

Chapter 19

Knowledge Visualization for Research Design: The Case of the Idea Puzzle Software at the University of Auckland

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ABSTRACT

This chapter presents a case of information and communication technology use in doctoral research processes. In particular, it presents the use of the Idea Puzzle software as a knowledge visualization tool for research design at the University of Auckland. The chapter begins with a review of previous contributions on knowledge visualization and research design. It then presents the Idea Puzzle software and its application at the University of Auckland. In addition, the chapter discusses the results of a large-scale survey conducted on the Idea Puzzle software in 71 higher education institutions as well as its first usability testing at the University of Auckland. The chapter concludes that the Idea Puzzle software stimulates visual integrative thinking for coherent research design in the light of Philosophy of Science.

INTRODUCTION

This chapter describes a knowledge visualisation tool – the Idea Puzzle software – for the overall design of a research project. The Idea Puzzle framework was created by the first author in 2007, in response to doctoral candidates' scepticism that they could share the same course on research design despite their heterogenous disciplinary background. The tool is based on Philosophy of Science to allow a visual overview of a research project beyond restricted notions of research design as method or fieldwork. Between 2007 and 2017, the first author presented the tool in 231 seminars, having received 1004 responses to

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an online anonymous feedback questionnaire. In 2009, the first software version of the tool was made available online, being licensed to higher education institutions (HEIs) since 2012. In 2016, the Academy of Management Learning and Education (4.235 5-Year Impact Factor) considered the Idea Puzzle software “a very useful tool for research across a multitude of disciplines, not only for PhD students as they learn about all of the elements of research project design, but also for reviewers and research project teams” (Parente & Ferro, 2016, p. 645). In 2017, the second author conducted the first usability testing of the Idea Puzzle software at the University of Auckland which subsequently led to the acquisition of its licence by the School of Graduate Studies. Congruent with such a chronological line, this chapter begins with a review of previous contributions on knowledge visualisation and research design. It then presents the Idea Puzzle software and its application at the University of Auckland. The chapter follows with an analysis of the issues identified in the large-scale survey and usability testing mentioned above, and concludes with solutions for the issues identified and suggestions for future research.

BACKGROUND

In recent years, there has been an unprecedented interest in the visualisation of academic research processes (Meyer, Höllerer, Jancsary, & Leeuwen, 2013). Previous contributions have focused, among others, on the practical visualisation of scientific knowledge (Worren, Moore, & Elliott, 2002), on the complementarity between visual formats (Eppler, 2006), on the disciplinary background of visualisation research (Eppler & Burkhard, 2007), on the visualisation of conceptual frameworks (Leshem & Trafford, 2007), and on the pitfalls of visualisation (Bresciani & Eppler, 2015). Taken together, such contributions have shed light on the origins, differences, and implications of visual representations in academia.

However, previous research on visualisation has neglected the overall design of a research project as a crucial stage of scientific practice. In the words of Meyer et al. (2013), “we should aim at actively making use of the potential of visual representations to enable better research processes and results. This starts at the stage of designing projects” (p. 536). Such a research gap is relevant because the overall design of a research project is more complex than that of its constituent parts, requiring holistic and immediate visualisation as a complement to linear and sequential verbalisation (Meyer et al., 2013).

The purpose of this chapter is therefore to present a visual decision-making tool – the Idea Puzzle software – that supports the overall design of a research project. In the words of Parente and Ferro (2016), it is “a support tool to assist PhD students and researchers in the process of designing research projects through a focus on three central dimensions of research that are collectively represented by a triangle” (p. 643). Parente and Ferro (2016) further emphasise the visual dimension of the Idea Puzzle software as follows:

Our students repeatedly commented that using Idea Puzzle contributed significantly to their understanding of the meaning of the multiple and interrelated dimensions of the research project process. In addition, they applauded the functionality of having an automatic evaluation of their input into each section/piece of the triangle allowing them to control the development of the project design, as well as to decide which points they should invest more time into to build the final “puzzle” (i.e., visual representation) of their research project. (p. 644)

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