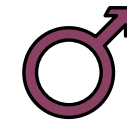


INCREASING GENDER DIVERSITY IN COMPUTER SCIENCE



ARE THE COURSE MATERIALS OF THE COMPUTER SCIENCE BACHELORS REPRESENTING DOCUMENTED STEREOTYPES FOR COMPUTER SCIENTISTS?



INTRODUCTION

- Women are underrepresented in Computer Science (CS):
 - 18.9% in Europe [1]
 - 19.4% in the Netherlands [1]
 - 21.2% in the US [2]
- Diverse teams improve inclusive product design and access to a profitable job market [3]
- Research shows stereotypes about Computer Scientists:
 - Male
 - Prefers to be alone
 - (Only) enjoys robotics and programming [3]
- Women's sense of belonging and belief in success may be impacted, as they don't feel characterized by these stereotypes
- Teaching materials might enforce and validate stereotypes [4]

RESEARCH QUESTION

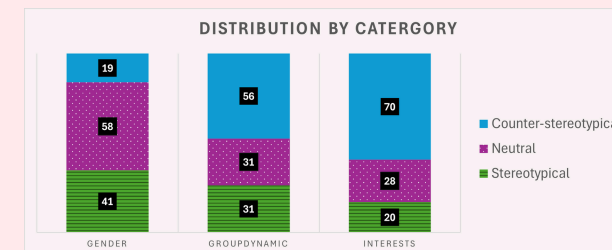
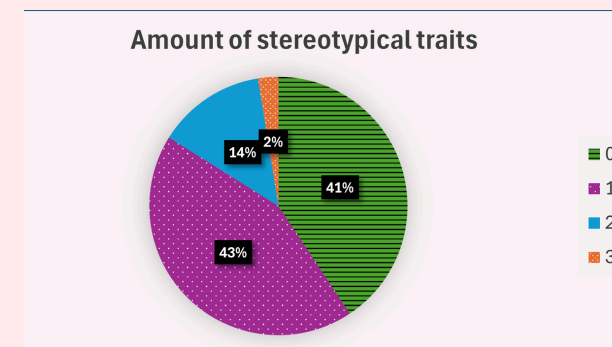
To what extent do the course materials used in introductory CS courses of the TU Delft Computer Science bachelor represent documented stereotypes for computer scientists; those being a Computer scientist has to be **male, prefers to be alone, and is obsessed with technology?**

METHODOLOGY

- Analyze TU Delft's introductory CS courses:
 - CSE1300 "Reasoning and Logic"
 - CSE1500 "Web and Database Technology"
- Analyzed different course materials:
 - Book (CSE1300 one book, CSE1500 2 books)
 - Lecture slides (CSE1300 14 slide sets, CSE1500 16 slide sets)
 - Videos (CSE1300 25 videos, CSE1500 4 videos)
- Focus on characters, inventorizing and classifying all examples [4] [5]
- Categorized examples based on stereotypes:
 - Male dominance
 - Working alone
 - Technology obsession
- Leaving out the following data:
 - Content marked as optional or extra
 - Examples used more than once within one chapter/video or lecture

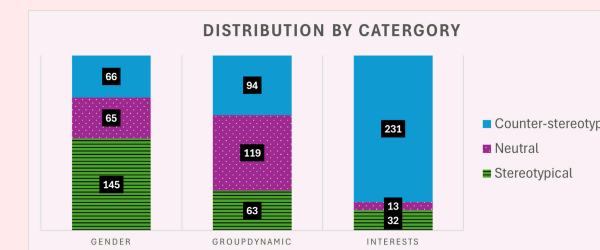
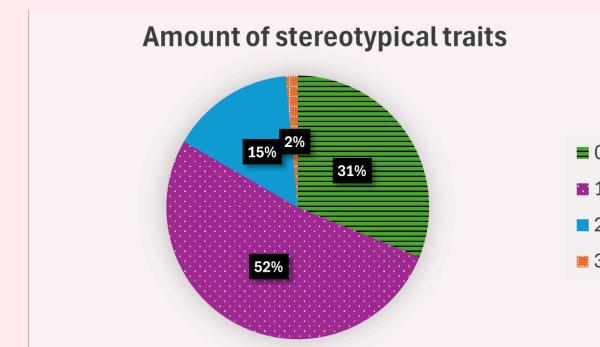
FINDINGS

CSE1300 'Reasoning and Logic'



- Number of Examples: 118 total examples (59 from book, 54 from slides, 5 from videos)
- Gender Representation:
 - 49% neutral characters
 - More than twice as many male characters (41) as female characters (19)
 - All highlighted researchers in slides are male
- Group Dynamics:
 - Majority of characters depicted in a group (56)
 - 31 characters depicted alone, with most using neutral pronouns like "You" or "I"
- Interests:
 - Most common interests: Neutral (29), Logic and puzzle games (21)
 - 20 characters represent stereotypical interests (e.g., inspired by game characters, discussing computers/technology)
- Combination of stereotypical Traits:
 - Female characters mostly depicted in groups or close proximity to people
 - Male characters often shown with stereotypical interests (e.g., logic games, technology)
 - Characters combining traits of being male and having stereotypical interests are most common

CSE1500 'Web and Database Technology'



- Number of Examples: 270 total examples (94 from books, 176 from slides, 6 from videos)
- Gender Representation:
 - More male characters (145) than female (66) or neutral characters (65)
- Group Dynamics:
 - Majority of characters labeled as "in proximity of people" (119)
 - Characters based on real people are often alone (41 out of 67)
- Interests:
 - Dominant interest category: Occupational activity (non-CSE) with 154 examples
 - Other common interests: Neutral (36), Computers & Technology (29), Care or Caring activity (25)
- Combination of stereotypical traits:
 - Over two-thirds of examples display at least one stereotypical trait
 - Male characters are often depicted alone and engaged in stereotypical activities
 - Real people examples heavily influenced by film and music industry biases

DISCUSSION

- Gender bias
 - Examples often male-dominated in both courses
 - Courses include stereotypes related to gaming and film industries
- Social Dynamics
 - Characters often depicted in groups or neutral settings
- Interests
 - Common: Logic puzzles, occupational activities
 - Stereotypical tech interests are prevalent
- Impact of Stereotypes
 - Negative effects on women's sense of belonging and success expectations
 - Reinforces the image of CS as a male domain
 - Highlighted need for diverse and inclusive educational materials
- Limitations:
 - Single researcher annotation
 - Potential human error
 - Selection bias in the selection of courses
 - Limited scope

TAKEAWAY

- The study reveals significant gender biases and stereotypes in educational materials.
- Especially a bias in showing male examples
- Addressing these issues can help retain more women in CS and foster a more inclusive environment.

REFERENCES

References



Full paper

