

Qualitative Research in Computer Science Education

Orit Hazzan, Yael Dubinsky, Larisa Eidelman, Victoria Sakhnini, Mariana Teif
Department of Education in Technology and Science
Technion, Haifa 32000

oritha@tx, yael@cs, elarisa@tx, vmsvicky@tx, tmariana@tx [technion.ac.il]

ABSTRACT

This paper discusses the suitability of the qualitative research approach to computer science education research. It is based on the following two observations: First, only a small proportion of works presented in the computer science education literature contain some experimental component (Fincher and Petre, 2004; Valentine, 2004). Second, those research works conducted in computer science education that do, usually employ a quantitative research approach. This paper focuses on the qualitative research approach presenting its nature, discussing its relationships to the quantitative research approach and addressing its application in general and in the context of computer science education in particular.

Categories and Subject Descriptors

K.3.0 [Computers and Education]: K.3.0 General

General Terms

Human Factors.

Keywords

Computer science education research, Research methods, Qualitative research, Qualitative research in computer science education.

1. INTRODUCTION

Consider the following two research works conducted in order to reveal students' problem-solving strategies in the context of sort algorithms.

The results of the first research are based on a validated test on sort algorithms and an adequate quantitative data analysis method that compared the performance of students who implemented the algorithms in some programming language with that of students who did not implement the algorithms and were exposed only to the relevant theoretical aspects. This research indicates several significant differences in problem-solving performance between students of the two groups. The research is based on a representative sample and claims for conclusions.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

Conference'06, March 1–5, Houston, Texas, USA.
Copyright 2004 ACM 1-58113-000-0/06/0004...\$5.00.

The second research presents data obtained from interviews with a small number of students from the two above-mentioned groups, together with its analysis. The results suggest mental processes that may explain how students of the two groups use different sort algorithms. Without any claim for the generalization of its results, the research proposes that its findings can be useful for instructors who teach sort algorithms.

It is clear that these two researches employ different research methods. We propose that the differences depend largely on the objective of the research works in general and on the way in which the research results are intended to be used in particular. On the one hand, if a researcher wishes to know whether algorithm implementation in some programming language influences students' performance of specific tasks that deal with sort algorithms, the qualitative-oriented conclusion about significant difference in students' performance may be of interest to the researcher. On the other hand, if the researcher's objective is to learn about mental processes that presumably guide students of the two groups in a variety of problem-solving situations, the researcher might find the descriptive, interview-based qualitative approach more useful.

This paper focuses on the qualitative research approach which was represented by the second research mentioned above. In a more general perspective, the paper aims at addressing the theme of research in computer science education (CSE), which has recently been receiving a lot of attention from the CSE community (Dale, 2002; Almstrum, Hazzan and Gimat, 2004; Valentine, 2004; Fincher and Petre, 2004; Almstrum, Gaudial, Hazzan and Petre, 2005). Two examples of recently conducted activities that indicate this growing interest are the new SIGCSE committee (under the SIGCSE Committee Initiative) on Teaching Computer Science Research Methods (facilitated by Hilary Holt and Anne Applin) and the Scaffolding Research in Computer Science Education hands-on workshop¹, which aims at introducing higher-education faculty to research in CSE. Participation in Scaffolding involves attending workshops as well as carrying out a research. Our own interest in the application of qualitative research in CSE stems also from our observation that most of the research conducted in CSE employs quantitative research approach. This observation is based on the review of the research articles published in the CSE literature during the past five years.

Joining the growing interest in CSE research and in light of the relative lack of qualitative research in CSE, we aim, in this article, to illustrate how the qualitative research approach, which has been

¹ The Scaffolding Research in Computer Science Education workshop: <http://depts.washington.edu/srcew/>.

Computer Science Education Research

JS Bruner



Computer Science Education Research:

Unveiling the Magic of Words: A Report on "**Computer Science Education Research**"

In some sort of defined by information and interconnectivity, the enchanting power of words has acquired unparalleled significance. Their power to kindle emotions, provoke contemplation, and ignite transformative change is really awe-inspiring. Enter the realm of "**Computer Science Education Research**," a mesmerizing literary masterpiece penned by a distinguished author, guiding readers on a profound journey to unravel the secrets and potential hidden within every word. In this critique, we shall delve to the book is central themes, examine its distinctive writing style, and assess its profound affect the souls of its readers.

https://gandalf.roeckerfam.com/public/detail/fetch.php/christ_with_us_now_and_alwaysa_history_of_the_church_teachers_manual.pdf

Table of Contents Computer Science Education Research

1. Understanding the eBook Computer Science Education Research
 - The Rise of Digital Reading Computer Science Education Research
 - Advantages of eBooks Over Traditional Books
2. Identifying Computer Science Education Research
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Computer Science Education Research
 - User-Friendly Interface
4. Exploring eBook Recommendations from Computer Science Education Research
 - Personalized Recommendations
 - Computer Science Education Research User Reviews and Ratings

- Computer Science Education Research and Bestseller Lists
- 5. Accessing Computer Science Education Research Free and Paid eBooks
 - Computer Science Education Research Public Domain eBooks
 - Computer Science Education Research eBook Subscription Services
 - Computer Science Education Research Budget-Friendly Options
- 6. Navigating Computer Science Education Research eBook Formats
 - ePub, PDF, MOBI, and More
 - Computer Science Education Research Compatibility with Devices
 - Computer Science Education Research Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Computer Science Education Research
 - Highlighting and Note-Taking Computer Science Education Research
 - Interactive Elements Computer Science Education Research
- 8. Staying Engaged with Computer Science Education Research
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Computer Science Education Research
- 9. Balancing eBooks and Physical Books Computer Science Education Research
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Computer Science Education Research
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Computer Science Education Research
 - Setting Reading Goals Computer Science Education Research
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Computer Science Education Research
 - Fact-Checking eBook Content of Computer Science Education Research
 - Distinguishing Credible Sources

13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

Computer Science Education Research Introduction

In this digital age, the convenience of accessing information at our fingertips has become a necessity. Whether its research papers, eBooks, or user manuals, PDF files have become the preferred format for sharing and reading documents. However, the cost associated with purchasing PDF files can sometimes be a barrier for many individuals and organizations. Thankfully, there are numerous websites and platforms that allow users to download free PDF files legally. In this article, we will explore some of the best platforms to download free PDFs. One of the most popular platforms to download free PDF files is Project Gutenberg. This online library offers over 60,000 free eBooks that are in the public domain. From classic literature to historical documents, Project Gutenberg provides a wide range of PDF files that can be downloaded and enjoyed on various devices. The website is user-friendly and allows users to search for specific titles or browse through different categories. Another reliable platform for downloading Computer Science Education Research free PDF files is Open Library. With its vast collection of over 1 million eBooks, Open Library has something for every reader. The website offers a seamless experience by providing options to borrow or download PDF files. Users simply need to create a free account to access this treasure trove of knowledge. Open Library also allows users to contribute by uploading and sharing their own PDF files, making it a collaborative platform for book enthusiasts. For those interested in academic resources, there are websites dedicated to providing free PDFs of research papers and scientific articles. One such website is Academia.edu, which allows researchers and scholars to share their work with a global audience. Users can download PDF files of research papers, theses, and dissertations covering a wide range of subjects. Academia.edu also provides a platform for discussions and networking within the academic community. When it comes to downloading Computer Science Education Research free PDF files of magazines, brochures, and catalogs, Issuu is a popular choice. This digital publishing platform hosts a vast collection of publications from around the world. Users can search for specific titles or explore various categories and genres. Issuu offers a seamless reading experience with its user-friendly interface and allows users to download PDF files for offline reading. Apart from dedicated platforms, search engines also play a crucial role in finding free PDF files. Google, for instance, has an advanced search feature that allows users to filter results by file type. By specifying the file type as "PDF," users can find websites that

offer free PDF downloads on a specific topic. While downloading Computer Science Education Research free PDF files is convenient, its important to note that copyright laws must be respected. Always ensure that the PDF files you download are legally available for free. Many authors and publishers voluntarily provide free PDF versions of their work, but its essential to be cautious and verify the authenticity of the source before downloading Computer Science Education Research. In conclusion, the internet offers numerous platforms and websites that allow users to download free PDF files legally. Whether its classic literature, research papers, or magazines, there is something for everyone. The platforms mentioned in this article, such as Project Gutenberg, Open Library, Academia.edu, and Issuu, provide access to a vast collection of PDF files. However, users should always be cautious and verify the legality of the source before downloading Computer Science Education Research any PDF files. With these platforms, the world of PDF downloads is just a click away.

FAQs About Computer Science Education Research Books

1. Where can I buy Computer Science Education Research books? Bookstores: Physical bookstores like Barnes & Noble, Waterstones, and independent local stores. Online Retailers: Amazon, Book Depository, and various online bookstores offer a wide range of books in physical and digital formats.
2. What are the different book formats available? Hardcover: Sturdy and durable, usually more expensive. Paperback: Cheaper, lighter, and more portable than hardcovers. E-books: Digital books available for e-readers like Kindle or software like Apple Books, Kindle, and Google Play Books.
3. How do I choose a Computer Science Education Research book to read? Genres: Consider the genre you enjoy (fiction, non-fiction, mystery, sci-fi, etc.). Recommendations: Ask friends, join book clubs, or explore online reviews and recommendations. Author: If you like a particular author, you might enjoy more of their work.
4. How do I take care of Computer Science Education Research books? Storage: Keep them away from direct sunlight and in a dry environment. Handling: Avoid folding pages, use bookmarks, and handle them with clean hands. Cleaning: Gently dust the covers and pages occasionally.
5. Can I borrow books without buying them? Public Libraries: Local libraries offer a wide range of books for borrowing. Book Swaps: Community book exchanges or online platforms where people exchange books.
6. How can I track my reading progress or manage my book collection? Book Tracking Apps: Goodreads, LibraryThing, and Book Catalogue are popular apps for tracking your reading progress and managing book collections. Spreadsheets: You can create your own spreadsheet to track books read, ratings, and other details.

7. What are Computer Science Education Research audiobooks, and where can I find them? Audiobooks: Audio recordings of books, perfect for listening while commuting or multitasking. Platforms: Audible, LibriVox, and Google Play Books offer a wide selection of audiobooks.
8. How do I support authors or the book industry? Buy Books: Purchase books from authors or independent bookstores. Reviews: Leave reviews on platforms like Goodreads or Amazon. Promotion: Share your favorite books on social media or recommend them to friends.
9. Are there book clubs or reading communities I can join? Local Clubs: Check for local book clubs in libraries or community centers. Online Communities: Platforms like Goodreads have virtual book clubs and discussion groups.
10. Can I read Computer Science Education Research books for free? Public Domain Books: Many classic books are available for free as they're in the public domain. Free E-books: Some websites offer free e-books legally, like Project Gutenberg or Open Library.

Find Computer Science Education Research :

christ with us now and always a history of the church teachers manual

[chiricahua mountains](#)

choosing a career in helping professions

chinhomineys secret a novel

chipmunk song

chinese childrens favorite stories

chinese petroleum. an annotated bibliography.

choices and chances

chinese story teller

[chip of the flying u](#)

[chinese secret service](#)

christ and the human soul

[choice sermons from missouri pulpits](#)

christ for us in the theology of dietric

chong ming wa ren shi cong su shuang yu

Computer Science Education Research :

HUMAN ANATOMY 6th Edition Textbook Solutions Textbook solutions for HUMAN ANATOMY 6th Edition SALADIN and others in this series. View step-by-step homework solutions for your homework. LABORATORY MANUAL Saladin vf the US Human ... Jun 15, 2021 — Question: LABORATORY MANUAL Saladin vf the U.S. Human Anatomy Sixth Edition n V 17. Name the phases of the cell cycle as illustrated. Laboratory Manual for Anatomy and Physiology (6th Edition) Access the complete solution set for Allen's Laboratory Manual for Anatomy and Physiology (6th Edition). Chapter 1 Saladin 6th edition Human Anatomy Flashcards Study with Quizlet and memorize flashcards containing terms like Anatomy, Physiology, Inspection and more. Laboratory Manual by Eric Wise to accompany Saladin ... Laboratory Manual by Eric Wise to accompany Saladin Human Anatomy. 6th Edition. ISBN-13: 978-1260399769, ISBN-10: 1260399761. 4.7 4.7 out of 5 stars 81 Reviews. Laboratory Manual by Eric Wise to accompany Saladin ... Get the 6e of Laboratory Manual by Eric Wise to accompany Saladin Human Anatomy by Eric Wise Textbook, eBook, and other options. ISBN 9781260399769. Laboratory Manual by Wise for Saladin's Anatomy and ... Laboratory Manual by Wise for Saladin's Anatomy and Physiology. 9th Edition. ISBN-13: 978-1260791501, ISBN ... Laboratory Manual, Saladin Anatomy and Physiology: The ... Laboratory Manual, Saladin Anatomy and Physiology: The Unity of Form and Function, 6th Edition Keiser Univerity by Unknown Author - ISBN 10: 0077643879 ... Laboratory Manual by Eric Wise to accompany Saladin ... This lab manual can be used with Saladin's Human Anatomy text, or it can be used independently. The illustrations are labeled; therefore, students do. Wilderness Skills for Women: How... by Jordan, Marian Wilderness Skills for Women: How to Survive Heartbreak and Other Full-Blown Meltdowns [Jordan, Marian] on Amazon.com. *FREE* shipping on qualifying offers. WILDERNESS SKILLS FOR WOMEN Wilderness Skills for Women: How to Survive Heartbreak and Other Full-Blown-Melt Downs. From Moses to Jesus, so many heroes of the Bible had to endure some ... Wilderness Skills for Women - eBook: Marian Jordan Aimed at young women aged 18 to 35, Wilderness Skills for Women helps them endure the spiritual droughts in their lives and emerge on the otherside victoriously ... Wilderness Skills for Women: How to Survive Heartbreak ... This book is for women who are going through a tough season in their lives! If you suffer from any pain and your heart aches, this is definitely a book you want ... Wilderness Skills for Women: How to Survive Heartbreak ... In Wilderness Skills for Women, Marian Jordan Ellis sees the same thing happening today as she and her friends still find themselves going through periods of ... Wilderness Skills for Women by Marian Jordan | eBook In Wilderness Skills for Women, rising author/speaker Marian Jordan sees the same thing happening today as she and her friends still find themselves going ... Can women survive in the woods without any skills? Jul 9, 2023 — While women are fully capable of surviving in the wilderness, it is important to note that basic survival skills and knowledge greatly enhance ... Wilderness Skills for Women: How to Survive... Wilderness Skills for Women: How to Survive... by Marian Jordan. \$4.79 Save \$8.20! List Price: \$12.99. Format: Paperback. Condition: Very Good. Quantity: 1, 2 ... Wilderness Skills for Women : How to

Survive Heartbreak ... It's woman versus wild in this fun yet frank book about the various wilderness seasons of life. Whether it's relationship drama, the constant pull of our ... Wilderness Skills for Women: How to Survive Heartbreak ... Wilderness Skills for Women: How to Survive Heartbreak and Other Full-Blown Meltdowns by Jordan, Marian - ISBN 10: 0805446702 - ISBN 13: 9780805446708 - B&H ... Seeing Sociology - An Introduction (Instructor Edition) Publisher, Wadsworth; Second Edition (January 1, 2014). Language, English. Paperback, 0 pages. ISBN-10, 1133957196. ISBN-13, 978-1133957195. Product Details - Sociology an Introduction Sociology an Introduction: Gerald Dean Titchener. Request an instructor review copy. Product Details. Author(s): Gerald Dean Titchener. ISBN: 9781680752687. Instructor's manual to accompany Sociology, an ... Instructor's manual to accompany Sociology, an introduction, sixth edition, Richard Gelles, Ann Levine [Maiolo, John] on Amazon.com. Seeing Sociology: An Introduction Offering instructors complete flexibility, SEEING SOCIOLOGY: AN INTRODUCTION, 3rd Edition combines up-to-the-minute coverage with an easy-to-manage approach ... Seeing Sociology - An Introduction [Instructor Edition] Seeing Sociology - An Introduction [Instructor Edition] ; Condition. Good ; Quantity. 1 available ; Item Number. 235292307873 ; Author. Wadsworth ; Book Title. MindTap Sociology, 1 term (6 months) Instant Access for ... Offering instructors complete flexibility, SEEING SOCIOLOGY: AN INTRODUCTION, 3rd Edition combines up-to-the-minute coverage with an easy-to-manage approach ... seeing sociology an introduction Seeing Sociology - An Introduction (Instructor Edition). Ferrante. ISBN 13: 9781133957195. Seller: Solr Books Skokie, IL, U.S.A.. Seller Rating: 5- ... Seeing Sociology: An Introduction - Joan Ferrante Offering instructors complete flexibility, SEEING SOCIOLOGY: AN INTRODUCTION, 3rd Edition combines up-to-the-minute coverage with an easy-to-manage approach ... Seeing Sociology - An Introduction (Instructor Edition) by ... Seeing Sociology - An Introduction (Instructor Edition). by Ferrante. Used; good; Paperback. Condition: Good; ISBN 10: 1133957196; ISBN 13: 9781133957195 ... Sociology: An Introductory Textbook and Reader This groundbreaking new introduction to sociology is an innovative hybrid textbook and reader. Combining seminal scholarly works, contextual narrative and ...