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Leveraging Senior Undergraduate Teaching Assistants in Computer Science Education: A Case Study from a Swedish University

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Background and Motivation

- Undergraduate Teaching Assistants (UTAs) are common in large universities, underexplored in small settings
- Increased CS enrollment strains small universities
- Challenges:
  - *teaching resources,*
  - *student support,*
  - *and course quality*

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Investigation & ”win-win” outcomes

- This study explores UTA roles and *triple* benefits:
  - *from the instructors’ perspective,*
  - *from the TAs pedagogical experience,*
  - *from the students’ perspective.*

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UTA Model and Its Origins

- Stanford (1988): Early UTA model

  (1) increasing student enrollment,

  (2) improving the quality of education, and

  (3) maintaining costs at existing levels

- Peer relatability, communication, and pedagogy emphasized
- Continuous training and reflective practice

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Literature Review Findings

- Mirza et al. identified five UTA program themes:
  - recruiting and selection, duties, training, organizational structure, and program evaluation.
- Benefits to UTAs: skills, confidence, engagement
- Benefits to students, instructors, and institutions

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UTA / TA Model at Kristianstad University

- Applied in many CS courses
- Uses Discord for flexible support
- TAs serve as peer mentors and pedagogical support

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Methodology

- Based on 3-5 years of course evaluations, interviews, and reflections
- Two courses studied in-depth
- Qualitative feedback from TAs, students, and instructors

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Introduction to Computer Science Course

- First-year & first (!) course
- Significant growth in student enrollment (30 → 130)
- TA roles evolved from pandemic Discord support to full mentoring
- Support both online and on campus

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Algorithms and Data Structures Course

- Second-year course with more advanced expectations
- TAs help in seminars: discussions, checking task completion
- Improves student understanding and reduces teacher workload

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Results: Benefits for TAs

- Deeper subject knowledge
- Improved communication and leadership
- Shift in perspective and interest in teaching

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TAs´ feedback

- *“I wanted to be a TA since day one. Having the chance to help other students is mostly what I am good at. This experience enriched my study years.”*
- *“The TA experience has strengthened my confidence in technical problem-solving, mentoring, and teamwork all of which are essential in the professional world. It has also inspired me to stay open to future roles in teaching or knowledge sharing, whether in academia or industry. I will recommend TA positions for other students as well for them to gain experience and increase their knowledge and soft skills as I did”*

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Results: Benefits for Students

- Approachable peer support
- Increased course satisfaction and engagement
- Strong feedback on TA contributions

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Students´feedback

- *“Interesting subjects, knowledgeable teacher and teacher assistants. [Teacher] and [TA] were very enthusiastic of the topics and us learning them.”*
- *“... Also ..the TA [...] ... is always ready to help a student, [...] is very cooperative and has a good knowledge on the subject”*
- *“[...], the TA, was very supportive and helpful throughout the course.”*
- *“In my opinion, practical tasks were very useful, I liked that we could go through the homework tasks together in class and that if something was not understandable, then [Teacher] or [TA] explained in a different way than in the book, for example.”*

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Recommendations

- Assign two TAs per course
- Introduce *general* TAs for first-year support
- Use platforms like Discord for accessibility
- Provide TA communication training

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Future Role of TAs in the AI Era

- AI complements, not replaces, human TAs
- TAs handle nuanced, context-specific support
- AI can assist with repetitive tasks

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Conclusion

- UTA model highly effective at small universities
- Enhances learning outcomes, supports instructors
- Develops TAs academically and professionally

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