Disciplinary Integration and the Role of Border Fields

Jan Youtie*

Enterprise Innovation Institute, Georgia Institute of Technology, Atlanta, GA 30308,

jan.youtie@innovate.gatech.edu

Gregg E. A. Solomon

Directorate for Education and Human Resource, National Science Foundation, Arlington, VA USA 22230,

Graduate School of Education and Department of Psychology, Harvard University, Cambridge, MA 02138

gesolomo@nsf.gov 703-292-8333

Stephen Carley,

School of Public Policy, Atlanta, GA 30332 USA, stephen.carley@gmail.com

Seokbeom Kwon

School of Public Policy, Atlanta, GA 30332 USA, seokbeom.kwon@gmail.com

Alan L. Porter

School of Public Policy, Georgia Institute of Technology, Atlanta, GA 30332 USA;

Search Technology, Norcross, Georgia USA 30092, aporter@searchtech.com

*Corresponding author

Extended Abstract

Encouraging interdisciplinary research has been a science policy goal, but barriers in terminology, tools and instruments, and analytic approaches exist (Holbrook 2013). Our work focuses on the role of the border field in advancing flows of knowledge between two fields that are important in US efforts to improve science, technology, engineering and mathematics (STEM) education: education research and cognitive science (Bransford et al., 1999). In the case of education research and cognitive science, it may be "a bridge too far" to think of dramatically increasing direct knowledge flows between neuroscience and educational practice for example (Bruer, 1997). Border communities such as educational psychology can act as an intermediary or additional bridge between the two fields (Anderson, 2002). We posit that there are three subfields that serve as border communities: educational psychology, human/computer interaction and learning technologies, and applied linguistics. These border communities are assumed to sit between cognitive science and education research, but at the same time apart as they are scholarly

communities in their own right and with their own literatures. The extent to which educational psychology draws on cognitive science, draws on education research, and influences both communities is an open question.

We examine this proposition by analyzing cited references in metadata from articles in the Web of Science. We define the fields under analysis—cognitive science, education research, educational psychology, human/computer interaction and learning technologies, and applied linguistics using journal (Leydesdorff and Goldstone 2014) and journal-category based definitions of the fields in question. We focus on articles published in the years 1994, 1999, 2004, 2009, and 2014 because of their importance in US STEM policy initiatives to encourage connections between cognitive science and education research.

Our results show there are relatively small direct citation rates between articles in education research and cognitive science and relatively larger rates by which each cites articles appearing in border field journals. These results suggest that border fields would indeed appear to be situated at the border between education and cognitive science.

Acknowledgements

This work was supported by the US National Science Foundation, Division of Research on Learning in Formal and Informal Settings (DRL-1348765). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

References

Anderson, J. R. (2002). Spanning seven orders of magnitude: A challenge for cognitive modeling. *Cognitive Science*, *26*(1), 85-112.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (1999). *How people learn: Brain, mind, experience, and school*. Washington DC: National Academy Press.

Bruer, J. (1997). Education and the Brain: A Bridge Too Far. *Educational Researcher* 26(8), 4-16.

Holbrook, J. B. (2013). What is interdisciplinary communication? Reflections on the very idea of disciplinary integration. *Synthese*, 190(11), 1865-1879.

Leydesdorff, L., & Goldstone, R. L. (2014). Interdisciplinarity at the journal and specialty level: The changing knowledge bases of the journal Cognitive Science. *Journal of the Association for Information Science and Technology*,*65*(1), 164-177.