journals. This delimitation may not result in representing an adequately broad base of knowledge production in the field as a whole, nor it can it represent the interactions among all authors of the field. Fourth, this study only covers journals published in the past ten years. Collaborations of authors outside this time frame were unfortunately excluded. The choice of the ten-year time frame was arbitrary so the findings may be biased as a result. Fifth, authors are not weighted by the order of authorship within in a co-authorship relation. As a result, all coauthor relationships are considered equally – which they very well might not be. Sixth, some information about the authors and institutions were not included in the analysis. For example, though best efforts were made, information about authors on the tenure stage, the institution where authors received their highest degree and total number of publications in five journals in the author's career life were incomplete and thus were not included in the analysis. One reason for this lack of

author data may be that the study only dealt with published authors in the specified ten-year period; some authors may have retired at the beginning of this time frame and their information was not available. Another reason has to do with the nature of the data. Tenure stage, for example, was not usually presented in the article, and professional vitas were not consistently found. In addition, the sheer number of authors (1,234) and their countries (81) added more difficulty in assessing the personal information of the authors. In terms of institutions, additional sources and criteria for ranking institutions, if available, would likely help add more information to the study. However, there is no universally-accepted ranking index for academic institutions in this field, and many institutions are international organizations (such as World Bank), for which ranking index is not really applicable.

Future Research

An extensive literature review has shown that no previous research has been conducted to detect peer review bias through the methods of social network analysis. Unlike previous studies on peer-review bias which predominantly focused on examining the process of peer review to detect bias, this study turned to the published journal articles that had gone through the scrutiny of editorial peer review and are presumed to be free of bias, using the methods of social network analysis. This study is the very first attempt ever made in this regard, and there is still much to do.

As stated in the limitation section, one validity question is to what extent co-authorship data reflects actual collaboration. Future studies should attempt to

clarify the relation between co-authorship analysis and actual research collaboration. This study has found no evidence on peer review bias within the ten-year time span. It also found that co-authorship networks were highly disconnected. Future research questions one could ask are: "Would this result also hold true if the same study was conducted for the ten years before (1982-1993) and the ten years (2004-2013) after this chosen time frame? How about for the combined 3 ten-year periods (1982-2013) together? " In addition, comparisons can be made to examine the evolution the network changes in different decades.

At the author level, previous research has shown that optimal networking helps the productivity and quality of scholar's research (Coleman, 1988; Gomez-Mejia & Balkin, 1992; Bordons and Gomez, 2000). Questions can be asked such as: "What are the characteristics of a scholar's optimal co-authoring network? Is there an optimal network structure given size, density and number of components?"

At the institutional level, future research should try to distinguish different levels of collaboration: inter-institutional versus intra-institutional, national and international. Questions can be asked as: "To what extent are collaboration patterns on the inter-institutional level similar or different from the intra-institutional level?" Similar questions can be asked for national and international comparisons.

Summary

This research was designed to explore potential bias in the editorial peer-review system within the context of the field of comparative and international

education through the methods of social network analysis. By examining data from the peer-reviewed academic articles published between 1994 and 2003 in the five core journals of the field, two networks (co-authorship network and institutional network) were created and analyzed. The primary tool used in the analysis was centrality. Focus was specifically given to the network structure for patterns that might indicate bias in terms of author, gender, author-affiliated institution, country, number of articles published and number of journals in which the author published.

Findings of this research revealed no discernable patterns nor network-wide centralization in either the co-authorship network or the institution network. This lack of patterns implied that no evidence exists that the peer-review process in the five core academic journals of comparative and international education 1994 – 2003 is biased based upon the criterion of centrality. Thus, based on the criterion of centrality no reason exists to suspect the objectivity of peer-review process of the five core academic journals of comparative and international education 1994 – 2003.

Further descriptive analyses, however, did reveal patterns that may represent norms of the field and, thus, may suggest potential sources of bias. Findings indicated that 1) scholars of the field tend to research independently and publish in relative isolation, and single-authored journal articles are the norm of the field; 2) the field is dominated by the scholars Westernized countries, especially the U.K and the U.S; and 3) journals of the field tend to publish more authors from the hosting countries of the journal.

The lack of active collaboration among scholars and institutions in the field of comparative and international education, regardless of its cause (either the intentional preference of referees or the unintentional nature of the field), indicates a field where scholars and institutions appear to be mutually closed to each other, and consequently the sharing of crucial resources (intellectual, physical, or financial), the flow of information and the acquisition and accumulation of social capital which are equally important to one's academic success, are limited. The dominance of scholars and institutions from Western countries and consequently the potential presence of a Eurocentric bias in the field may impose an unfair disadvantage to scholars from non-western countries and reinforce the homogeneity of the field.

This research is the first study that investigates peer-review bias by examining the published peer-reviewed journal articles, in the similar way that a quality control system is evaluated by inspecting the final product of a commodity on the market. Knowledge on the current state of the field may help scholars of the field make right choice and develop more successful pathway to increasing their publication. The questions raised here beg for further research given the limitations of this research. And there is still much more to do in detecting peer-review bias with social network analysis, to ensure that, objectivity, the very basic tenant of the peer review system of science, is constantly and carefully protected.

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