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Bibliometric Analysis of Engineering Education Research Publications - A Reference Discipline Approach

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In recent years, bibliometric analysis of publications has been receiving growing attention in engineering education research as an approach that can bring a number of benefits. In this paper, we use reference discipline and author affiliation analysis of journal articles to provide data on the development of Engineering Education Research (EER) as a scholarly research field [1] and the diffusion of engineering education innovations [2].

In this study a total number of 139 articles published in 6 engineering education journals in 2011 were analysed with regard to reference discipline and the country affiliation of the authors.

Analysis of reference disciplines has been used by scholars in the new disciplines of Information Systems and Enterprise Engineering research for the past two decades and involves a study of the disciplines referenced and cited in research papers to track the developing maturity of these fields of research. We propose that a similar approach can be useful in EER as an indicator of interdisciplinarity and a form of measuring the developing maturity of EER as a field and cross-fertilization between EER and other research fields. In addition, when this is combined with data on the affiliation of authors we can also obtain data on cross-fertilization within the field of EER beyond national boundaries.

The journals were selected to obtain a mix between US based (JEE and AEE) and non-US general engineering education journals AJEE and IJEE), and also to include two disciplinary engineering education

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journals, CEE and IEEE Trans Educ. Knowing that similar work was already underway by other researchers for the European Journal of Education Research, we opted not to include it in our sample.

For the research discipline analysis, each of the journal articles was classified independently by both authors and the results later discussed until the classifications were consensual. To satisfy our classifications system, a discipline needed to be specifically shown by the authors to underpin their research. Such references were normally found in the background or methodology sections of the papers and were frequently mentioned as keywords. Any disciplines which only appeared in the bibliographic references section were not considered reference disciplines.

The results concerning the reference discipline approach are presented in Fig. 1. In the case of IEEE Transactions on Education and the Journal of Chemical Engineering Education, our results shows little evidence of reference disciplines which suggests that the research of the authors of the papers published in these discipline-based journals tends to be informed by concepts within rather narrow disciplinary confines. By contrast, the results for the general engineering education journals, particularly JEE, show that the authors appear to be reading more broadly and their work is informed by both engineering education research and other reference disciplines. This could be interpreted as a sign of interdisciplinarity and developing maturity of EER as a field of research.

On the other hand, from an internationalization perspective, the limited number of countries involved in publishing research in the journals studied, seems to point to a lack of cross-dissemination of EER findings and suggests there may be barriers limiting the diffusion of proven educational innovation. Although the work presented, 139 articles from 6 EER journals in 2011, represents a relatively small sample of the overall volume of EER publications, we believe the study demonstrates the value of a bibliometric analysis approach to EER. It allows to study the developing maturity of the field, identify possible barriers to cross-fertilization and to help authors choose suitable publication channels. ■

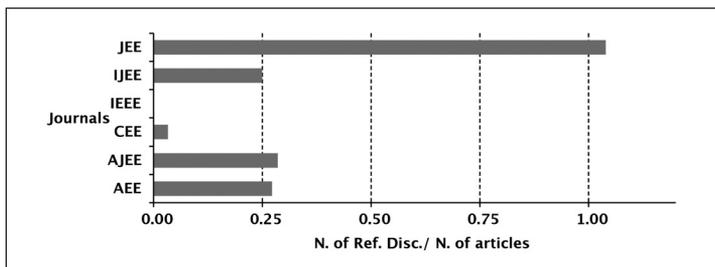


Fig. 1. Number of Reference Disciplines per number of articles

REFERENCES

- [1] Jesiek, BK, Borrego M, Beddoes K, Hurtado M, Rajendran P and Sangam, D (2011), Mapping Global Trends in Engineering Education Research, 2005–2008, *Int. J. Eng. Educ.*, Vol. 27, No. 1., pp. 77-90.
- [2] Borrego, M., Froyd, J. E., & Hall, T. S., (2010). Diffusion of Engineering Education Innovations: A Survey of Awareness and Adoption Rates in U.S. Engineering Departments. *Journal of Engineering Education*, 99 (3), 185-207.