Mixed-Approach Social Comparison for Improving Online Discussions’ Efficacy: Insights from Field Experiments

Emergent Research Forum Paper

Elahe Javadi
Illinois State University
ejavadi@ilstu.edu

Nancy L. Novotny
Illinois State University
nlnovot@ilstu.edu

Abstract

Effective online discussions contain substantive posts and are highly interactive. Interactivity may be measured by quantity, distribution, and quality of the comments exchanged. Quality of comments can be measured by their level of integrative complexity, i.e., the extent to which they have examined different dimensions of the topic. This manuscript reports results of field experiments in twelve courses (24 online discussions). Quantity and quality of comments were examined as dependent variables. Half of the online discussions involved use of a mixed-approach social comparison. The approach was mixed because firstly students had access to scores of both lower and higher performing peers (upward and downward social comparisons); and secondly students had access not only to their peers’ scores but also to the goal-specific informational evaluation associated thereto, i.e., notes on why a score was earned. The mixed approach was effective in advancing quality and decentralizing commenting networks.

Keywords

Online discussion, social comparison, informational evaluation

Introduction and Research Model

Online discussion forums are prevalently used for sharing ideas, experiences, and opinions. In education, online discussions can promote peer-learning among students (Waters & Gasson 2012). Effective online discussions contain substantive posts and high levels of interaction. Interactivity may be measured by quantity, distribution, and also quality of the posts and comments exchanged among students. Evidence from prior research and practice suggests that electronic tools (e.g., group brainstorming tools) have created an illusion of productivity without yielding much gain in terms of quantity or quality of the ideas generated by individuals (Pinsonneault et al. 1999). Ceteris paribus, increased quantity (of posts and comments), decentralized interaction networks (who responded to whom), and higher quality posts and comments are desirable in educational settings. To achieve the three desirable dimensions of interactive discussion, this research study has focused on a mixed-approach social comparison as an enabler of interactivity. The mixed approach used in the reported field experiments has elements of both upward and downward social comparison as well as goal-specific informational evaluation. The impact of the mixed approach, created based upon Social Comparison and Cognitive Evaluation theories, was examined through field experimentation in twelve information technology course sections.

Social Comparison

Prior research posits that the existence of a discrepancy in a group with respect to opinions or abilities will lead to action on the part of members of that group to reduce the discrepancy (Festinger 1954). Social comparison can take many forms and can be implemented through different mechanisms (e.g., use of charts or leaderboards). Upward or downward social comparison happens when individuals are exposed to the process outcomes of higher and lower performing peers or competitors. Research indicates that
Social Comparison and its Saliency Influence Outcomes in Brainstorming and Electronic Brainstorming Systems (Dugosh & Paulus 2005). Shepherd and colleagues (1996), for instance, examined the impact of social comparison and the saliency of comparison tool on the brainstorming performance in an electronic setting. In their lab experiments, they observed a 63% increase in the number of unique ideas generated in the treatment groups in which a highly salient social comparison tool was utilized. The 63% gain was compared to only a 22% gain for low salience social comparison treatment group. Dugosh & Paulus (2004) observed higher productivity, as measured by the number of ideas generated, in social comparison treatment; in their experiments, social comparison was manipulated through instructional sets. In another related study, researchers found that social comparison positively influenced productivity and creativity (Michinov & Primois 2005); in their study social comparison was implemented by use of a shared table which showed each members’ contributions; their experimental design allowed communication among brainstormers through a newsgroup feature. The authors noted that even when the brainstormers could publicize their contributions on the newsgroup, the publicizing did not have the same impact as having a highly salient shared contribution-tracking table, i.e., social comparison mechanism.

Informational Evaluations & Goal-Specificity

Individuals are more likely to generate creative ideas when they feel they are intrinsically motivated (Deci & Ryan 1980); intrinsic motivation proves to be higher in experimental groups when individuals expect informational evaluation (Shalley & Perry-Smith 2001). In scholarly work on teaching and learning, informational evaluation is labeled formative assessment. Research studies on formative assessment suggests that goal specificity is a crucial component of formative evaluation methods (Ambrose et al. 2010). Goal specificity will enable deliberate practice which leads to expert-level performance (Ericsson & Charness 1994). Goal specificity for discussions can be achieved by clearly identifying learning goals on which discussion participants are expected to excel and providing feedback that directly assesses the extent to which students have achieved the said goal; therefore, goal specificity provides a focus for participant’s efforts. Goal specificity can be a feature of assignment instructions and feedback, and can be achieved through identifying concrete examples of successful performances. This study used (1) goal specific instructions, (2) a social comparison mechanism that had goal-specific feedback on peers’ performances, and (3) concrete examples of successful and unsuccessful performances through sharing scores & feedback on contributions of all peer).

Online Discussions’ Efficacy

This study examines integrative quality of the posts and the dynamic of interactions among participants as measures of online discussions’ efficacy. In the field experiments each student was required to submit one initial post and four comments, therefore quantity could not be used as an independent variable. In brainstorming and online discussions literature, most experimental studies have addressed an individual’s idea-sharing behavior in electronic settings (e.g., Wasko and Faraj 2005) and little research done to examine the extent to which individuals build on the ideas shared by others. This study measures integrative quality of the posts, i.e., the extent to which discussion participants take into account and analyze different dimensions of the topic discussed. In this research study, an idea is defined as a basic element of thought that consists of at least one testable proposition (Simon 1976). The current study conceptualizes and measures integrative quality of the posts based on the well-studied concept of integrative complexity in social psychology (Baker-Brown et al. 1992; Suedfeld et al.1992). More details on the measurements are shared in the section on field experiments.

Mixed-Approach Social Comparison

The mixed-approach social comparison in this study was operationalized by allowing (and encouraging) discussion participants to view both controlling and informational evaluation that their peers received on the discussion posts. Controlling (summative) evaluations focus on the outcome whereas informational (formative) evaluations provide information on how to improve said outcome. Viewing other students’ scores and comments associated with those scores, implies exposure to both lower performing and higher performing peers, thus yielding a mixed upward/downward social comparison. Based on Cognitive Evaluation Theory, individuals are more likely to generate creative ideas when they are intrinsically
motivated (Deci & Ryan 1980); and this study proposed that intrinsic motivation can be higher in experimental groups in which individuals view and process informational evaluation associated with their scores and those of others (Shalley & Perry-Smith 2001), hence the following proposition:

Proposition 1: Mixed-approach social comparison influences quality of integrative ideas in that presence of upward social comparison leads to an increase in the quality of integrative ideas.

Field Experiments

The Field experiments involved twelve course sections, in three sections of a course taught during four semesters. Each course section included two discussions, i.e., twenty-four discussions total. Half of the course sections were control group (C) and half treatment (T). The sample sizes for each section in the control and treatment groups are summarized in Table 1.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Semester</th>
<th>Section sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Fall 2014</td>
<td>30, 22, 21</td>
</tr>
<tr>
<td>Control</td>
<td>Spring 2015</td>
<td>21, 20, 19</td>
</tr>
<tr>
<td>Treatment</td>
<td>Fall 2015</td>
<td>30, 25, 16</td>
</tr>
<tr>
<td>Treatment</td>
<td>Spring 2016</td>
<td>30, 21, 11</td>
</tr>
</tbody>
</table>

Table 1: Sample Sizes

In the control sections, after the first discussion, students were given their individual scores, and were reminded of the general scoring rubric. In the treatment sections, students were given goal-specific instructions. Also, after the first discussions, students were given an annotated transcript of the whole discussion which contained each student’s discussion score along with the instructor’s goal-specific feedback associated thereto. Both instructions and informational evaluation for the treatment groups were goal-specific, in that, students were clearly instructed to focus on integrating ideas, and were given feedback (on the annotated transcript) on how they performed with respect to that goal. The instructions followed guidelines created by Shalley and Perry-Smith (2001) in their research study on creativity and were formulated as below:

“…you will be told how your discussion post compared to other students’ posts. A transcript of all students’ posts & comments annotated with scores and comments for each score was shared with students after each discussion.”

To measure integrative quality of posts, this study used a modified integrative complexity measure based on the measure developed by Baker-Brown and colleagues (1992). The integrative complexity measure is a 1-7 scale which would rate comments that show “no conceptual differentiation or integration” as 1; and would rate a comment in which “the nature of the relationship or connectedness between alternatives are clearly delineated and are described in reasonable detail” as 7. In this study’s measurement scale, integrative complexity measurement scores 1-3 were used to represent different levels of integration from emergent to fully developed.

The trend of quality improvement for treatment groups have shown in Figure 2. To compare quality improvements from Discussion 1 to Discussion 2 in control and treatment groups, the scores were normalized in each section and an Integration Improvement Factor (IIF) was calculated as below:

\[
\text{Normalized scores } NS \text{ in section } s = \frac{\text{score} - \text{Min}\text{scores in } s}{\text{Max}\text{scores in } s - \text{Min}\text{scores in } s}
\]

\[
\text{Integration Improvement Factor (IIF)} = \frac{NS_{D2} - NS_{D1}}{NS_{D1}}
\]
Each course section had one IIF vector (one vector element for each student), and a total of twelve integration improvement factor for all sections. Sections in FA 14 & SP15 were no social comparison (C: control) groups and sections in FA15 & SP16 were mixed-approach social comparison (T: treatment) groups in the experiment. IIFs from the corresponding courses in the two semesters were concatenated to create: $IFF^C_1, IFF^C_2, IFF^C_3$ for control groups and $IFF^T_1, IFF^T_2, IFF^T_3$ for the treatment groups. Analysis of variance showed mild to marginal difference among the control and treatment groups: $ANOVA \left( IFF^C_1, IFF^T_1 \right) \ p-value: 0.034$ ; $\left( IFF^C_2, IFF^T_2 \right) \ p-value: 0.056$ ; $ANOVA \left( IFF^C_3, IFF^T_3 \right) \ p-value: 0.074$.

Discussion interactions dynamics were analyzed by creating interaction matrices in which cell $(i,j)$ was 1 if student $i$ commented on student $j$’s posts. Initial comparison of discussion network’s centrality measures indicates less centralized discussion networks for treatment groups. These analyses were performed only on the binary discussion matrices. More in depth network analyses are planned. This will include examination of matrices where edges are indicated by their quality scores, i.e., cell $(i,j)$ shows the quality score of the comment that student $i$ provided on student $j$’s posts. Furthermore, we plan to perform mixed nodal-dyadic analysis on the discussion interaction matrices.

**Summary and Conclusion**

This study aspires to contribute to the literature on productivity and effectiveness of online discussions by advancing integrative quality of posts through use of a mixed approach social comparison. The proposed mixed-approach social comparison had built in it elements of upward and downward comparisons with goal-specific informational evaluations. The mixed approach social comparison was used in six of the twelve course sections in the reported field experiments. Treatment groups showed higher levels of quality improvement and lower levels of centralization in commenting networks when two consecutive discussions were compared therein. Further analyses are required to fully unravel and compare the dynamics of interactions in control and treatment groups. The findings of this study are consistent with literature on social comparison and informational evaluation. The mixed-approach social comparison employed in the treatment groups of this study can inform design of online discussions and electronic brainstorming features, and creativity support tools.

**REFERENCES**

Social Comparison & Online Discussions’ Efficacy


