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Facilitating Boundary Crossing for Interdisciplinary Research Collaboration

By David Junsong Huang

Challenges in building interdisciplinary research collaboration

Interdisciplinary research is important for scientific research because diverse expertise can be drawn on to deal with complex research problems (Katz & Martin, 1997). For example, the Science of Learning (SoL) is a research field with collaboration between neurological and education research to investigate the brain's role in learning.

While twisting the reward system can incentivize interdisciplinary collaboration, there are other challenges worth considering. For researchers from diverse disciplines to collaborate, they may over- or underestimate what other disciplines could contribute. For example, in the SoL research, some education researchers believe that, with the tools like MRI and EEG headgear, the investigation on brain activities could lead to better understanding of cognition. Others, however, are more skeptical; if we already know how a learning activity enacts students' cognitive processes and leads to learning, what's the benefit of having evidence at the neurological level?

Researchers who step out of their comfort zone to collaborate may face identity crisis too. Researchers often identify themselves with areas of research, and they have strong disciplinary orthodoxy in their specific area. So, to work at the intersection of two disciplines, researchers may be perceived as being at the periphery of the disciplinary communities, and hence not being fully recognized by either community.

Crossing the boundaries of disciplinary-based communities

Boundary crossing (Akkerman & Bakker, 2011) is proposed as a lens to help bridge the discipline-based communities. Boundaries draw lines of discontinuity, for example, between the



communities of neurological research and education research. The two communities have demarcations in practices, norms and cultures. Crossing the boundaries involves building connections and transiting across the two discipline-based research communities.

Boundary crossers

Boundary crossing usually refers to a person's transitions across different communities. At the

International Conference of the Learning Sciences (ICLS) 2016, a prestigious education research conference, Professor Elsbeth Stern (ETH Zürich) delivered a keynote speech on *Educational Neuroscience: A field between false hopes and realistic expectations*. Professor Stern was initially trained as a neurological scholar. Subsequently, she crossed over and established herself as an education researcher. She maintains legitimacy in both disciplines and

continues to participate in both actively. She acts as a link and translator between neuroscience and education. Because of her boundary crossing and establishment in both fields, her presentation gave the audience a balanced and authentic understanding of the challenges of interdisciplinary neurocognitive research between neurological and education researchers.

Boundary objects

Boundary objects are artifacts sitting at the nexus of different community boundaries. They facilitate boundary crossing by bridging and linking communities together. For example, a water cooler in an office is a boundary object. When random colleagues go to the water cooler, they bump into each other and start to chat casually; giving opportunities for knowledge exchange. In this case, the water cooler is a boundary object independent from the two colleagues. It functions as a social bridge where different communities overlap. In research collaboration, policy documents, program plans and objectives, research seminars and such can be perceived of as boundary objects.

Creating and legitimizing boundary objects facilitates interdisciplinary collaboration. For example, the Science of Learning Research Centre (SLRC) is a SoL research initiative in Australia. The SLRC brings together neuroscientists, psychologists and education researchers from nine leading universities across Australia. Creating and legitimizing the SLRC as a boundary object not only establishes the initial critical mass of interdisciplinary researchers but also builds bridges, for example through its events and projects, to facilitate boundary crossing.

Brokers

Brokers or boundary spanners (Tushman, 1977) refers to individuals or organizations who adopt the role of developing relationships and networks within a community and aligning the community's internal networks with external networks for transference across boundaries. They actively and deliberately bring two disciplines together, through a variety of means, such as facilitating dialogues.

In Singapore's SoL journey, the National Research Foundation (NRF) plays the role of a broker. It matchmakes Singaporean universities with top overseas counterparts to connect their capacities in both neurological and education research. By making use of boundary objects, such as planning grants and research seminars, NRF links researchers from diverse disciplines and different universities to deepen insights into the

brain's role in learning. In this way, the relevant researchers are identified and brought together.

Implications for research managers

If interdisciplinary research collaboration is interpreted as boundary crossing, what does it mean to us as university research administrators (URAs)?

Firstly, we need to recognize that we are, in fact, important boundary objects. Researchers come to us in the course of grant submission, project management, other professional work, and social networking. Therefore, we are central points around which individual researchers

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gather and interact, much like a water cooler in an office. A URA who displays professional and personal trustworthiness will attract more researchers to his or her network and support an effective boundary object role, which benefits from having a wide and sustainable network. Naturally, our working environment is designed as such so that researchers bump into each other around us (as boundary objects).

Secondly, we can capitalize on our role as boundary objects to be effective brokers for interdisciplinary collaboration. Different from a water cooler which passively sits at the juncture of the boundaries, we can actively and deliberately bring disciplines together within and across our universities. For example, Singapore's Nanyang Technological University has a Research Administration Network which connects URAs from different schools within the university. Professional bodies, such as NCURA and ARMS

(the Australasian Research Management Society) bring together URAs across universities and countries. I do not mean to cross the boundaries to do the job of others (which is prohibited by Union). Hence, there is a need for legitimate boundary crossing.

Active participation in such networks allows us to build strong connections with fellow URAs within and across universities. Such connections allow us to actively broker researchers in our schools and universities with researchers in other schools and universities. Collaboration meetings organized by ARMS in its annual meetings encourage us to identify research collaborations across universities, promote dialogues, and therefore enhance our roles as brokers.

Thirdly, to be effective brokers, we can pursue boundary crossing ourselves between research and research management. As suggested above, crossing the boundaries of schools, universities and countries can be achieved through active participation in research management communities. I would like to highlight that, just like Professor Stern, who is a boundary crosser between neurological research and education research, some research managers can be inspired to be boundary crossers between research and research management. By boundary crossers, I do not mean a person who used to be a researcher and has now become a research manager, or vice versa. I mean that the person remains an active researcher and active research manager, being fully recognized as a legitimate member of both communities.

Having experience as boundary crossers ourselves, we would better understand how boundary crossers such as Prof Stern may feel, for example, feeling stressed, being susceptible to criticism for being neither here nor there, and other personal and professional insecurities. Gaining an embodied experience on how a boundary crosser feels, we could guide researchers for boundary crossing, with assurance of social and emotional support, which will help them build self-confidence. ■



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