Specialization Versus Diversification: A Trade-Off For Young Scientists?

Owing to the inherent links between the fields of Earth science and its applications in fundamental sciences (e.g., terrestrial, aquatic, and atmospheric), there is an increasing demand for interdisciplinary research where Earth scientists with different academic, technical, or geographic backgrounds come together and approach projects in novel ways. In theory, interdisciplinary research involving diverse researchers with complementary skills and areas of expertise can be able to tackle larger research problems or questions or problems. In this essay, we discuss the perceived trade-offs that young scientists face when specializing or diversifying their research programs to best prepare for participation in such interdisciplinary research.

An effective interdisciplinary team involved in any interdisciplinary research project in natural sciences can be composed of individuals with diverse backgrounds and disciplinary interests. Being an interdisciplinary research team, one should have expertise in at least one discipline. For a young scientist at the start of his or her career, a period of specialization is necessary in order to be perceived as an expert by potential collaborators. At the same time, the success of an interdisciplinary collaboration can be determined in part by an individual’s ability to understand and communicate about subject matters outside of his or her immediate area of expertise. For a young scientist, this implies that one should become aware of the scope of one’s field of expertise and diversity. Thus, young scientists may prepare themselves for participation in interdisciplinary research teams by either specializing or diversifying their research efforts. However, in this essay, we focus on the potential trade-off between both may exist.

This article presents ideas that arose from a working group held at the DIALOG VII Symposium on Dauphin Island, Alabama (http://www.dIALOGvii.org). The young scientists discussed their intentions to specialize with respect to techniques and systems they work in (e.g., ponds, estuaries, oceans, river systems) and the research questions they ask. Most participants felt more inclined to diversify with respect to techniques and research questions rather than with research questions. While it may be beneficial for young scientists to acquire new research tools, and to become exposed to alternative study systems during their postdoctoral tenures, addressing different research questions may better be left to a later career stage when a scientist becomes more established within his or her discipline. It was generally perceived that such diversification was better postponed because the additional resources (time, energy, financial support, etc.) taken to address new research questions might detract from attaining short-term career goals (e.g., promotions based on publications, etc.), and because funding agencies might be more willing to support exploratory, higher-risk research proposed by established scientists with good funding track records.

Additionally, the decision to specialize or diversify one’s research project may be related to the type of employee one is obtaining. For example, a symposium participant who had recently accepted a faculty position at a liberal arts university noted that he could view two scenarios occurring with respect to specialization: (1) the fact that the school has a natural science faculty at that a Research 1 university will necessitate my developing more research interests to accommodate more short-term undergraduate projects. (2) My research will be limited and I will need to specialize and focus on several key questions/methods. The degree to which young scientists specialize or diversify in their research programs may also depend on the funding situation in their country of residence. For example, “Given the lack of research positions within Australia (and funding to do research), it pays to be flexible. Without some willingness to adapt research methods to new systems and research questions, and without a large number of skills in one’s toolkit, it would be virtually impossible to find employment within academia.”

Therefore, while young scientists may be inclined to specialize during the early stages of their scientific careers, the extent to which they specialize will vary considerably with external conditions. Given the current trends of funding interdisciplinary science, however, many symposium participants believe that the careers of many young scientists will benefit from keeping some ideas in the pipeline and developing a diverse research program.

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