

Research Methods in Computing: What are they, and how should we teach them?

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ABSTRACT

Despite a lack of consensus on the nature of Computing Research Methods (CRM), a growing number of programs are exploring models and content for CRM courses. This report is one step in a participatory design process to develop a general framework for thinking about and teaching CRM.

We introduce a novel sense-making structure for teaching CRM. That structure consists of a road map to the CRM literature, a framework grounded in questions rather than answers, and two CRM skill sets: core skills and specific skills. We integrate our structure with a model for the process a learner goes through on the way to becoming an expert computing researcher and offer example learning activities that represent a growing repository of course materials meant to aid those wishing to teach research skills to computing students.

Our model is designed to ground discussion of teaching CRM and to serve as a roadmap for institutions, faculty, students and research communities addressing the transition from student to fully enfranchised member of a computing research community of practice. To that end, we offer several possible scenarios for using our model.

In computing, research methods have traditionally been passed from advisor to student via apprenticeship. Establishing a richer pedagogy for training researchers in computing will benefit all (see Figure 1).

Categories and Subject Descriptors

K.3.2 [Computers and Education]: Computer and Information Science Education—Computer science education, Information systems education, Literacy

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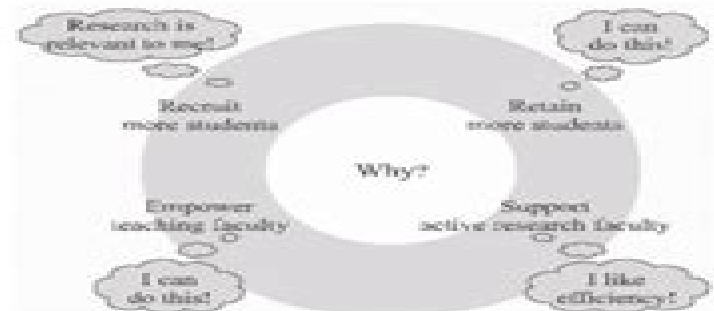


Figure 1: A richer set of options for teaching CRM benefits all the stakeholders.

General Terms

Experimentation, Human Factors, Design

Keywords

Research Methods, Situated Learning, Constructivism, Pedagogy, Learning Activities

1. INTRODUCTION

Despite a lack of consensus on the nature of Computing Research Methods (CRM), a growing number of programs are exploring models and content for CRM courses with varying degrees of success [87, 84, 101, 105]. In 2005, the SIGCSE Committee on Teaching Computer Science Research Methods (SIGCSE-CSRSM) [89] was founded to facilitate collaborative exploration of the content, pedagogy and curricular issues related to teaching CRM. SIGCSE-CSRSM runs a listserv, sponsors meetings at technical conferences, and hosts a Wiki [88].

On the listserv and at a Birds-of-a-feather (BOF) session at SIGCSE 2006 [41], the most frequently mentioned barriers to establishing a successful course were: (1) not being sure what material to teach, and (2) a lack of resources from which to build

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Human-Computer Interaction. Theories, Methods, and Tools Masaaki Kurosu, 2014-06-07 The 3 volume set LNCS 8510 8511 and 8512 constitutes the refereed proceedings of the 16th International Conference on Human Computer Interaction HCII 2014 held in Heraklion Crete Greece in June 2014 The total of 1476 papers and 220 posters presented at the HCII 2014 conferences was carefully reviewed and selected from 4766 submissions These papers address the latest research and development efforts and highlight the human aspects of design and use of computing systems The papers thoroughly cover the entire field of human computer interaction addressing major advances in knowledge and effective use of computers in a variety of application areas

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interdisciplinary research The human society is in the stage of major historic transition and enters the digital world with the main goal of developing the artificial world In this world the development of digital economics is significantly characterized by the deep interaction between the real and the virtual worlds while the key triggering this paradigm reform is the evolution of ideas since the modern times While involving the field of computer these thoughts are also related to the fields of philosophy ethics communication and economics Therefore the results of the research on the history of ideas related to digital economics are required to really understand the depth of this discipline If computationalism is the most important paradigm evolution of natural science the most important paradigm evolution of social science is interdisciplinary complex science In the meantime this book is the most significant in understanding the nature of paradigm evolution related to the development of digital economics from the perspective of complex science and interdisciplinary systematic researches Digital economics is in the foundation laying phase while this book mainly aims to historically narrate the thoughts of this discipline and hopes that readers can understand the influence of ideas in the old era on shaping the disciplines in the new era while exploring this new discipline The construction of digital economics is a process of evolution This book will be helpful to understand the underlying logic of the ideas constructed by the thinkers in different fields Virtual Communities: Concepts, Methodologies, Tools and Applications Management Association, Information Resources, 2010-10-31 Covers the development design and utilization of virtual organizations and communities and the resulting impact of these venues

Thesis Projects Mikael Berndtsson, Jörgen Hansson, B. Olsson, Björn Lundell, 2007-10-30 Any B Sc or M Sc study programme in the computing discipline typically ends with a capstone project A capstone project builds and tests the skills and the knowledge acquired during the education and is an essential part of the training towards becoming a professional There is a large number of different terms for these types of projects capstone project senior project final year project B Sc M Sc thesis project etc In this book we will use the term thesis project and in some cases for the sake of simplicity just project This book focuses on thesis projects within the computing discipline Thus the type of project discussed in this book is in line with the capstone format described in the ACM IEEE Computing Curricula 2001 Computer Science p 53 an alternative capstone format is a research experience that includes some original work a review of the scientific literature and an investigation of a proposed solution followed by a scientific paper and or an oral presentation of the results It is important to remember that these are undergraduates and be realistic about the amount and quality of research expected Even so it may be more worthwhile to expose outstanding students to the challenges of research than to have them design and build yet another program In this book we present a process for conducting thesis projects with the research orientation described in the quote above **User Experience Methods and Tools in Human-Computer Interaction** Constantine Stephanidis, Gavriel Salvendy, 2024-08-16 This book covers user experience methods and tools in designing user friendly products and services by encompassing widely utilized successful methods including elicitation analysis and establishment of requirements

collaborative idea generation with design teams and intended users prototype testing and evaluation of the user experience through empirical and non empirical means This book Provides methods and tools tailored for each stage of the design process Discusses methods for the active involvement of users in the human centered design process Equips readers with an effective toolset for use throughout the design process ensuring that what is created aligns with user needs and desires Covers a wide array of research and evaluation methods employed in HCI from the initiation of the human centered development cycle to its culmination This book is a fascinating read for individuals interested in Human Computer Interaction research and applications

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


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