The Impact of a Notification System on Student Behaviours in a Collaborative Online Learning Environment

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abstract
This study examines the use of a notification system that makes students aware of interactivity in their online learning community. There are many opportunities for learners to interact with each other in online discussions, but whether or not students are aware that these interactions have taken place is worth investigating. The system is designed in a hybrid graduate course. Social constructivism and social cognitive theory are used to frame our understanding of the way various interactions with student-produced content can lead to higher engagement. Correlation and ANOVA analyses are used to understand how student contribution behaviours are influenced by the notification system. Findings suggest that activation of the notification system positively influences student contribution behaviours. Suggestions for significance are provided.

purpose
To explore how a personalized notification system increases user awareness and contribution behaviours in a discussion-intensive online course.

research questions
1) How do student expectations and professional orientation influence their use of the notification system?
2) How much more likely are students to exhibit activity based on the types of notifications they receive?

methodology
• Extraction of log file data of a graduate course (n = 73) including anonymized biographic data and student activity logs.
• Grounded analysis to classify students' course expectations:
  - Expresed no expectations (n = 16)
  - Expand knowledge and knowledge sharing capacity (n = 28)
  - Apply knowledge to research/professional practice (n = 22)
  - Unclassified (n = 7)
• Grounded analysis to classify students' professional orientation:
  - Behavioural therapist (n = 11)
  - Teacher (n = 25)
  - Students with education and behavioural therapy volunteer experience (n = 17)
  - Behavioural therapist and teacher (n = 4)
  - Other professionals with no education experience (n = 9)
  - Unclassified (n = 7)
• Correlation analysis: Use of the notification system, student activity and professional orientation.
• ANOVA to explore 2 relationships:
  1. Students’ course expectations and their online learning behaviours;
  2. Use of the notification tools and students’ online activity behaviours.

results
Correlation Results: Correlation analyses suggest a significant increase in students’ contribution and interactivity behaviours when the notification system is used.
• Replies received were significantly and positively associated with:
  - the number of notes written (r = .88, p < .001)
  - the number of messages sent (r = .25, p < .05)
  - the number of Likes given (r = .35, p < .05)
• Links received were significantly and positively correlated to:
  - the number of links created (r = .67, p < .001)

ANOVA Analysis:
• Statistical significance between students' professional orientation and the number of notes written, F(4, 65) = 3.87, p < .05, along with the number of replies written, F(4, 65) = 3.56, p < .05.
• Significant relationship between students’ course expectations and the number of links created, F(2, 65) = 6.47, p < .05.
• The use of the co-author notification tool was significantly related to the number of notes written, F(1, 65) = 6.04, p < .05, and the number of replies written, F(1, 65) = 5.34, p < .05.
• The use of the class wall notification tool was significantly correlated with the number of notes written, r (1,65) = 3.68, p = .05, and the number of replies written, r (1,65) = 5.34, p < .05.

discussion
• Students enrolled in the course with the intention of expanding knowledge and engaging in knowledge sharing are most likely to activate the system – demonstrates intrinsic motivation in this group.
• Use of system helps increase awareness of activities taking place in learning community when students are not logged in and also positively influence contribution behaviour.
• Teachers tend to have the most notifications activated and they are being replied to, liked, and linked most often.
• Students with education and behavioural volunteer experience are the greatest producers in the discussions and may indicate the need for them to be more aware of interactivity in their online learning community.

future work
• Examine aggregate trends of notification use in Pepper across 50+ discussion-intensive courses
• Understand how use of the system can be integrated into instructional design of discussion-intensive courses

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The Notification Center activation screen. If an email address is not provided, then the system is not activated.

Table 1: Descriptive of notification tools and students' course expectations
<table>
<thead>
<tr>
<th>Notification Type</th>
<th>Did not know expectations</th>
<th>Knowledge and knowledge sharing</th>
<th>Applying knowledge to research</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response (n)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message (n)</td>
<td>11 (17%)</td>
<td>20 (32%)</td>
<td>18 (27%)</td>
<td>49 (76%)</td>
</tr>
<tr>
<td>Link (n)</td>
<td>1 (2%)</td>
<td>4 (6%)</td>
<td>4 (6%)</td>
<td>9 (14%)</td>
</tr>
<tr>
<td>Co-author (n)</td>
<td>15 (23%)</td>
<td>25 (39%)</td>
<td>10 (15%)</td>
<td>40 (61%)</td>
</tr>
<tr>
<td>Call wall (n)</td>
<td>5 (8%)</td>
<td>9 (14%)</td>
<td>10 (15%)</td>
<td>24 (36%)</td>
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<tr>
<td>Total</td>
<td>37</td>
<td>71</td>
<td>62</td>
<td>160</td>
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</table>

Table 2: Descriptive of notification tools and students' professional orientation
<table>
<thead>
<tr>
<th>Notification Type</th>
<th>Behavioural therapist</th>
<th>Teacher</th>
<th>Students</th>
<th>Behavioural therapist &amp; teacher</th>
<th>Others</th>
<th>Total</th>
</tr>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message (n)</td>
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<td>16 (25%)</td>
<td>11 (17%)</td>
<td>3 (5%)</td>
<td>4 (6%)</td>
<td>30 (45%)</td>
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<td>1 (2%)</td>
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<td>14 (21%)</td>
<td>3 (5%)</td>
<td>5 (8%)</td>
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<td>10 (15%)</td>
<td>3 (5%)</td>
<td>6 (9%)</td>
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<tr>
<td>Total</td>
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<td>71</td>
<td>44</td>
<td>12</td>
<td>27</td>
<td>160</td>
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