

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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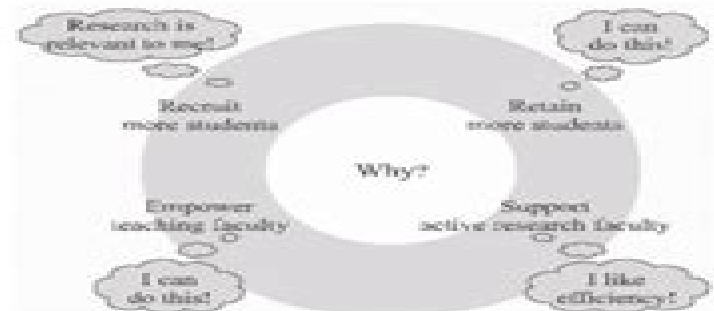


Figure 1: A richer set of options for teaching CRM benefits all the stakeholders.

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

Research Methods In Computing

Ronald S. King



Research Methods In Computing:

Research Methods in Computing Pearson Custom Publishing, Richard Halstead-Nussloch, Bob Harbort, 1999-01-01

Research Methods in Human-Computer Interaction Jonathan Lazar, Jinjuan Heidi Feng, Harry Hochheiser, 2010-02-01

Continual technological evolution has led to an explosion of new techniques in Human Computer Interaction HCI research. Research Methods in Human Computer Interaction is a thoroughly comprehensive guide to performing research and is essential reading for both quantitative and qualitative methods. Chapters cover a broad range of topics relevant to the collection and analysis of HCI data going beyond experimental design and surveys to cover ethnography, time diaries, physiological measurements, case studies, and other essential elements in the well-informed HCI researcher's toolkit. This book is a must-read for anyone in the field of Human Computer Interaction. The multi-disciplinarian approach housed in the reality of the technological world today makes for a practical and informative guide for user interface designers, software and hardware engineers, and anyone doing user research. Dr. Mary Czerwinski, Research Area Manager, Microsoft Research USA. Research Methods in HCI is an excellent read for practitioners and students alike. It discusses all the must-know theory, provides detailed instructions on how to carry out the research, and offers great examples. I loved it! Professor Vanessa Evers, Professor Human Computer Studies Lab, University of Amsterdam, the Netherlands. The book is superb, comprehensive, clear, and engaging. This is a one-stop HCI methods reference library. If you can only buy one HCI methods book, this is the one. Dr. Clare Marie Karat, IBM TJ Watson Research USA and recipient of the 2009 ACM SIGCHI Lifetime Service Award. A much-needed and very useful book covering important HCI research methods overlooked in standard research methods texts. Professor Gilbert Cockton, School of Design, Northumbria University, United Kingdom.

Handbook of Research Methods in Computing, 2010. Research Methods for Information Systems KING, Ronald Scott King, 2011-06-03. This book is designed for a first course in research and statistical methods in computing and does not assume the student has previous knowledge of the subject. Research Methods for Information Systems shows how to apply research and statistical methods to the current problems faced in a variety of fields but with special emphasis on computer science and information systems. It takes a non-threatening approach to the subject, avoiding excessive mathematics and abstract theory, and includes numerous exercises and examples to ensure the students understand the relevance of research methodology applications. Throughout the text, lead articles, examples, and exercises provide students with actual instances of various research methods, including implementation-driven research, mathematical proof techniques, empiricism, and observational research. This diversity in research methods in the computing fields is due to the fact that topics in the disciplines of computer science and information systems are technologically based rather than theory-driven logic. The author also exposes students to qualitative and mixed research methods. This is extremely important since within information systems, there has been a general shift in information system research away from technological studies toward more managerial and organizational issues. Research method topics

covered and summarized include proposal formulation research design methods of investigation methods of demonstrating concepts approaches to research validation and documentation of research results

Research Methods of Computer Science Ehtiram Raza Khan, **Research Methods for Information Systems** Ronald S. King, 2013 Assuming no previous knowledge this book provides comprehensive coverage for a first course in research descriptive statistics data mining probability estimation hypothesis testing chi square tests linear regression variance random number generation guide to research model construction statistical software axiomatic research simulation and clustering methods simulations statistical tables

Researching Information Systems and Computing Briony J Oates, 2005-12-18 With everything readers need to know about how to execute their research project this book is written specifically for information systems IS and computing students It introduces key quantitative and qualitative research methods makes sense of underlying philosophies and helps readers navigate and assess existing academic papers Special features support students as they bridge the gap between theory and practice These include research examples from the IS and computing disciplines suggestions on how to build internet research into each method mentioned an explanation of how knowledge is created drawing an analogy between this and the creation of software systems Throughout readers are supported by pedagogical features such as learning objectives explanations discussion questions evaluation guides and further reading

The Science of Computing Matti Tedre, 2014-12-03 The identity of computing has been fiercely debated throughout its short history Why is it still so hard to define computing as an academic discipline Is computing a scientific mathematical or engineering discipline By describing the mathematical engineering and scientific traditions of computing The Science of Computing Shaping a Discipline

Research Methods in Software Engineering Simon Giesecke, 2006 **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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RESEARCH METHODS FOR COMPUTING AND INFORMATICS. , 2024 **Teaching Psychology** James Hartley, Wilbert James

McKeachie,1990 This publication is the first to cover the entire field of teaching psychology and includes teaching methods advising and curriculum planning as well as special problems in teaching laboratory and statistics courses The articles selected provide thought provoking reading for an international readership Each of twelve subject oriented sections contains a brief introduction five articles and suggested further readings for those wishing to pursue a particular topic in more detail

Research Methodology and Strategy Patrick X. W. Zou,Xiaoxiao Xu,2023-08-01 Research Methodology and Strategy Provides comprehensive coverage of the entire research process methodologies strategies and their applications ideal for final year undergraduate Masters and PhD students academics researchers and professionals Research Methodology and Strategy Theory and Practice is designed to help readers understand the research process and equip them with the skills required to successfully execute their projects In depth chapters describe the general research processes different research paradigms and their applications and criticism and more Written by authors with decades of research experience this authoritative textbook addresses the skills needed by all active researchers including mixed method research design and development data and technology driven research methodologies writing and publishing research outcomes strengthening research practice nexus and strategies for improving research impact and citations Provides a solid understanding of interdisciplinary research and analytical methods Offers clear guidance on the application of data driven and technology enabled research methods Covers qualitative quantitative and mixed methods research methodologies Discusses different case study research methods and practices Describes methods drawn from business management economics and social sciences research Provides strategies for thesis and journal article writing and publishing Provides theoretical frameworks and examples for research practice nexus and improving research impacts Research Methodology and Strategy Theory and Practice is an invaluable textbook for senior undergraduate masters and PhD research students academic and scientific researchers and industry professionals who perform research in the course of their work Mobile Computing: Concepts, Methodologies, Tools, and Applications

Taniar, David,2008-11-30 This multiple volume publication advances the emergent field of mobile computing offering research on approaches observations and models pertaining to mobile devices and wireless communications from over 400 leading researchers Provided by publisher **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 servicesby 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 History of Nordic Computing 3 John Impagliazzo, Per Lundin, Benkt Wangler, 2011-09-29 This book constitutes the refereed post proceedings of the Third IFIP WG 9.7 Conference on the History of Nordic Computing HiNC3 held in Stockholm Sweden in October 2010 The 50 revised full papers presented together with a keynote address and a panel discussion were carefully reviewed and selected from numerous submissions The papers focus on the application and use of ICT and ways in which technical progress affected the conditions of the development and use of ICT systems in the Nordic countries covering a period from around 1970 until the beginning of the 1990s They are organized in the following topical sections computerizing public sector industries computerizing management and financial industries computerizing art media and schools users and systems development the making of a Nordic computing industry Nordic networking Nordic software development Nordic research in software and systems development teaching at Nordic universities and new historiographical approaches and methodological reflections *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 Frontier Computing Jason C. Hung, Neil Y. Yen, Lin Hui, 2019-05-18 This book presents the proceedings of the 6th International Conference on Frontier Computing held in Kuala Lumpur Malaysia on July 3-6 2018 and provides comprehensive coverage of the latest advances and trends in information technology science and engineering It addresses a number of broad themes including communication networks business intelligence and knowledge management web intelligence and related fields that inspire the development of information technology The contributions cover a wide range of topics database and data mining networking and communications web and internet of things embedded systems soft computing social network analysis security and privacy optical communication and ubiquitous pervasive computing Many of

the papers outline promising future research directions The book is a valuable resource for students researchers and professionals and also offers a useful reference guide for newcomers to the field **Official Gazette of the United States Patent and Trademark Office** ,2007

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inhalt u boot bunker in brest der leser begleitet buchheim auf seiner odyssee durch ein vom krieg zerstörtes europa die geschichte beginnt mit dem einlaufen von u 96 in saint nazaire nach der zweiten feindfahrt des kriegsberichters buchheims auf dem boot

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