CASE STUDY OF ONLINE DISCUSSION BOARD USE IN AN ENGINEERING EDUCATION GRADUATE COURSE

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Abstract – Due to the increasing prevalence of asynchronous learning platforms, the development and implementation of online discussion boards have become important considerations in the design of post-secondary learning environments. This research is conducted as a case study of the online discussion board use in a small engineering education graduate course, consisting of in-class and online discussion components. By varying the structure of the online discussion board to allow different types of student interaction, the study identifies trends in discussion board use, specifically pertaining to student participation, student collaboration, and the integration between in-class and online discussions. As a result, the study provides insight into the utility and limitations of online discussion boards in post-secondary courses.

Keywords: Asynchronous learning, online discussion board, blended courses, student participation

1. INTRODUCTION

Asynchronous learning platforms, especially online discussion boards, have become prevalent in post-secondary education due to the development of instructional technology aimed at making learning more accessible. Asynchronous online discussion often provides flexibility for participants’ work and social schedules [1], and can also enhance instructor-student, student-student, and student-content relationships through the provided online resources and the additional time to express ideas and thoughts [2]. Typically, the success of online instructional tools is correlated to student performance. However, as these tools develop, additional metrics such as student participation and collaboration type and frequency are necessary for fully understanding the advantages and limitations of online discussion.

There are a variety of online discussion platforms available which can be used to facilitate learning. Various Learning Management System (LMS) platforms include integrated discussion boards, which can be automatically accessed by registered course participants.

Typically, these platforms are set up with the traditional discussion board structure of a general discussion topic or question to which participants can post a response. All participants can see and respond to other participants’ posts at any time. However, many online discussion boards include features that can be customized to fit specific course curriculum or a target learning environment. For example, in the Canvas LMS discussion board, the post-first (PF) framework is one possible modification to a traditional discussion board where participants are required to reply directly to the discussion topic before they can read or reply to other posts [3].

Based on the incorporation of asynchronous online components into an increasing number of post-secondary courses, both online and blended, research into the utility of features such as post-first discussion boards could better inform discussion facilitation efforts and the participant learning experience. Furthermore, research into student participation and collaboration trends in an asynchronous online environment would better categorize the value of online discussion as an instructional tool.

1.1. Literature Review

Despite the fact that asynchronous and blended courses may be delivering the same content as traditional course equivalents, the platform itself influences the learning outcomes and as a result, the method of delivery must be suitable to the types of interaction desired within the course [1]. On this topic, several studies have presented asynchronous courses as generating equivalent levels of learning compared to the traditional learning environment [4]. However, in the case studies of online discussion board implementation in post-secondary courses [2, 5, 6, 7, 8, 9, 10, 11], the researchers typically relied on student performance as a measure of the success of the teaching method (traditional versus online). The result was that there was no significant advantage over traditional learning environments with regards to student performance. Instead, the majority of studies concluded that overall performance in the course was correlated positively with student participation in the online discussion [4, 9, 10].

Beyond student performance, students’ relation to the course content and collaboration between students were identified as two key metrics in determining the success of asynchronous discussion boards. Due to the flexibility and
accessibility of the online discussion boards, there is an increase in student interactions with the content and with other students, as compared to the traditional class setting [2]. However, other studies have concluded that despite increased interaction online compared to traditional environments, students focused mainly on their own responses without integrating other perspectives [6]. In order to determine a method that facilitates high-level learning in an online discussion board, research must identify factors which influence how students relate to the course content online as well as how they collaborate with other students.

One method of categorizing student participation and collaboration is based on activity and posting behaviour. One study characterized students by when and how often students posted, how often they referred to other students, and how often they were referenced by others [9]. Results showed more frequent interactions equaled higher quality post content and better course performance. Another study also classified results based on student types, identifying thorough, self-monitoring, and independent types [5], which classified how students interacted with each other. However, due to the large variance between different student characterizations, it is difficult to engage all types. While individual personality is a contributor to the type of participation, the structure of the discussion board itself is key to maximizing the learning potential of an asynchronous platform.

Several studies investigated modifications to certain features of the discussion board which were predicted to promote participation and interaction between students. The main change to the organizational structure was requiring students to respond to other students’ posts a minimum number of times per discussion [7, 11]. Wegmann et al observed an increase in quality of posts and interaction between students when the discussion board structure was changed from open-ended (students posted and responded as they saw fit) to experimental (students were required to respond directly to at least three other posts) [7]. In An et al, students in one group were required to respond to at least two posts while another group was only responsible for replying to the discussion question [11]. Both [7] and [11] demonstrated an increase in higher-level learning outcomes for students who were required to respond to other students, over students who only posted in response to the discussion question, even if the total number of posts per student was the same.

However, in contrast, Kim et al identified that when responding to others, students typically read over the other responses to identify what had already been said, and only added new content that had not been addressed. While this is an important aspect of discussion, there was minimal integration of ideas due to lack of reflection or challenging of others’ perspective [6]. Essentially, students were replying to other posts to agree with their statements or to add their own summarization of the topic, rather than synthesizing information.

When compared to a rubric based on Bloom’s taxonomy, thinking levels in the discussion question responses were typically in the middle level (organize, classify, apply, compare, and contrast), and it was suggested that more structure or guidance from the instructor could promote higher levels of thinking (synthesize and evaluate) [12]. Without a structured discussion board format which clearly established how students were expected to behave and contribute, there were fewer responses from students, less interaction between them, and the level of thinking in the posts was lower. As a result, there must be a balance between requiring students to formulate their own opinions and responding thoughtfully to other perspectives. Furthermore, the online discussion board setup, as facilitated by the instructor, is imperative to a successful learning experience.

Wegmann et al notes that a well-structured discussion board with explicit expectations for students in the form of a rubric or guidelines will increase and enhance student participation [7]. Dalelio and Yeh et al are also in agreement that it is the role of the instructor to encourage participation through clearly defined course expectations [8, 9]. Andresen concludes that due to the need for instructor guidance, asynchronous learning cannot be seen as a method of displacing instructors; instead, instructors are imperative to implementing the conditions for successful learning via asynchronous platforms [4].

The success of discussion board platforms is dependent on the level of interaction, which is in turn dependent on the defined roles of the instructor and students, and the structure of the discussion board [12]. Therefore, additional research is required to determine the optimal structure and discussion board format to provide the best learning experience for students. This research attempts to address, in part, these objectives.

1.2. Objectives and Scope

The goal for the research was to identify key trends around student connection to course content through participation in discussion and collaboration with other students via the online discussion board platform. More specifically, the study investigated the effects of facilitation methods, such as the post-first feature, on the participants’ interaction with the online discussion board. By implementing the traditional (TD) and post-first (PF) frameworks for comparison, the goal was to identify discussion board trends and the differences between the two frameworks in terms of participant learning experience and the perceived effectiveness of discussion facilitation. The research goals were achieved by meeting the following objectives:

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1. Assess the utility and limitations of modifying the discussion board structure by implementing the TD and PF discussion board frameworks for comparison in an online discussion environment.

2. Qualify student connection to the course material, student participation, and student collaboration by analyzing discussion board use and participant feedback.

1.3. Methods

The research was conducted as a case study on a small (n=10) graduate-level blended course in engineering education. The course consisted of weekly in-class seminars and an asynchronous online discussion board hosted on the Canvas Learning Management System (LMS) course website. As part of the course, students were required to participate in weekly online discussions prompted by discussion questions posted by the course instructor.

In order to determine the effect of discussion board structure on student interaction and participation, the following two frameworks were implemented:

1. Traditional (TD): Participants can view and respond to the discussion question and/or to other posts at any time.
2. Post-First (PF): Participants must respond to the discussion question before being able to view and/or respond to other posts.

These frameworks were alternated each week for a total of six weeks, with three weeks/discussion questions per framework. Furthermore, students were required to participate in the discussion board as part of the course. Students were required to post at least once for the first discussion question and at least twice for each subsequent question in order to complete the participation requirement.

The preliminary analysis of the discussion board included an overview of the number of posts and discussion board activity as a basis for comparison between participants and across the six discussions.

Secondary analysis of the discussion board included a grounded coding approach, whereby both inductive and deductive qualitative analyses were employed [13] to data code the discussion board content.

In addition to the analysis of the discussion board content, the study also included individual interviews with six of the course participants, using a standardized open-ended format with questions prepared [13]. The interviews were also data coded using the themes identified in previous analysis of the discussion board.

For the purpose of this study, the participants were anonymized at all stages of the data analysis, and pseudonyms are used for all results presented in this report.

1.4. Targeted Outcomes for Research

By varying the structure of the online discussion board to allow different types of student interaction, the study identifies trends in discussion board use, specifically pertaining to student participation, student collaboration, and the integration between in-class and online discussions. More specifically, an analysis of the discussion board demonstrates key themes including the relationship between online discussion board use and accountability to peers and course expectations; levels and types of learning demonstrated through different discussion types using Bloom’s Taxonomy; and course participation styles according to Knowlton’s Taxonomy. The intended outcome of the research is to inform course instructors as to the utility and limitations of asynchronous learning tools, such as online discussion, for use in post-secondary courses.

2. CENTRAL THEMES FOR ANALYSIS

Based on the small population size of the class, the analytics for the discussion board were not used for any statistical analysis of the results. Instead, the quantitative data from the discussion board posts and user interaction with the board was used to develop the central research themes, as well as to cross-reference responses from participants during the interview process. The data was also used to qualify student behaviour, specifically categorizing patterns in direct posts (direct response to the discussion question) and threaded posts (responses to other students’ posts).

Initially, the discussions were examined using an inductive technique, typically referred to as open coding, to discover themes in the discussion data and develop a data coding scheme for further categorization of results [13]. Based on the initial review of the discussion board posts, the following notable code categories were recorded and subsequently applied to the entire dataset.

1. References: referencing course material; referencing external information or sources; referencing another post.
2. Contributions: expressing thoughts, opinions or beliefs; providing personal experiences or anecdotal examples; asking another student a direct question.
3. Analysis: elaborating on references or contributions; questioning (hypothetical, wondering, or speculative); self-reflection.
4. Miscellaneous: acknowledging other students’ contributions to the discussion, building rapport; humour.

Common themes were identified based on the data codes for references, contributions, and analysis. The students performed analysis in their posts, typically using
the course material or readings as a starting point and adding their own contributions in the form of opinions and personal experiences. Therefore, it was determined that a key element of the discussion board was students relating to the course content through their posts. However, in the context of the entire discussion board, there was also the key element of interaction between students, driven by student participation and collaboration through responses to other posts and references to other students. As a result of the analysis, the following central themes were identified for the study:

1. Student relation to the course content;
2. Student relation to the discussion; and
3. Integration between online and in-class discussion.

Following the initial identification of these themes from the patterns in the discussions, deductive analysis was employed via interpretive coding to analyze the data according to existing frameworks [13]. In this case, the discussion board was reviewed using two learning taxonomies as frames of reference. Firstly, Bloom’s learning taxonomy [12] was employed to evaluate the level of learning associated with different types of data codes demonstrated in the discussion. Secondly, Knowlton’s participation taxonomy, designed specifically with asynchronous online discussion in consideration [14], was employed to categorize student posting behaviour and trends in collaboration with each discussion. The relation between these taxonomies and the discussion board coding is outlined in Fig. 1 and Fig. 2.

3. RESULTS AND DISCUSSION

3.1. Student Relation to the Course Content

An important consideration for asynchronous online discussion is its utility in improving how students relate and engage with the course material. Understanding course content is a key learning objective in any course and is often correlated with student performance. Online discussion can be used in blended courses to provide further engagement with the course material outside of a lecture setting.

3.1.1. Accountability and Engagement with Course Material.

One of the benefits of online discussion is that it increases student engagement with the course material, beyond the usual platforms. In this case study, the discussion questions were related to material for the next in-class session and therefore motivated students to review the assigned material before class. In general, students reportedly felt more accountable for the readings and kept more up to date with the course material since they were required to participate in the discussion board.

"I think it helps hold me a bit accountable for actually going through the material ahead of time. [...] And then I think the discussion board helps ensure I read them on a timely manner, in a timely manner." (Andrew)

"Yeah, I wouldn’t do it if I didn’t have to do it. I don’t know, there’s some community aspect to it but it’s mostly you just do it because you’re told to." (Brandon)

Additionally, requiring discussion board participation influenced the way the students approached and engaged with the required readings or content in preparation for the discussion. Most of the students completed the readings before writing their posts on the discussion board.

"I think one of the things that’s changed is that while I’m reading I’m constantly thinking about what I could use from the reading to comment on the discussion board. So it’s like, I’m not making notes or anything, so like in that sense nothing has changed, but it’s kind of at the back of my mind and I’m constantly thinking about what points are relevant to how I feel and what I can use to answer this question." (Denise)
I think it helped push the content of the course a bit better. Even though I wasn’t necessarily reading the reading ahead of the post, like, I think it pushed me to like, I think a lot of other people will draw on the readings, and then if I reply to their post, I kind of have to dig into it. (Catherine)

I usually, I’ll go read the question and then I’ll have a snap reaction to it and I think I’m lucky because I do have teaching experience to draw from. So I’ll have that snap reaction and then I’ll kind of, like, make notes of what that reaction was and then usually I’ll go do the reading and come back and add what I’ve extracted from the reading. It’s kind of a sandwich approach. (Grace)

The results show that participation in the discussion board generated positive connections with the course content and extended the learning of the classroom. However, while the discussion board may have increased engagement with the course material, it is also important to consider whether it had any notable influence on the understanding of the material.

3.1.2. Levels of Learning. In order to determine the level of understanding of the material as a result of the discussion board activity, the data coding from student posts was evaluated using Bloom’s taxonomy of learning as a basis. The results indicate that the discussion board structure influenced relation to the course content in several different ways.

In the post-first (PF) framework, students’ direct posts usually consisted of references to the course material or external courses, opinions or thoughts on the material, and occasionally a personal example or anecdote. In comparison, the traditional (TD) framework included references to other students and analysis of the material typically built on previous discussion, rather than course content. On average, the PF framework appeared to generate better student relation with the course content on a basic level. This could be attributed to the fact that students felt they needed to prepare more when they could not see the other posts.

I liked that [the course instructor] had the thing where you had to post without seeing what other people posted. That kind of makes you to think more before just like, reading everyone else’s. (Catherine)

I feel like I probably do more preparation when I can’t see other people’s posts because I don’t know what other people have posted so they might’ve posted really nice posts and I just don’t want to feel like, I don’t want to post a sloppy post, or like something that’s like, not as knowledgeable. So I probably do a lot more prep for that kind of thing. (Denise)

However, references to course content in the direct posts from the PF discussions were typically limited to summarization and preliminary thoughts on the topic, corresponding to the lower levels of learning in Bloom’s taxonomy, including “remember”, “understand”, and “apply”. Further analysis and evaluation of the content was more typical of the TD framework discussions where students were able to collaborate and relate to other opinions and perspectives. Students felt that they were able to effectively build on existing analysis.

I think that if I don’t have to post first I look at the other comments and if a reply to a comment is going to be counted equally as a new parent comment, it's just easier to look at the discussion someone else has started and then put my own twist on it and build out from there. (Andrew)

I think it’s really helpful. Like it gets the topics kind of started, helps you think about it, before you even get going on the, in class. So it kind of prompts you to think more about what happens in your own learning experiences and then think of questions so you can participate better in class. (Catherine)

Some of them, it’s been interesting to see how other students’ perspectives are different from mine or how their experiences are different. So I think it’s like learning from experiences I haven’t had has been helpful. (Grace)

The students also demonstrated greater synthesis of opinions or examples and higher-level questioning in the TD framework. Despite the increase in relation to explicit course content using the PF framework, it appeared as though the higher likelihood for discussion and collaboration in the TD framework resulted in higher levels of learning.

3.2. Student Relation to the Discussion

Results indicated that increased participation in discussion and collaboration with other students had the potential for higher levels of learning. Therefore, it is important to understand the different modes of student participation and how they relate to student interaction on the discussion board.

3.2.1. Discussion Board Posts. The number of posts made by each student were tracked throughout each discussion board. On average, the students posted the minimum number of times required by the course instructor for the specific discussion question. In the case of the first discussion question, only one response was required, resulting in an average of one post per person, with two students posting one more than required and one student not posting at all. Similarly, for discussion questions 1-6, two posts were required, resulting in an average of two or fewer posts per student. In each discussion, there were typically a small number of students who posted one more post than required as well as students who did not meet the minimum number of posts.

The number of posts per discussion board were fairly consistent across the study. Not including the first discussion question, which only required one post per
student, the total number of posts per discussion board ranged from 14-18, with the number of direct posts ranging from 7-10 and threaded responses from 6-9. It is noted that the sixth discussion question was structured differently than the previous questions. The discussion question included two distinct prompts with instructions for the students to integrate their responses or post them separately. As a result, there were fewer threaded responses compared to direct posts since several students posted two direct posts, one for each prompt.

3.2.2. Types of Participation. The number of posts were also used to qualify the different categories of student behaviour observed in the discussion board, using Knowlton’s taxonomy as a basis. These categories are summarized in Table 1. The first category of students included those who predominantly posted direct posts in comparison to threaded responses. These students each posted threaded responses two or fewer times throughout all six discussions. Their participation was categorized as a combination of “passive” and “developmental” since they were not very active in the discussion. The second category of students was the opposite, with more threaded responses than direct posts. Their participation was categorized as mainly “dialogical” since they were actively interacting with other students by responding to their posts. The final category of students included those who had a similar number of direct posts and threaded responses and were categorized as a mix of “generative” and “dialogical” since they typically posted earlier, prompting discussion, and responded to others, generating interaction.

Table 1: Participation behaviour.

<table>
<thead>
<tr>
<th>Description</th>
<th>Knowlton’s Taxonomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>These students typically did not respond to other students, instead posting directly in response to the discussion question (categorized by significantly more direct posts than threaded responses)</td>
<td>Passive, Developmental</td>
</tr>
<tr>
<td>These students frequently responded to other posts (categorized by significantly more threaded responses than direct posts)</td>
<td>Dialogical</td>
</tr>
<tr>
<td>These students typically posted earlier and also responded to other posts (categorized by a similar number of direct posts and threaded responses)</td>
<td>Dialogical, Generative</td>
</tr>
</tbody>
</table>

For example, Grace had ten threaded responses compared to only five direct posts and was therefore categorized as dialogical, while Brandon had four direct posts and no threaded responses and was categorized as passive. Most of the students had a similar number of direct posts and threaded responses and demonstrated qualities representative of both ends of the spectrum.

Based on the results for the number of posts and the categorization of participant behaviour, student behaviour in relation to the discussion board remained consistent throughout the study, including both the traditional (TD) and post-first (PF) frameworks. Therefore, these participation behaviours or trends could be attributed to the inherent learning styles or preferences of the students, rather than the structure of the course. Furthermore, some students may be more naturally inclined to focus on the course content, while others learn more from their interactions with peers around the course content. Due to this range of participation types, it is evidently difficult to facilitate discussion in a way which effectively motivates all students.

3.2.3. Student Collaboration. The student participation behaviour also directly influenced the level of student collaboration. Students with passive or developmental tendencies typically did not engage in much discussion with other students and demonstrated fewer references to other students in their posts. In comparison, dialogical students more frequently responded to others, referenced other posts, and engaged in back and forth discussion. Furthermore, the tendency of the students to limit their participation to the minimum number of posts required to achieve the participation mark was also consistent across the study and had a negative effect on collaboration. Even if there are several students who are engaged in the discussion board, lack of participation from other students can make it difficult to effectively facilitate discussion. Students also expressed this perspective during the interviews.

"My experience has been largely, you have to do this to get course credit and it never feels like an organic discussion evolved. And I think for it to be organic you would have to have a fairly large group of highly motivated and engaged students, if not the whole class, a large contingent to kind of drag everyone else along and foster that environment." (Andrew)

This lack of collaboration can be exacerbated further by the discussion board structure. For example, if the PF framework is used but only one post is required, students would be likely to post once as required and not collaborate with the other students at all. Even with a minimum of two posts, the PF structure resulted in less collaboration since by construction every student’s first post included no references to other posts. As discussed previously with regards to student connection to course content, deeper levels of learning were typically reached through more collaboration. The students agreed that relating the course content to other perspectives was valuable and was not as present in the PF structure.
3.3.1. Online Discussion Board as an Extension of the Classroom. From the interviews, students expressed positive reviews of the integration between their in-class learning and their online discussion board experience. The students liked the combination of media since it extended the classroom beyond the traditional learning environment.

Yeah, I think it’s good. It draws your attention to certain aspects of people’s posts as opposed to just like, oh we did that outside of class, so it draws the discussion into the course material. (Catherine)

So the discussion boards are cool in that they make you interact in between, so it almost extends the classroom. (Emma)

The online discussion board acted as a connection between students and the course content in between classes. There were several references to in-class discussions in the discussion board content, such as students noting, “as we discussed in class” and continuing their thoughts on the subject, as relevant to the discussion question.

3.3.2. Benefits of Discussion Facilitation and Integration. The main benefit of the integration between the online discussion board and the classroom discussion is that it extends discussion beyond one medium or the other, effectively deepening the discussion. It also allows for more direct instructor facilitation in class, to respond directly to comments and lead the discussion in a direction conducive with the learning objectives of the course. This integration also keeps discussion relevant between classes or discussion board posts. The students believed that the integration between separate course components increased the individual value of each element.

Yeah, it’s interesting, it’s neat. It was, like, different, and I feel like it was a good way to integrate like, what you type versus what you’d say in class. Yeah…I thought it was an effective teaching strategy. (Brandon)

Students also expressed that once they met the minimum required posts, the discussion board was no longer a priority, but that with an increased minimum, there was potential for deeper discussion.

In terms of like, encouraging student learning, I think it’s a better strategy to force everyone to post to kind of unlock the board because then you’re at least getting everyone’s original thought once and to require multiple responses. (Andrew)

It’s like a one-shot deal. It’s like, this is the discussion topic, I see it in the email, I do it, read whatever else was already there, and that’s it […] Just up until when I post. I never go back to the discussion board. (Brandon)

But I suppose three times would be ideal to, like, actually prompt conversation, because I feel like sometimes when you do that second reply, the person may or may not reply. (Catherine)

Although the PF framework may increase student relation to the course content, it is potentially negatively correlated with student collaboration if student participation is low. In order to facilitate collaboration while still benefitting from the PF framework, the course instructor could potentially increase the minimum number of posts or interactions required.

3.3. Integration Between Online and In-Class Discussion

In addition to the online discussion board component of the course, the effects of instructor facilitation through in-class and online integration of course components were explored. As part of the course, the course instructor addressed specific material from the previous week’s discussion board in class, to prompt further discussion. In these sessions, certain students would be required to elaborate on their posts or comments from the discussion board and then the class would discuss. However, the in-class component of the course was outside of the scope of this study and therefore the analysis completed in this section only includes references to in-class discussion on the discussion board and in the interview responses.

Yeah, there’s like an extra motivation to do it when it’s like, you don’t see anybody else’s until you do it. But I feel like you go a little bit deeper into what you’re going to say when you’ve read everybody else’s and theirs are pretty in depth or some are in depth, some aren’t, but you can kind of build off of what others are doing. So it’s like one way is more depth and the other way is kind of motivates you to do it in the first place. (Brandon)

I definitely prefer seeing the others, I feel like that’s more conversational, whereas when I’m posting kind of blindly I feel like, I don’t know, I’m not, I’m not really, I’m just thinking about my own experiences, I’m not really able to reflect on what other people have said and tie in, maybe, responses to other perspectives. (Grace)

By [the course instructor] just said we’re going to have an online discussion board and as part of the course completion, you know, like a 5% participation mark, whenever you have to participate, you know, every week, two comments, in whatever format we choose, I think I would not find it very useful because it’s just kind of off in isolation and it would be that, you know, I post to get the credit but then I just disconnect from it, it would just be kind of separate from the class so I think it’s really important that [the course instructor is] bringing it to the classroom. (Andrew)
Finally, the integration between course components also encourages more student engagement and participation by providing acknowledgment and positive feedback to students for their contributions to the discussion board. Students were much more receptive to discussion when they felt that their posts were being read and valued by not only the other students but the instructor as well.

It makes the discussion relevant, and it makes your contribution worth putting out there. It also makes you take the discussion board a little more seriously, than just a space to write things. Because otherwise it feels like your comments go into the abyss and you’ll never see them again. You don’t know what the prof is making of them. So it’s kind of nice that [the course instructor] brings it back to class. (Emma)

Overall, integration between course components created a holistic learning environment, which fostered continued discussion and interaction among students.

3.4. Other Notable Findings

Additional results which were outside the scope of the themes identified above included idiosyncrasies with the discussion board platform. The PF framework requires students to post once, after which they will be able to see and respond to any other posts on the board. However, there is a workaround for this feature, namely posting on the discussion board and then deleting the post. The system registers this as a valid post and the student is therefore able to view and respond to the other posts. The deleted post is not visible to other students but is shown as having been deleted to the course administrator. The ability to delete posts can be turned off but would also limit the ability of students to edit their posts. In this case study, there was one instance of a deleted post in the first PF discussion. In the interviews, this student mentioned that they did in fact delete their post for this purpose. This is notable since it could potentially affect the expected outcomes for the use of the PF feature in other courses.

Other notable trends were student dissatisfaction with the discussion board platform itself. The layout of the discussion board made it difficult to differentiate between direct posts and threaded posts. The discussion board also only allows for one level of threading, which students thought was limiting in fostering branched discussions.

4. CONCLUSION

4.1. Implications of Results

Based on the results, it is evidently difficult to successfully facilitate high levels of learning and meet course learning objectives in any online discussion, even in a small, motivated class. The students in this case study were highly motivated and interested in the course material and therefore had a potentially higher predisposition to collaboration and deeper analysis than the average student in another course. One of the main difficulties is the differences in student behaviour, which require different approaches with regards to student motivation and participation. More specifically, the results of the study showed that features such as the post-first framework can be successfully implemented to promote student learning and contribution, as well as facilitate discussion, if used in the right context. In this case, the minimum number of required posts would need to be greater in order to effectively benefit from the post-first feature while still facilitating collaboration.

In general, asynchronous online discussion can be an effective tool for promoting student interaction and understanding of the course material via participation and collaboration with other students. However, the key to its successful implementation includes facilitating the online environment based on the desired learning outcomes for the course and considering both the student motivation to participate and the importance of structuring the discussion effectively.

4.2. Future Work

The discussion of this report focused on student participation and collaboration in the online discussion board independently from student performance in the course. Since student performance is a key metric in measuring the success of asynchronous online learning, it would be useful to find the correlation between student participation and collaboration and student performance. Furthermore, the results cannot be conclusively scaled to larger classrooms or confidently applied to courses in other disciplines. The next step in this research would be to do a comprehensive analysis of asynchronous online discussion in larger class sizes and different course types. For example, a first-year engineering communications class would be potentially very different than the graduate-level engineering education course discussed in this case study. It would also be beneficial to monitor these trends over a longer period of time, to include all elements of the course.

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