

# Chapter 9

## CAWriter:

### A Computer Supported Collaborative Tool to Support Doctoral Candidates Academic Writing – A Pedagogical and Human–Computer Interaction Perspective

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#### ABSTRACT

*This chapter discusses a range of topics, including pedagogical concerns, writing practices, existing tools, and human computer interaction approaches, all related to the design of a tool to support PhD candidates with their academic writing. These topics are then used to inform the design of a computer supported collaborative writing tool, CAWriter, which is being developed as part of an ongoing participatory design research project concerned with the creation of a toolkit to support doctoral candidates. This chapter reviews existing tools to support the writing process and explores both the relevant pedagogical and human-computer interaction foundations necessary for the design of such tools. The chapter concludes with a look at a number of initial iterations of the CAWriter tool and the design rationale and approaches used.*

#### INTRODUCTION

This chapter provides an overview for those interested in designing systems to support PhD candidates with academic writing. It highlights a broad range of areas in the literature from peda-

gogical concerns, existing systems and Human Computer Interaction methods and approaches needed to develop prototype designs. The chapter then explores the design of a Web-based Computer Supported Collaborative Learning/Work (CSCL/W) tool to support doctoral candidates with their academic writing. It looks at best practices, strategies and existing approaches to support the

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PhD candidate with their academic writing. It is the aim of this chapter to provide the reader with a good foundation from which they can develop their own designs.

Pedagogical theories and practices on doctoral training generally emphasize the social and collaborative nature of learning (Boud & Lee, 2008; Hopwood & McAlpine, 2007; Leshem, 2007; McCotter, 2001). Community of Practice (Johnson, 2001; Lave & Wenger, 1991; Miao, Fleschutz, & Zentel, 1999; Wenger, 1998; Wenger & Snyder, 2000), Cognitive Apprenticeship (Lave & Wenger, 1991), and Peer Learning (Boud & Lee, 2005) provide the theoretical frameworks to describe the social environment and practice in which doctoral candidates can be supported in the transition from novice researchers to legitimate members of the academic community.

The pedagogical literature specifically addressing computer science doctoral training, the context in which this research is taking place, is limited but a noticeable exception is an ACM taskforce paper on research methods in computing (Holz, et al., 2006) which extends Bloom's taxonomy of higher order thinking skills (Bloom, Krathwohl, & Masia, 1956) for the domain of computer science doctoral training education. The extended framework covers "core skills," such as synthesis, evaluation and analysis, which are largely applicable to all scientific disciplines and a set of "specific skills." These specific skills include selecting papers, analysing the literature, writing research proposals and evaluating results.

Although Holz et al and others regard writing as a central activity in research, doctoral candidates often receive little support in this area beyond the one-to-one meetings with their supervisor (Paré, Starke-Meyerring, & McAlpine, 2009). Aitchison and Lee (2006) argue that writing skills are best acquired through engagement with a community of practice and through apprenticeship. They also suggest that writing is a "*knowledge-creating*" rather than merely knowledge-recording activity. This view is supported by Sharples (1999), who

argues writing is a creative design process. These works do not deal specifically with the processes involved in academic writing, therefore this chapter describes, in detail, a largely paper based, approach to dissertation writing, the "Single System" (Single & Reis, 2009), is described in detail. The "Single System" provides a comprehensive peer supported model for dissertation writing which resonates with both the arguments for collaboration, mentioned above, and the features found in a number of innovative writing tools.

After an initial discussion on research and writing skills, and underlying pedagogical foundations for their acquisition, the chapter discusses tools which help with the writing process. Writer's Assistant (Sharples, Goodlet, & Pemberton, 1989) and iWeaver (Shibata & Hori, 2002, 2008) are described as examples of innovative tools to support non-linear approaches to writing. Concept mapping tools are also examined. Given the arguments in the literature that both collaboration and community of practice are central to doctoral training, key concepts from the field of Computer Supported Collaborative Work (CSCW) and Computer Supported Collaborative Learning (CSCL) are introduced and their implications for the design of writing tools are explored.

Against the background of the ideas introduced, the chapter describes how a Participatory Design (PD) and Participatory Action Research (PAR) approach is being followed in the iterative development of the CAWriter writing tool, which is in turn part of a larger virtual research environment project to support computer science doctoral candidates in mastering and utilising a range of research skills.

## PEDAGOGICAL PRACTICES IN DOCTORAL TRAINING

Understanding the best practices and strategies within any domain is an essential element when designing a tool. This section reviews the peda-

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