Improving Class Participation by Using an Online Interactive Platform

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Abstract — Class engagement and participation has a direct impact on students’ learning. Improving participation has been one of the main focuses of education. It has been shown that classroom participation through asking questions can reinforce students’ learning process and improve their knowledge foundation. Classroom dynamics, that is, the interaction between the instructor and students, is another factor that influences students’ attentiveness and learning.

The motivation for this pilot research is to examine the impact of using existing online platforms on the class participation and engagement of undergraduate Mechanical Engineering students at the University of British Columbia. By the use of this online platform, students can anonymously and dynamically provide feedback to the instructor and ask their questions.

The findings of this work confirmed that classroom dynamics vary in different tutorial sections and instructional adjustments are necessary to accommodate students’ needs and learning dynamics. Overall, students were positive about the use of online platforms and more than 50% of the students suggested the use of this tool for future tutorials.

Keywords: Class participation, learning, online voting platforms

1. INTRODUCTION

Various electronic response systems have been used in college classrooms for more than 50 years now. The idea of using these systems is to enable students to provide immediate feedback to instructors of their learning and level of understanding on specific topics as well as providing constructive feedback on instructional strategies [1]. The use of personal mobile devices such as cell phones and laptops to participate in classroom activities have become more common during the past few years. Findings of recent studies have revealed that students are positive about using their cell phones and laptops to participate in classroom activities or online polling [2].

It has been shown that classroom participation through asking questions can reinforce students’ learning process and improve their knowledge foundation. However, there are students who struggle with asking questions due to fear of public speaking and peer judgment. This could directly impact their understanding of the topic and their performance in exams [3]. Findings of previous research have confirmed that anonymous online voting in classrooms improves students’ participation among all students and more specifically among shy students [4].

Students’ feedback on classroom dynamics can provide great impact on instructor interaction with students [5]. Students’ feedback regarding these factors can help the instructor to adjust the pace of the lecture and the level of details provided to the classroom. This can eventually improve students’ class engagement and learning.

The first objective of this research to assess students’ perceived clarity of tutorial content and instructional pace using online response tools. The second objective of this work is to assess the effectiveness of using online platforms on students learning and class participation.

2. METHODS

Two pilot studies with different sample sizes and in two different classroom settings were conducted to achieve the objectives of this research. In our first pilot study, the free of cost version of “sli.do”, which is an audience interaction tool was used to get students’ feedback on the pace and clarity of the tutorial content. Following the first study, we performed a second pilot study and used another online platform called “Mentimeter” to collect students’ feedback again on the pace and clarity of the tutorial content. These online platforms are accessible via a mobile application or web. During each tutorial, students were given an access code to log in to an online session where they could participate in online polls, ask questions, and provide feedback to the instructor. The details regarding the two studies are explained in 2.1 and 2.2.

2.1. First Pilot Study

In the first study, using the sli-do platform (www.sli-do), students were asked to rate the clarity of the tutorial content and delivery in real-time. They could rate whether the tutorial content is ‘clear’, ‘kind of clear’, or ‘not clear’ to them. Next, they were asked to evaluate the pace of the current tutorial. They could rate whether the tutorial is ‘too fast’, ‘fast’, ‘ok’, ‘slow’, or ‘too slow’ to them. Finally, the online platform was kept open to students throughout the tutorial and they could anonymously ask any questions they
have on the tutorial topic. When using this online platform, all the students could see their peers’ responses (anonymously) including the questions they asked. It was believed that using this feature would help to normalize feelings of misunderstanding among the students.

This method was implemented in three 90-minute tutorial sessions in a third-year mechanical engineering course at the University of British Columbia. The course was taught using Team-Based Learning and covered topics in solid mechanics (e.g. fatigue, fracture, deflection) in design contexts. The study took place in the fifth of six modules, on the topic of weld design. The course had one lecture section and three identical tutorial sections at different times on the same day. All the three sessions were on a given topic were facilitated by the same teaching assistant (TA), and had the same content. This study involved one day of tutorials, but included all three sections.

2.2. Second Pilot Study

The second pilot study, using Mentimeter (www.mentimeter.com), took place in an integrated second-year Mechanical Engineering course at UBC that covered thermodynamics, fluid mechanics, and mathematics. The course had one lecture section and four identical tutorial sections (A, B, C, D). Students had one or two 50-minute tutorials on a given subject each week (same topics for every student). Two TAs covered each subject, and the TAs rotated between sections. The two thermodynamics TAs participated in this study; however, only one of the TAs collected sufficient data for analysis.

In this study, students were asked to rate their satisfaction with the clarity of the tutorial content and delivery in real-time. They could rate whether they were ‘very satisfied’, ‘somewhat satisfied’, ‘neutral’, ‘somewhat dissatisfied’, or ‘very dissatisfied’. They were also asked to rate their satisfaction with the pace of the current tutorial. They could rate whether the pace was ‘much too slow’, ‘a little too slow’, ‘just right’, ‘a little too fast’, or ‘much too fast’ to them. Finally, the online platform was kept open to students throughout the tutorial and they could anonymously ask their questions. Similar to the first study, when using this online platform, all the students could see their peers’ (anonymous) participation and the questions they asked.

For each section, and during the last session of using the online tool, students were asked to fill out an optional and anonymous online survey regarding their experience with the tutorials and online tool. Students were asked whether they felt comfortable with verbally asking questions of the TA during the tutorial. Students responded using a 5-point Likert scale: strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, and strongly disagree. Next, they were asked whether they were comfortable posting questions via the online platform used by the TA during the tutorial (again, strongly agree to strongly disagree). Next, they were asked whether they recommend the use of this online platform in future and in other tutorial sessions (strongly agree to strongly disagree). The survey concluded with an open text entry form was provided to the students if they wanted to provide any other feedback or comment. Primary data analysis was through the Likert scale responses [6].

3. RESULTS

3.1. First Pilot Study

A summary of the main findings of this pilot research is presented in Table 1 and Figures 1 and 2. As mentioned before, all the three tutorials were on the same day but at different times. Tutorial A, B, and C is the first, second, and third tutorial of the same day, respectively.

Table 1: Summary of findings, First Pilot

<table>
<thead>
<tr>
<th>Section</th>
<th>No. of participants</th>
<th>No of questions asked</th>
<th>Feedback to the instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>16</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Fig. 1: Tutorial pace

Fig. 2: Tutorial clarity
3.2. Second Pilot Study

A summary of the findings regarding the use of online platform and survey results for the second pilot study is presented in Tables 2 and 3. The results of the online survey for section B were missed due to communication issues.

**Table 2: Online platform participation**

<table>
<thead>
<tr>
<th>Sec.</th>
<th>Tutorial</th>
<th>Total no. of participants voting online</th>
<th>Total no. of questions asked online</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 3: Online survey participation**

<table>
<thead>
<tr>
<th>Sec.</th>
<th>Average number of students in class</th>
<th>Total no. of students participating in the online survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>29</td>
<td>20</td>
</tr>
<tr>
<td>C</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>D</td>
<td>22</td>
<td>10</td>
</tr>
</tbody>
</table>

For each section, the average perceived pace and clarity of the tutorials are shown in Figures 3 and 4, respectively. On average, 93% of online voting participants in section A, 100% of B, 72% of C, and 71% of D rated the pace of the tutorial “just right” (78% overall). On average, 100% of online voting participants in section A, 80% of B, 81% of C, and 75% of D were “very satisfied” or “somewhat satisfied” with the clarity of the tutorials.

**Fig. 3: Tutorial pace**

**Fig. 4: Tutorial clarity**

On average, the level of comfort asking questions verbally was higher than asking questions via the online tool. However, when comparing the level of comfort asking questions during the tutorial, 35 percent of students had the same level of comfort and 15 percent of the students had a greater level of comfort asking questions via the online platform compared to asking their questions verbally. Corresponding results are shown in Figures 5 and 6.
Fig. 5: Level of comfort asking questions verbally

Fig. 6: Level of comfort asking questions via the online tool

Students’ response regarding the use of the online tool in future tutorials is shown in Figure 7. Overall, 52% of the participants strongly or somewhat recommended the use of the online platform in future tutorials, compared to 12% who opposed.

The summary of normalized scores (by the number of participants voting online) regarding the average satisfaction with the clarity of the content, comfort asking questions verbally and via the online tool, and recommending the future use of the online tool are presented in Table 4.

4. DISCUSSION

The findings of both pilot studies confirmed that the perceived pace and clarity of the tutorial vary in different classrooms. Using the students’ feedback, the instructors were given the opportunity to adjust the pace of each tutorial session and the level of detail on each topic. The findings of the first pilot study showed that in addition to the questions asked verbally in class, further questions were asked through the online platform. The frequency of questions that were asked on certain topics helped the instructor to understand the learning gaps. Although the questions were asked anonymously, it was hypothesized that more students than the ones who were already active and verbally asking their questions were engaged during the tutorial session. Finally, the feedback provided to the instructor helped her to modify and improve her teaching methods, e.g. students’ positive feedback regarding the use of the online platform encouraged the use of the online platform in the second and third tutorials as well.

The results of the second pilot study revealed that 15 percent of the participants in the online poll were more comfortable asking questions via the online tool compared...
to asking questions verbally. Recognizing that different learners have different needs and different levels of confidence with the course materials, this finding shows the potential positive effects of using the online tool on students’ class participation and learning. Specifically, having an alternate method for students to pose questions beyond speaking up in class appears to be a valuable option.

To maintain an efficient interaction in classrooms, it is crucial for instructors to understand the students’ perceived pace and clarity of content during each tutorial. As an example, in the second study, it was informative to know that on average, section D had the lowest perceived satisfaction with the pace and clarity of the tutorials’ content. Further investigation can identify the main reasons for this finding and effective actions can be taken to improve students’ satisfaction in this section.

Preliminary results showed that there is a correlation between the level of comfort asking questions via the online tool and whether the use of the tool is recommended by the students. On average, the sections with a higher level of comfort asking questions via the online tool more strongly recommend the future use of the tool. Overall, students’ feedback on the use of the online tool was positive and more than 50% of the participants recommended the future use of this tool. One student specifically mentioned that “the online question platform is a great tool to engage introverted students.”

Through all 14 tutorial sections involved in the second study, only four questions were posed online during tutorials. The culture of this course and the tutorials was such that students seemed to be actively engaged and comfortable interacting verbally with the TA during the sessions. This is supported by the high comfort expressed with asking questions verbally; however, the four online questions do indicate and remind us that some students are less comfortable speaking out during class. These four online questions represent questions that may not have otherwise been asked without the online tool.

5. CONCLUSION

The integration of the online feedback platform shows promise. Overall, students seemed to be more engaged and motivated to participate in class discussions. However, it is not clear if the use of this online tool had any direct impact on students’ learning or grades. Further investigation is required to systematically evaluate the effectiveness of the method used.

Acknowledgments

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References