

# Chapter 1

## The Theoretical Foundations and Historical Development of Interdisciplinarity

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### ABSTRACT

*The concept of interdisciplinarity has a long history but interpretations of this term and the importance of interdisciplinarity in research and education have varied over time. This chapter traces the theoretical understanding and historical development of interdisciplinarity to provide background and context for the book. First it examines the ways in which interdisciplinarity and similar phenomena have been conceptualized in the literature. A roughly chronological account of the main theoretical and empirical developments in interdisciplinarity is then set out, divided into three main periods dating from the early 20<sup>th</sup> century to the present day.*

### INTRODUCTION

Interdisciplinarity as a concept has a long history, though there has rarely been much consensus about what it means in practice. This chapter examines the ways in which this interdisciplinary has been conceptualized in the literature, the theories that have been developed to explain the phenomenon, and historical developments in interdisciplinary policy and practice both in the United States and Europe. The related concepts of multidisciplinary and transdisciplinarity are also discussed, in order to help define the conceptual boundaries of interdisciplinarity and to highlight the ways in which these terms have been by previous researchers and how they relate to interdisciplinarity. In tracing the historical development and the theory of interdisciplinarity, some key drivers of growth in this practice are identified, as well as some of the factors that have prevented or hindered its further expansion.

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## CONCEPTS AND DEFINITIONS

Understanding interdisciplinarity requires an appreciation of the ways in which a number of related concepts have been conceptualized in the literature. Specifically, the following sub-sections first examine the nature of disciplines, followed by an exploration of interdisciplinarity as it has been defined by researchers and distinguished from the similar concepts of multidisciplinary and transdisciplinarity.

### Disciplines

Since interdisciplinarity describes various forms of research and teaching that straddle disciplinary boundaries, it is first important to understand what a discipline consists of. Most authors concur that a discipline refers to a field of academic study that has its own distinctive approach for identifying and solving problems. According to Kuhn (1974), for example, any discipline has three key components: symbolic generalizations, models and exemplars, which define the problems addressed by practitioners in that community, the ways they solve them and the types of solutions reached. Similarly, Klein (1990) argues that disciplines can be identified in terms of the particular worldview they hold, which limit the types of questions asked, the methods used and the criteria used to evaluate the validity of findings. Aldrich (2014) explains that a discipline usually has its own “professional organizations, conferences, publications, standards, academic job market, and so on” (p.6), and, crucially, “defines the appropriate membership of the relevant scientific community from which to draw those who give their assent via peer review” (p14).

There are numerous disciplines within the social and natural sciences. The social sciences, for example, include sociology, psychology, demography, economics, politics, law, and social anthropology, while the natural sciences incorporate biological science, chemistry, mathematics, the earth sciences, and physics, to name but a few. Disciplines have often been conceptualized in terms of a hierarchy (e.g. Bertalanffy, 1973; Comte, 1835; Faber & Scheper, 1997), based on the level of generality or unit they are concerned with analyzing, with the natural sciences at the lower levels of the hierarchy and the social sciences at the higher levels. As Aldrich (2014) observes, although disciplines rarely possess any formal structural or institutional identities, nonetheless they represent quite “stable and robust ways of organizing knowledge (p.18). At the same time, this means that they are associated with methodological and intellectual “boundaries” which can hinder their value for addressing real life research problems (Aldrich, 2014).

### Interdisciplinarity, Multidisciplinary, and Transdisciplinarity

Because disciplines have inherent limitations in their ability to address issues that cut across subject fields, it has long been common practice for disciplinarians to collaborate with others, in organizational arrangements variously defined in the literature as interdisciplinarity, multidisciplinary or transdisciplinarity. The term *interdisciplinarity* is sometimes used in a generic way to refer to all these different cross-disciplinary approaches to knowledge generation (Barry and Born, 2013; Frodeman & Klein, 2017). For example, the Organization for Economic Cooperation and Development (OECD) (1972) described interdisciplinarity as encompassing a range of ways of working across disciplines, from “the simple communication of ideas to the mutual integration of organizing concepts, methodology, procedures, epistemology, terminology, data, and organisation of research and education in a fairly large field” (pp. 25-26). In this broad sense, there is a great deal of diversity in approaches to interdisciplinarity,

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