

Teamwork in Capstone Courses: A Comparative Analysis of Dutch Universities

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1. Introduction

- **Capstone courses** – Integrate the knowledge and experience students acquired through previous coursework and prepare them for industry
- **Teamwork** – Important skill for Computer Scientists, but often subordinate to technical skills in education
- **Problem** – Literature on capstone courses is mainly case-based
- **Knowledge gap** – Unclear how similar capstone courses at different universities differ in their approaches to teamwork

2. Research Question

RQ: What differences exist in teamwork between similarly structured capstone courses in Computer Science at Dutch universities?

SQ1 How is teamwork incorporated in Computer Science capstone courses at Dutch universities?

SQ2 How do Dutch universities align their teamwork teaching methods with their learning objectives in Computer Science capstone courses?

3. Background

Most capstone courses use the following characteristics:

1. **Project Based Learning** – Students work on a project in teams
2. **Industry based** – Projects are sourced from industry based on real-world problems or needs

4. Methodology

- This research analyzes publicly available course documentation to examine the intended design and organization of teamwork
- Three universities in the Netherlands were selected:



- Qualitative Content Analysis and Qualitative Comparative Analysis are used to answer the main research question

6. Discussion

SQ1: Teamwork is a core component of all capstone courses with multiple teaching methods

SQ2: Courses use several teaching methods backed by literature

- RQ:** Universities differ in how teamwork is taught, supported and assessed
- Most variation is seen in their teaching methods, team formation and assessment
 - No university excels in all aspects

7. Conclusion

- Teamwork is implemented differently despite similar course structures
- Recommendations
 1. Include teaching methods like reflection and support options
 2. Directly assess teamwork
 3. Include teamwork in course description
 4. Work together and learn from each other
- Strong teamwork integration into capstone courses is crucial for students' teamwork skills and their preparation for industry

5. Results

Aspect	University of Groningen	Delft University of Technology	Utrecht University
Course description	Teamwork not addressed	Teamwork not addressed	Teamwork explicitly included
Learning objectives	Moral responsibilities & societal impact, implications in time and project management	Collaboration with coach and client	Using Scrum
Team formation	Skills taken into account	Self organized teams	Role preferences
Teaching methods	Lectures, optional support	Teamwork sessions, reflection, mandatory meetings	Peer observation, reflection, lectures, team building
Assessment	Monitored but not directly assessed	Directly assessed in rubric with fixed weighting	Directly assessed in rubric with role dependent weighting

Table 1: Differences in teamwork across capstone courses