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Community Informatics is both a study and a practice that seeks to facilitate socioeconomic empowerment through the use of Information and Communication Technologies, such as the Internet. As a developing area of interdisciplinary scholarship, Community Informatics has not yet been defined in academic terms. Using a bibliometric method, the intention of this study is to reveal the scholarly influences for this emerging area of academic scholarship. In order to examine the foundations of this scholarly community, this study evaluated citation patterns from the first year of publication of *The Journal of Community Informatics*, the sole and seminal peer-reviewed serial publication in this research area. The results of this study make an important and necessary contribution that will help to more accurately characterize the intellectual home for Community Informatics.

Headings:

Bibliographical citations.

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Community life – Technological innovations.

Information technology – Social aspects.

Interdisciplinary research.

COMMUNITY INFORMATICS:
A BIBLIOMETRIC STUDY OF SCHOLARLY INFLUENCE

by
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Approved by

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INTRODUCTION

Community Informatics (CI) is both a study and a practice that seeks to facilitate socioeconomic empowerment through the use of Information and Communication Technologies (ICT), such as the Internet. As a developing area of interdisciplinary scholarship, CI has not yet been defined in academic terms. Using a bibliometric method, the intention of this study is to reveal the scholarly influences for this emerging area of academic scholarship. In order to examine the foundations of this scholarly community, this study evaluated citation patterns from the first year of publication of *The Journal of Community Informatics* (*JoCI*), the sole and seminal peer-reviewed serial publication in this research area.

The results of this study make an important and necessary contribution that will help to more accurately characterize the intellectual home for Community Informatics. Defining a subject area by its scholarly influences is valuable to both CI scholars and professional librarians. For academic researchers, the establishment of a field can influence tenure and promotion decisions. Moreover, it is essential for scholars to access information on the impact of their citations, particularly if works are cited in journals that are not indexed by the major citation analysis tools. The findings of this study also make an important contribution to librarianship. Collection development departments in academic libraries often find it difficult to build collections in interdisciplinary subject areas. The patterns revealed in this study will help librarians to better serve the unique needs of CI research at their institutions.

LITERATURE REVIEW

DEFINING COMMUNITY INFORMATICS

Research, teaching and engagement in the field of Community Informatics are all very recent practices. The subject area is still in the developmental phases of establishment within academic disciplines and institutions. Therefore, current literature often discusses the scope and definition for this area of scholarship at great length. A comprehensive definition for CI emerged in a call for papers at the 2001 "Informing Science and Information Technology Conference" (2001):

> "The term Community Informatics (CI) refers to an emerging area of research and practice, focusing on the use of Information Technology (IT) by human communities. It links economic and social development at the community level with emerging opportunities in such areas as electronic commerce, community and civic networks, electronic democracy, self-help, advocacy, and cultural enhancement. CI brings together the concepts of Information Technologies (IT) and information systems with the concept of community development. As an area of research, CI is a growing body of theory underlying one of the most exciting phenomena of the last decade, namely the diffusion and use of Internet technologies within communities."

As part of the National Science Foundation "Digital Society and Technologies Program," Bieber, Civille, Gurstein, and White (2002) articulated the philosophical foundation of CI as an area of interdisciplinary research and practice supporting human development, democracy, citizenship, individual freedoms, privacy, the free expression of ideas, and the obligation to both personal and community health and well-being. Gurstein (2000) and Tacci (2004) affirm that CI is primarily dedicated to incorporating individuals and groups who are normally excluded from the benefits of Information and

Communications Technologies (ICT) into the processes of development and use of such systems.

CI strives to better understand how information is created, distributed, accessed and shared in communities. Therefore, social networking theory also greatly influences the principles of CI. Wellman's (2003) theory of "networked individualism" argues that the nature of the social ties people establish and maintain using ICT changes from what used to be door-to-door and place-to-place relationships to what are now person-to-person and role-to-role relationships. Modern ICT allows human interaction to flow between the physical and the virtual in what Castells (2004) designates, the "space of flows." Consequently, CI research and inquiry are often informed by studies of human interaction and networking behaviors.

CI utilizes Information Technologies (IT) and systems in order to benefit community development, therefore sociological issues are a vital component of CI research. As economic and democratic activity increasingly move into the electronic sphere, some fear that the stratification between those who have access, knowledge and skills required for ICT use, and those who do not, will greatly increase, creating a formidable barrier to economic advancement (Hampton, 2003; Gurstein, 2000; Janowski, Van Selm & Hollander, 2001). The literature contends that the use of ICT is directly linked to foregoing access to such technologies. Accordingly, Meredyth, Ewing and Thomas (2004) found that an individual's use of ICT was consistent with an orientation to broader participation in economic, educational, social and cultural life. Clement and Shade's (2000) metaphor of the "Access Rainbow" outlines that consideration of access occurs at many levels in the development of a CI project. Access to IT and related systems is

fundamentally affected by carriage services, devices, software tools, content, service providers, literacy and social facilitation, and governance. Gurstein (2003) adds that access also includes the ability to actively create and disseminate information, making users producers, as well as consumers, of information. Gurstein's contention is that supportive educational and organizational structures are essential factors affecting effective use of ICT. This blend of technology within socioeconomic and sociopolitical contexts calls for a unique blend of academic disciplinary influences.

Examining the academic influences of this subject area has not been a priority in CI scholarly inquiry thus far. There are a few reasons for the gap in the literature in this aspect of CI research. First, CI is still in the earliest stages of development as an area of research. The use of ICT, namely the Internet, is a relatively new practice and enhancing the understanding of its potential uses is still quite young in terms of academic study. Appropriately, it appears that scholars are more interested in the development of research at this point than evaluating the origin of ideas. In part, this is due to the predominant method of action research in CI, which is an iterative process that is focused on practice, rather than theory. Action research is defined as:

> "a cyclical, iterative process of action and reflection on and in action. ... [which] include[s] active learning, searching, problem solving and collaborative inquiry. However, action research is more systematic, rigorous, scrutinisable, verifiable, and always made public" (Zuber-Skerritt, 2001).

Using an action research methodology rarely results in an analysis of the study itself. Lastly, it is important to note that CI research often falls outside the scope of traditional academic disciplines. This can create a whole host of problems for a scholar in terms of jurisdictional paradigm and time management. Such issues that befall many interdisciplinary subject areas can result in decreased motivation for meta analysis.

DEFINING INTERDISCIPLINARY SUBJECT AREAS

Historically, disciplines in academia have had definable boundaries. However, by nature, interdisciplinary subject areas cross, blend and mix the boundaries of physical location and traditional disciplines in an attempt to synthesize the traditional and the non-traditional. For this reason, the examination of new interdisciplinary subject areas, such as CI, has been of great interest to academic scholars. Early studies on the development of scholarly inquiry have significantly influenced the way in which researchers think about emerging subject areas. Kuhn (1962) termed the emergence and development of new areas of research as "paradigms." The communities of practice, like the small, interconnected CI community, that contributed to the creation and growth of these paradigms also fell within the scope of Kuhn's research. Price's (1963, 1970) studies of communication between scientists have also contributed a great deal to this line of research, as he coined the infamous phrase "invisible colleges." According to Price, "invisible colleges" are a set of informal communication networks between scholars with common research interests. Like those involved in CI research, scholars that collaborate across differing institutions, departments and geographic locations make up an "invisible college." Furthermore, Crane (1972) defines "invisible colleges" as scholarly communities unbound by geography or discipline, but rather linked by a shared set of interests and research goals. There could not be a more precise definition for the network of CI researchers and practitioners.

Issues related to defining interdisciplinary subject areas have been of particular interest in the field of library science. Klein (1996) notes that academic librarians are concerned with how to collect and disseminate resources and materials that support

interdisciplinary studies. Clayton (1985) and Klein (1996) further note that a great deal of interdisciplinary work is "concealed," taking place behind the "subject facade" of traditional disciplines. Academic librarians whose collections ignore interdisciplinary scholarship at institutions where scholars are engaged in interdisciplinary research, are not adequately serving the research needs of their patrons (Michalski & Taub, 2001; Searing 1996). The current study is important for this purpose because it will help librarians to identify whether CI research takes place at their institutions, which will, in turn, influence collection development, access and dissemination decisions.

A three-part study of Cultural Studies offers an example of how library science methods can be used to measure interdisciplinarity. Using a bibliometric method to study authorship characteristics of monographs classified as "Cultural Studies" by two prominent academic presses, the researchers found that "there is no prototypical model for these academic centers; instead they vary from university to university, each employing a different balance of departmental affiliated faculty, and each focusing on different subject areas" (Michalski et al., 2001). It will be interesting to see whether the affiliations of CI researchers follow a similar pattern.

CHALLENGES FOR DEFINING COMMUNITY INFORMATICS

Like most other interdisciplinary subject areas, CI is difficult to define because its research transcends such wide academic and geographic boundaries. However, the newness of this area of research contributes to the principal barriers and challenges for the current study. CI largely studies the potential uses for ICT, which have only been commonly used since the dawn of the Internet. Moreover, Michalski et al. (2001) expresses the difficultly in defining an area of research, multidisciplinary in origin, that is

dependent upon evolving technologies, terminologies, and paradigms, which is precisely the case for the study of ICT application. As an emerging, interdisciplinary area of research, CI challenges traditionally entrenched institutional and departmental boundaries in the academic community. Lattuca (2001) asserts that academic disciplines and their institutional departments are defined by their problems, methods, research practices and bodies of knowledge. The expectations of many academic disciplines can prevent scholars from pursuing research in this area.

As a result of both the expectations and limitations of academic affiliations as well as the currency of the topic, the rules and roles that underlay the interdisciplinary approach to research are still limited in CI. Therefore, no previous studies have analyzed the intellectual origins, or established the intellectual framework of CI. This study hopes to fill the existing gap.

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Bauer (1990) found that disciplinary boundary crossing in research production is tremendously difficult and often impossible. Perper (1989) echoes these findings, and noted further difficulties for interdisciplinary researchers in the peer review process. Prior to the foundation of The *Journal of Community Informatics*, a peer-reviewed, online open access journal, interdisciplinary barriers to scholarly publication in CI were pronounced. *JoCI* was established in 2004 in order to create a space for CI in the academic environment. The Community Informatics Research Network (2007), an international network of CI researchers, practitioners and policy makers, sponsors and publishes *JoCI*. The narrow scope of this serial publication-- CI research and practice,

allows scholars in this area to differentiate from their traditional home disciplines, and find common ground with other researchers outside of those disciplines,

> "CI is a point of convergence concerning the use of ICTs for diverse stakeholders, including community activists, nonprofit groups, policymakers, users/citizens, and the range of academics working across (and integrating) disciplines as diverse as Information Studies, Management, Computer Science, Social Work, Planning and Development Studies" (The Journal of Community Informatics).

This outlet for scholarly research related to CI makes for a fitting unit of analysis for the current study.

METHODOLOGY

An evaluative bibliometric method, citation analysis, as defined by Potter (1988) was conducted on articles published in the first year of publication for *JoCI*. This method was chosen in order examine the character of CI as an emerging interdisciplinary area of action research. Garfield (1983) found that citation analysis helps to define emerging disciplines, such as CI, by analyzing relationships between citations and revealing the interdisciplinary nature of related research. Michalski et al. (2001) echoed the value of this method as a means to uncover both the "research patterns of scholars, and the state of particular disciplinary discourses."

This particular serial publication was chosen for two reasons. First, *JoCI* is the recognized repository of publications related to CI, an emerging area of research that draws from various academic disciplines. Scholars in this field often publish in their own home disciplines, however this journal provides a means for researchers and practitioners to share knowledge from across the academic spectrum. Secondly, *JoCI* began publication in 2004, at the early stages of this emerging research area. In order to study the foundations of CI during its evolutionary development, the timing of publication is of great import. Therefore, citations from the first year of *JoCI's* publication, from 2004-2005, were examined.

JoCI is a peer reviewed open access journal, managed by Open Journal Systems, a journal management and publishing system dedicated to open access. This serial, which is published three times a year, is not indexed in ISI Web of Science, which is a

commonly used database for bibliometric analysis. Therefore, citation data for the four issues published in the years 2004 and 2005 was collected manually. Each issue of JoCI has four sections: "Editorial," "Points of View," "Articles" and "Notes and cases from the field (practitioners)." The "Article" section was chosen as the unit of analysis due to the academic nature of articles published in this section. For the current study, the following information was collected from the references of the "Article" sections published between 2004 and 2005:

a) Authorship

Information on the authors was recorded in order to reveal the most commonly cited scholars in the field of CI.

b) Article Title (if applicable)

Article titles were recorded to determine the influential works in this area of research.

c) Monograph Title (if applicable)

Monograph titles were recorded to determine the influential works in this area of research.

d) Journal Name (if applicable)

The periodical or journal name was recorded in order to determine which journals have published the most articles that have contributed to the foundations of CI.

e) Year of Publication

Publication date is helpful in determining the currency of research in this subject area.

The ultimate intention of this study was to better understand the intellectual home of CI by revealing the academic affiliations of authors cited in *JoCI* articles. By determining the academic and departmental affiliations of commonly cited scholars in

JoCI articles from 2004-2005, this community of practice will gain a more holistic picture of the origins of this field, and begin to solidify the metrics and the foundation for the evolution of CI into the future. Choi (1988) conducted an author affiliation study in anthropology, often cited in the literature, which provides a model for categorizing author affiliation by distributing authors of journal articles according to departmental affiliation. The current study took a similar approach. Buchanan & Herubel (1997) believe that bibliometric investigations into institutional affiliations allow practitioners a historical perspective on the development of an area of research. For the purpose of this study, scholars were defined as individual authors who were cited at least twice in *JoCI* articles for the period between 2004 and 2005.

Considering the time frame of this study, authors who had been cited at least two times were given greater standing, and provided a more representative sample of the variety of disciplines that contributed to *JoCI* and ultimately, this area of research. Hooydonk's (1998) fractional counting method has influenced how researchers handle multiauthored publications. Using this method, the weight of production is divided equally between authors. Due to the collaborative nature of research and practice in CI, the current study incorporated all authors singularly and jointly listed for each cited article or monograph, rather than focusing solely on first authors. Corporate or governmental authored publications fall outside the scope of this study, and therefore were not included.

For authors who have been cited at least twice in *JoCI*, information on their academic and departmental affiliations was collected in one of three ways. First, author affiliations were collected by searching for each author's curriculum vitae (CV) using

search engines (i.e. Google, Yahoo). Second, for CV that were not readily available on the free web, affiliations were found on up-to-date personal websites or institutional websites. Thirdly, and in the event that neither of these methods proved successful, the information was requested directly from the author via email. Email messages sent to cited authors requested information on institutional and departmental affiliation for the range of years cited in *JoCI*. The following information was collected from free information on the web, or through direct correspondence with authors:

a) Institution

Author's institution references, at the time of publication, were recorded in order to determine which institutions supported foundational research for CI. For authors who had multiple institutional appointments, academic affiliations were used.

b) Department

Academic department affiliations were recorded, in order to determine the intellectual home of CI. Department names were coded with the most specific of the following department categories: agriculture, business, communication, Community Informatics, computer science, development, economics, education, geography, history, humanities, law, liberal arts, library and information science, management, nursing, planning, political science, psychology, public policy, research institute, social sciences, sociology or technology.

RESULTS

This exploratory bibliometric study evaluated citations from the four issues of *JoCI* published between 2004 and 2005. Citations from 29 articles comprised the original data set. However, the primary data analyzed in this study consisted only of citations from authors who were cited at least twice- 581 authors. In total, 34 parties were removed from the data set because the authors were corporate, governmental or non-profit in origin, rather than individual. As Figure 1 demonstrates, individual authors are the dominating trend for cited articles in *JoCI*. Six 6 citations were pulled from the data because they were identified as citing the wrong person. As a result, the remaining 541 citations were evaluated for the purposes of this study.

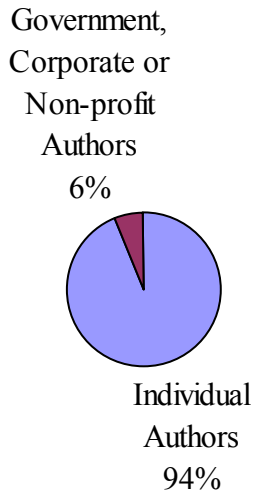

Figure 1. Type of Authors Cited

The results of this study revealed the authors who were most cited in *JoCI* during the 2004-2005 period. As *JoCI* is the only existing repository for scholarly publication in this area, it can be inferred that the most cited authors, articles and monographs which populated this data set provided the intellectual metrics and foundations for this area of research. Appendix A identifies the names of authors who were cited at least twice during the 2004-2005 period, and the frequency of citations. The author names are ranked in order of the number of citations. Figure 2 demonstrates the top ten most cited authors. Michael Gurstein and Barry Wellman were the most cited authors during the first year of publication of *JoCI*. Appendices B and C display the articles and monograph that are cited at least twice in *JoCI* literature from 2004-2005, respectively. Gurstein's "Effective Use: A Community Informatics Strategy Beyond the Digital Divide" was the most cited article, while Community informatics: Enabling communities with information and communication technologies was the most cited monograph. It must be noted that the accuracy of article and monograph citations is entirely dependent upon the citation provided by *JoCI* article authors. (See Appendix A for list of authors cited. See Appendix B for list of most cited articles. See Appendix C for list of most cited monographs.)

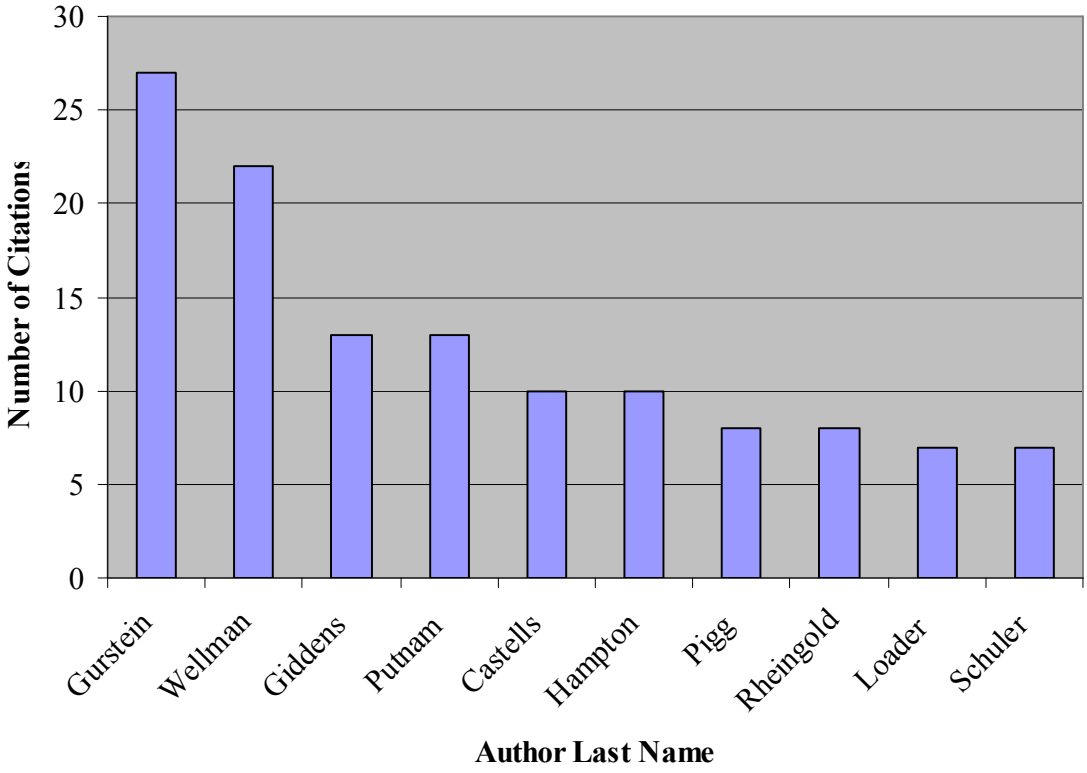

Figure 2. Top 10 Most Cited Authors

An analysis of journal titles was also conducted on article citations. 61 journal titles were cited in *JoCI* during 2004-2005. Table 1 lists the journal titles that were cited at least twice in the literature, while Figure 3 demonstrates the top ten journal titles. *American Behavioral Scientist* was the most cited serial publication in *JoCI* from 2004-2005.

Journal Title	**Number of Citations**
American Behavioral Scientist	9
First Monday	7
Journal of Community Informatics	7
The Information Society	7
Information, Communication & Society	5
American Psychologist	4
Organization Science	4
American Journal of Sociology	3
Annual Review of Sociology	3
Rural Sociology	3
Academy of Management Journal	2
Information Technology & People	2
Internet Research: Electronic Networking Applications and Policy	2
Journal of Applied Behavioral Science	2
Journal of Democracy	2
The American Prospect Inc	2

Table 1. Most Cited Journal Titles

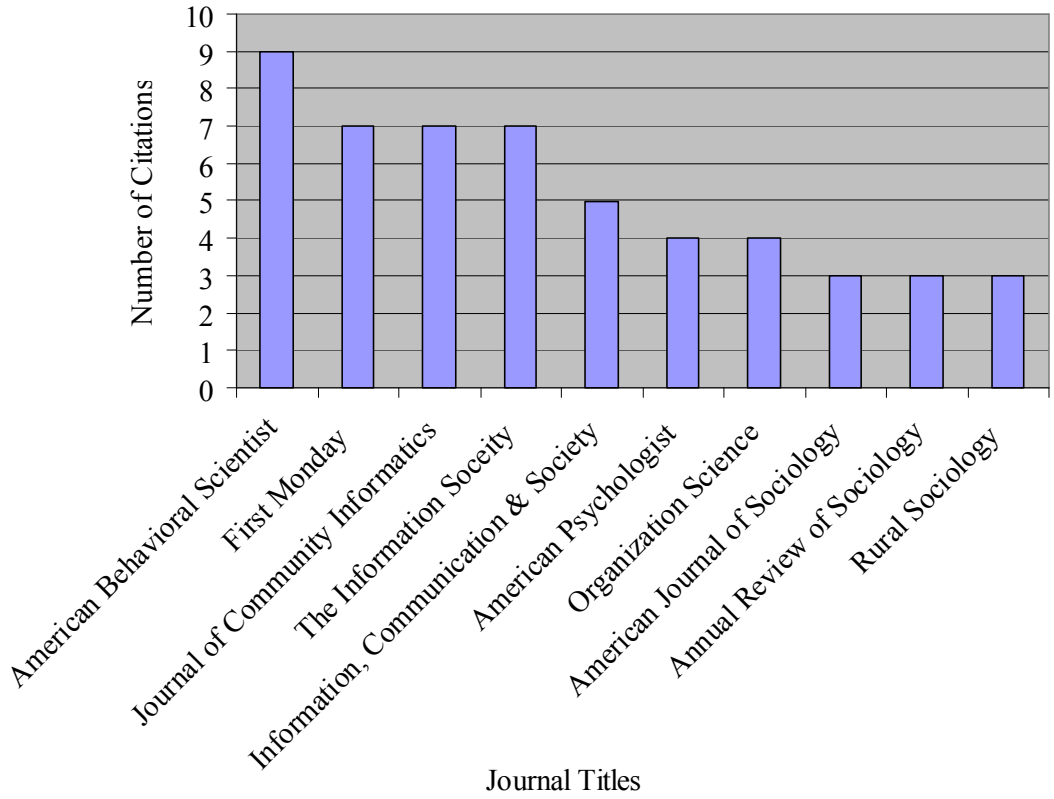

Figure 3. Top 10 Most Cited Journal Titles

This study also looked at the institutional and departmental affiliations and citations in *JoCI* for academic and non-academic scholars. Of the 541 citations in the data set, author affiliation data was available for in excess of 98% of citations. At the time each cited article was published, of authors had an academic affiliation, 80% of authors had an academic affiliation, just under 19% had a corporate, governmental or non-profit affiliation, and just 1% were independent scholars who had no formal affiliation.

Appendix D lists the academic institutional affiliations for authors evaluated in this study, and Figure 4 identifies the top academic affiliations for authors cited in *JoCI*

between 2004 and 2005. The highest number of author citations from a single academic institution come from the University of Toronto. (See Appendix D for list of academic institutional affiliations.)

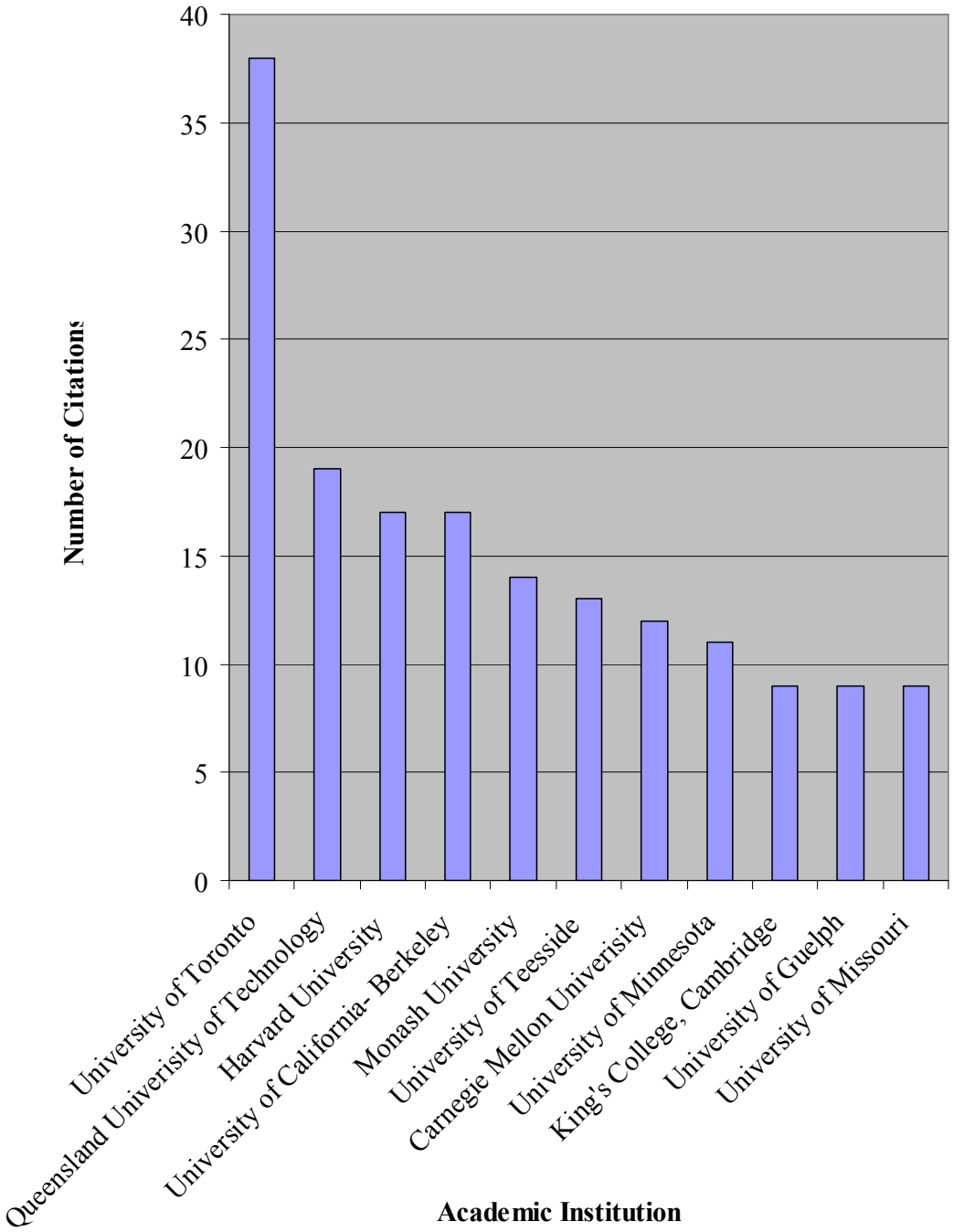

Figure 4. Top Academic Affiliations

Appendix E lists the non-academic institutional affiliations for authors cited in *JoCI* in 2004 and 2005. The Centre for Community Informatics Research, Development and Training (CCIRDT) sponsored the highest number of non-academic cited authors, as shown in Figure 5. (See Appendix E for list of non-academic institutional affiliations.)

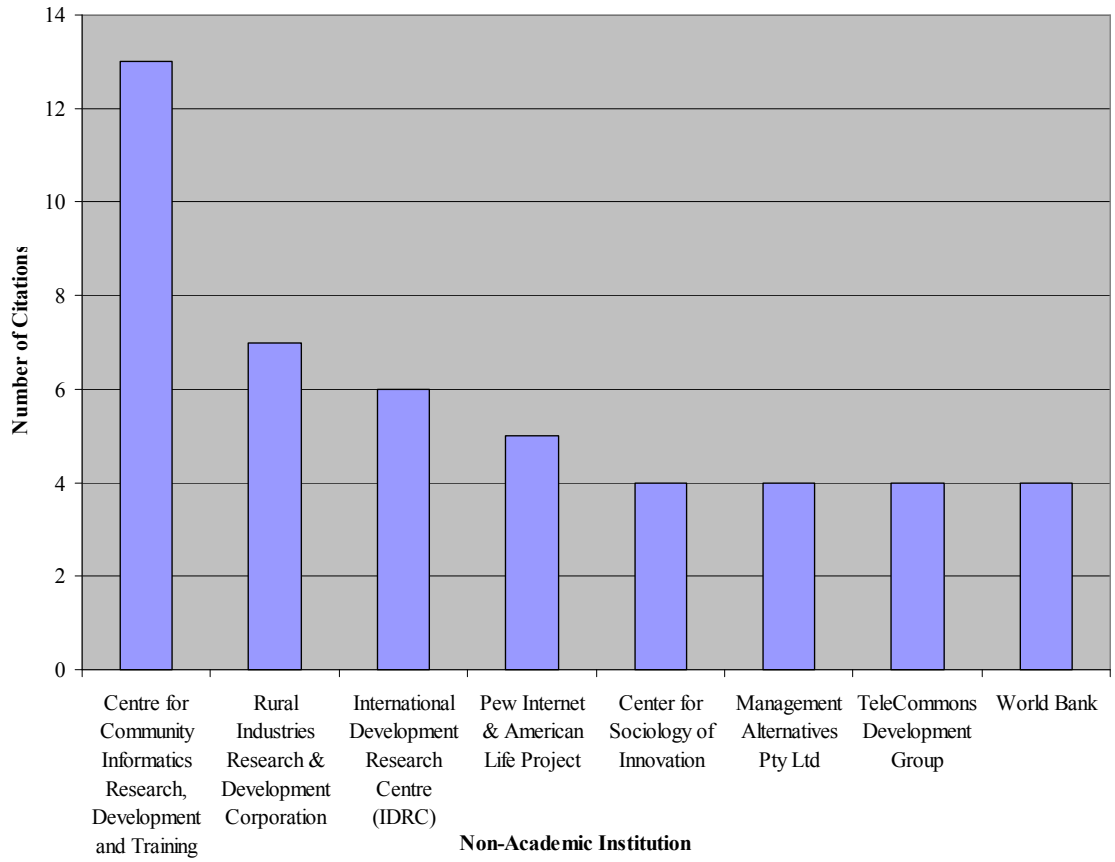

Figure 5. Top Non-Academic Affiliations

Departmental affiliation data was examined for all authors with an academic institutional relationship. Table 2 lists the department codes used to define each departmental affiliation, as well as the percentage of authors from the corresponding department. As seen in Figure 6, the largest proportion of authors were affiliated with the following academic disciplines: sociology, communication, library and information

science, management, research institute, public policy, computer science, psychology, business, development, technology and Community Informatics.

Department Code	Percentage Represented
Sociology	24.40%
Communication	11.20%
Library and Information Science	11%
Management	7.50%
Research Institute	7%
Public Policy	5.60%
Computer Science	4.70%
Psychology	4.20%
Business	3.70%
Development	2.60%
Technology	2.60%
Community Informatics	2.30%
Education	1.40%
Political Science	1.40%
Social Sciences	1.40%
Planning	1.20%
History	0.94%
Law	0.94%
Liberal Arts	0.94%
Agriculture	0.47%
Economics	0.47%
Geography	0.47%
Nursing	0.47%
Humanities	0.23%

Table 2. Departmental Affiliations

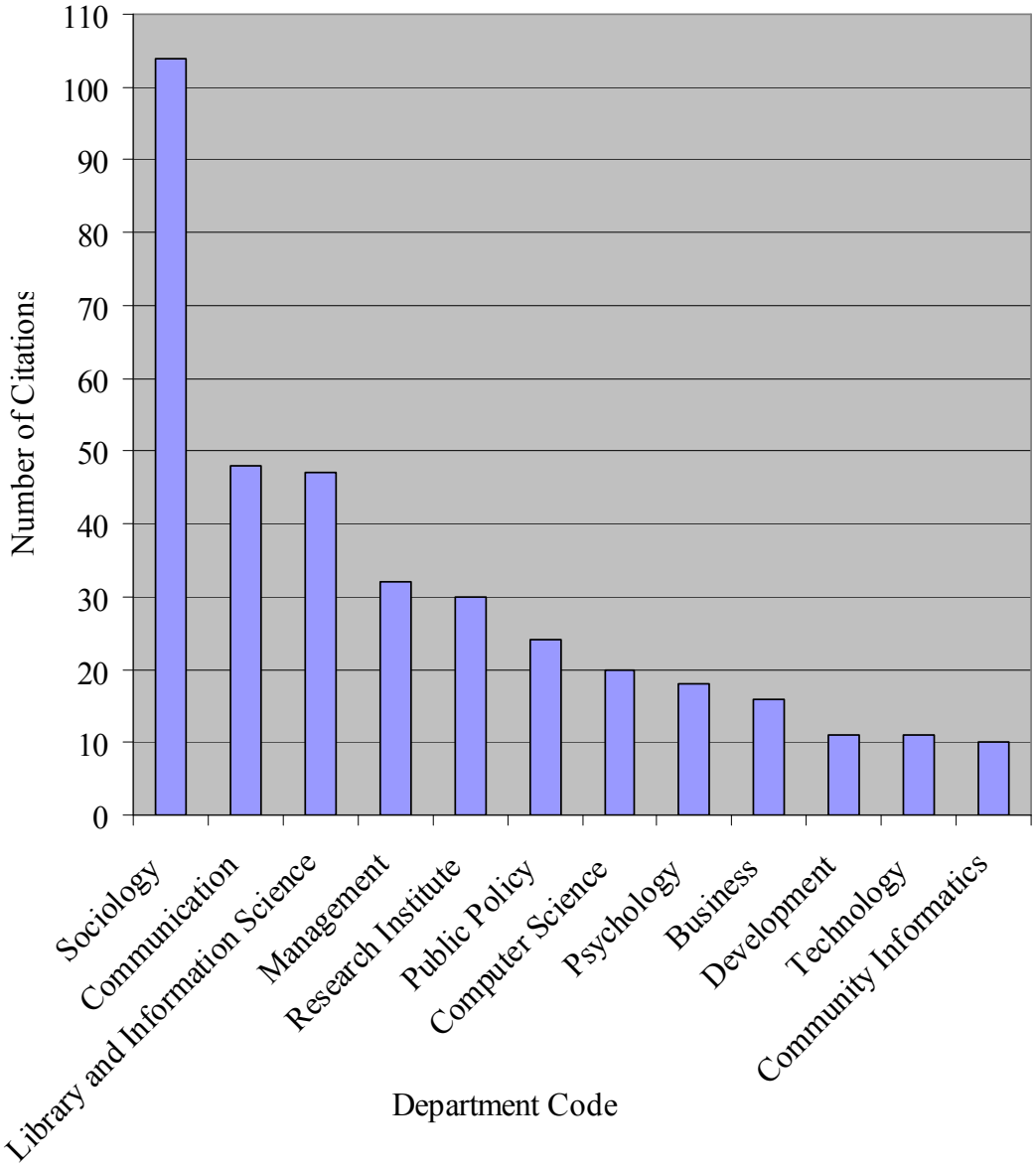

Figure 6: Top Academic Departmental Affiliations

Most of the articles or monographs cited in *JoCI* between 2004 and 2005 were published during, or after, the year 2000, as seen in Figure 7.

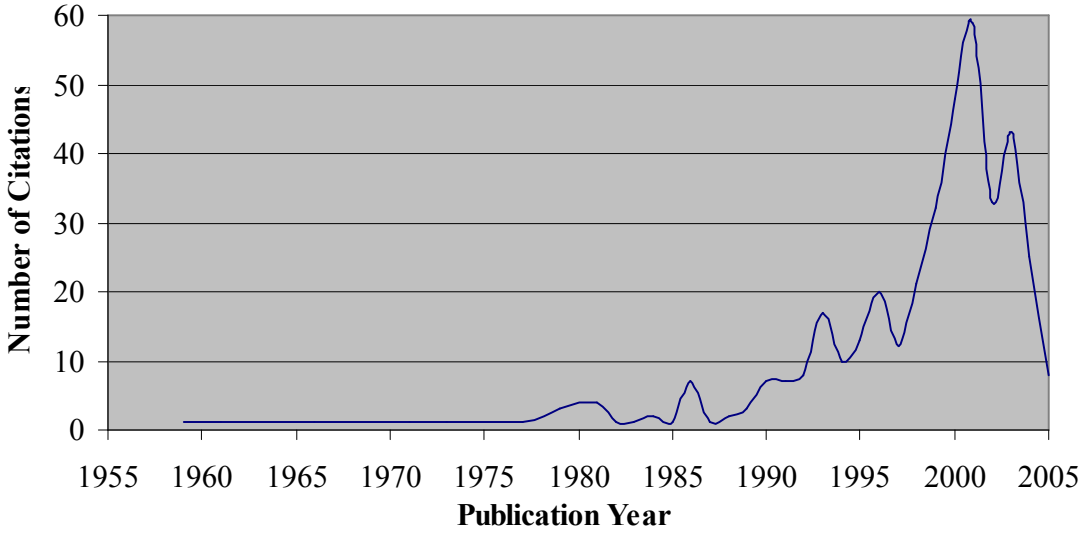

Figure 7. Citations per Publication Year

DISCUSSION

The framework for this analysis was designed for identifying trends in the emerging area of CI. The findings of this study provide key insight to the citation patterns and scholarly influences of CI scholarship.

For authors cited in articles from *JoCI* during the 2004-2005 period, authors with academic affiliations dominated the frequency of citation, and were cited more than authors affiliated with government, corporate or non-profit institutions. Considering the fact that most individual authors were affiliated with specific academic institutions, this is not terribly surprising. The publication expectations for academic scholars in terms of publication tend to be more pronounced and demanding than with other institutions. However, by the nature of the field, CI research and practice is largely dependent upon governmental policies, collaborations and partnerships with non-profit sponsors. It would not be unreasonable to expect scholarship in this area to draw from such sources accordingly. Corporate, governmental and non-profit reports are often structured and defined within the particular paradigms of the institutional funding sources and practices, making published information, even that which is public, difficult to find, access or interpret even for expert researchers. This is likely a contributing factor when scholars decide who and what to cite.

This study revealed the most influential authors, articles and monographs for scholarly research published in the first year of *JoCI* publication. The works of Dr. Michael Gurstein, Executive Director of the Centre for Community Informatics,

Research, Development & Training (CCIRDT) and Chief Editor for *The Journal of Community Informatics*, largely influenced the development of CI as a scholarly subject area (CCIRDT 2006). 93% of the articles examined in this study cited a work by Dr. Gurstein. Dr. Barry Wellman, Professor of Sociology and Director of NetLab at the University of Toronto, also made an impressive impact on CI, specifically in relation to social networking theory (Wellman 2006). 76% of the articles analyzed in this study cited a work by Dr. Wellman. Moreover, because this study only examined citations that were cited by at least two *JoCI* articles, the remaining influential authors, articles and monographs revealed other influences that are shared in this scholarly community.

JoCI is currently the only recognized space for serious publication in this specific area of research and practice. However, the most cited journal titles expose the other communities of practice CI scholars from which draw. *American Behavioral Scientist* was the most cited journal title discovered in this study. An interdisciplinary journal, the *American Behavioral Scientist,* analyzes a range of topics including "sociology, international and U.S. politics, behavioral sciences, communication and media, economics, education, ethnic and racial studies, terrorism, and public service" (SAGE Publications, 2006). Sharing similar research ideas and goals, CI is a diverse interdisciplinary subject area that covers many of the same topics as this journal. Subsequently, it can be expected that scholars who publish in *JoCI* and scholars who publish in *American Behavioral Scientist* will provide reciprocal citations for one another's work.

As previously stated, due to research expectations, most authors cited in *JoCI* during the 2004-2005 period were affiliated with academic institutions. The highest

number of academics cited in this collection of *JoCI* articles were affiliated with the University of Toronto, Toronto, Canada and Queensland University of Technology, Brisbane, Australia. Seeing that 81% of the authors affiliated with the University of Toronto were also affiliated with that institution's Department of Sociology, it can be inferred that the department's "Networks and Community" specialization is chiefly responsible for this influence on CI literature (University of Toronto Sociology). Departmental affiliations among cited authors from Queensland University of Technology are much more diverse. The relationship between Queensland University of Technology and National ICT Australia (NICTA) may influence CI publication frequency. NICTA is a national research organization that focuses on innovations in ICT and associated research. This partnership provides doctoral training opportunities for emerging ICT researchers at Queensland University of Technology (NICTA, 2008a; NICTA, 2008b).

In terms of academic disciplinary affiliation, the largest body of research cited in *JoCI* is linked with the science of sociology. According to the Oxford English Dictionary (2008), sociology is

> "the science or study of the origin, history, and constitution of human society; social science. Also, the study of social organization and institutions and of collective behaviour and interaction, including the individual's relationship to the group."

CI focuses on how ICT can be used to advance human communities and communication. Appropriately, when conducting related research, CI scholars draw upon the knowledge of a field that specializes in social organization and behavior.

Furthermore, this study found that the disciplines of communication, and library and information science also significantly influence research in CI. The study of human

interaction from the field of communication and the studies of human-computer or human-information interactions from library and information science, can be easily applied to the goals and principles of CI.

For authors affiliated with non-academic institutions, the CCIRDT was the most frequently cited institution. All of those citations were associated with the work of Dr. Michael Gurstein, one of the main contributors to CI research.

The results of this study also revealed the reliance on current research in CI scholarship. Articles published in either 2004 or 2005 in *JoCI* most often cited works published in the year 2000. This means that scholars today are defining current research based largely upon that which has been published within a prior four or five year period. Due to the fact that the study of CI is dependent upon evolving technologies, it makes sense that the principal foundations of the discipline as revealed in citation patterns, are predominantly retrospective.

LIMITATIONS AND FUTURE RESEARCH

Although valuable data has been collected using this methodology, it has its limitations, the primary one being that only scholars who are actively publishing in this area of research were included in the study. Therefore, researchers and practitioners who practice, yet do not publish, in the field were not considered. This study could be appropriately aligned with future research on the activities of practitioners and scholars who are practicing the principles of CI. Secondly, it is important to consider that scholars in interdisciplinary fields, although influenced by a variety of perspectives, still create a niche in their home discipline since "scholars associated with an interdisciplinary field will have a deep understanding of their core area and their departmental subjects but may lack a broad understanding of the interdisciplinary field as a whole" (Dobson et al., 1996). Moreover, Spanner's (2001) survey of the information-seeking behaviors of interdisciplinary scholars found that "Twenty-one (91%) of the respondents expressed difficulties in adapting to the vocabularies and culture of their non-affiliate disciplines." Such behaviors surely have an impact on publication in CI. For example, researchers and practitioners in the health sciences are likely to be concerned with CI-related issues, but are far more likely to turn to medical publications due to their training and interests.

The most common drawback in bibliometric studies is that citations are not always accurate or representative of a researcher's scholarly influenced. Mis-cited works could not always be detected during data collection, creating a margin of error. An assessment of six medical journals found that errors in citation of reference occurred in

24% of the sampled citations (DeLacy, Record & Wade, 1985). Furthermore, eight percent of the mis-cited references included in this study prevented the researcher from identifying the accurate source of the citation. Another limitation is that the community of practitioners for CI crosses international and linguistic boundaries. Authors cited in *JoCI* publish in a wide range of disciplines and languages, resulting in diverse publishing practices. Narin (1976) has found that different disciplines vary in terms of citation rates. In a study of physics papers, Irvine (1985) discovered that scholars from different countries have divergent rates of citation. Moreover, it is important to note that many citations in *JoCI* are in a variety of languages, many of which the author of this study could not read. Therefore, errors may be present due to incomplete translations for all citations. Lastly, as others have noted, with bibliometric studies, patterns of self-citation can skew results (Lawani, 1982; Fowler, 2007).

It is recommended that future bibliometric study on the scholarly influences of CI expand upon the current study. In order to track the changing influences over time, a similar analysis conducted on a broader date range of JoCI articles would help to create a more comprehensive illustration of the intellectual home for CI. Drawing from the results of this study, future research could also focus on the scholarly influences of the seminal authors in this field. For example, the examination of the citation behaviors of Gurstein and Wellman, may help CI better understand the academic development of this subject area.

CONCLUSION

Exploratory in nature, the purpose of this study was to reveal patterns in Community Informatics scholarship. These findings will hopefully help this area of research to recognize its foundation and building blocks, its scholarly influences, its value to the work of seminal scholars and works that inspire future CI research, and it provides the paradigm which lays the groundwork for future bibliometric research on emerging interdisciplinary subjects. The works and institutions highlighted in this study may provide leadership for this emerging area of research and practice in CI. Moreover, this type of information may also help to develop a core list of publications for CI for the development of future coursework or library collections.

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APPENDIX

Appendix A

Last Name	First Name	Number of Citations
Gurstein	Michael	27
Wellman	Barry	22
Giddens	A	13
Putnam	R	13
Castells	Manuel	10
Hampton	Keith	10
Pigg	Ken	8
Rheingold	Howard	8
Loader	Brian	7
Schuler	Douglas	7
Haythornthwaite	Caroline	6
Lazarus	RS	6
Taylor	Wal	6
Keeble	Leigh	5
Kiesler	Sara	5
Menou	Michel	5
Onyx	Jenny	5
Poole	MS	5
Quan-Haase	A	5
Simpson	L	5
Upward	F	5
Bullen	P	4
Day	Peter	4
De Cindio	Flora	4
DeSanctis	Gerardine	4
Guila	Milena	4
Kling	Robert	4
Kraut	Robert	4
Latour	Bruno	4
Lennie	June	4
Page	Margaret	4
Ramirez	Ricardo	4
Riley	TB	4

Shade	Leslie Regan	4
Warschauer	Mark	4
Avolio	BJ	3
Bass	BM	3
Benjamin	P	3
Boyte	H	3
Callon	M	3
Clement	Andrew	3
Colle	Royal	3
Fineman	S	3
Finquelievich	S	3
Goleman	D	3
Gomez	R	3
Groves	J	3
Hargittai	Ezter	3
Hartel	CEJ	3
Harvey	David	3
Heeks	R	3
Hunt	P	3
Kavanaugh	AL	3
Levy	P	3
Malina	A	3
O'Neil	D	3
Orlikowski	WJ	3
Portes	A	3
Rainie	L	3
Ripamonti	LA	3
Rogers	Everett	3
Schauder	DE	3
Stoecker	R	3
Sutton	RI	3
Wilkinson	KP	3
Witte	J	3
Woolcock	M	3
Zerbe	WJ	3
Aitkin	Helen	2
Ashkanasy	N.M.	2
Barlow	JP	2

Baudrillard	J	2
Bennett	Katy	2
Bieber	Michael	2
Biocca	F	2
Boal	IA	2
Boneva	B	2
Civille	R	2
Coleman	JS	2
Connell	D	2
Corbin	Juliet	2
Crank	L	2
Cutforth	N	2
Da Rin	J	2
Daws	L	2
Donohue	P	2
Duncan	OD	2
Dutton	William	2
Evans	SM	2
Feenberg	A	2
Fernback	J	2
Flora	C	2
Granqvist	M	2
Hague	Barry	2
Harris	R	2
Heim	M	2
Hunter	A	2
Izard	CE	2
Johanson	G	2
Jones	M	2
Jung	JY	2
Jupp	V	2
Kautz	K	2
Kora	Galin	2
Kretzman	JP	2
Kubicek	Herbert	2
Kwak	N	2
Lamoureux	E	2
Lanvin	B	2
Larsen	EA	2

Law	J	2
Lundmark	V	2
Marullo	S	2
Mayer	JD	2
McIver	William	2
McKnight	JL	2
Mosco	Vincent	2
Mumby	DK	2
Musgrave	S	2
Naranyan	Deepa	2
Norris	Pippa	2
Nyden	PW	2
Odasz	F	2
Parham	D.	2
Patterson	S	2
Pfeffer	J	2
Pinder	A	2
Pitkin	B	2
Prahalad	CK	2
Preece	Jenny	2
Proenza	FJ	2
Putnam	LL	2
Rafaeli	Anat	2
Reddick	A	2
Resnick	P	2
Richardson	Don	2
Rideout	Vanda	2
Roman	R	2
Romm	Celia	2
Salovey	P	2
Scherlis	W	2
Schryer	F	2
Scott	A	2
Scott	M	2
Seinen	A	2
Sher	JP	2
Shergold	P	2
Shields	Peter	2
Slater	Don	2

Smith	G	2
Smith	MA	2
Stafeev	S	2
Stewart	J	2
Stillman	L	2
Stoll	Klaus	2
Strand	K	2
Strauss	Anselm	2
Venkatesh	Murali	2
Wall	E	2
Weick	KE	2
Weiss	HM	2
Weissberg	JL	2
Wenger	E	2
White	Nancy	2
Winner	L	2
Winter	I	2
Wood	L	2

Most Cited Authors

Appendix B

Article Title	First Author Last Name	First Author First Name	Number of Citations
Effective Use: A Community Informatics Strategy Beyond the Digital Divide	Gurstein	M	6
Community Informatics, Community Networks and Strategies for Flexible Networking	Gurstein	M	3
Learning about Information Technologies and Social Change: The Contribution of Social Informatics	Kling	Rob	3
Applications of Community Informatics for Building Community and Enhancing Civil Society	Pigg	Ken	3
Net Surfers don't ride alone: virtual communities as communities	Wellman	B	3
A white paper exploring research trends and issues in the emerging field of community informatics	Bieber	M	2
Capturing the complexity in advanced technology use: adaptive structuration theory	DeSanctis	Gerardine	2
Assessing ICT efforts in marginalized regions from a critical social viewpoint. Learning from the case of Lincos in Dominican Republic	Granqvist	M	2
Community Innovation and Community Informatics: Building national innovation capacity from the bottom up.	Gurstein	M	2
Examining community in the digital neighbourhood: Early results from Canada's wired suburb	Hampton	K	2
Netville online and offline: Observing and surveying a wired suburb	Hampton	K	2
Research Partnerships to Support Rural Communities in Malaysia With Information and Communication Technologies.	Harris	R	2

The Impact of Community Computer Networks on Social Capital and Community Involvement	Kavanaugh	AL	2
Internet paradox: A social technology that reduces social involvement and psychological well-being.	Kraut	R	2
The Potential of PAR and Participatory Evaluation for Increasing the Sustainability and Success of Community Development Initiatives Using New Communication Technologies	Lennie	June	2
A Community Informatics for the Information Society	McIver	William	2
Assessing community informatics: a review of methodological approaches for evaluating community networks and community technology centers	O'Neil	Dara	2
Measuring Social Capital in Five Communities	Onyx	J	2
Measuring Social Capital in Five Communities in NSW: A Practitioner's Guide	Onyx	J	2
The Duality of Technology: Rethinking the Concept of Technology in Organizations	Orlikowski	WJ	2
Building community social capital: The potential and promise of information and communications technologies.	Pigg	K	2
Social Capital: Its Origins and Applications in Modern Sociology	Portes	A	2
Bowling alone: America’s declining social capital	Putnam	RD	2
Tuning in, tuning out: The strange disappearance of social capital in America.	Putnam	RD	2
Capitalizing on the Internet: Social contact, civic engagement, and sense of community	Quan Haase	A	2

Community engagement, performance measurement and sustainability: Experiences from Canadian community based networks.	Ramirez	Ricardo	2
Beyond Bowling Together: SocioTechnical Capital	Resnick	P	2
The Community Network Lifecycle: A Framework for Research and Action	Venkatesh	Murali	2
Getting the goods on social capital	Wall	E	2

Most Cited Articles

Appendix C

Monograph Title	First Author/Editor Last Name	First Author/Editor First Name	Number of Citations
Community informatics: Enabling communities with information and communication technologies	Gurstein	Michael	7
Community informatics: Shaping computer mediated social relations	Keeble	Leigh	6
The Virtual Community: Homesteading on the Electronic Frontier	Rheingold	Howard	5
Bowling alone: The collapse and revival of American community.	Putnam	Robert	4
New community networks: Wired for change.	Schuler	Douglas	4
Communities in Cyberspace	Kollock	Peter	3
Diffusion of Innovations	Everett	Rogers	3
Technology and Social Inclusion: Rethinking the Digital Divide.	Warschauer	Mark	3
The Rise of the Network Society.	Castells	Manuel	3
Basics of qualitative research : Techniques and procedures for developing grounded theory.	Strauss	Anselm	2
Building Communities From The Inside Out.	Kretzmann	John	2
Building Community: Social Science in Action.	Nyden	Philip	2

Digital Cities: Technologies, Experiences, and Future Perspectives	Ishida	Toru	2
Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide	Norris	Pippa	2
Free spaces: the sources of democratic change in America	Evans	Sara	2
Making democracy work: Civic traditions in modern Italy	Putnam	Robert	2
Managing IT/Community Partnerships in the 21st Century	Lazar	Jonathan	2
Networks in the global village: Life in contemporary communities.	Wellman	Barry	2
Online Communities: Designing Usability, Supporting Sociability	Preece	Jenny	2
Shaping the Network Society: The New Role of Civil Society in Cyberspace.	Schuler	Douglas	2
Social Capital and Public Policy in Australia	Winter	Ian	2
Society on the Line: Information Politics in the Digital Age	Dutton	William	2
Telecentre Evaluation and Research: A Global Perspective.	Gomez	Ricardo	2
The Internet Galaxy: Reflections On The Internet, Business, And Society.	Castells	Manuel	2

Most Cited Monographs

Appendix D

Academic Institution	Number of Citations
University of Toronto	38
Queensland University of Technology	19
Harvard University	17
University of California- Berkeley	17
Monash University	14
University of Teesside	13
Carnegie Mellon University	12
University of Minnesota	11
King's College, Cambridge	9
University of Guelph	9
University of Missouri	9
Massachusetts Institute of Technology	8
Evergreen State College	7
New Jersey Institute of Technology	7
Technical University of British Columbia	7
Università degli Studi di Milano	7
University of Michigan	7
Cape Peninsula University of Technology	6
Purdue University	6
SUNY- Binghampton	6

University of Illinois at Urbana-Champaign	6
University of Paris	6
City University, London	5
Northwestern University	5
Stanford University	5
University of Technology	5
Carleton University	4
Cornell University	4
Indiana University	4
London School of Economics and Political Science	4
University of Brighton	4
University of Bristol	4
University of California- Irvine	4
University of Glasgow	4
Clemson University	3
École des Mines de Paris	3
Georgia Tech Research Institute	3
Pennsylvania State University	3
Rutgers University	3
University of Bath	3
University of Buenos Aires	3
University of Calgary	3

University of California- Los Angeles	3
University of Manchester	3
University of Ottawa	3
University of the Witwatersrand	3
Virginia Tech	3
Australian and New Zealand School of Government	2
Blackpool and The Fylde College	2
City University Hong Kong	2
Copenhagen Business School	2
Georgetown University	2
Hebrew University of Jerusalem	2
Hood College	2
Loyola University Chicago	2
Malmö University	2
Middlesex County College	2
Nanterre University	2
Newcastle University	2
Princeton University	2
Rensselaer Polytechnic Institute	2
San Francisco State University	2
San Jose State University	2
Syracuse University	2

Union Institute	2
University of Bremen	2
University of California- San Francisco	2
University of Canterbury	2
University of Central Queensland	2
University of Chicago	2
University of Colorado- Boulder	2
University of Delaware	2
University of Denver	2
University of Edinburgh	2
University of Maryland Baltimore County	2
University of New Brunswick	2
University of New Hampshire	2
University of Pittsburgh	2
University of Queensland	2
University of Southern California	2
University of Tokyo	2
University of Toledo	2
Yale University	2
Art Center College of Design	1
Bowling Green State University	1
Iowa State University	1

Keele University	1
Lancaster University	1
McGill University	1
Ohio State University	1
Simon Fraser University	1
University College of Cape Breton	1
University of London	1
University of Wisconsin	1
Virginia Polytechnic	1
Western University Missouri	1

Academic Institutional Affiliations

Appendix E

Non-Academic Institution	Number of Citations
Centre for Community Informatics Research, Development and Training	13
Rural Industries Research & Development Corporation	7
International Development Research Centre (IDRC)	6
Pew Internet & American Life Project	5
Center for Sociology of Innovation	4
Management Alternatives Pty Ltd	4
TeleCommons Development Group	4
World Bank	4
Accenture	2
American Academy of Arts and Sciences	2
Andersen Consulting	2
Aston Charities Community Involvement Unit	2
Australian Institute of Family Studies	2
Canadian Internet Registration Authority	2
Centre of Community Networking and Information Policy Studies, Russia	2
e-Envoy	2
Electronic Frontier Foundation	2
Full Circle Associates	2
Fundacion Chasquinet	2
Gartner Lee Limited	2

International Teledemocracy Centre (ITC)	2
Investment Centre of the Food and Agriculture Organization of the United Nations	2
National Research Council Institute for Information Technology	2
Productivity Commission, Australia	2
Rural Education and Development, Inc.	2
U.S. Agency for International Development	2
Women Connect	2
Institute for Research on Learning	1
Itech-Research	1
Microsoft Research	1
Russel Sage Foundation	1

Non-Academic Institutional Affiliations