

MULTI- AND INTER- DISCIPLINARITY IN MEDICAL AND VETERINARY LITERATURE: APPROACHES AND ASSERTIONS



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Significance of multidisciplinary

The significance of inter- and multidisciplinary research cannot be overestimated in the 21st century science. It is emphatically present in the basic documents of several major science policy agencies:

“Interdisciplinary research (IDR) can be one of the most productive and inspiring of human pursuits – one that provides a format for conversations and connections that lead to new knowledge.” (COSEPUP, 2004)

“Interdisciplinary research integrates the analytical strengths of two or more often disparate scientific disciplines to create a new hybrid disci-

pline. By engaging seemingly unrelated disciplines, traditional gaps in terminology, approach, and methodology might be gradually eliminated.” (OPASI, 2006)

“Multidisciplinary research takes place at the edges of traditional disciplines and across traditional subject boundaries. The Research Councils believe that novel multidisciplinary research is needed to solve many, if not all, of the next decade’s major research challenges.” (Research Councils UK, 2006)

In academic discourse and practice, there are four realms to which the term “interdisciplinarity” is most commonly applied (BRAUN & SCHUBERT, 2003). *Interdisciplinary knowledge* involves familiarity with distinctive components of two or more disciplines. Interdisciplinary knowledge is a necessary, but not sufficient, condition for *interdisciplinary research*: combining distinctive components of two or more disciplines while searching or creating new knowledge, operational procedures, or artistic expressions.

Interdisciplinary education merges distinctive components of two or more disciplines in a single program of instruction. *Interdisciplinary theory* takes interdisciplinary knowledge, research, or education as its main objects of study.

The degree of interdisciplinarity in any realm may vary, of course. The degree of interdisciplinary integration is characterized according to four criteria (WEINGART & STEHR, 2000):

- the number of disciplines which are involved;
- the degree of similarity between them (e.g., mathematics and physics are similar, molecular genetics and electronics are less similar);
- the novelty and creativity involved in the combination, and
- the degree of integration.

Possibilities of scientometrics in studying multidisciplinary

Scientometrics has unique possibilities both in the quantitative characterization and in the impact assessment of inter- and multidisciplinary research.

- Multidisciplinary can be studied on different objects and levels
 - Researchers, research groups, institutions
 - Research areas, subfields, fields
 - Papers, journals, etc.

- Multidisciplinarity can be characterized by
 - Use of specific keywords
 - Collaboration of authors, institutions from various disciplines
 - Publication in journals from various disciplines
 - Citing references from various disciplines
 - Being cited by papers from various disciplines
- The impact of multidisciplinary works can be assessed, e.g., by their citation rate as compared to the average of the respective discipline(s)

“Multidisciplinarity in title”

In a recent publication (BRAUN & SCHUBERT, 2007), the occurrence of the words “interdisciplinarity” and “multidisciplinarity” has been studied in the titles of scientific and scholarly publications (6183 papers between 1975–2006).

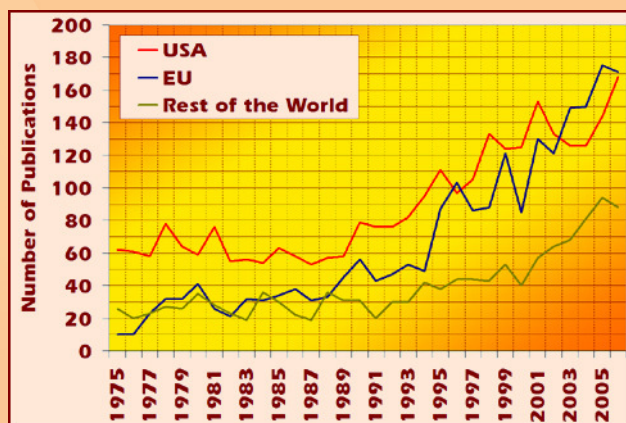


Figure 1 Number of publications with "interdisciplinarity" or "multidisciplinarity" in their titles (Source: Thomson WoS, SCI & SSCI)

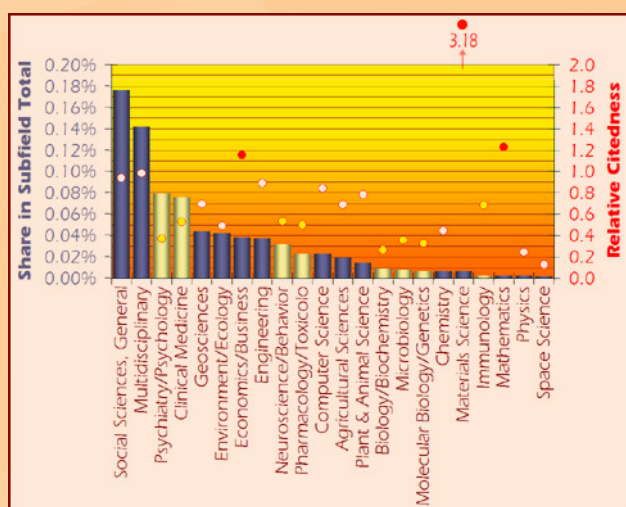


Figure 2 Relative weight of "multi" papers by subfields. (Source: Thomson WoS; both publications and citations were counted for the period 1996–2006; ESI subfield categorization was used.)

Among the major regions of the world, Europe appears to be the most dynamically growing.

The weight of “multi” papers can be assessed by comparing their number and citation rate to the subfield totals/averages. Health related subfields are shaded in Figure 2 in yellow. Strikingly, only on 3 of the 22 subfields “multi” papers attracted higher citation rate than the subfield average.

“Institutional multidisciplinarity” and “reference multidisciplinarity”: case studies in dentistry, surgery and veterinary medicine

In what follows, multidisciplinarity in three medical subfields are studied in greater detail:

- dentistry
- surgery
- veterinary medicine

Three samples of 1000 papers published in 2003 were taken from journals having the stems “DENT”, “SURG” and “VETERIN” in their titles, respectively. For each sample, three criteria of multidisciplinary were considered:

- “keyword multidisciplinarity”: special keywords in title, abstract, etc.
- “institutional multidisciplinarity”: off-disciplinary co-authoring institutions
- “reference multidisciplinarity”: off-disciplinary references

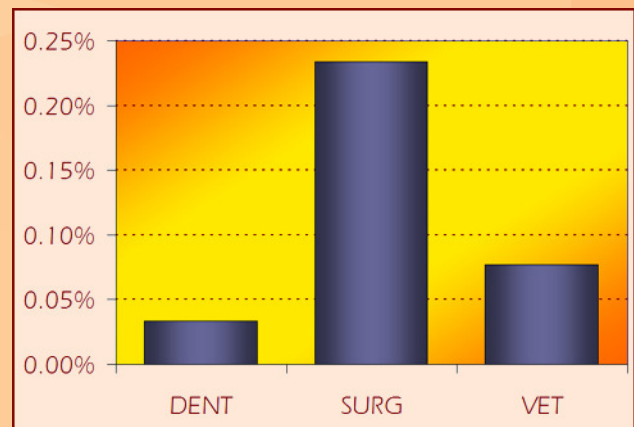


Figure 3 “Keyword multidisciplinarity” of dentistry (DENT), surgery (SURG) and veterinary medicine (VET). (Source: Thomson WoS, 1975–2007.)

In Figure 3, “keyword multidisciplinarity” of the three subjects fields is shown: inter- and multidisciplinary were searched as key terms in the title, abstracts and keywords of the papers.

“Institutional multidisciplinarity” is measured by the share of off-disciplinary institutions among the affiliations of the co-authors (Figure 4). A

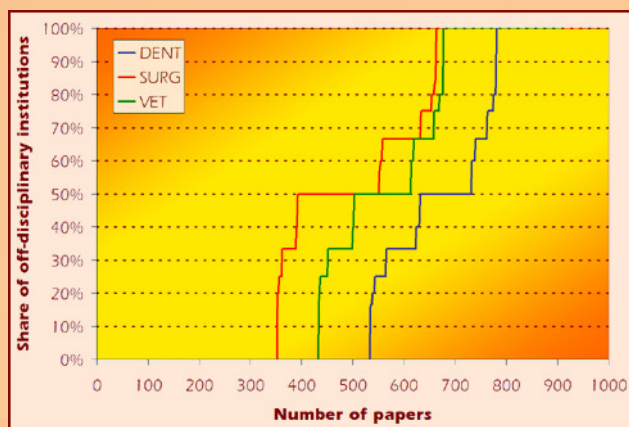


Figure 4 "Institutional multidisciplinary" of dentistry (DENT), surgery (SURG) and veterinary medicine (VET). (Source: Thomson WoS, 1975-2007.)

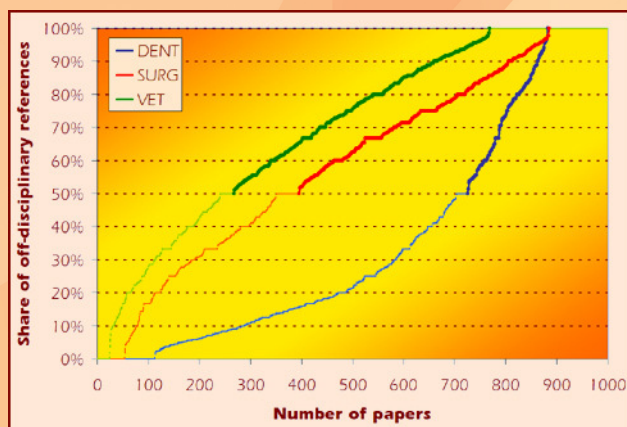


Figure 5 "Reference multidisciplinary" of dentistry (DENT), surgery (SURG) and veterinary medicine (VET). (Source: Thomson WoS, 1975-2007.)

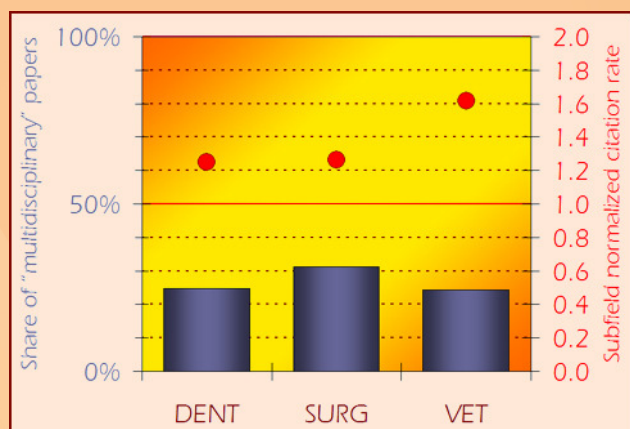


Figure 6 Subfield shares of "institutional multidisciplinary" and its effect on citation impact (Source: Thomson WoS; publication year: 2003; citations were counted for the period 2003-2007.)

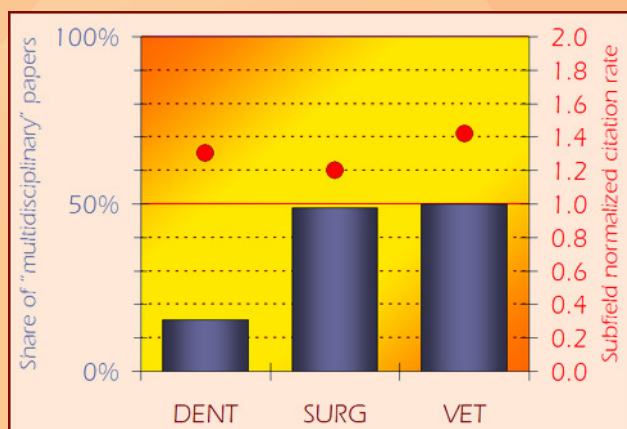


Figure 7 Subfield shares of "reference multidisciplinary" and its effect on citation impact (Source: Thomson WoS; publication year: 2003; citations were counted for the period 2003-2007.)

paper is considered "institutionally multidisciplinary" if at least one (but not all) of the contributing institutions is off-discipline.

"Reference multidisciplinary" is measured by the share of off-disciplinary references in the bibliography of a paper (Figure 5). A paper is considered multidisciplinary in this respect if more than 50% (but not all) of the cited references are off-discipline.

As it was mentioned in connection with Figure 2, in spite of the emphasized interest in multi- and interdisciplinary papers, "keyword multidisciplinary" does not attract above-average citation rates. The situation is dramatically different if "institutional multidisciplinary" or "reference multidisciplinary" are considered (Figures 6 and 7).

Subfield shares of "institutional multidisciplinary" and its effect on citation impact

The results suggest that actual multidisciplinary (as reflected in institutional co-operations or cross-disciplinary references) is more effective in attracting wider interest than using it as advertising slogan in the title of publications.

Summary and conclusions

- Scientometrics has various effective tools to assess the extent and impact of multi- and interdisciplinarity. It can be asserted that both are remarkable and are constantly growing.
- Among the three medical subfields studied in detail, dentistry shows the lowest, surgery the highest level of multidisciplinary, the latter successfully challenged by veterinary medicine in "reference multidisciplinary".
- The citation impact of papers with higher "institutional" or "reference" multidisciplinary is definitely higher than the subfield average. This is not the case for "keyword multidisciplinary", suggesting that, among others, multidisciplinary is also more effective if practiced than if just talked about.

Acknowledgements

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