

**Structuring Interdisciplinary Collaboration:  
*Resource Mobilization in Biotechnology and  
Nanotechnology Teams***

By

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## ABSTRACT

In an era in which technological development increasingly requires the combined efforts of multiple scientific and engineering disciplines, interdisciplinary collaboration is essential and unavoidable. This dissertation explores how teams of academic scientists are redefining and mobilizing their resources as they integrate knowledge and skills derived from traditional disciplines and methodological approaches to solve scientifically and technologically complex problems. It uses ethnographic methodology and symbolic interpretive assumptions to study three interdisciplinary teams of scientists, at different stages of their respective collaborations (pre-funding and post-funding), working on topics within the fields of biotechnology and nanotechnology at a private university in the Northeastern U.S., over a two-year period. In particular, this research examines the ways in which the teams mobilize and used different categories of resources during their respective collaborations. Using Giddens' (1984) allocative and authoritative resources as the basis, these resources include allocative (funding, students, technology), authoritative (leadership, disciplinary identity). A third resource category symbolic (language) is added to these resources. Results suggest that the success of each team's outcome mirror the extent to which they mobilize and use the three categories of resources.

Two of the interdisciplinary teams (INB I and INB II) investigated topics within the field of nanotechnology; both teams had already obtained funding for their projects. Thus, these two teams were studied during the *post-funding* stage of their collaborations. The outcome of the collaborations of INB I and INB II were graded as "successful" and "semi-successful." The somewhat greater success of INB I may be attributable to differences in specific aspects of Giddens' (1984) structuration theory occurring within the groups, including more stable leadership (authoritative resource), strategic use of students (allocative resource) as a means of creating open and productive communication among the scientists, and more highly structured, regularly occurring and productive team meetings.

The third interdisciplinary team (IB) investigated a topic within the field of biotechnology, but had not yet obtained funding. Thus, the members of the IB team were studied during the *pre-funding* stage of their collaboration. In addition to resources

present in INB I and INB II, a third category of resource—*symbolic* (language) played an important role in what turned out to be a failed effort of interdisciplinary collaboration. While the members of the INB I and INB II teams studied topics within nanotechnology, and therefore could rely on physics as a common language or starting point to their respective collaborations, this was not the case in the IB team. Instead, the members of the IB team came from disparate areas of science ranging from biology to electrical engineering, and therefore, they lacked this important resource. Furthermore, while the presence of structural resources contributed to the success and semi-success of INB I and INB II, the lack of these same resources contributed to the failed effort by IB.

Theoretically, this dissertation makes a contribution to the team development literature. Its central advance lies in its conceptualization of the types of resources necessary for interdisciplinary team development, and ultimately, their success. For scientific interdisciplinary collaboration to succeed, money and access to technology aren't enough. Instead, there are more subtle forms of resources needed to bridge the divide that exists between scientists from different backgrounds and traditions (such as students as key intermediaries and a shared cohesive identity vis-à-vis a shared language. Scientists working on interdisciplinary research teams must learn how to shift, adjust, and realign their resources, and personal perspectives, with new and emerging situations. The literature on team development has not yet examined the mobilization of resources. A symbolic interpretive approach to resources captures how team members understand, construct, and mobilize resources in their interdisciplinary collaborations.

Practically, this dissertation best informs three levels of organizational stakeholders: (1) scientists wishing to collaborate, (2) administrators within academic institutions (e.g., deans, provosts and research center directors) looking to fund and attract specific teams of scientists, and (3) funding sources (e.g., government and private funding agencies).