INCREASING GENDER DIVERSITY IN COMPUTER SCIENCE

A Systematic Literature Review of Interventions in Primary and Secondary Education

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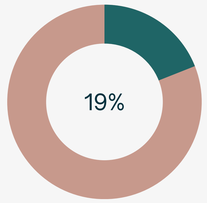
BACKGROUND

The research addresses women's historical and persistent underrepresentation in computer science, particularly in primary and secondary education. Despite significant contributions by women in computing history [1], gender stereotypes and misconceptions continue to limit female participation in this field. This review explores various educational interventions to increase female interest and participation in computer science from a young age.

ISSUE



Graduation Statistics in Computer Science Based on Gender in the US for 2017 [2]

OBJECTIVE

What practices have been documented to increase the interest in Computer Science of primary and secondary school girls?

METHODOLOGY

The study employs the SALSA framework (Search, AppraisaL, Synthesis, and Analysis) [3] for conducting a systematic literature review to identify documented practices that increase the interest of primary and secondary school girls in Computer Science.

SEARCH

Databases: *ACM Digital Library*, *Scopus*, *Web of Science*

Keywords categories: *Gender*, *Diversity*, *Computer Science*, *Primary/Secondary Education*

Query: Structured to intersect *gender terms* with *CS education contexts*.

APPRAISAL

Inclusion: *English*, *Peer-reviewed*, *CS education focus*

Exclusion: *Non-English*, *Irrelevant fields*, *Theoretical*, *pre-2005*

Process: PRISMA [4] - *Identification*, *Screening*, *Eligibility*

Result: 13 included studies [5-17]

SYNTHESIS

Analysis Approach: *Deductive* and *Inductive* encodings

Deductive:
- Types of Interventions
- Documentation Nature
- Issues Addressed
- Skills Developed

Inductive (Emerging themes):
- Recruitment methods
- Gender exclusivity

ANALYSIS

Process: Classifying papers based on deductive encodings. Conducting and in-depth analysis to confirm data, and exploring inductive themes.

Steps:
1. Broad classification into categories.
2. In-depth analysis for confirming data and finding new insights.
3. Identifying patterns and correlations across studies.

RESULTS

The systematic literature review results are presented by categorizing the *types of interventions*, *the nature of documentation*, *the issues addressed*, *skills development*, *enrollment strategies*, and *gender exclusivity participation*. Each category displays insights on

1. Type of Intervention
   - Camps: Hands-on Activities, Strong Engagement
   - Workshops: Short-term, Intensive Training
   - Online: Flexible, Scalable, Less SocialInteraction
2. Nature of Documentation:
   - Specific Activities: Immediate impacts
   - Analytical Studies: Long-term strategies
3. Issues Addressed:
   - Underrepresentation: Broad impact
   - Role Models: Mentorship, Guidance
   - Curriculum Barriers: Inclusive environments
4. Skills Developed:
   - Social/Community: Group Projects, Teamwork
   - Self-Esteem: Confidence-building Activities
   - Algorithmic: Fundamental CS Skills
5. Enrollment Strategies:
   - Random: Equal opportunities
   - Skills-based: Targeted engagement
   - Category-based: Socio-economic inclusivity
6. Gender Exclusivity:
   - Female-only: Builds confidence
   - Mixed-gender: Fosters inclusivity

TAKEAWAY

All documented interventions positively impact girls' interest in computer science. Effective strategies include camps, workshops, mentorship, role models, and curriculum adjustments. However, there may be a publication bias towards reporting only successful interventions. Continuous implementation, adaptation, and transparent documentation of challenges are essential to maintaining progress toward gender diversity in computer science.

REFERENCES