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# An Analysis of Research Article Productivity by Telecommunication Scholars Over the Past Decade

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**T**HE study of scholarly research productivity has emerged as a distinctive area of inquiry in the communication field (e.g., Burroughs, Christophel, Ady, & McGreal, 1989; Schweitzer, 1988). Yet, although communication technologies are rapidly affecting the organizations and contexts in which our students work and live, the current level of scholarship addressing new telecommunication technologies remains relatively modest. Researchers (Vincent, 1991; Atkin, 1996) note that new media technology accounts for only a small portion (below 10%) of all research addressing telecommunication in the U.S.

Most scholars choose to focus instead on traditional applications in broadcasting and film. The present study is designed to 1) establish a research norm for telecommunication studies, 2) outline topical foci of that research, particularly the portion attributable to emerging technologies, and 3) identify communication scholars who are relatively more productive in writing articles on the telecommunication area.

Such applications are needed if communications programs are to meet the needs of students in an increasingly "hi-tech" job market where, for instance, journalism and promotional communication professionals rely increasingly on the Internet as an information source. Studies of telecommunication research can help discern and predict the uses and influences of new technologies in the field (Holmes & Rice, 1997; Rice, 1986). By incorporating these perspectives into their pedagogy and research, communication educators can better prepare their students for the changes this technology brings to the workplace.

Thus, at a time when some communication programs have come under attack from more established disciplines in the academy (e.g., Atkin, 1996; Atwater, 1993), telecommunication research might help bolster the rationale for enhancing communication programs. Such work can help document the centrality of communication to our emerging information economy, during a decade that has seen expenditures for computing and communications surpass those for industrial, mining, farming and construction sectors. Media examples

include advertising, electronic media, publishing and film industries—all projected to be among the top 20 career growth areas beyond the year 2000—and all of which are being revolutionized by multimedia technology and expanding telecommunication channels (Berko et al., 1994).

Similar productivity research has been conducted in a wide range of academic disciplines (e.g., Graham & Diamond, 1996; Laband, 1985), as peer-reviewed journals are now considered the “standard outlet” for new research (Vincent, 1991). One recent study noted that, over the past 40 years, the number of authors of scientific papers has steadily increased, doubling from 1.8 per paper in 1955 to 3.5 today (McDonald, 1995).<sup>1</sup> A cross-disciplinary survey of career productivity in journals (*Chronicle*, 1996) found that 27.6% of faculty had no publications, with remaining frequencies following in a roughly descending order: 1-2 articles (18.3%), 3-4 articles (18.3%), 5-10 articles (15.2%), 11-20 articles (10.8%), 21-50 articles (9.9%) and 50 or more (5.8%).<sup>2</sup>

When considering comparable output measures within the communication discipline, it's apparent that the study of research productivity subsumes a growing range of methods and subfields. According to national surveys, roughly 30% of undergraduate enrollment is in the areas of interpersonal/speech and organizational communication, while the bulk pursue a general or mass communication focus (Berko et al., 1995; Becker & Graf, 1995). Communication scholars have addressed article productivity in such subfields as journalism (Cole & Bowers, 1973), advertising (Soley & Reid, 1988), mass communication (e.g., Schweitzer, 1988) and telecommunication (Vincent, 1991).

Ratings methodologies range from perceptual peer surveys (Edwards & Barker, 1984; Edwards, Watson & Barker, 1988; *U.S. News & World Report*, 1996) to empirical analyses of productivity by institution (Vincent, 1984; Watson, Barker, Ray, & Hall, 1988) and individual scholars (Schweitzer, 1988; Vincent, 1991). Edwards et al. (1988) found that peer ratings correlate positively with publication records, with faculty salaries, and with other objective measures of departmental quality.

Others (Glasser & Goldstein, 1996) have criticized some peer surveys for 1) overly inclusive or unqualified panels of evaluators, 2) low response rates, and 3) poorly specified evaluation criteria. Such shortcomings can lead to biased ratings based on large faculty/alumni voting blocks or vague denotations of overall school prestige, as when *U.S. News* ranked Stanford's “radio-television” program among the top five nationally, even though they offered no such program. Francese (1996) goes on to note that surveys published in *Time*, *Newsweek*, and the like are rather vulgar, and that high ratings guarantee neither sound programs nor good professors.

Alma College's survey of 158 college presidents serving as *U.S. News* respondents revealed that 84% were unfamiliar with some programs being evaluated (*Chronicle*, 1997). Graham and Diamond (1996) conclude that such reputational surveys are too “soft” to provide a reliable basis of academic quality. Their own findings, based on fellowship awards and journal productivity data across a decade, did not correlate well with reputational surveys. Results among public schools, for instance, indicate that U.C. Santa Barbara is the second ranked school (behind Berkeley), despite receiving lower reputational rankings.

Focusing on productivity of individual communication scholars, Hickson, Stacks and Amsbury (1989) found the median and modal number of listings per author (1915-1985) was 1; the mean was 1.86. Booth-Butterfield (1987) notes that one article a year in speech communication journals is superior, while the overwhelming majority (95%) of publishing researchers produced three or fewer publications from 1981-1985. The top 1% of scholars each produced eight or more articles during this five year period. Scholars who rank highest in article productivity tend to reside at departments located within large, state supported schools with a tradition of research (King & Baran, 1981; Schweitzer, 1988).

Hickson et al. (1993) found that a “productive,” currently active scholar is one who has

published six or more times in his or her career, in journals listed in the SCA Index; such output would place one in the top 5% of all publishers. Similarly, Schweitzer (1988) notes that faculty from 15% of U.S. communication programs account for nearly 60% of articles published. Hickson's (1991) analysis of prolific mass communication scholars (1924-1985) suggests that only 2% had more than 10 citations. He found that citations were unevenly spread across the four journals analyzed: *Journalism Quarterly* (57% of articles), *Journal of Communication* (25%), *Journal of Broadcasting & Electronic Media* (17%) and a relatively newer journal, *Critical Studies in Mass Communication* (1%).

Vincent's longitudinal analysis of institutional output revealed that numerous institutional moves among the top 36 ranked scholars contributed to changes in school rankings. This may help explain Burroughs et al.'s (1989) finding that departments reach peaks, but find it somewhat difficult to stay at those lofty levels.

While Hickson et al. (1989, 1993) did not formally consider the influence of rank, their study of prolific communication scholars suggests that most have published while still in graduate school. Vincent's studies also indicate that assistant professors are doing most of the publishing, followed by associate and finally full professors. Schweitzer (1988) did not, however, find productivity differences by rank. Given the heightened pressure lower level faculty feel to "publish or perish," we expect them to be the most productive group here.

As Schweitzer (1988) notes, individual faculty may be interested in the results of productivity studies as a gauge of their own standing in the discipline. In addition, such information is widely used for internal and external purposes by institutions which find themselves highly ranked (Greenberg & Schweitzer, 1989), including student recruitment and external fundraising.

Vincent (1991) concludes that more prolific scholars generally receive "higher salaries, larger salary increments, faster promotion, and more 'upper-level' classes to teach than those who publish less" (p. 840). He further endorses journal productivity as the least biased productivity measure, noting that book publishing and editorial board appointments are more indicative of collegial recognition, and do not relate well to journal publication activity.

Burroughs et al. (1989) nevertheless caution that no single indicator of quality is sufficient for making an important judgment about any given program. Greenberg and Schweitzer (1989) discuss controversies involving past productivity studies, where author rankings may be altered by different journal configurations or omission of important work appearing in book chapters and the like. Even the method of counting author credit can greatly influence rankings. Allocating fractional consideration for coauthored pieces might limit any inflation accompanying a scholar involved with several research teams. Yet such "parceling" of credit could also dilute the contributions made by research team leaders, especially faculty mentors who are more "generous" in sharing authorship with students. Fractional methods are also more open to error, as when scholars (e.g., Bradley Greenberg) were inadvertently omitted from Schweitzer's (1988) list of nationally ranked scholars, owing to tabulation errors (see Greenberg and Schweitzer, 1989).

Focusing on topical emphases, Hickson et al. (1989, 1993) found that mass communication journals were not among those patronized most frequently by top speech scholars, and mass communication scholars were less likely to use speech-oriented journals. For that reason, this study addresses a sample of journals with a focus on mass or telecommunication (see Vincent, 1991).

Although Vincent's study provides useful information on the broader telecommunication domain studied here, its scope extends only through the 1980s, and excludes important journal offerings in such allied areas as telematics and policy. As with most productivity studies, it examines a relatively short (five-year) time span.<sup>3</sup> The present study assesses scholarly productivity in telecommunication-oriented journals from 1985-1995.

## METHOD

Although several productivity studies (e.g., Hickson et al., 1989) rely upon the *Index to Journals in Communication*, this study pursues an interdisciplinary focus on research addressing telecommunication. It is necessary, then, to consult the journal issues themselves as primary sources.

Telecommunication can be defined as "mediated communication across a distance." We apply that definition and consider work addressing electronic media and film, as found in articles ranging in scope from social science to law/policy and economics. Although our topical focus is not directly comparable to past such work, it most closely approximates Vincent's (1991) analysis of scholarly productivity in telecommunication.

Consistent with past work, we consider only articles written by authors with U.S. academic affiliations in communication programs (e.g., departments, schools or colleges of communication, radio-TV, mass media, advertising, business communication, journalism, media studies, speech and the like). Our study frame yielded 2,315 author citations over an eleven-year period.

Sixteen journals were selected for this analysis. Our intention was to examine the more prestigious, national-level journals with an emphasis on media, particularly telecommunications. Most were listed among publications with the highest number of telecommunication authorship credits, according to Vincent's (1991) study. Conversely, journals carrying relatively few articles with a mass communication focus, according to past work, were excluded (e.g., *Quarterly Journal of Speech*).

The following criterion journals were included from previous studies: *Communication Research*, *Critical Studies in Mass Communication*, *Communication Monographs*, *Human Communication Research*, *Journalism Quarterly*, *Journalism Monographs*, *Journal of Advertising Research*, *Journal of Advertising*, *Journal of the Association for Communication Administration*, *Journal of Broadcasting & Electronic Media*, *Mass Comm Review*, *Journal of Communication* and *Communication Education*. Three other journals, focusing on telecommunication policy, were also added: *Journal of Media Economics*, *Telecommunication Policy* and *Telematics & Informatics*. Journal issues published from Spring 1985 through Winter 1995 were analyzed. The final 1995 issue of one journal was not available as of this writing.<sup>4</sup>

Consistent with past studies, all articles were coded, including research briefs. Editorials, book reviews and invited pieces were excluded. Articles with a primary emphasis on telecommunication were selected, as identified in the title or the article's first two paragraphs (see Vincent, 1991). Thus, all articles appearing in *Journal of Broadcasting & Electronic Media* and *Telecommunication Policy* were included provided they met the aforementioned authorship criteria. Articles that mention telecommunication media only in passing, as is the case with "media systems" overviews, would not meet our criterion definition.

With regard to topical focus, the study includes articles addressing traditional broadcast radio and TV, as well as film and emerging electronic media (e.g., cable, DBS, VCR, teletext, videotext, and interactive video). We thus included any article suiting a general definition of telecommunication, as outlined earlier. Consistent with past work, radio and television broadcasting are considered together, owing to the large amount of work that addresses them in tandem (e.g., studies of broadcast regulation).

Coding for a third of the volumes was reviewed by two trained coders. Consistent with past work, reliability was found to be quite high, using Vincent's (1991) approach (coefficient of reliability  $\geq .98$ ).

We determined author credit in accordance with both traditions identified earlier—by awarding fractional credit (e.g., Vincent, 1991) as well as full credit for the raw number of citations per author (Greenberg & Schweitzer, 1989). In the latter method, an author re-

ceives a "point" regardless of how many coauthors appeared on an article. For the former, fractional consideration was given according to the number of contributing authors listed. Publication points thus represent the fraction of one total article credit: where 2 authors, each get .5; three authors get .34, .33, and .33; four authors each get .25; and so forth.

Finally, institutional affiliation was ascertained through examination of notes accompanying each article. Such listings reflect the last school at which the scholar published a criterion article, and may not reflect subsequent movement. Academic rank was determined in a similar manner (including categories for full, associate and assistant professors as well as instructors and graduate students). In cases where author rank or other identifying information was not included in the article, it was checked against academic directories.

## RESULTS

Table 1 presents a ranking of the more prolific producers of criterion articles in telecommunication, listed alphabetically in conjunction with the raw number of citations accorded each. Output based on fractional totals for multiauthored articles is provided in the following column. In this fashion, we try not to take sides in the debate over whether fractional or aggregate frequency methods are most appropriate in determining rankings. However, in the interest of formulating a workable cut-off point, it was necessary to specify a minimum criterion of four activity points and 3.51 fractional citations for inclusion in the table. This resulted in the exclusion of fewer than a dozen authors who met the activity criterion, but who typically appeared with a coauthor.

**TABLE 1**  
**Top Scholars Producing Telecommunications Articles by Author Credit**

BY TOTAL OUTPUT OF 4 CITATIONS AND 3.51 ARTICLE EQUIVALENTS			
<u>AUTHORS NAME</u>	<u>UNIVERSITY (recent byline)</u>	<u>AUTHORSHIP FREQUENCY</u>	<u>ARTICLE POINTS</u>
ABELMAN, R.	Cleveland State	11	10.50
ALLEN, C	Arizona State	4	4.00
ATKIN, D.	Cleveland State	25	17.93
ATWATER, T.	Michigan State	11	5.91
BATES, B.	Tennessee	12	9.66
BERKOWITZ, D.	Iowa	7	6.50
BIOCCA, F.	North Carolina	7	4.67
BOYD, D.	Kentucky	6	4.50
CANTOR, J.	Wisconsin	9	3.84
CARROL, R.L.	Alabama	5	4.20
DOMINICK, J.	Georgia	6	4.00
DUPAGNE, M.	Miami	5	4.00
ENTMAN, R.M.	Northwestern	5	4.50
FERGUSON, D.A.	Bowling Green	7	4.16
FOOTE, J.S.	Southern Illinois	6	4.00
GREENBERG, B.S.	Michigan State	8	3.58
HOFFNER, C.	Illinois State	8	4.01
HUDSON, H.	University of San Francisco	6	5.00
KRUGMAN, D.	Georgia	9	5.34
KUNKEL, D.	Santa Barbara	8	4.45

LACY, S.	Michigan State	8	3.59
LANG, A.	Washington State	9	5.58
LAROSE, R.	Michigan State	10	5.00
LIN, C.	Cleveland State	13	12.50
LITMAN, B.R.	Michigan State	9	4.34
MCDONALD, D.G.	Cornell	9	5.83
MCGREGOR, M.A.	Indiana	5	5.00
NEWHAGEN, J.	Maryland	8	5.84
OGAN, C.	Indiana	6	6.00
OLIVER, J.	Virginia Polytechnic	5	4.50
PERSE, E. M.	Delaware	17	10.67
PFAU	Wisconsin	8	4.09
POTTER, W. J.	Santa Barbara	19	14.67
POWERS, A.	Northern Illinois	5	3.67
REESE, S.	Texas	11	4.93
REEVES, B.	Stanford	9	3.83
RUBIN, A. M.	Kent State	12	6.34
SAWHNEY, H.	Indiana	4	4.00
SPARKES, G.	Purdue	9	5.67
STONE, V.	Missouri	5	4.00
THORSON, E.	Missouri	11	3.99
UMPHREY, D.	Southern Methodist	6	4.50
WALKER, J.	Memphis State	9	7.33
WATERMAN, D.	Indiana	6	5.00
WICKS, R.	Arkansas	6	4.83
WILSON, B. J.	Santa Barbara	10	6.50
WOMACK, D. L.	Temple	4	4.00

Author credits coded for the decade beginning in 1985 reflected contributions from nearly 300 schools. Consistent with Greenberg and Schweitzer's (1989) finding, we see a close correspondence between the fractional and raw citation measures. As Hickson et al. (1989; 1992) found, a disproportionate number of articles were produced by a handful of scholars. The scholars listed above generated over a sixth (18%) of our 1373 criterion articles, although they comprise 2% of all faculty coded.

In terms of publishing activity, our most prolific two entrants each averaged 2 authored pieces per year (part or whole authorship). Their fractional credit totals were in the range of 14.5-17.5 articles, or an average of roughly 1.5 single author equivalents per year. On the latter measure, only four authors averaged over an article per year—a cutoff that comprises one of the clearer breaking points in the data. Consistent with past findings on productivity, the modal output was one article.

Although institutional productivity is not a primary focus here, it's interesting to note that many of our top producers resided at a handful of schools, the plurality of which were in the Midwest. In particular, looking at the most recent school of full-time residence at which one had published, Michigan State housed the largest number of telecommunication scholars on the list (5), followed by Indiana (4). Santa Barbara and Cleveland State each had three scholars make this list. Taken together, these institutions accounted for roughly a third of the scholars listed, although a small number have moved since last authoring a criterion article.

The findings on rank also confirm past work, as assistant professors account for the plurality (34.3%) of author credits. They're followed by associate (26.6%) and finally full professors (23.7%), who account for comparable output levels as a group.<sup>5</sup> In terms of

authorship configurations, one-way ANOVA contrasts confirm our expectation that faculty at lower ranks are more likely to be active as individuals. Specifically, full professors were most likely to engage a coauthor ( $x = .56$  points), followed by associate ( $x = .61$ ) and finally assistant professors ( $x = .66$ ); contrasts between all groups are significant at  $p \leq .01$ . Doctoral students pen 10.0% of articles, followed by masters students (3.6%) and instructors (1.7%).

In examining activity by journal, most of the peer-reviewed publications coded here were concentrated in the older mass communication journals—*Journalism Quarterly* (22.4%), *Journal of Broadcasting & Electronic Media* (21.9%) and *Journal of Communication* (15.1%). *Communication Research* is a rather distant fourth, with 6.4% of criterion articles, followed by *Journal of Advertising Research* (5.4%), *TC Policy* (4.9%) and *CSMC* (4.4%). The remaining journals each accounted for less than 4% of domestically produced articles on telecommunication. This confirms past work (Vincent, 1991; Hickson, 1991), where *Journalism Quarterly* accounted for the plurality of criterion articles.

Some of the differences in journal contributions may be a function of publication frequency and size. For instance, *Journal of Media Economics* (3.6% of articles) offered two issues/year through 1990 before expanding to four issues in 1993. *Journalism Quarterly* publishes more articles per issue than any of the other criterion journals.

The overall breakdown for media focus by publication credit was broadcasting (75.7%), cable (4.6%), other new technology (12.9%), film (3.1%) and telephony (2.8%). Further breakouts indicate that 25.2% of all articles had a primary focus on empirical measurement of audience effects, while the remainder addressed aspects of media law, economics, content or criticism.

## DISCUSSION

This study set out to establish a yardstick for telecommunication productivity in peer-reviewed communication journals. The fact that only a handful of scholars produce much of the peer reviewed research is consistent with past studies in communication (e.g., Hickson et al., 1989) and telecommunication (Vincent, 1991). Because only a half-dozen of the institutions listed accounted for nearly a third of the productive scholars listed, it seems that parity has not yet arrived in the sub-discipline.

Just as Hickson (1991) found that teaching in doctoral programs is less important for highly productive scholars in mass communication than in speech communication, the presence of non-Ph.D.-granting departments in our own list suggests that such programs are neither a precondition for productivity in telecommunication. For example, Cleveland State and Santa Barbara—both terminal MA programs through the 1980s—are among the top three schools in number of resident scholars on the list. They're joined by over half-a-dozen other such programs in housing many of the remaining scholars on our list. That Santa Barbara and other schools have not generally been recorded in past productivity lists—and many other perennial powers (Vincent, 1991) are absent from our list—reinforces Burroughs et al.'s (1989) contention that it is difficult for schools to retain large numbers of productive scholars over time. In terms of individual output, the fact that much of the publishing is done by a minority of scholars confirms past work on productivity in communication journals (Hickson et al., 1992). Consistent with Burroughs et al. (1989), we found that reaching a relatively high level of output is possible with as little as one publication per year. As they suggest:

Those institutions which spawn such individuals make a disproportionately high contribution to the advancement of this field and those who attract

such people to their faculty ranks have a better chance of offering their students a high quality graduate education. (p. 40)

Although our study confirms Greenberg and Schweitzer's (1989) finding of a close correspondence between the fractional and raw citation measures, the present data base is limited. In particular, it excludes several regional and speech-oriented journals (e. g., *Argumentation and Advocacy*, *Philosophy and Rhetoric*). As Hickson et al. (1993) note, the latter journals only accounted for a handful of communication articles, while contributions in other speech areas have already been aptly chronicled. Moreover, their work suggests that prolific scholars publish in a variety of outlets, so active contributors of telecommunication articles reflected here also would emerge in more inclusive samples. The fact that half of the scholars on this list do not appear on Vincent's list of productive telecommunication scholars, however, suggests that these rankings are greatly influenced by the particular topical, journal and chronological parameters of productivity studies.

It is also likely that faculty change their publication patterns over time. In fact, one explanation for the disproportionately higher output among lower ranks might extend beyond the need for assistant professors to gain tenure (see Schweitzer, 1988; Vincent, 1991). Given anecdotal evidence that many senior level faculty are likely to write books, journal publication might be a means by which junior scholars can "establish" themselves as book authors before prospective publishing houses. Later work should investigate this link between career cycle, book publishing and journal publication.

As for the oft-cited criticism that research might detract from service or teaching activities (Francese, 1996), we can echo Burroughs et al.'s (1989) observation that many of these productive researchers are renowned as teachers, active in professional organizations, and serve as editors or on editorial boards. In this regard, inspection of our data indicates a link between publication productivity and professional links in the area of telecommunication studies.

Acknowledged is the fact that this is a one-shot study. We do not consider other important offerings in such areas as book publishing and creative activity. As Edwards et al. (1988) note, assessments of productivity have subjective dimensions, as faculty quality is a complex variable that changes from study to study. Moreover, the issue of article quality cannot be settled here. All of the journals included were peer reviewed, however. Rejection rates ranging from 80-90% were typical for our sample. This study cannot of course redress bias stemming from the fact that some articles of high quality are not published, while many that are inferior are published. As Burroughs et al. (1989) note, the range of journals and length of time covered in this analysis "should outweigh any factors of editorial bias or luck for attaining high levels of output in those refereed journals over this length of time" (p. 40).

Yet, while no single productivity measure can be considered definitive, such research may provide a reality check for scholars, administrators and students in the field. The recent trend to move beyond school ratings and address individual scholarly productivity seems logical, given the maturity of the communication discipline. Productivity research, like any other scholarly tradition, is likely to become more complex over time.

As for topical foci, the findings reported here document a sizeable presence of articles on new media, although "plain-old" broadcasting and telephone applications continue to dominate the literature. Traditional journals (e.g., *JOBEM*, *JQ*) continue to provide a leadership role on telecommunication research, although some of their dominance may be a function of larger page capacity, especially in the case of *JQ*. Even so, the "communications revolution" has not yet prompted a dominant position for research on new technology within the telecommunication arena.

Concurrently, it seems that student or public consumers of academic research are de-



manding "more perfect information" on program quality. This is especially true of institutional analyses, as witnessed by the recent commercial success of *US News and World Report's* annual collegiate ratings. That analysis easily provides the most visible and popular, if controversial, yardstick for all universities. The fact that it included mass communication for the first time in its 1996 issue is encouraging for a discipline that, despite producing 5% of BA graduates, is not even included among the 36 disciplines evaluated by the National Research Council (Becker & Graf, 1995).<sup>6</sup>

Some of the impetus for the academy's hesitancy to reflect communication as a discipline may stem from the program identification challenges noted here. It seems that few academic units in communication use the same name (e.g., journalism versus [mass] communication). Serving as a metaphor for the discipline, past work on new telecommunication media has developed irregularly, having originated from diverse disciplinary frameworks (e.g., political science and economics) and is not widely accessible. Meanwhile, the boundaries between print, broadcast, film and wire media are blurring in editing systems that pool content and images--in print as well as video formats--to construct messages that may emerge in several forms.

In this regard, merging definitions of technology can help unify academic traditions that study them. The ongoing convergence of telecommunication media presages a "communication" or "information" revolution that is based on collecting, storing, processing and communicating information.<sup>7</sup>

The present study documents an expanding number of articles and journals addressing the social transitions wrought by telecommunication technology. As these trends suggest, eventually we will all be part of the "integrated communication grid" (Dizard, 1994) or network through which anyone can send or receive messages in any mode to virtually anyone anywhere. In the next decade alone, the telecommunications and information industry's contribution to the Gross Domestic Product will nearly double, from 9% to 17% (Jessel, 1994).

The findings reported here should help construct a yardstick for faculty productivity in the telecommunication area. Further work might also analyze productivity in terms of books, published journal pages and faculty citation frequencies. If such research is to continue to thrive, it will be important to export key paradigms (e.g., cultivation, uses and gratifications, agenda setting) to the new telecommunication technology environment.<sup>8</sup>

For that reason, communication scholars must continue to seek exposure and access to information on an interdisciplinary basis, making use of journals not considered here (e.g., *The Information Society*). While computer science and engineering disciplines have a key role to play in the design of these "communications" applications, the task of studying their uses and effects has fallen increasingly upon communication scholars.<sup>9</sup> As that literature continues to evolve, further such research should identify trends in institutional productivity and topical foci appearing in telecommunication research over time.

## REFERENCES AND NOTES

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<sup>1</sup> In particular, the number of papers with more than 50 authors grew nearly ten times since 1981, and articles with more than 100 authors grew from 1 to 182 over the same

period. Meanwhile, papers with more than 200 authors rose from 1 in 1988 to 98 in 1994, and 18 papers with 500 or more authors were published from 1989-1994 (see McDonald, 1995).

<sup>2</sup> The publication frequencies for book publishing are as follows: none (57.8%), 1-2 (26.5%), 3-4 (8.7%), 5-10 (5.2%), 11-20 (2.6%), 21-50 (.4%), 50 or more (.1%). Further findings indicate that most (58.4%) have no chapters in edited volumes, 20.6% have 1 or 2, 10% have 3-4, 7.2% have 5-10, 2.6% have 11-20, 1.1% have 21-50 and .3% have 50 or more.

<sup>3</sup>In addition, Vincent's inclusion of humanistic film journals overreaches the focus of most U.S. "telecommunication" programs, which generally emphasize electronic media (AEJMC, 1996). Since these journals are not affiliated with any communication organizations (e. g., ICA, SCA), they have not been included in other studies of communication scholarship.

<sup>4</sup>Publication of *Mass Comm Review* had been temporarily suspended, causing an indefinite delay in the release of all issues after 1994.

<sup>5</sup>These figures exclude information on several multiple-authored articles for which rank identification was incomplete.

<sup>6</sup>Communication thus remains one of the more robust fields in the academy—growing 1500% in enrollment since 1966—the fastest growth rate of any discipline (Becker & Graf, 1995). Although enrollment growth slowed to 19% from 1988-1993, American universities conferred 53,874 communication degrees in 1993, placing it among the top eight fields in national enrollment (*Chronicle*, 1995).

<sup>7</sup>According to some estimates, over half of American employees today are part of the "knowledge class" in an "information age." Thus we see the emergence of a post-industrial society, where communication is increasingly replacing transportation as the major means of connecting people. The energy core of this new social framework involves new technologies of communication (Bell, 1976).

<sup>8</sup>This has already been done to some degree in new media such areas as VCRs (e.g. Levy, 1989) and cable (e.g. Heeter & Greenberg, 1988). However, as those book examples illustrate, it may be easier to construct a thematic arrangement in an edited volume than in a journal. Although *JOC*, *JOBEM*, and *JME* have offered thematic issues on new media (e.g., *JOC*'s 1993 issue on virtual reality), most others have yet to do so.

<sup>9</sup>As a multi-level discipline, communication encompasses several scholarly approaches to the ways societies understand themselves and their world, including their politics, social relations and identities. Thus, as universities move to adopt distance learning and "multi-media classroom" facilities—integrating interactive features into classes—communication researchers will be well-poised to study the uses and effects of such technology.

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