Exploring Students' Self-Assessment on Collaborative Process, Calibration, and Metacognition in an Online Discussion Environment

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Abstract: Students need to accurately assess their performance on collaborative sense-making before employing strategies and making changes to improve their collaborative learning processes. In this study, one group of three undergraduate students who took part in five synchronous discussion in an online text-based learning environment was focused on as a case. The patterns of self-assessment, their calibration of understanding of learning goals, and inaccurate understandings were analyzed and discussed.

Collaborative skills are gaining prominence as the workplace becomes increasingly dependent on groups to solve complex, cross-disciplinary problems. According to Stahl (2017), group practices provide group members with opportunities that individual work cannot provide, where they can share knowledge and develop intersubjective sense-making. One critical competence that learners need to have to achieve better learning outcome is regulation. Learners with better self-regulated learning skills perform better academically (Azevedo, 2009). In collaborative learning activities, groups with higher regulation show less conflict and more productive processes. Self-assessment on both content knowledge and collaborative sense-making processes is critical to group success. In this study, we investigate the co-occurrence of students' self-assessment and their metacognitive reflection and aim to investigate the interplay between accuracy in individual self-assessments and group calibration as teams engage in metacognitive reflections over the five sessions in one semester.

Self-assessment is critical to students' self-regulated learning and also their lifelong learning (Harris & Brown, 2013). To improve accuracy of self-assessment, students' self-calibration of their decisions on performance over time and over different learning goals is needed. However, students' calibration is affected again by various factors, including students' actual performance level, feedback provided by instructors, and the degree of their sophistication in epistemological beliefs (Dunning, Heath, & Suls, 2004). We see calibration as a process of change that happens when students are engaged in metacognitive activities and adjusting their understanding of the assessing criteria, and argue that the process of calibration is enhanced when students are actively engaged in metacognitive activities both individually and as a group. To better understand the nested relation between self-assessment, calibration, and metacognition, we ask the following questions: 1. How does the group's average scoring accuracy of collaborative process change over time? 2. How does individual students calibrate their understanding of criteria over time as they engage in metacognitive activities? 3. What are the most commonly mistaken criteria?

Methods

The study took place in a 15-week university level introductory online course in College of Information Sciences and Technology in a university in the Northeast United States in Spring 2016. We selected one team (Team 12) of three as a case. Same with other teams, team 12 answered questions about course materials before participating in online synchronous discussions in weeks four, six, eight, ten, and twelve. The online text-based discussion environment is called CREATE (*Collaborative Regulation, Enhanced Analysis, and Thinking Environment Prototype*). After answering reading questions, teams first plan their discussion. When they meet online, they discuss the course materials for around 90 minutes, move to the self-reflect session where they self-assess the discussion quality, and close with a group discussion on their individual reflections. Students use the same rubric for self-assessment with the one used by expert to assess group discussion quality. The rubric is a 5-point rating scales on six items (i.e. verbal equity, developing joint understanding, joint idea building, exploring alternative perspective, quality of claims, and constructive discourse; see more in Table 1 in Borge, Ong, & Rosé, 2018).

To answer the first question, we examined the students' group average scores as compared to expert scores. For expert scores, six items were averaged to produce an overall quality of collaborative communication competence. For students' group average score, after averaging each individual's quality of collaborative communication competence score, the quality scores from each student were then averaged to present group's overall average scores. To answer the second and third research questions, we analyzed the data of individual students self-reflections where they gave self-assessing scores and justification score on the item. Code "Match"

was assigned to students' justification that included direct or indirect explanation of item. Cases when students provided description of any other item, indicating misunderstanding or confusion about assessment criteria, were coded "Mismatch." "Other" refers to cases when students provided unrelated or general justification, or the justification was missing.

Findings

Figure 1 of the radar plots of score changes (Blue: Expert score, Red: Groups' average score) shows an increased accuracy in terms of the group's self-assessment. However, we need to examine students' self-reflections about their score assignment to see if team 12's metacognitive reflections show a similar trend.

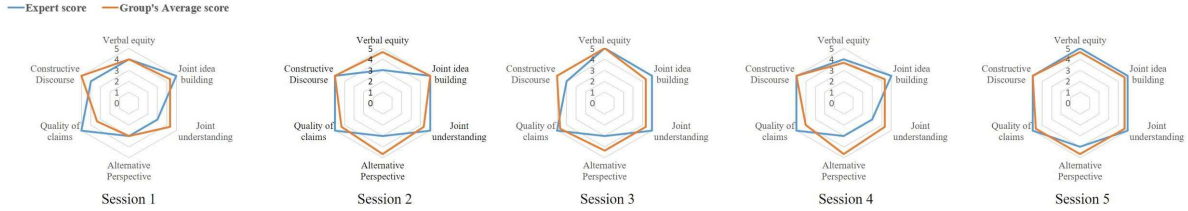

Figure 1. Quality of discussion assessed by expert and team 12 from session 1 through session 5.

Analysis of the individual reflections across five time points, the percentage of Match justification tend to improve, from 50% at session 1 to 61.54% at session 5. Percentage for students' Mismatch justification identified noticeably decreased as time goes by, from 27.78% at session 1 to 7.69% at session 5. However, the percentage for Other category varied from 21.88% to 36.36%.

A further focus on Mismatch reflections revealed that when students were asked to assess joint idea building, students frequently included the quality of claim (19.4%); when assessing alternative perspective, the most frequently confused criteria was identified to be joint idea building (18.2%); and when assessing verbal equity, quality of claims were identified in students' justification (11.8%).

Discussion and conclusion

The present study examined students' self-assessments on collaborative processes as they engaged in group discussions, and how the nested calibration and metacognition is related to the accuracy of self-assessment. As shown in the findings, students improved in accuracy of assessing their discussion quality as their scores were better aligned with expert scores by session 5. Team 12 also showed calibration in their understanding of the rubric. The shown calibration in metacognitive activities matches the improved accuracy of the group's self-assessments, indicating that having students to reflect on their discussions for the self-assessment scores directly engages students in metacognitive processes, which contributes to both students' metacognitive competence and self-assessment accuracy.

Nevertheless, further work is needed to reflect all 12 teams' calibration accuracy over time on collaborative sense-making. With data from more groups, we would be in a better position to understand the complex interplay between calibration and metacognition, and how this interplay is related to self-assessment. Also, quality of claims are the most frequently confused item, meaning when asked to assess other items, students included criteria of quality of claims in their justification. This indicates the necessity of follow-up analyses about students' understanding in association with criteria, which may be expected to give an implication for the design of learning systems. Providing more explanations or visualizations as scaffolding in the activity that fade as students are more familiar with the environment is one way to address this problem.

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