Towards Improving Success Rate in Technically Challenging Computer Science Modules through Active Collaborative Learning

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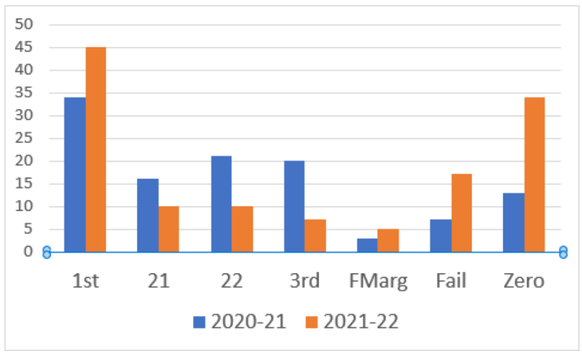
Background

Technically challenging modules such as those demanding programming of core and emerging concepts from **modern day computer science and computer engineering** fields, pose difficulties to undergrad students, especially when these students come from various backgrounds and courses requiring **different skillsets**. The sudden shift to online teaching during the pandemic has not helped with this situation despite a return to blended and in-person teaching, as the attendance and engagement rates have remained low. This had a **polarizing effect** with students divided between those capable of solving the coursework and those that do not even attempt it, or when they do, they find they cannot progress to a minimal standard of passing (see right figure). Existing studies (Özmen and Altun, 2014) as well as student feedback have identified problems in the programming process and programming knowledge as key factors.



Objectives

This project **aims** at improving student success in a specific module, i.e., Service Centric and Cloud Computing by introducing group work and SCALE-UP approaches to teaching and learning (Waite et al., 2004). As a first step, current research focused on **understanding the causes for failure** and **obtain student feedback** on alternative teaching strategies.

Methods

- Online survey of students enrolled in Service Centric and Cloud Computing (SCC) level 6 module.
- Statistical analysis of the student dashboard attendance data and of module results.

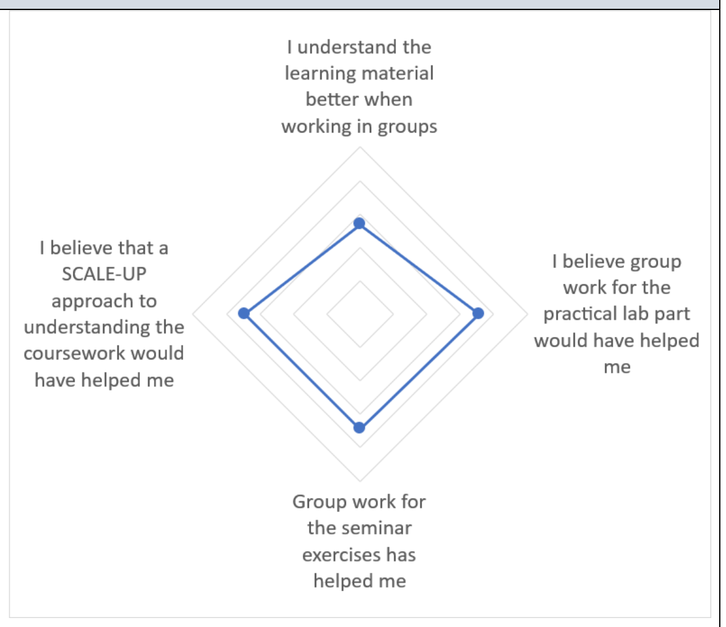
References

Büşra Özmen, Arif Altun (2014), *Undergraduate Students' Experiences in Programming: Difficulties and Obstacles*, Turkish Online Journal of Qualitative Inquiry, Vol. 5(3). Online https://www.tojqi.net/index.php/journal/article/view/89.

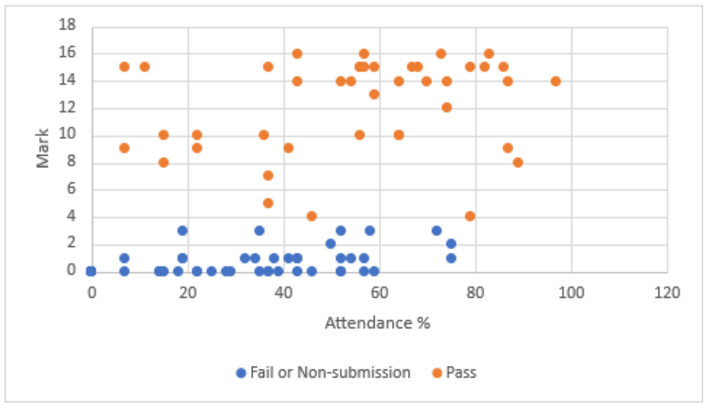
William M. Waite, et al. (2004), *Student Culture vs. Group Work in Computer Science*, ACM SIGSE Bulletin, Vol. 36(1), pp. 12-16

Results

The **post module survey** focused on the student perception of having a group work/SCALE-UP approach to teaching lab programming practicals and understanding the coursework (top right figure), instead of the current individual learn by doing approach. In addition, 66% of the respondents said that they prefer to choose their own group.



Analysis of the student attendance data found that about 25% of students with >50% attendance failed the coursework in 2022 (bottom right figure). This represents a good indicator regarding the possibility of improving the success rate by switching to a group work where these students are integrated into heterogeneous groups.



Conclusions

- ✓ The **observed trend** in the last year is to polarize level 6 students enrolled in the SCC module.
- ✓ Students are **open to the idea** of group work / SCALE-UP approach to learning and understanding the technical material.
- ✓ Given the fail vs. attendance ratio there is **potential** for considerable improvement in the success rate.
- ✓ While this trend could be a result of online teaching, we cannot ignore its effect and potential for innovative teaching and learning techniques for SCC.

Acknowledgement

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