A preliminary study of peer assessment feedback within team software development projects

Anonymous Author(s)**

ABSTRACT

Team-based software development projects where teams of learners design and develop software artefacts are common in computing-related degree programmes in the UK and other jurisdictions. Peer assessment is a commonly used approach to ensure learners are fairly recognised and rewarded for their contributions to such projects. This poster presents a preliminary study analysing the relationship between peer marking using the Team-Q rubric and peer feedback from one cohort using open coding and sentiment analysis. The preliminary results from a UK institutional study (N=124) illustrate how learner behaviours within teams appear to impact upon peer scores and the sentiment and intensity of emotion expressed in peer feedback. Additionally, the results provide valuable insights into common behaviours within teams. Given the prominence of team projects in computing curricula, the insights offered from this UK institutional study can shape and inform future learning, teaching and assessment practice.

CCS CONCEPTS

• **Social and professional topics → Computing education**; **Student assessment**.

KEYWORDS

Peer assessment, team-based software projects, sentiment analysis

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1 BACKGROUND

Peer assessment has been advocated as an approach to help address the challenge of ensuring fair reward for learner contributions within team projects [2]. Such peer assessment is often based around learners peer assessing their team members via a rubric. This can be achieved using online tools such as WebPA, BuddyCheck.io or SparkPlus, or through the use of common surveying tools. Each learner marks each member of their team against the rubric; a weighting is then calculated by Mean Peer Score for the learner divided by Mean Peer Score for their whole team. The individual learners' mark is then calculated by the mark awarded to their team multiplied by this weighting. It is also common practice to request qualitative feedback to explain the peer marking awarded.

2 METHOD

The study took place during the final year of a computer science undergraduate degree at a UK university between January-April 2021 over a 15 week period (including a three-week Spring vacation). The working was primarily virtual due to the COVID-19 pandemic. The study was approved through the institutional ethics panel. Explicit written consent was sought from each learner for inclusion in the study. The size of the cohort was 170, of whom 124 opted to participate. The peer assessment scheme adopted was Team-Q metric [1], a validated scheme which provides insights to a range of dimensions within teamwork. Team-Q assesses five dimensions of team-working and 14 specific criteria.

The peer assessment marks and feedback were analysed by two approaches. Firstly, open coding analysis was employed to analyse the peer feedback, and overall peer marks were then analysed by the common codes to explore the consequences in terms of peer marks for common behaviours. Secondly, sentiment analysis of the peer feedback was completed using Orange Data Science (version 3.29.3) employing Valence Aware Dictionary for Sentiment Reasoning (VADER) [3]. VADER was chosen as it is sensitive to sentiment polarity (positive and negative sentiment) and the intensity of the emotion expressed. A binary tree was then produced (via logistical regression) using the Orange Data Science Binary Tree Algorithm to explore the compound VADER statistic by the Team-Q score and individual components. This model is illustrative of aspects of team behaviour having more influence upon the sentiment and strength of emotion in the feedback provided.

3 FUTURE WORK

The outcomes from this preliminary UK institutional study provides a solid foundation for further fruitful research in this area, suggesting that a wider study has the potential to yield valuable insights into the impact of learner behaviour upon peer scores and the sentiment and intensity of emotion expressed in peer feedback.

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4 TENTATIVE LAYOUT AND CONTENT OF THE POSTER

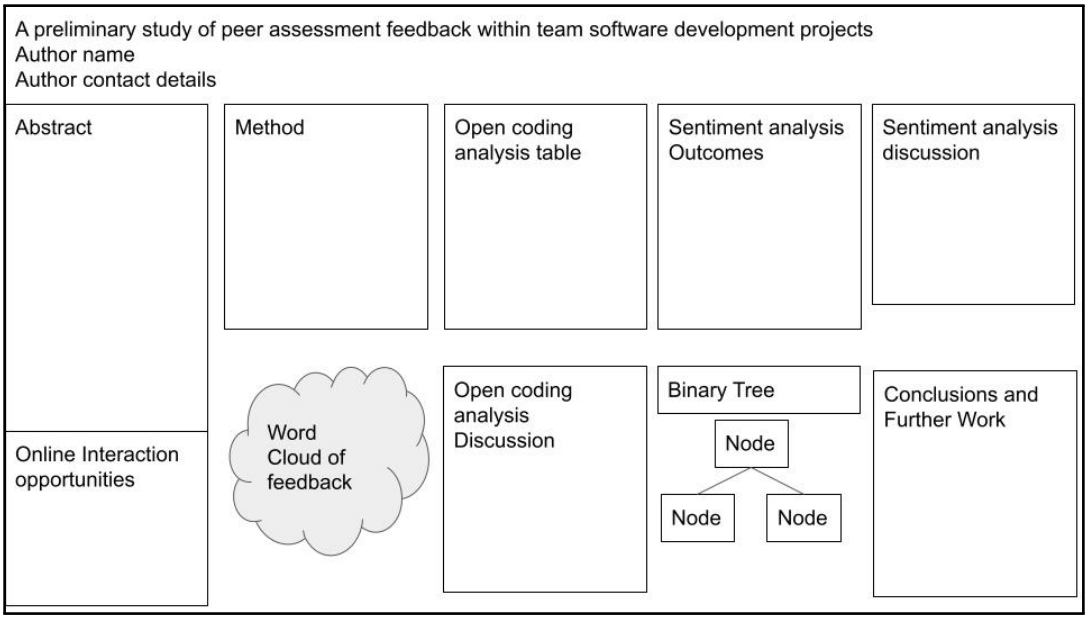

Figure 1: Tentative layout and content of the poster

The tentative layout for the poster and content can be seen in Figure 1.

5 BRIEF DESCRIPTION OF AUTHOR EXPERTISE AND BACKGROUND AS IT RELATES TO THE POSTER

The authors are experienced educational researchers and university computing practitioners. They have over 10 years experience of supervising collaborative team projects with cohorts of up to 250 learners. Widely published, their research into education has reached a wide audience including SIGCSE, ITiCSE, WiPSCE and CEP. In this instance the poster explored a pilot project, so the feedback gained from this year's Symposium would be helpful to shape the future direction of this emerging research project.

If due to continued travel difficulties (nationally, internationally and by the travel policies of the authors' institutions) from COVID-19, the authors are unable to attend the symposium physically, the team have experience of delivering posters at several virtual conferences over the past 20+ months. They will employ appropriate digital tools to promote discussion on a synchronous and asynchronous manner remotely. Indeed the authors wish to provide this facility irrespective of their attendance to help ensure access to the work from all attendees. The intention is to employ the InVision Freehand online tool to facilitate this interaction.

6 HOW YOUR POSTER WILL ENGAGE PARTICIPANTS IN DISCUSSION

The poster will be of interest to the attendees of the symposium for two main reasons:

i) As discussed in the abstract, the delivery of team development projects within computing-related degrees is extremely common in the UK and other jurisdictions. It is an opportunity to develop critical work-ready skills, as well as address key areas of the curricula (configuration management, version control, testing, project management, project control, etc) which can challenging to address by other formal learning, teaching and assessment approaches. Many attendees of the symposium will recognise the issues explored in the poster and we hope it will trigger wider discussion and sharing of best practice.
ii) The method adopted employing open coding analysis alongside data science techniques presents a valuable development in how peer marking and feedback within team projects has been analysed. VADER has been employed for the sentiment analysis at this stage of the project; however the poster intends to promote discussion regarding potential alternative approaches that could be employed. Additionally, the use of data science analysis techniques present further exciting opportunities for research in a variety of educational contexts.