

Peer assessment of individual contribution in group work: a student perspective

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ABSTRACT

With group work increasing in popularity at universities, students no longer feel it is acceptable to be awarded the same group mark. This presents a significant challenge in awarding an individual mark which reflects unequivocally the time and effort a student has invested in a group project. To address this challenge, a tool to evaluate individual peer assessed contribution (IPAC) has been developed at University College London (UCL). The aim of this paper is to report on the perceptions of students regarding their experience of peer assessment in group work, since these perceptions are key to ensuring that a tool, such as IPAC, is accepted and used effectively by staff and students alike. The views of 133 students were acquired through anonymous surveys and focus groups ranging from first year undergraduate to doctoral students across 12 different departments. Results showed that 92% of students are in favour of peer assessment with a positive trend to using the IPAC tool. Receiving constructive feedback was considered imperative amongst respondents, which in turn should identify clearly the points of error; highlight explicitly the areas for improvement; and thus reflect accurately the mark being awarded. The attributes that students valued to be important when assessing their teammates were, in decreasing order of priority, attendance at meetings, listening and communication, actual contribution to the project deliverables, quality of the work produced, personal circumstances, and finally time management and organization skills. The detailed analysis and conclusions drawn from this study are the focus of this paper.

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1 INTRODUCTION

Engineering design is at the core of engineering education. Engineering design practice in turn is a “deeply social process” requiring regular interactions and collaborative group work between people [1].

Yet, it is a well-known fact that in group work, not all members of the team invest the same amount of time and effort into the project. Awarding the same group mark to all team members is thus considered to be an unfair method of assessment. It is argued that the students who have first-hand experience of working within the team should themselves be able to assess the contribution of each member. This method of peer assessment though comes with its own set challenges, as examined in this paper.

1.1 Group work

A group can be defined as a collection of people who recognise the existence of the group, help each other when necessary and share the same aims and objectives. Membership of each group can be determined by how well the individuals integrate with each other including communication and work exchange [2]. In an ideal scenario, the tasks are split equally amongst members who all have the same drive to succeed in the project [3]. Each member’s contribution, effort and behaviour, as well as the appreciation of social organisation, various roles and power positions, directly affect the interactions between individuals and subsequently the performance of the group.

For a group to perform well, they must agree on a set of methods, rules and structure to facilitate cooperation [4]. Communication between members is vital to the team’s cohesiveness, irrespective of whether members are located in the same physical location or not, and is key to building enthusiasm and dedication within the group.

While students have mixed opinions regarding group work, those who value it consider group work to be inspiring, motivating and central to fostering deep and active learning, as identified by Hall [3] and Swaray [5]. Students also consider group work to be a time-efficient way to complete a project through splitting up tasks, while concurrently developing their teamwork and communication skills, as found by Taqi and Al-Nouh [6]. Students may also benefit from a more fulfilling learning experience since they are likely to receive more detailed and frequent feedback as a group compared to individual, isolated feedback [2].

In the study by Chiriac [4], 97% of a 210-student cohort concurred that working in a group enhanced academic knowledge, collaborative abilities or both, through discussion and questioning each other’s ideas and opinions. Such creativity would not occur if they were working independently, as they would not feel inspired or provoked to think differently. Group work allows students to gain credit for developing and refining these skills [7] encouraging them to work harder to improve these attributes. Furthermore, communication, leadership and working effectively in teams are considered essential transferrable skills that can increase students’ employability [8].

1.2 Peer assessment of individual contribution in group work

Despite the benefits offered by group work, students may encounter unpleasant experiences as a result of a dysfunctional group, poor communication or conflict. In Hall and Buzwell's study [3], almost half the respondents commented on negative and stressful experiences during group projects caused by different work styles (10%), impact on personal learning (20%), as well as group dynamics and workload allocation (27%). Above all, 61% felt that their own individual contribution was not reflected in the mark they received. The contribution of a team member to the group project will depend on their level of ambition, and their interest and commitment to the project. This in turn will affect how willing they are to complete the tasks to high standards [4].

Awarding the same final mark to all members in a team is generally considered to be an unfair approach causing frustration amongst students and having significant impact on group dynamics [3]. This is particularly the case with 'free riders' who are reluctant to participate and commit to the aims and tasks of the project. Worse, however, this issue may cause more capable students to reduce their input to the team, an issue referred to as "*inequity based motivation loss*" [2].

Peer assessment aims to address this issue by giving students 'a voice' to comment on their own contribution and that of their fellow team members [3]. In a survey by Willis et al. [7], 66.4% of the 156 respondents agreed that having a final mark consisting of an individual mark and a separate group mark would be a fair approach to a group project, as corroborated further in a study by Shiu et al. [9]. Peer assessment helps students reflect on their own and group, development and progress. This can enable them to focus on their strengths and become aware of their weaknesses, while gaining an insight into how they are valued within the team [7] [8].

While there is a clear need to assess individual contribution, a study by Zou and Darvish [10] emphasizes the importance of not impeding the collaboration and cooperation of the team itself in the process. Even though free riding could be seen as a sign of apathy or laziness, it should be noted that there may be a host of reasons for which a member is not contributing to the project. For example, some students might feel uncomfortable or feel that they lack the necessary skills to contribute; this could be particularly the case for international students whose first language is not English [3]. As a result, such students may be asked or forced by the remaining team members to carry out a different, maybe inferior, role, which in turn could result in those students being marked unfavourably during the peer assessment process.

2 METHODOLOGY

To address this challenge of peer assessment in group work, a tool to evaluate individual peer assessed contribution (IPAC) [11] has been developed at University College London (UCL). Using IPAC, each student is held accountable for their level of contribution to the project and their interaction with the team's members. Therefore, the goal of IPAC is to reduce the amount of free-riding that occurs within a team, since

the prospect of receiving poor marks and negative feedback may be sufficient to motivate free riders to work with the team [3].

Over one hundred students from 12 departments (see Fig. A1 in the appendix) across UCL at different stages of their degree, as depicted in Fig. 1, were invited to participate in focus groups and to complete surveys. This was achieved by distributing a link to an anonymous online survey, as well as an invite to attend a focus group on a first-come, first-served basis. The focus groups and surveys were run independently, yet alongside each other with separate results acquired from each medium. It is worth noting that participants or respondents might not have necessarily used the IPAC tool.

This study was aimed at gathering students' experiences and views of marking schemes used in group work; the effectiveness of these marking schemes, particularly with regard to reflecting accurately the work carried out; and their opinions on peer assessing their fellow students. The focus groups were ran by student representatives in absence of faculty staff, to allow students to express their views freely and honestly while maintaining anonymity. The survey questions in their complete format are listed in Table A1 in the appendix.

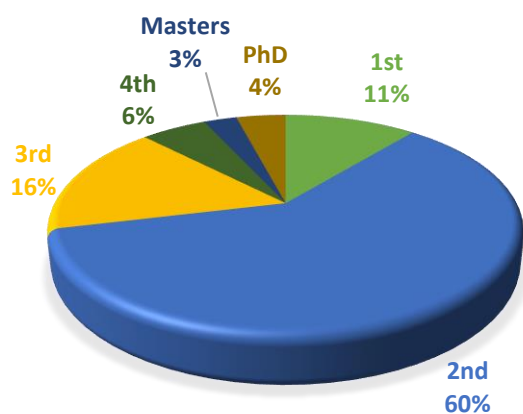


Fig. 1. Student demographics according to degree year

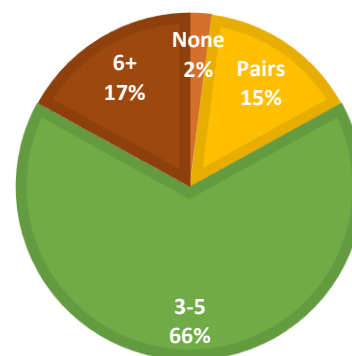


Fig. 2. Taxonomy of group sizes experienced by the respondents

2.1 Focus groups

Four focus groups with a total of 44 students were ran with participants mostly from the engineering disciplines but also from the arts and sciences. Hence, it was likely that some of the participants knew each other but this was not necessarily the case for all focus groups. Qualitative data on the following questions and topics was obtained; Who should be responsible for awarding marks and how would this reflect the group work? What attributes and factors should be considered when assessing a team member? Is peer assessment a reliable method of assessment, and if so, under what conditions? How often should peer assessment take place? In what form should feedback be provided?

Through discussions, it became apparent that assessment criteria and transparent justification for the marks given were of paramount importance.

2.2 Surveys

The survey questionnaire was divided into two sections. The first section collected students' academic data, such as the department they were affiliated to, their year of study and the group size they typically work in, as shown in Fig. 2. The second section focused on obtaining their views of peer assessment by answering 20 questions on a 1-to-5 Likert scale (strongly disagreeing to strongly agreeing). Yet, to improve visualisation, points 1-2 and 4-5 on the scale were combined giving the three-colour bar (red [1, 2] – yellow [3] – green [4, 5]) shown in Fig. 3. We included the very few respondents who had not experienced group work, in order to get their open-minded views of the perceived benefits and drawbacks of working in teams.

The questionnaire included questions with free-text responses offering us greater insights into students' opinions and helping us with our subsequent analysis. Responses were consolidated into three levels with the individual responses tallied against these levels. As evidenced in Fig. 2, 83% of the respondents had experience of working in groups, defined here as working in teams of three or more people, thus ensuring the results acquired were relevant to the analysis under consideration.

3 RESULTS AND ANALYSIS

When looking at the results from both the survey and the focus groups, we are assuming that all respondents are answering in an honest manner. We are also assuming that each respondent answered the questions on their own initiative, that is, without peer pressure or direct guidance by a third party to respond in a certain way.

Figures 3 and 4 summarise the results obtained from the survey. The results show that there is strong support from students for the introduction of a method to assess individual contribution in group work. As shown in Fig. 3, 79% of respondents agreed that being awarded an individual mark based on the individual contribution of each team member is fairer compared to all team members being awarded the same group mark. The positive trend of this result is also highlighted in the box plot in Fig. 4, which shows that the response to this question (Q2) received a mean score of 4.11 with a standard deviation of 0.83. The same argument is corroborated by the fact that 66% of respondents disagreed with the idea of everyone in the team receiving the same mark with the response to this question (Q1) receiving a mean score of 2.11 and a standard deviation of 1.09.

The results also demonstrate that over 70% of the respondents agreed that the introduction of IPAC would motivate them to contribute to the team (Q19-74%) and would encourage them to be more professional and respectful (Q20-71%) with a mean score of 3.92 and 3.88, respectively.

Feedback was considered to be paramount to students with three of the top four most agreed statements related to this idea. 69%, 66% and 67% of students agreed with the statements "It would be valuable to know how I was perceived", "Comments would be appropriate", and "Justification for the marks given should be provided", respectively, with the latter (Q10) receiving a mean score of 4.55.

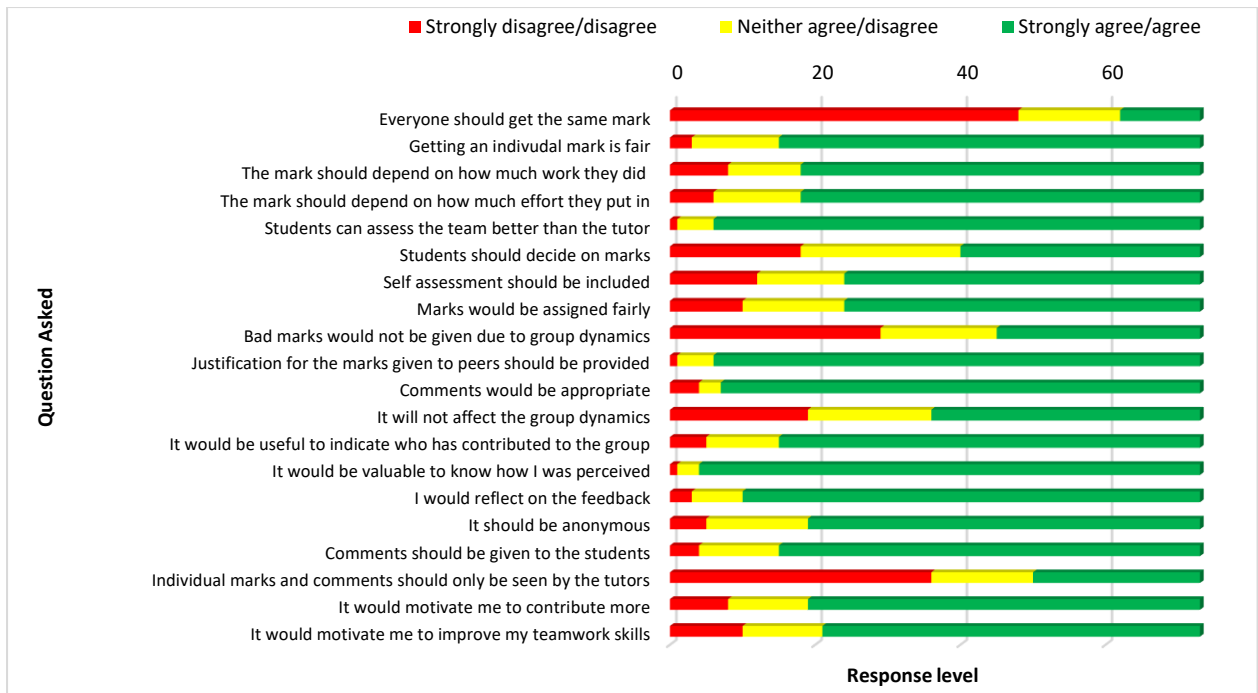


Fig. 3. Grouping of survey results according to three levels

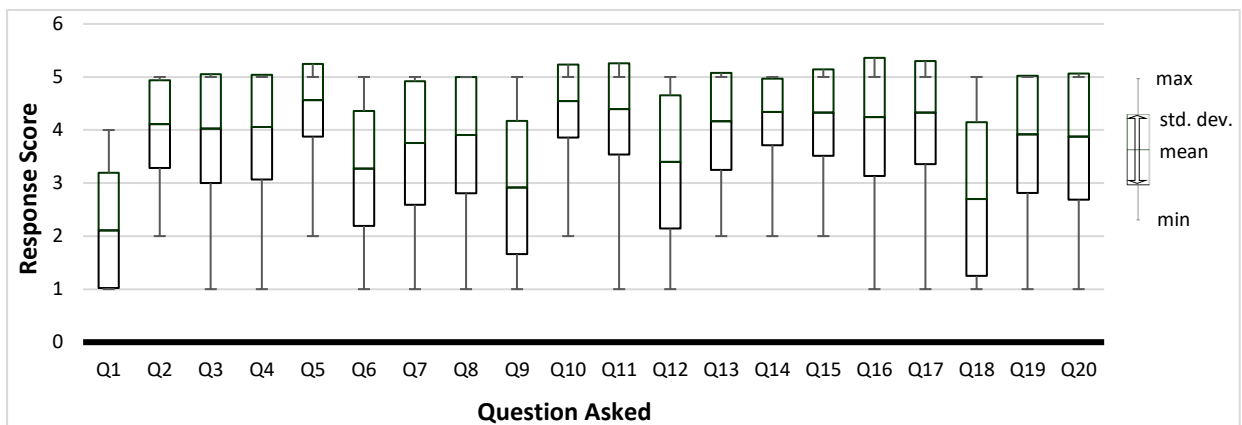


Fig. 4. Boxplots of survey response scores on a Likert scale of 1-5 showing the mean, the standard deviation, and the minimum and maximum scores per question

From the free text responses regarding peer assessment of individual contribution, the attributes that appeared most frequently were those referring to attendance, time invested into the project, and teamwork skills, as depicted in Fig. 5. Students felt that they were in a better position to comment on the performance of their team members rather than the instructor with this response (Q5) having a mean score of 4.56. This view was echoed strongly by engineering students, particularly those who partake in week-long, problem-based, group projects in teams of four to five students. They felt that the instructor did not have sufficient evidence to judge an individual's contribution

in view of the fact that a significant amount of work was completed outside the scheduled contact hours.

If instructors are to be involved in the peer assessment process, Fig. 6 lists the attributes that they should take into account, as perceived by students. Being aware of the students who are actively engaged in the project versus the free riders is of utmost importance followed by acknowledging the different skillsets of members in a team. Confidence, commitments and personal issues outside the project were also deemed important factors to be borne in mind during the assessment process.

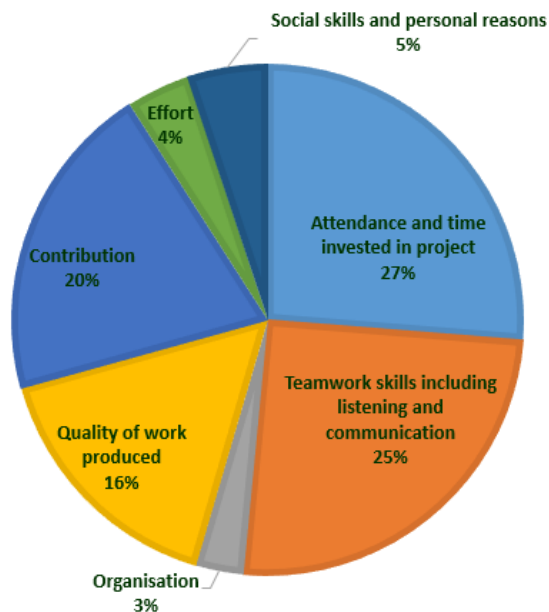


Fig. 5. Considerations in peer assessment of individual contribution

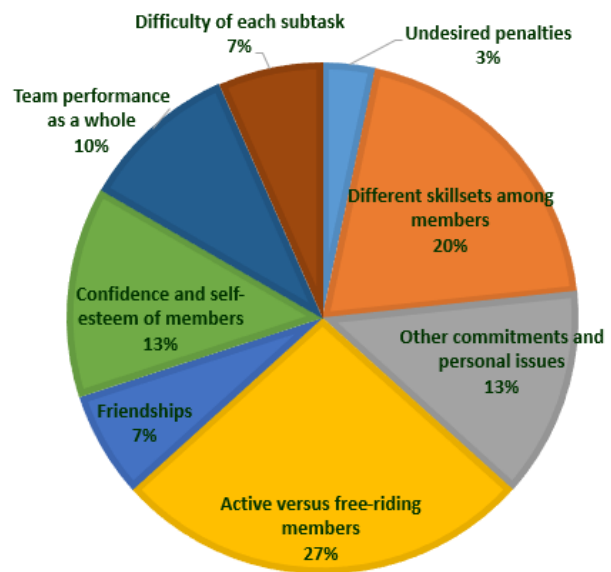


Fig. 6. Instructor's considerations when assessing students in a group

4 DISCUSSION

Goldfinch and Raeside found that assessing individual contribution improved group dynamics [12] as it coerced members to contribute to the team. Further evidence is provided in yet another study by Shiu et al. [13], where 58% of students felt that peer assessment helped improve the quality of the teamwork.

The issue of who marks the group project, and whether this is reflective of the work that has been carried out, is a key factor in assessing how each member contributes to the team. From our survey 75% agreed that the students should be involved in determining the marks, with 92% agreeing that the team members are more aware, and thus in a better position to judge, an individual's contribution to the project.

Self-assessment was perceived to be a necessary element in the IPAC process, as indicated by 67% of respondents in our study, and further supported by 68% in Kuisma's study [8], taking into account that self-assessment allows each member to reflect on their own personal contribution to different aspects of the group project.

Students consider it imperative to know what criteria are being used to assess them, as well as the tasks and skills they are being assessed on [15]. Justification of marks is crucial as supported by 90% of the respondents and indicated by the boxplot with a high mean of 4.55 and very small standard deviation of 0.68.

In terms of feedback, students indicated that they would rather receive comments with regard to teamwork qualities directly from their peers instead of the instructor provided that these comments were anonymous; they were written in a professional and constructive manner enabling them to improve; and that the system would allow students to question the comments or feedback if necessary. This feedback approach is considered to be an effective way for reflection and for rewarding individual contribution [9]. Instructors can facilitate this form of feedback by holding regular meetings with the team members to monitor the progress of each individual member, as well as that of the group overall [10].

On the issue of anonymity, our survey results indicated that attaching a name to the feedback could result in the peer assessment becoming a popularity contest. Maintaining anonymity can reduce problems during the reporting and feedback process while using the same method of peer assessment consistently across different courses can lead to improved teamwork and transferrable skills [8].

Students agreed that the IPAC marks should be moderated by the instructor, particularly with regard to identifying the free riders, since as quoted by one student "Some students appear to do a lot in the eyes of the instructor [taking charge in presenting to the instructors] but might not have actually done the work [though taking credit for the work other people have done]". Based on the above, respondents felt that the final mark should be a combination of the instructor's mark with a moderated IPAC mark, with this technique being amongst those favoured the most by students [12]. Literature has shown that similar views are shared by students in other domains, for example, in the physiology of vision and practice management as described in the study by Conway et al. [15].

In terms of weighting, results showed that the IPAC element should count between 15% and 30% of the final mark with 20% being the general consensus. Yet, if the final mark is provided as a combination of the peers' and instructor's mark, students indicated that they would prefer to know these marks separately, in order to understand why one mark might be different to the other.

In terms of frequency of assessment, this was very much dependent on the length of the project. Overall, students agreed that it was necessary to carry out the assessment more than once to increase the robustness of the assessment, a view echoed in a study by Jones et al. [7]. This study states that peer assessment should be a formative and dynamic process, instead of a single view at a single instance in time, and should be aimed at improving group dynamics and thereby the productivity of the team. For long projects taking place over one academic term, students felt that two reviews, one half-way through the project and one at the end, would be appropriate with the middle term review used to effect behavioural changes and resolve any problems within the

team. On the other hand, shorter projects of five to six weeks duration, would benefit from weekly reviews to allow team members to receive feedback promptly and act upon it in good time before the final deliverable is due.

5 CONCLUSIONS

There is a wealth of literature evidencing the impact of using peer assessment in higher education in general, and in engineering education in particular. While the pedagogical practices of collaborative group learning can yield many benefits, these can often be hindered or counteracted by issues of fairness in the marking process. Peer assessment is particularly important in teams which engage in project and problem based learning, commonly encountered in the engineering sciences.

This paper examined students' perceptions on assessing individual contribution of team members in a group project. Students strongly supported the idea of peers contributing to the marking process with the final grade being determined as a combination of instructor and peer marks. Nonetheless, this process should be closely monitored and moderated by the instructor to ensure that marks are awarded fairly.

Running the system online while maintaining confidentiality and anonymity throughout the assessment and feedback process, were considered key success indicators for the IPAC tool. By means of doing so, the process can be completed rapidly and efficiently while drawing honest views from team members. Clear and unambiguous marking criteria coupled with a transparent peer assessment process were regarded paramount, as was the justification for the marks given. Students felt that this approach would improve the quality of the work while making the tasks more enjoyable and fair.

Group size and project duration were considered crucial factors in determining the style of assessment. While friendship could skew the marks awarded during the peer assessment process, most students agreed that they would award reasonable marks in line with the work carried out regardless of friendship. In terms of frequency of the IPAC assessment, this depended on the weighting of the IPAC element to the final mark. Students suggested that a larger weighting should call for more frequent and robust assessment, using IPAC in a formative manner during the initial project stages.

Finally, students pointed out that IPAC could potentially have a negative impact on group dynamics if not implemented carefully with students' perceptions in mind. Such concerns, however, could be prevented if comments were written in a professional manner and returned to students anonymously. Students were strongly against member ranking and competitive marking and were of the opinion that such approaches would cause more problems than the IPAC tool aims to solve.

6 ACKNOWLEDGMENTS

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APPENDIX

This appendix provides supplementary information regarding the survey respondents' background and questionnaire design.

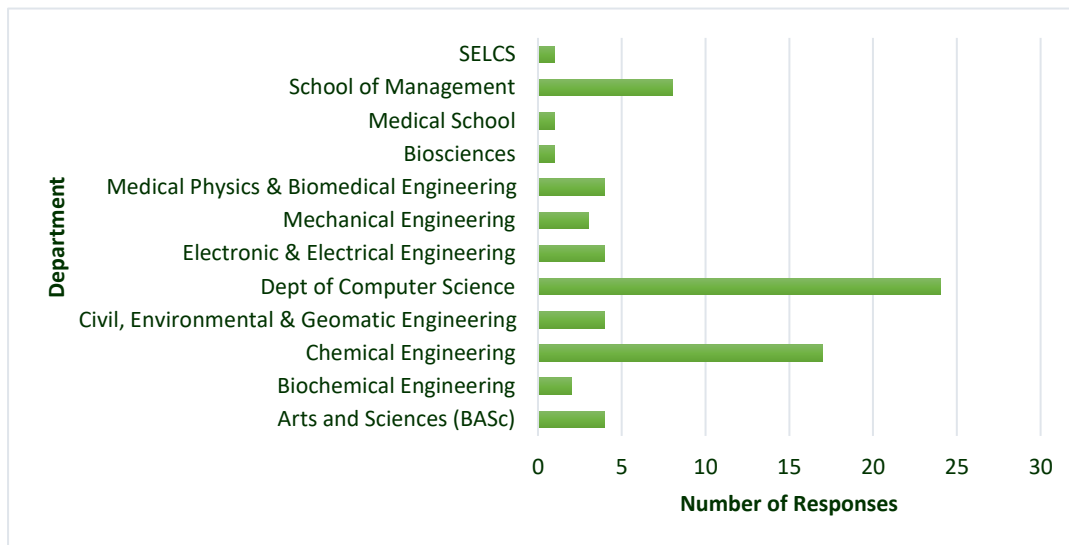


Fig. A1. Student demographics according to degree type

Table A1. List of survey questions in full format

Q1	When working in a group everyone should receive the same mark.
Q2	In a group, getting an individual mark based on the individual contribution level is fairer.
Q3	Each member of the group should receive more/less marks depends on how much work they did.
Q4	Each member of the group should receive more/less marks depending on how much effort they put in.
Q5	The students are better aware of the individual student performance than the tutor.
Q6	The students, rather than the tutor should decide on who gets extra/less marks.
Q7	When assessing the individual peers' contribution, self-assessment should be included.
Q8	I would assign marks fairly, regardless of whether someone was my friend.
Q9	I would not give bad marks to my teammates because it might affect the group dynamics.
Q10	Justification for the marks given to peers should be provided.
Q11	I would write comments in a professional and constructive manner.
Q12	Marks and comments, if written in a professional and constructive manner, will not affect the group dynamics.
Q13	I would find it useful to be able to indicate who has contributed more/less to the group work.
Q14	I would find it valuable to know how the other team members perceived my work and my contribution.
Q15	I would use the feedback given by my peers to improve my performance and teamwork skills in the future.
Q16	I would like that the marks and justification comments are anonymous.
Q17	If the comments for mark justification are anonymous, I would like that these are given back to the students.
Q18	Individual marks and comments should only be seen by tutors.
Q19	If IPAC is used as part of the assessment, this would motivate or encourage me to contribute more to the group project.
Q20	If IPAC is used as part of the assessment, this would motivate or encourage me to work more professionally and respectfully with the rest of the team.