

# Chapter 12

## The Utility of Interdisciplinary Case Study: Research and Education in the Arts and Sciences

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### ABSTRACT

*This chapter deals with various definitions and implementations of a case study from the literature and focuses on the utility of case study for interdisciplinary research and education. Along with beneficial aspects of case study theory, misconceptions and conflicting definitions abound and will be highlighted in order to present a clearer picture of the perceptions of case study researchers and educators and how this affects implementation. Four case studies dealing with the integration of mathematics and music are closely examined. The definitions, methodology and implementation for each are discussed and compared, to shed light on the issues outlined above. The results of the studies shed light on the implications for interdisciplinary work in the two subjects.*

### INTRODUCTION

The case study is a common tool in the arsenal of researchers involved in the humanities and various fields of education. The fact that it is more commonly used in these fields than others likely results from perceptions and definitions of the case study, which seem to indicate that it is more useful in these areas and that it is used

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primarily (or solely) with qualitative data. Some of this is due to false assumptions and confusion about case studies.

There is a fair amount of literature that attempts to define what a case study is, with varying and often conflicting descriptions and designations. These differences apply to many aspects of case study research, ranging from the basic foundations to specific aspects. In the former instance, there are differing assertions regarding what a case study actually is. Is it a method or means of study? Is it a research design? Is it a methodology? Regarding its application, questions arise in terms of whether it is disciplinary or interdisciplinary and for which disciplines its application is appropriate. Descriptions seem to provide conflicting information as to whether it is best applied to explore proposed hypotheses, to find hypotheses to explore, or both.

Often, these discussions lead to even more questions. VanWynsberge and Khan (2007) ask, “Why is [case study] so regularly involved in educational and other social science research and yet so irregularly, randomly, and poorly defined?” (p. 80). Regarding the breadth of the subject, Merriam (1998) observes that case studies in education have come to serve as a “catch-all” category for studies that cannot easily be identified as another type (p. 18).

The discussions mentioned above, and the predilections of researchers to use case studies more frequently in certain fields, often lead to the assumption that case studies can only be applied to those projects primarily involving qualitative analysis. However, it does find suitable application in research involving quantitative data, even when the case study in question employs large amounts of such data. Indeed, it may be used satisfactorily when both qualitative and quantitative data are used in a study (Yin, 2003, p. 15).

This all suggests that, for a number of reasons which will be explicated in this chapter, a case study is useful when simultaneously exploring what are normally considered diverse subjects, such as those in the arts and sciences. The sheer number of possible combinations for such work is vast; for the purposes of this exploration, this article will focus on one particular combination as an example—that of mathematics and music. As Barrett (2014) explains, “Multiplicity is another hallmark. Case studies lend themselves to multiple scholarly orientations such as ethnography, phenomenology, social constructivism, and critical perspectives, where the types of questions and the stances toward inquiry are steeped in interdependent networks of thought and practice” (p. 114).

This article delves into the issue above, chiefly by examining the purpose, methodology, philosophy and results of several previously published case studies. This chapter will discuss a number of published case studies that deal with various intersections of music and mathematics. The case studies in question represent different geographical areas, situations, approaches and methodologies. Each is

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