

Doctoral Student Research Briefs

School of Education

Drexel University

**Uncovering Pedagogical Beliefs and Practices in Higher Education through the Lens of
Mind, Brain, and Education Science**

by

Tamara Galoyan

Drexel University

Supervising Professors:

Dr. Kristen Betts and Dr. Penny Hammrich

Editors:

Dr. Penny L. Hammrich

Professor and Associate Dean of Graduate Studies

Dr. Rajashi Ghosh

Associate Professor and Program Director of the PhD Program

Dr. Kathy Geller

Associate Clinical Professor and Program Director of the EdD Program

Tamara Galoyan

PhD Candidate

Katelyn Alderfer

PhD Student

Copy Editor:

Anthony Hopkins

Marketing and Communications Manager

Uncovering Pedagogical Beliefs and Practices in Higher Education through the Lens of Mind, Brain, and Education Science

Tamara Galoyan

Abstract

The purpose of this study is to investigate the prevalence and predictors of neuromyths and to examine learning sciences literacy among instructors, instructional designers, and professional development administrators who work in higher education across onsite, online, and blended environments at four-year and two-year higher education institutions. This study seeks to identify factors that may predict beliefs in neuromyths and an understanding of varying levels of learning sciences literacy, including demographics, educational attainment, professional development, and neuroeducation exposure.

Background

Mind, Brain, and Education science. Advances in brain research and brain imaging technology in the past few decades has completely reshaped the areas of cognitive psychology and neuroscience and served as basis for the emergence of Mind, Brain, and Education (MBE) science. MBE science has been defined as a discipline that has been shaped by the different histories, philosophies, and epistemologies guiding education, psychology, and neuroscience (Tokuhama-Espinosa, 2008; 2017). One of the major goals of the MBE science is to understand how to translate neuroscience findings into pedagogy (Sousa, 2010). A major contribution to this process was the seminal work by Tracey Tokuhama-Espinosa, whose thesis focused on developing standards for the emerging field, which she referred to as mind, brain, and education (Tokuhama-Espinosa, 2008).

The discipline of MBE science calls for constant interaction between scientific research and practical knowledge in addressing research questions about mind, brain, and education (Fischer 2009). Research findings from neuroscience have important implications for instructional design, including onsite, online, and blended learning. MBE science makes the educational application of neuroscience findings possible. Neuroscience findings support student-centered learning models, which allow for flexible learning experiences and account for individual learning differences (Hinton, Fischer, & Glennon, 2012).

Neuromyths. One of the challenges that the MBE science faces is the misinterpretation of neuroscience findings by researchers and educators from other areas, which, in its turn, may lead to the formation of neuromyths and result in ineffective instructional practices. Neuromyths have been described as misconceptions that arise from misunderstanding, misquoting, or misreading information about the brain (Goswami, 2006). Examples of some neuromyths include the beliefs that people are either “left-brained” or “right-brained, that we regularly use 10 percent of our brain capacity, or that there are visual, auditory, and kinesthetic learners (Geake, 2008).

Research shows that an educator's conceptualization of knowledge can greatly impact her/his pedagogy, which, in turn can influence learners' epistemological beliefs (Johnston, Woodside-Jiron, & Day, 2001). With increasing research about the role of the human brain in education, it is important to understand the pedagogical beliefs of instructors, instructional designers, and professional development administrators in higher education and their awareness of evidence-based practices that build upon the literature and advancements in neuroscience, cognitive psychology, and the learning sciences.

Over the past decade there has been tremendous growth in publications on the human brain both in academia and the media. Therefore, it is necessary to be able to critically evaluate relevant information sources and the impact on the formation of one's knowledge of and beliefs about the human brain (MacDonald, Germine, Anderson, Christodoulou & McGrath, 2017; Papadatou-Pastou, Haliou & Vlachos, 2017; Dündar & Gündüz, 2016; Dekker, Lee, Howard-Jones & Jolles 2012). Previous research has shown a relationship between an instructor's beliefs and her/his instructional practices in general (Nie, Tan, Liao, Lau, & Chua, 2013). However, this connection has mainly been established with regards to teacher self-efficacy and primarily within K-12 education. Past studies on neuromyths and pedagogical beliefs have also focused primarily on traditional teaching in face-to-face environments.

Purpose and Significance

The purpose of this study is to investigate the prevalence and predictors of neuromyths and to examine learning sciences literacy among instructors, instructional designers, and professional development administrators who work in higher education across onsite, online, and blended environments at four-year and two-year higher education institutions. This study seeks to identify factors that may predict beliefs in neuromyths and an understanding of varying levels of learning sciences literacy, including demographics, educational attainment, professional development, and neuroeducation exposure. This study seeks to obtain a large sample of educators involved in instruction, course design, and training in the United States and internationally from a diverse range of higher education institutions and across disciplines. This study is significant since it is the first study that will compare the prevalence and predictors of neuromyths and examine learning sciences literacy among these three groups in higher education across onsite, online, and blended environments.

Research Questions

There are three research questions guiding this study:

- Are there differences among professional roles (instructor, instructional designer, professional development administrator) with respect to susceptibility to believing in neuromyths?
- Are there differences among types of institutions (two-year/four-year, community college, public/private, selective/open) with respect to evidence-based best practices and learning sciences literacy?
- Do professional development and training experiences predict lower susceptibility to believing neuromyths or higher levels of learning sciences literacy and awareness of

evidence-based best practices? If so, are some experiences more strongly predictive than others?

Participants and Procedure

This study includes an online survey that was sent out electronically to the Online Learning Consortium (OLC) membership list which includes 750 higher education affiliated institutions in the United States and worldwide. OLC is a non-profit, professional organization that aims at improving the quality of online and blended learning through instruction, professional development, publications of best practices, and guidance to educators, online learning professionals and organizations around the world. OLC members include instructors, administrators, instructional designers, and professional development administrations who work across online, blended, and onsite environments.

To increase participation in this study, a snowball sampling technique has been used. Members receiving the email have been asked to share the invitation with professional and personal contacts who work as instructors, instructional designers, or professional development administrators at two-year and four-year higher education institutions in the United States and worldwide.

Measures

The survey includes three sections. The first section consists of 24 items focusing on general statements about the brain. The second section consists of 29 items focusing on general statements from the learning sciences. The third section consists of 21 items focusing on participant demographics, professional experience, professional development, as well as experience and interests related to education and brain.

Research Implications

This study has important implications for future research in learning sciences and Mind, Brain, and Education science. Pedagogical application of neuroscience findings is the primary goal of Mind, Brain, and Education sciences (Tokuhama-Espinosa, 2008; 2017). This study will assist in advancing understanding of the important connection between knowledge of brain research and related pedagogy practices in higher education.

Research Team

Jill Buban, Ph.D., Sr. Director, Research & innovation, The Online Learning Consortium (OLC)

Kristen Betts, Ed.D., Drexel University, School of Education, Philadelphia, Pennsylvania, USA

Michelle Miller, Ph.D., Northern Arizona University, Department of Psychological Sciences,
Flagstaff, Arizona, USA

John D. Eigenauer, Ph.D., Taft College, Department of Philosophy, Taft, California, USA

Tracey Tokuhama-Espinosa, Ph.D., FLACSO (Latin American Social Science Research
Faculty), Quito Ecuador, Harvard University Extension School, Cambridge,
Massachusetts, USA

Sanne Dekker, Ph.D., Radboud University, Science Education Hub, Nijmegen, Netherlands

Alida Anderson, Ph.D., American University, School of Education, Washington, DC, USA
 J. Michael Williams, Ph.D., Drexel University, Department of Psychology, Philadelphia, Pennsylvania, USA
 Rafael Molina, M.Ed., Loma Linda University, School of Public Health, Loma Linda, California, USA
 Toni A. Sondergeld, Ph.D., Drexel University, School of Education, Philadelphia, PA, USA
 Gregory E. Stone, Ph.D. The University of Toledo, Judith Herb College of Education, Toledo, Ohio, USA
 Tamara Galoyan, Ph.D. student, Drexel University, School of Education, Philadelphia, Pennsylvania, USA
 Brian Delaney, Ph.D. student, Drexel University, School of Education, Philadelphia, Pennsylvania, USA

References

- Dekker, S. J., Lee, N. C., Howard-Jones, P., & Jolles, J. (2012). Neuromyths in education: Prevalence and predictors of misconceptions among teachers. *Frontiers in Psychology*, 3, 1-8. doi:10.3389/fpsyg.2012.00429
- Dündar, S., & Gündüz, N. (2016). Misconceptions regarding the brain: The neuromyths of preservice teachers. *Mind, Brain, and Education*, 10(4), 212-232. doi:10.1111/mbe.12119
- Fischer, K. W. (2009). Mind, brain, and education: building a scientific groundwork for learning and teaching1. *Mind, Brain, and Education*, 3(1), 3-16.
- Geake, J., & Cooper, P. (2003). Cognitive Neuroscience: implications for education? *Westminster Studies in Education*, 26(1), 7-20.
- Goswami, U. (2006). Neuroscience and education: from research to practice?. *Nature Reviews Neuroscience*, 7(5), 406-413.
- Hinton, C., Fischer, K. W., & Glennon, C. (2012). Mind, brain, and education. *Mind*.
- Johnston, P., Woodside-Jiron, H., & Day, J. (2001). *Teaching and learning literate epistemologies*. *Journal of educational psychology*, 93(1), 223.
- Sousa, D. A. (2010). How science met pedagogy. *Mind, brain, & education: Neuroscience implications for the classroom*, 9-26.
- Tokuhama-Espinosa, T. (2017). *Mind Brain, and Education science: An International Delphi Survey 2016-2017*. Quito, Ecuador: Author. DOI: 10.13140/RG.2.2.14259.22560
- Tokuhama-Espinosa, T. N. (2008). *The scientifically substantiated art of teaching: A study in the development of standards in the new academic field of neuroeducation (mind, brain, and education science)* (Doctoral dissertation, Capella University).
- MacDonald, K., Germine, L., Anderson, A., Christodoulou, J., & McGrath, L. M. (2017). Dispelling the myth: Training in education or neuroscience decreases but does not eliminate beliefs in neuromyths. *Frontiers in Psychology*, 8
- Nie, Y., Tan, G. H., Liao, A. K., Lau, S., & Chua, B. L. (2013). The roles of teacher efficacy in instructional innovation: Its predictive relations to constructivist and didactic instruction. *Educational Research for Policy and Practice*, 12(1), 67-77.

Papadatou-Pastou, M., Haliou, E., & Vlachos, F. (2017). Brain knowledge and the prevalence of neuromyths among prospective teachers in Greece. *Frontiers in Psychology, 8*
doi:10.3389/fpsyg.2017.00804

Author Information

Tamara Galoyan is a doctoral candidate enrolled in the Educational Leadership Development and Learning Technologies program in the School of Education at Drexel University. Tamara holds a Master's degree in TEFL (Teaching English as a Foreign Language) from the American University of Armenia and a Master's degree in linguistics from the Yerevan State Linguistic University, Armenia. Her broader research interests focus on the neurocognitive, behavioral, and social factors affecting acquisition, retention, and transfer of learning across different instructional modalities, including onsite, online and blended learning environments.