A Statewide Survey on Computing Education Pathways and Influences: Factors in Broadening Participation in Computing.

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Outline

- Motivation/Background

- Introduction

- Description of pool: Demographics & Influences

- Analysis of results

- Benefits of the survey

- Strengths & Weaknesses of the paper

- Education in Big Data World

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Motivation/Background

- Why did I choose this paper?

- My Interest in computer science education, gender influences on participation, creating better academic software packages, data management and analysis.

- My past research on "User's Involvement in Software Development Projects".

- Some of my current research questions:

  - Why do female students drop the computer science major after undergraduate level and divert into other arts or general studies, is it due to curriculum structure, gender stereotyping or general climates in the learning environment?

  - How do we retain or attract more females to the computer science field so as to create balance in the educational systems and industry?

  - What are gender influences on software products used in computer science education?

  - What are the effects of gender on computer interactions and how do these effects relate to software project/product failures?

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Motivation/Background contd.

- What are the research questions addressed by the paper?

    ➔ Who takes computing in Georgia state and how computing experiences in middle & high school influences their choices?

    ➔ What is the impact of GaComputes' work on computing enrollment in Georgia?

    ➔ What influences the decisions of women & minorities to purse computing.

Introduction

- ## What is Computing Education?

  It involves the teaching and learning of all forms of computing - computer science, computer engineering, information technology, information systems etc.

- ## Why do we need to understand the factors that affect computing education pathways?

➜ To help students develop personally.
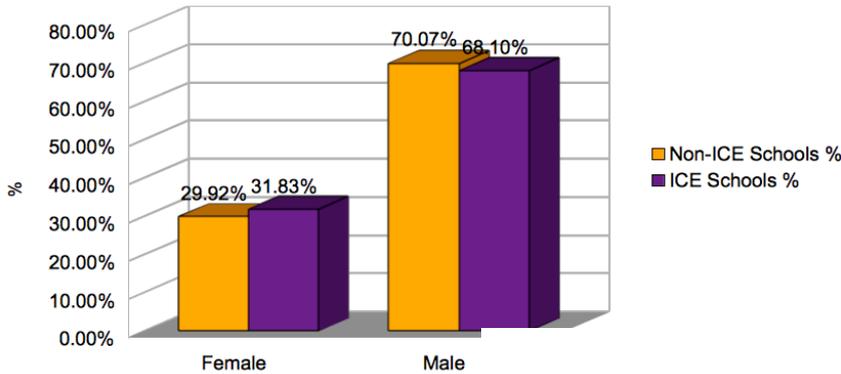
➜ To help them perform better in the job market.

➜ To help schools and faculties know what teaching resources are required.
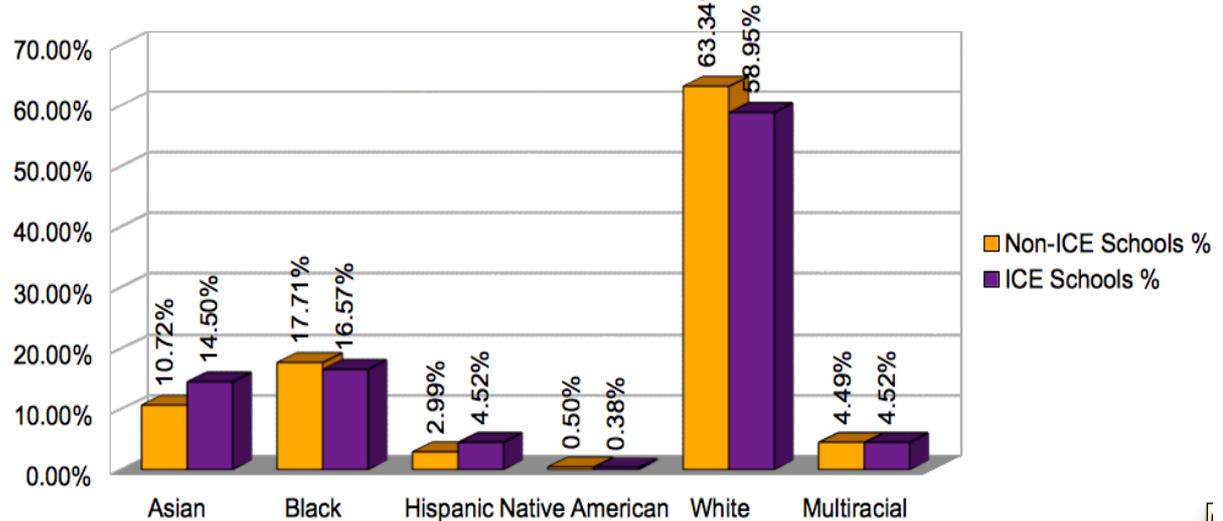
Description of Pool

- Demographics:

  1434 undergraduates in introductory computing classes from 19 higher education institutes in Georgia state.

- Influences on pathways:

  ➔ GaComputes

  ➔ Gender

  ➔ Race/Ethnicity

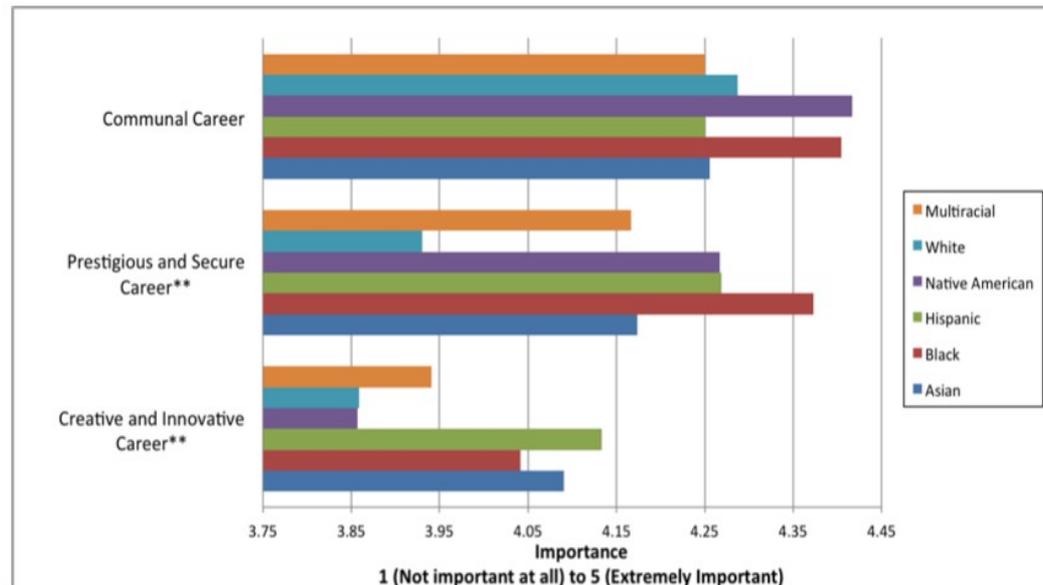# Demographics: Percentage of students based on gender comparison & race/ethnicity.
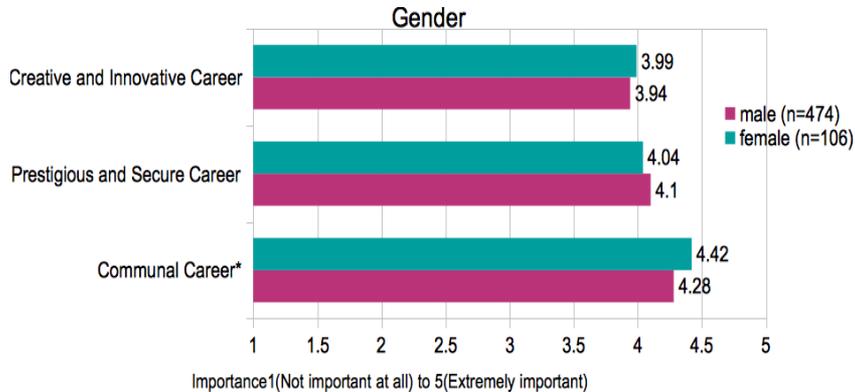
# Analysis of Results: Based on important career characteristics.

10 Reasons for Choosing a computing major/minor

- Interest in creating computer animation.

- Enjoy working with computers.

- Enjoy programming computers.

- Interest in solving problems with computing.

- Computing offers diverse and broad opportunities.

- Interest in computer games.

- Interest in helping people or society.

- Increased creativity.

- Provision of financial opportunities in future careers.

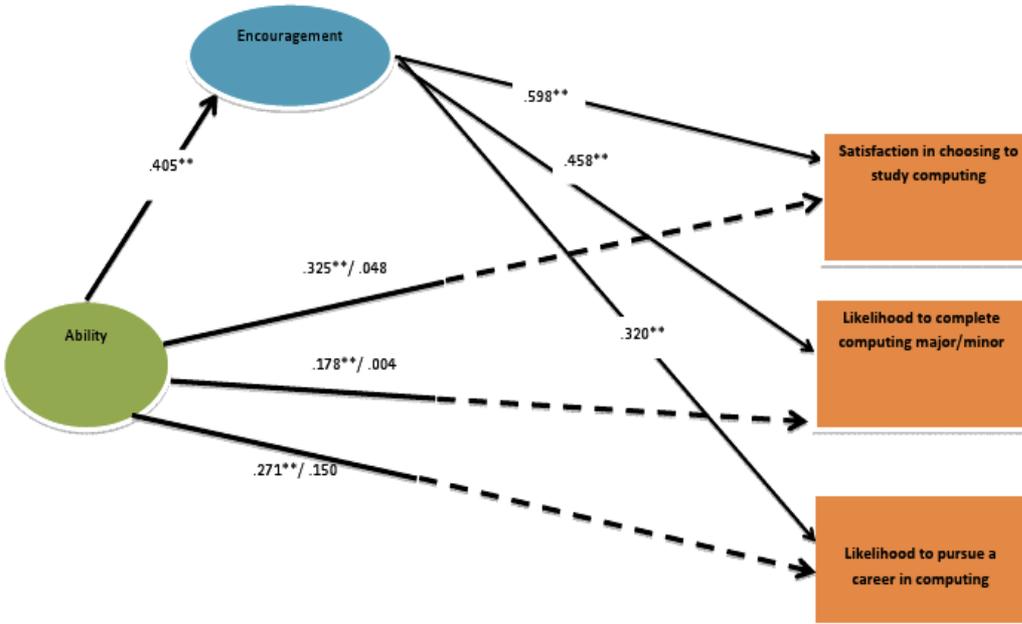- Good grades in Math and Science.

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Mediation Analysis: Gender
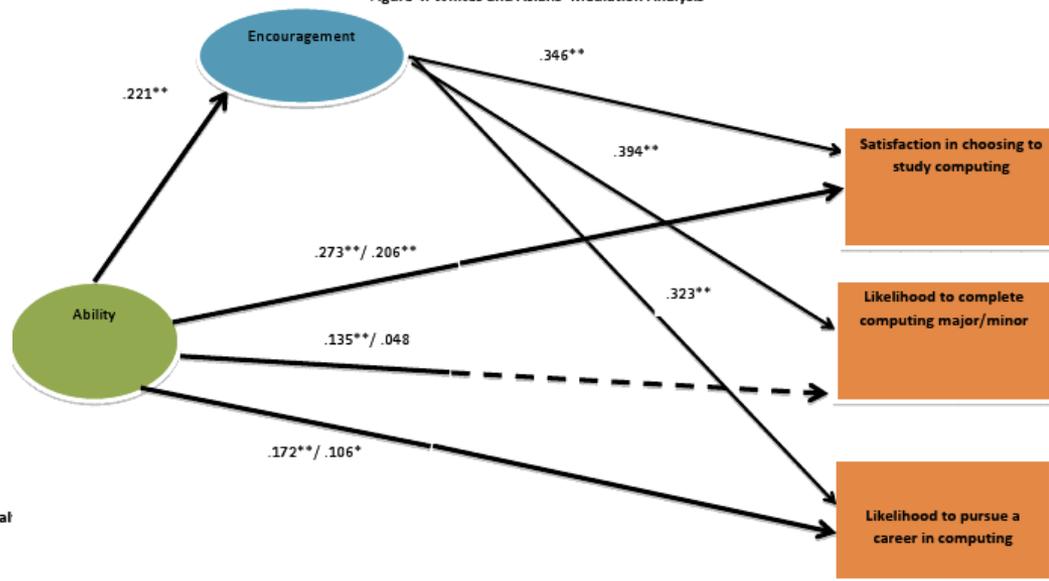
Figure 2. MALES -Mediation Analysis
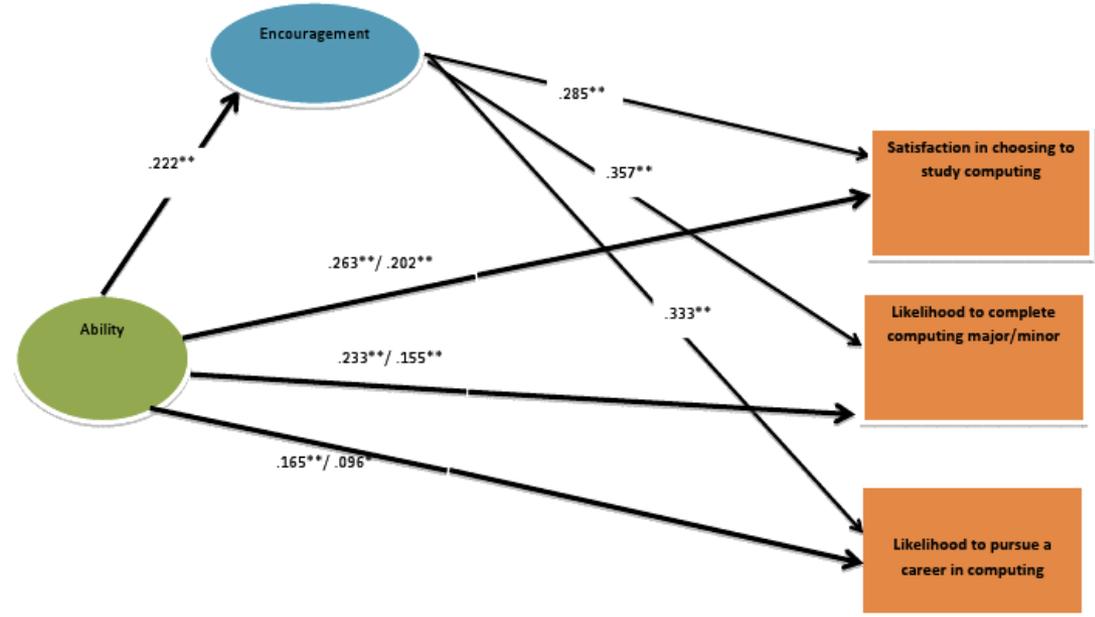
Male

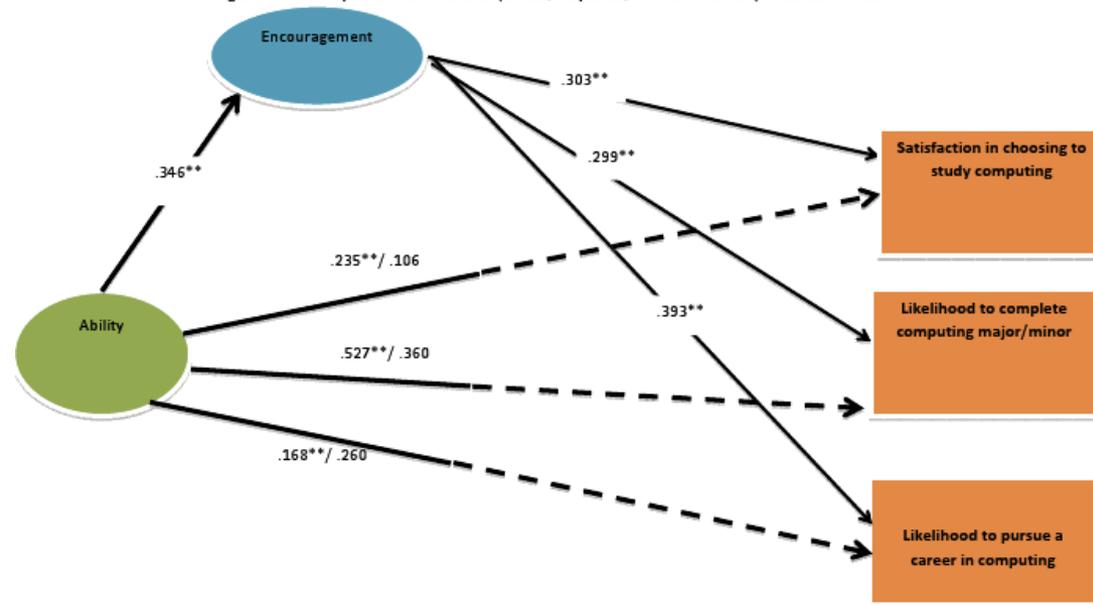Figure 1. FEMALES -Mediation Analysis

Female

Mediation Analysis: Race/Ethnicities

Figure 4. Whites and Asians -Mediation Analysis

White and Asian majorities

Figure 3. Underrepresented minorities (Blacks, Hispanics, Native American) -Mediation Anal

Under-represented minorities

Benefits of the survey

- Creating career planning guides

- Structuring curriculum and allocation of courses.

- Fitting students into industry based on interests.

- Faculty approach to teaching different groups of students.

- Broadening the participation of students in computing.

- Position for future work

Strengths

- ## Easy to understand/well organized

  The authors made use of illustrative graphs that are easy to understand and gave clear description of the accuracy of the results of their analysis.

- ## Credibility

  The paper was published September, 2012 in ACM-International Computing Education Research conference proceedings. The authors conducted the analysis on a quite a large number of datasets,covering a wider range of students compared to previous research done in this area.

- ## Impact

  The results of their analysis increase our understanding on what interventions along the pathways might or might not be having effects on students.

Weaknesses

- Some other factors like parents educational backgrounds,mentoring would be good variables for the mediation analysis.

- More computer-intensive methods of data analysis would yield more accurate results than the traditional mediation analysis has they can possibly handle multiple mediators. (Monte Carlo studies(use of computer simulations) , permutations tests, neural networks etc).

- No mention of difficulties faced during analysis or any down-sides encountered.

- No suggestions for further works.

Education in Big Data World

- Understanding students behavior for better creation of educational software packages. Research grounds for better human-computer interaction.

- The need to retain key concepts in education for future use by students and faculties.

- Taking advantage of the available digital resource to improve learning process.

- Data-driven approaches make it possible to study learning in real-time and offer systematic feedback to students and teachers

- Rather than rely on periodic test performance, instructors can analyze what students know and what techniques are most effective for each pupil. By focusing on data analytics, teachers can study learning in far more refined ways.

- Online tools enable evaluation of a much wider range of student actions, such as how long they devote to readings, where they get electronic resources, and how quickly they master key concepts..

Future Work

- Focus on how individual behaviors affect software products and their participation in computing by using and possibly modify behavioral models based on several factors that would be considered.

- Utilize a diversity of techniques including analysis of large data sets, behavioral experiments, theoretical analysis. Data gotten from surveys might require new algorithms that can do more that analyze graphs but analyze the interactions that occur within the elements of the graph.

- Use of Big data analytics tools for improving the learning processes of both genders.

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Thank You