Using Social Annotations to Support Collaborative Learning in a Life Sciences Module

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Introduction

As part of their curriculum, Life Sciences undergraduates are often tasked to learn how to read and study research articles. However, the large class size makes it difficult for lecturers to give individual, immediate feedback to such students. This study aims to investigate the efficacy of collaborative learning with the use of annotations via the platform **Perusall.**

Hence this study aimed to answer how students were engaging with Perusall in terms of cognitive effort as well as to investigate whether the quality of the collaborative annotations were up to par.

Methodology

The overall flow of the study is described in Figure 1. 224 Life Sciences undergraduate students were tasked to read 2 research articles and complete 2 quizzes. They were divided into groups and instructed to annotate the articles with questions or comments to help their group mates understand the articles better. The annotations were also graded to incentivise quality annotations. Subsequent to quiz completion, data was analysed with the ICAP framework (Table 1) and SOLO taxonomy (Figure 2).

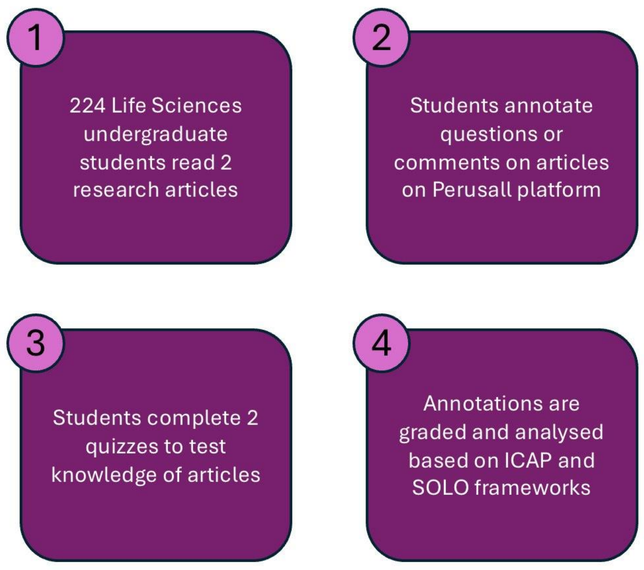

Figure 1: Flow of study

Table 1: Summary of ICAP framework (Chi & Wylie, 2014) that classified annotations either active, constructive and interactive, to assess cognitive effort placed into these annotations

Classification	Description
Passive	Student did not participate in the assignment.
Active	Student posted annotations without or with minimal thinking and consideration of contents in the research article.
Constructive	Student posted annotations with clear thinking and consideration of the contents in the research article. There was no interaction between students.
Interactive	Student posted annotations with clear thinking and consideration of the contents in the research article. There was interaction between students.

Table 2: Summary of SOLO taxonomy (Boulton-Lewis, 1995) used to further classify interactive annotations to assess higher order levels of understanding and generative learning in students.

Level of Understanding	Description
Pre-structural	Student had no understanding of the concepts in the paper. Information provided was irrelevant.
Uni-Structural	Student dealt with only one aspect/concept of the paper. Information provided was reductive or had low value and significance.
Multi-structural	Student dealt with multiple aspects/concepts of the paper and was able to make some connections within these aspects. However, overall significance of these aspects was not shown.
Relational	Student dealt with multiple aspects/concepts of the paper and was able to make clear connections. The integration showed the understanding of significance of parts, and parts to whole
Extended Abstract	Student was able to generalize what they had learnt to a new area, beyond that of the scope of the research article.

Results

Students demonstrated active participation in the assignment. Among 30 students selected randomly for our analysis, participation rate was high (96.67%). Students posted a total of 475 annotations, averaging 16.4 annotations per student. This exceeded the minimal 12 annotations set for the assignment.

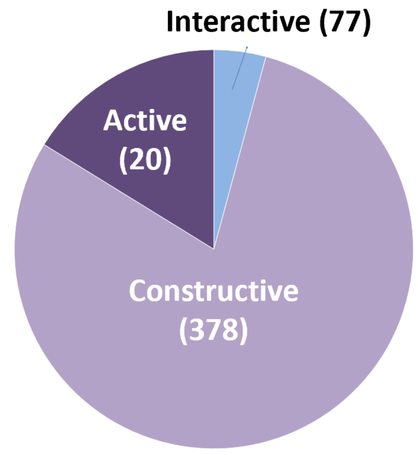

Figure 4: Breakdown of engagement

ICAP analysis also suggests high levels of cognitive engagement. More than 95% of annotations fell within the “C” and “I” categories. (Fig 4)

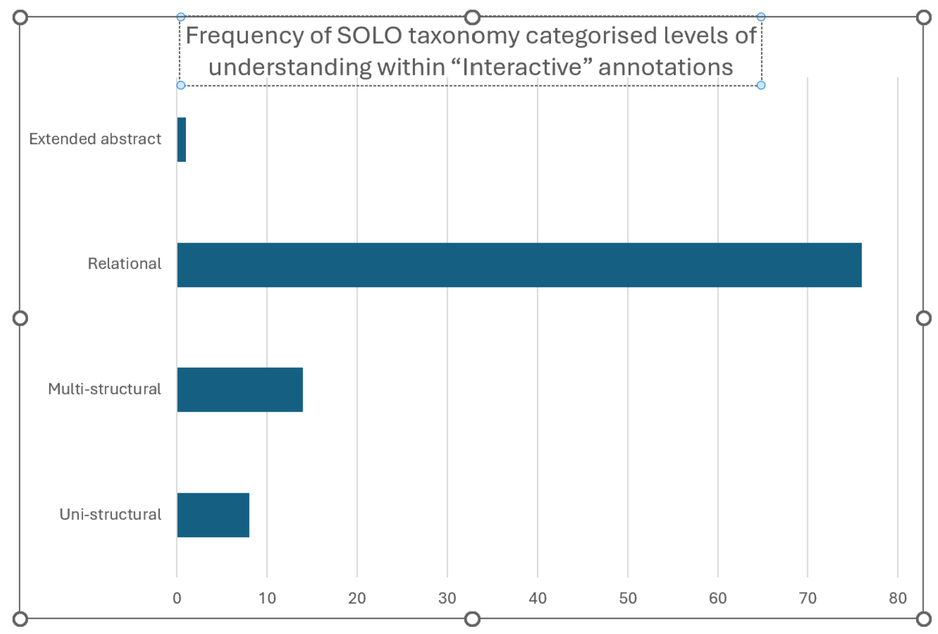

Figure 5: Frequency of different SOLO taxonomy categories

Upon further investigation, 92% of “I” posts achieved knowledge levels of multi-structural and above. (Figure 5)

Of these, 76% of “I” posts showed relational knowledge level with clear connections between different concepts. (Figure 5) This suggests that students were highly engaged with cognitive effort in using Perusall.

However, interaction between students remained relatively low (16%). Thus, students seemed to work on the annotation exercise individually and did not see the need to interact with other peers. Hence, the level of collaboration in annotations can be enhanced.

Conclusion and future directions

In this study, we report that the use of Perusall in the social annotation assignment fosters high student engagements and supports individual cognitive growth. Analysis of these observations allow instructors to improve on the design of activity to achieve better student learning outcomes.

To foster more collaborations, further research may be done to identify strategies to increase student interaction on online social annotation platforms.

One way this can be achieved would be via implementing a team based annotation system where teams of students collaborate on creating annotations, in conjunction with other methods to foster teamwork. The results can be assessed in a similar fashion as this project.

References

Boulton-Lewis, G. M. (1995). The solo taxonomy as a means of shaping and assessing learning in higher education. Higher Education Research & Development, 14(2), 143–154. https://doi.org/10.1080/0729436950140201

Chi, M. T., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist*, *49*(4), 219–243. https://doi.org/10.1080/00461520.2014.965823