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Inclusive Group Work Assessment for Cybersecurity

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ABSTRACT

This poster presents an ongoing study that takes a diverse and inclusive approach to designing a practical group work assessment for an undergraduate cybersecurity course delivered to third year university cohorts. Students were given the choice to either work individually or as part of a group to complete the assignment in virtual laboratories. The study evaluates how student grouping preferences change when the teaching structure adapts in response to the Covid-19 pandemic and how grouping preference impacts upon academic performance. Students reflected positively on the assignment and demonstrated a preference for treating group information as private. No disputes regarding group marks or contributions from different group members arose despite the number of groups involved. Students have taken responsibility for their choices and have accepted the outcomes of their teamwork.

CCS CONCEPTS

• **Social and professional topics** → **Computer science education**; **Student assessment**; • **Security and privacy** → **Network security**.

KEYWORDS

diversity and inclusion, group work assessment, cybersecurity education, virtual laboratory

A recent literature review on cybersecurity education [4] found that exactly half of the 64 teaching papers reviewed involved students working in pairs or groups, such as peer mentoring [2] and peer instruction [1]. However, these studies did not focus on group work assessment for cybersecurity education. In response to the promotion of EDI in higher education, this study seeks to investigate this issue in relation to curriculum design [3], embedding EDI in the design of group work assessment for a cybersecurity course. Our research questions (RQs) focus on the following:

RQ1: How do we design a group work assignment that includes practical tasks, that is diverse, inclusive and fit, for large groups of students in cybersecurity education?

RQ2: What preference, if any, do students have between working individually and working in a group, given that the students are able to choose the size of the group that they work in from 1 (working individually) up to a capped maximum of 4?

RQ3: Do student preferences have an impact on their results, and if so, what is the impact upon their results?

To answer the above research questions, an assignment called network attack and defense was designed. Two types of virtual laboratory were built enabling students to complete the assignment either as part of a group or individually. Questionnaires were used to collect feedback on student experience. Such an approach integrated the idea of EDI into the design of the assessment itself as it does not force students to join a group, thus providing students who may be hesitant to contribute in a verbal context greater flexibility in response to their needs.

Our analysis of the first two-year of data demonstrates that a higher percentage of students chose to complete the assignment alone in 2020-21 (26% of N=206) when the pandemic situation was more severe than in 2021-22 (18% of N=182). In 2020-21, the mean score of groups of size 1 ($68.4377 + / - 20.8.025$) was statistically, significantly lower than that of groups of size 2 ($86.84 + / - 19.18$, $p = 0.004 (< 0.05)$) and size 4 ($86.05 + / - 12.17$, $p = 0.007 (< 0.05)$). For 2021-22, no correlation was established linking student grouping preferences to their academic performance.

This study is of particular interest to the cybersecurity education community and to colleagues working on group work assignments, diversity and inclusion.

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