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Practical activities to engage students in face-to-face and synchronous online teaching environments

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Abstract

The primary objective of this research is to integrate student engagement activities into teaching practices in order to improve the effectiveness of instruction by fostering student involvement in the learning process. Active student engagement and interest are crucial factors for successful learning. Engagement, which is closely linked to learning motivation, plays a significant role in students' determination to overcome challenges. However, students often experience discouragement when attending lectures and tutorials, whether in online or face-to-face settings. The lack of student engagement and absence in the learning process can lead to poor academic performance. Regardless of the delivery mode, it is common to observe students' disinterest or lack of motivation in the classroom. This behavior is not only difficult to correct, but it also hampers the overall learning experience. Due to the impact of Covid-19, an increasing number of classes have transitioned to synchronous online mode. Consequently, higher education institutions are actively addressing the challenges and exploring strategies to effectively engage students in their online learning experience with the ultimate goal of ensuring their successful completion of a college degree. Therefore, maintaining student motivation and engagement in the learning process, particularly in synchronous online environment, presents a significant challenge. This paper explores various practical activities to engage students in both face-to-face and synchronous teaching, with the aim of transforming the learning process into an interactive and effective environment that promotes academic excellence.

Keywords: engagement activities in education, engagement platform, learning dynamics

Introduction

Student engagement and interest during instruction are important conditions for active learning, as it significantly influences learning motivation and persistence in overcoming challenges. Measures of engagement include the effort students invest in setting learning goals, planning, and self-monitoring (Fredricks & McColskey, 2012; GuNuc, 2014). However, college students often struggle with attendance and engagement in both online and face-to-face settings, leading to poor academic performance (Esposito & Weaver, 2011; Romer, 2020; Stanca, 2006). Educational technology is believed to positively impact student engagement, which is considered a crucial aspect of high-quality teaching and learning in higher education (Kahn et al. 2017). The use of multimedia and other educational technologies has been found to stimulate greater engagement (Kahn et al., 2017).

The COVID-19 pandemic has accelerated the adoption of technology-enhanced learning methods for online or synchronous remote delivery. However, even in traditional classroom settings, students often exhibit a

lack of interest or motivation, which poses challenges for effective instruction. These behaviors not only hinder the learning dynamics but also contribute to lower retention rates, particularly in the context of the COVID-19 impact. In response, higher education institutions have taken proactive measures to identify issues and explore strategies to engage students in their online studies, ensuring their successful completion of a college degree.

To further address the issue of student engagement and online learning, researchers have explored various strategies and interventions. For example, incorporating interactive elements and gamification techniques within online courses has shown promising results in promoting student engagement (Johnson, et al. 2014). Furthermore, fostering a sense of community and social interaction through online discussion forums, peer collaboration, and virtual study groups can significantly enhance student engagement in the online learning environment (Wang et al. 2018). In addition, the role of instructors in facilitating student engagement cannot be overlooked. Studies have highlighted the importance of instructor presence, prompt and meaningful feedback, and establishing a supportive and inclusive online learning environment (Garrison & Cleveland-Innes, 2005; Bolliger & Wasilik, 2009). Effective communication and regular interaction with students are critical factors in fostering engagement and maintaining student motivation in the online learning context. It is important for higher education institutions to continually explore and adapt strategies that address the evolving challenges of student engagement, especially in the online learning landscape. By implementing effective communication strategies, leveraging educational technologies, and promoting active learning approaches, institutions can create engaging and supportive learning environments that facilitate student success and degree completion.

Literature review

In recent years, the framework on student engagement in the learning process has gained significant attention as a valuable tool for higher education institutions. The framework offers a comprehensive approach to address the challenges faced by students in the learning process. The framework encompasses a systematic approach to promoting active and meaningful student involvement in their educational journey. It emphasizes creating an inclusive and supportive learning community, fostering active student participation, and ensuring successful academic outcomes. It integrates various strategies and techniques to enhance student engagement and promote a meaningful learning experience. The following literature review summarized existing studies and scholarly works related to the framework, highlighting its impact on student engagement in the online learning environment.

Student-Centered Approaches

A student-centered approach focuses primarily on what the student needs to do in order to learn, rather than on the course content or the transmission of information by instructors. It is an instructional approach in which students influence the content, activities, materials, and pace of learning. This learning model places the student in the center of the learning process. The instructor provides students with opportunities to learn independently and from one another and coaches them in the skills they need to do so effectively (Collins & O'Brien, 2003). Many researchers have emphasized the significance of student-centered approaches within the framework. By tailoring learning experiences to students' individual needs, interests, and backgrounds, student engagement can be significantly enhanced. A study by Fredricks, Blumenfeld, and Paris (2004) found that student-centered classrooms, characterized by personalized instruction and opportunities for choice and autonomy, positively impact student engagement and academic achievement. Student-centered approach allows students to create knowledge, as opposed to passively receiving information, and encourages deep learning.

Creating Supportive Learning Communities

The framework underscores the importance of creating inclusive and supportive learning communities. Research by Kuh, Kinzie, Schuh, and Whitt (2005) indicates that establishing positive relationships between students and instructors, providing clear expectations and guidelines, and fostering a sense of belonging, connectedness, and peer support contributes to higher levels of student engagement. Strategies such as collaborative group work, peer interaction, and mentorship programs have been found to enhance student engagement and improve retention rates (Tinto, 2017).

Effective Communication Strategies

Communication plays a crucial role in student engagement in the online learning environment. Studies (Smith and Johnson, 2018; Garcia and Smith, 2020) have emphasized the importance of clear and timely communication between instructors and students. The practical framework recommends leveraging various communication channels, such as email, video conferencing, and online platforms, to provide support, feedback, and regular updates. Effective communication enhances student understanding, addresses concerns, and strengthens their connection with the learning community.

Engaging Learning Materials and Activities

Engaging students through interactive learning materials and activities is a fundamental aspect of the practical framework. Incorporating multimedia elements, gamification techniques, and real-world applications can enhance student motivation and active participation (Jones and Dindyal, 2017). Research (Stahl, 2015) has indicated that interactive and immersive learning experiences increase student engagement, improve knowledge retention, and promote deeper understanding of the subject matter.

Ongoing Assessment and Feedback

The Ongoing Assessment and Feedback framework is designed to support continuous assessment and feedback practices in educational settings. This framework emphasizes the importance of regular and timely assessment, providing students with ongoing feedback to enhance their learning and inform instructional decisions (Hattie and Timperley, 2007). Regular assessment helps students track their progress, identify areas for improvement, and stay motivated throughout the learning journey. It involves various strategies such as formative assessments, self-assessment, peer assessment, and instructor feedback. Formative assessments are used throughout the learning process to gauge student understanding and identify areas for improvement. They can take the form of quizzes, class discussions, or project checkpoints. Self-assessment encourages students to reflect on their own learning progress and set goals for improvement (Nicol and Macfarlane-Dick, 2006). Peer assessment involves students providing feedback to their peers, fostering a collaborative learning environment and promoting a deeper understanding of the subject matter. The Ongoing Assessment and Feedback framework promotes a student-centered approach, focusing on continuous improvement and fostering a growth mindset. It supports the development of metacognitive skills, self-regulation, and critical thinking abilities. By providing ongoing assessment and feedback, educators can empower students to take ownership of their learning, make informed decisions, and achieve higher levels of academic success.

The frameworks discussed in this literature review provide a systematic and evidence-based approach to enhance student participation and success in learning environments. They emphasize student-centered approaches, building a sense of community, effective communication, engaging learning materials and activities, and ongoing assessment and feedback. By implementing these strategies, higher education institutions can create a supportive and engaging learning environment, ultimately leading to improved student outcomes and completion rates.

Strategies and techniques for eliciting student engagement

Many factors impact students’ engagement in the learning process. However, this study did not find practical framework that can be easily applied in real instructional setting. In developing a practical framework, this project focuses on the dimensions that are manageable from the perspective of faculty. Thus, the focus is on course content and how content is delivered in different instructional settings. The literature (Llorens et al., 2007; Russell & Slater, 2011; Yorke & Knight, 2004; Zepke & Leach, 2010; DiMenichi & Tricomi, 2015) revealed that the two most important factors to engage students in the learning process are (a) interaction between faculty, students and peer students and (b) how content is delivered. Thus, the framework being proposed focuses on engagement learning activities associated with the content delivery process.

A well-designed course content should allow teaching and learning to be organized in an engaging manner. The fundamental task of professors is to get students engaged in learning activities that are likely to result in achieving the desired learning outcomes. Activities should include those in which students collaborate in group assignments, solve problems together or individually, or get involved in experiential learning projects involving dialogue and shared research. Presentations, debates, “pop” quizzes or oral presentation, and competitions are all teaching strategies that emphasize active student effort over passive instructor-led presentations. Activities should be designed in such a way that: 1) they are in alignment with learning objectives and directly related to the content discussed; 2) students are cognitively motivated to participate and 3) they boost students’ learning experiences (students are satisfied by participating, learning something new or applying what they have learned, etc.). In order to determine the most effective methods for engaging students in the learning process, a group of faculty members from various educational institutions conducted a series of brainstorming sessions. These sessions aimed to explore strategies for engaging students in face-to-face, synchronous remote, and asynchronous online classes. The outcomes of these discussions, along with relevant activities identified from literature, have been consolidated and presented in Table 1.

Table 1: Strategies and techniques for eliciting student engagement

Student Engagement Techniques / Activities	
<i>Classroom Opinion Polls</i>	Polling allows students to choose from a variety of activity types, the results of which are presented visually in real time. Polls may be open-ended Q & As, multiple choice, or word clouds. Each activity type encourages audience participation and allows the instructor to collect various kinds of feedback.
<i>Tournament in class</i>	Giving quizzes through tournaments. Competition can increase motivation, improve productivity and performance, and provide accountability and validation (Llorens et al., 2007; Russell & Slater, 2011; Yorke & Knight, 2004; Zepke & Leach, 2010; DiMenichi & Tricomi, 2015).
<i>Instructional games</i>	Instructional games are gaining popularity in the classroom as they effectively engage students and provide immediate feedback.
<i>Quote Minus One</i>	Instructor gives a quote related to current topic but omits a key word and ask students to guess.
<i>Guided/ interactive notes</i>	Students get a note sketch with spaces to be completed.
<i>Documented Problem Solutions</i>	Provides steps needed to solve specific problem types. Students adapt the steps to problems.
<i>Make Them Guess</i>	Before a new topic, instructor asks intriguing questions to build curiosity and takes blind guesses.
<i>Background Knowledge Probe</i>	Verify how much learners know about a topic using questionnaire (multi-choice or short answer)
<i>Discussion</i>	Students tend to show more engagement when they participate in a live (synchronous) discussion; they are inspired by instant feedback or comments from instructors and peers.

Student Engagement Techniques / Activities	
<i>Frequent Assessment</i>	Quick quizzes and use of short journal entries. As assessment tools, quizzes are good motivational tools for engaging students in the learning process.

All the activities (various types of assessments) embedded in course content should align with course outcomes. Activities should be designed in ways that will allow students to demonstrate mastery of course content. The activities should also foster students' engagement and motivate participation. In practice, instructors need to design tasks that reflect the level of understanding of the topics. Bloom's taxonomy (Figure 1) illustrates the types of assessments that are aligned with various cognitive levels of learning outcomes, and the level of engagement that transforms passive learning into active learning.

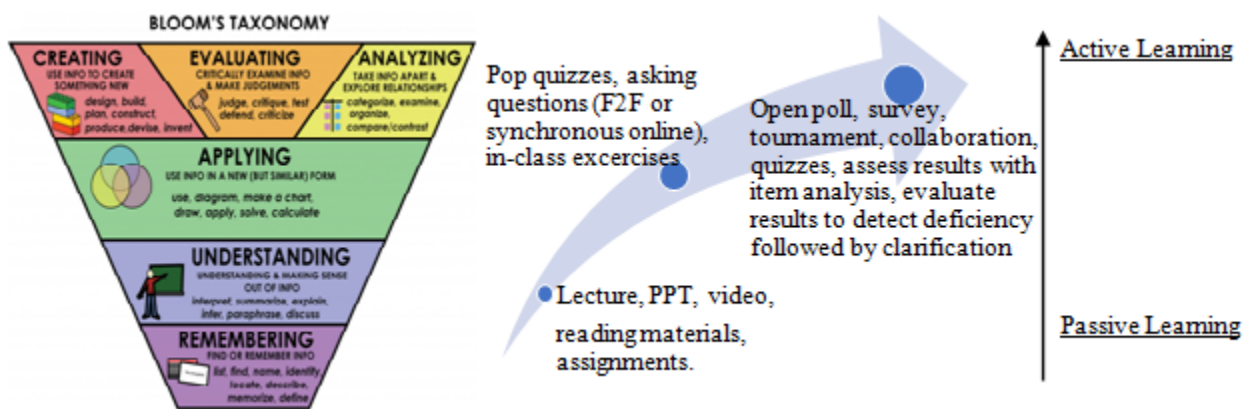


Figure 1: Bloom's taxonomy and level of engagement

To facilitate the process to integrate engagement activities to the instructional process, a framework (Figure 2) was developed to show the core components of the process and how engagement activities are aligned with the learning outcome.

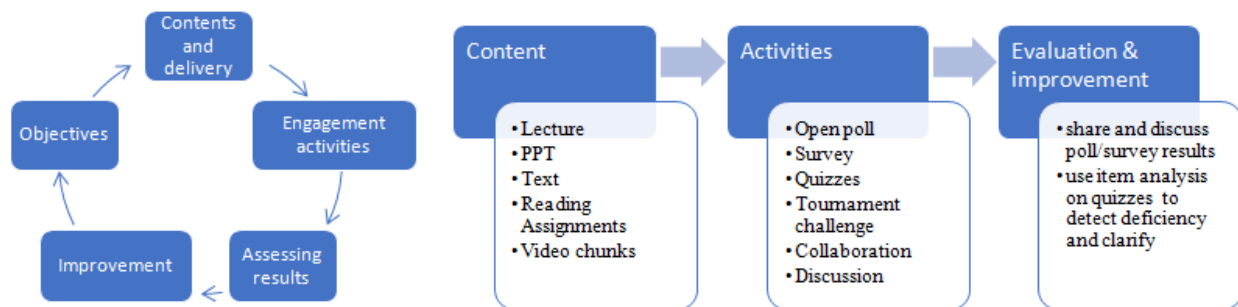


Figure 2: A framework of engaging students in the learning process

Sustained engagement often depends on good instruction, easy-to-follow routine, and progress report (Shernoff et al. 2014). Few students like watching someone lecture (face-to-face or synchronous online) nonstop for an hour. Chunk the lecture into shorter segments; find natural points to break up the content and engage students with the following activities: live survey with pre-prepared questions or open poll

activity, kahoot or tournament on the topics just covered in class, pose questions that require students to collaborate their contributions to the questions with google doc, GroupMe, or collaborate editing tools embedded in the LMS, for programming classes and transfer demo coding to the individual students. The framework provides a practical guideline that can be easily implemented in real instructional settings. The following list provides guidance, tips, and strategies that may be used to foster student engagement in actual instructional settings:

1. Implement a template for assembling learning content, which may consist of bookmarked lecture presentations, short pieces of video, and sections of text, interspersed with student engagement activities.
2. Provide a set of tools to facilitate learning activities and for chunking and assembling videos and for bookmarking presentations.
3. Make logging into class a regular necessity: if there is a regular expectation of practice built into the course, students will get in the habit of logging in. Encouraging students to login on a regular basis, provides statistics on logging in for the entire class to be displayed on dashboard.
4. Identify students who do not login regularly and communicate with them in a timely manner.
5. Make frequent use of poll tools: polling before a lesson is used to probe background knowledge; it allows the instructor to gauge the students' knowledge before the beginning of the lesson and prevents students from advancing to topics before they are ready. It offers immediate feedback that helps identify ongoing learning issues. This ensures that students aren't left behind.
6. Make frequent use of tools to engage students in class activities: quizzes, poll, survey, etc.. The tools provide mechanisms for engaging students in the classroom and helps identify learning issues.
7. Establish routines for class activities: provide standardized activities for each class, schedules for those activities, and display all tasks with appropriate flags to indicate past due, in-process, and completed activities.

It will be challenging to implement the framework in real instructional settings without tools or technology support. An in-house developed LMS platform provides integrated tools for all activities listed in the framework. In the following section, we will focus on how to use "Danmu" and collaboration tools to engage students in the learning process.

"Danmu", peer assessment and collaboration tools

Engaging students with "danmu," also known as barrage comments, is an effective strategy to promote active participation and interaction in the learning process (Li and Jin, 2018; Li, Wu and Yu, 2019). Danmu involves the real-time display of short comments or messages on the screen, allowing students to share their thoughts, ask questions, or provide feedback during a lecture or presentation. By incorporating danmu in the learning environment, students can actively contribute to the discussion, express their ideas, and engage with the course content. This interactive approach fosters a sense of community, encourages peer-to-peer interaction, and enhances overall student engagement. To engage students with danmu, various digital platforms or tools that support real-time messaging or chat features can be utilized. These tools allow students to post danmu comments instantly, creating a dynamic and interactive learning experience. Instructors can monitor the danmu stream, respond to student inquiries, address misconceptions, and facilitate discussions, thus fostering a collaborative and participatory learning environment. In our practice, we allow students to use "danmu" to ask questions when giving lectures. As shown in Figure 3, you can adjust speed, font size and color of the real-time messaging. You also have options to display owner of messages and allow multiple lines. In a typical lecture setting where "danmu" is available, there would typically be 5 to 10 messages using "danmu". In contrast, during lectures without "danmu", students rarely asked any questions.

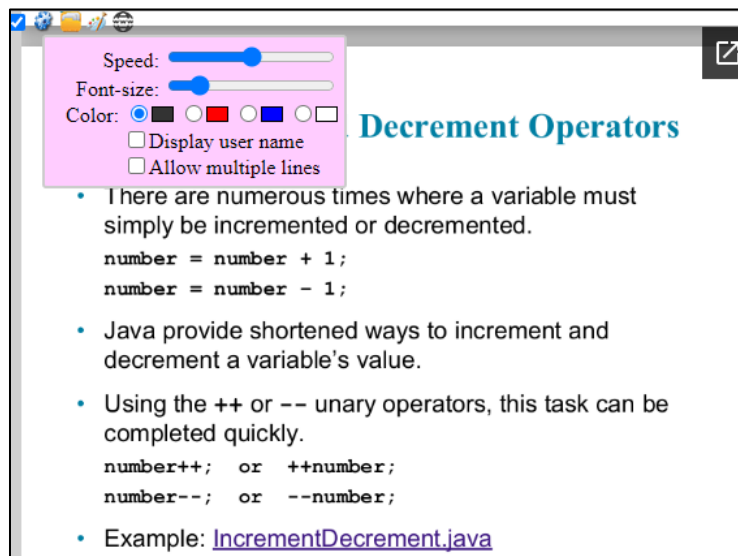


Figure 3: “Danmu” configuration

Students tend to ask more questions using “danmu” when I demo coding problems. I also utilize “danmu” to assess students’ comprehension of specific content by requesting them to share their responses. If I come across responses that require further discussion, I pause to address them in more detail. For instance, if there are incorrect responses, I pause the messages and encourage students to correct and learn from them. As shown in Figure 4, there are three responses with two of them are incorrect. I paused those responses and asked students to discuss which was/were incorrect and why.

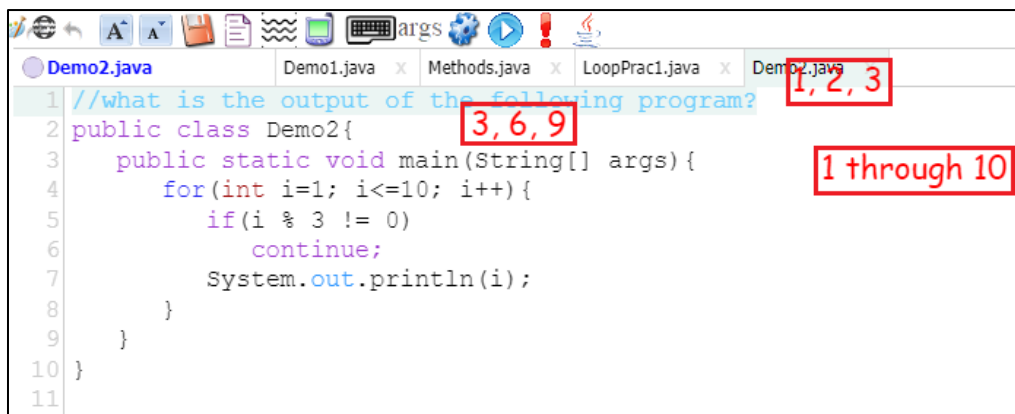


Figure 4: Sample danmu responses

In summary, engaging students with danmu provides an avenue for active participation, encourages student involvement, and enhances the overall learning experience by creating a lively and interactive classroom atmosphere. Peer assessment is a process where students evaluate the work or performance of their peers. It has been widely used in various educational settings, including classrooms, group projects, and online learning environments. It offers multiple benefits, such as encouraging active learning, promoting a deeper understanding of the subject matter, and fostering critical thinking and communication skills among students.

Peer assessment involves students providing constructive feedback, assessing each other's work based on predefined criteria, and offering suggestions for improvement. Peer assessment encourages active engagement, critical thinking, and the development of evaluative skills among students. Through peer assessment, students have the opportunity to take on the role of both evaluator and recipient of feedback. This process not only promotes a deeper understanding of the subject matter but also enhances self-reflection and self-regulation. Additionally, peer assessment fosters a sense of collaboration and community within the classroom, as students learn from and support each other's learning journey.

In our teaching approach, we incorporate In-Class Exercises as a means to promote engagement through peer assessment. During these exercises, students receive a prompt and are expected to provide their response within a designated time frame. Subsequently, each student is randomly assigned to evaluate another student's response. Upon completion of the exercise, the instructor facilitates a recap of the entire process. Figure 5 displays examples of students' responses and the feedback provided by their peers.

```
public static int smallest(int a, int b, int c){
    int max;
    if(c<b && c<a){
        max = c;
    }else if(a<c && a<b){
        max = a;
    }
    else if (b<c && b<a){
        max = b;
    }
    return max;
}
```

Student A's response

in the prompt it was asking for the smallest number, so instead of max it would be min. other than that it seems good. at least a 90%

Feedback made by student B

★★★★★ Grade: 90

```
int c= Integer.parseInt(args[2]),
}
}
Student B's response
public static int smallest(int a, int b, int c){
    if(a<=b && a<=c){
        return int a;
    }else if(b<=a && b<=c){
        return int b;
    }else if(c<=a && c<=b){
        return int c;
    }
}
```

* obligated to mention that writing the entire code wasn't needed as it just said to "complete the following METHOD", but props for going the extra mile
* literally the only difference between this and my code is that I did the "all are equal" differently, but it would still be the same result so... either we both got it wrong or we both got it right

nit pick: this specifically is too cramped IMO, and could have better spacing/formatting, but whatever **Feedback by student A**

★★★★★ Grade: 100

Figure 5: A sample of peer assessment

A collaboration board is a digital platform or tool that facilitates collaborative work and communication among individuals or groups. It provides a shared space where users can interact, contribute, and collaborate in real-time, regardless of their physical location. Collaboration boards typically offer features such as virtual sticky notes, drawing tools, file sharing, chat functions, and document editing capabilities. These features allow users to brainstorm ideas, share resources, provide feedback, and work together on projects or assignments. One of the key advantages of collaboration boards is that they promote active participation and engagement among participants. Users can simultaneously contribute their ideas, comment on others' contributions, and collectively develop solutions or strategies. The real-time nature of collaboration boards enables efficient communication and coordination, fostering a sense of teamwork and shared ownership of the collaborative process.

Collaboration boards are particularly beneficial in educational settings, as they support group projects, discussions, and problem-solving activities. They encourage students to collaborate, communicate effectively, and practice important skills such as teamwork, critical thinking, and negotiation. Additionally, collaboration boards provide a digital record of the collaborative work, making it easy to track progress,

revisit ideas, and assess individual and group contributions. Figure 6 shows a collaboration board created during the first week of Java Programming II class in the Fall 2022. Each student can view the contributions made by their peers while simultaneously working on their own sticky note. Additionally, students have the ability to vote for their preferred contributions by utilizing the "likes" feature. The numerical value displayed beside each sticky note represents the number of students who have expressed their liking for that particular contribution.

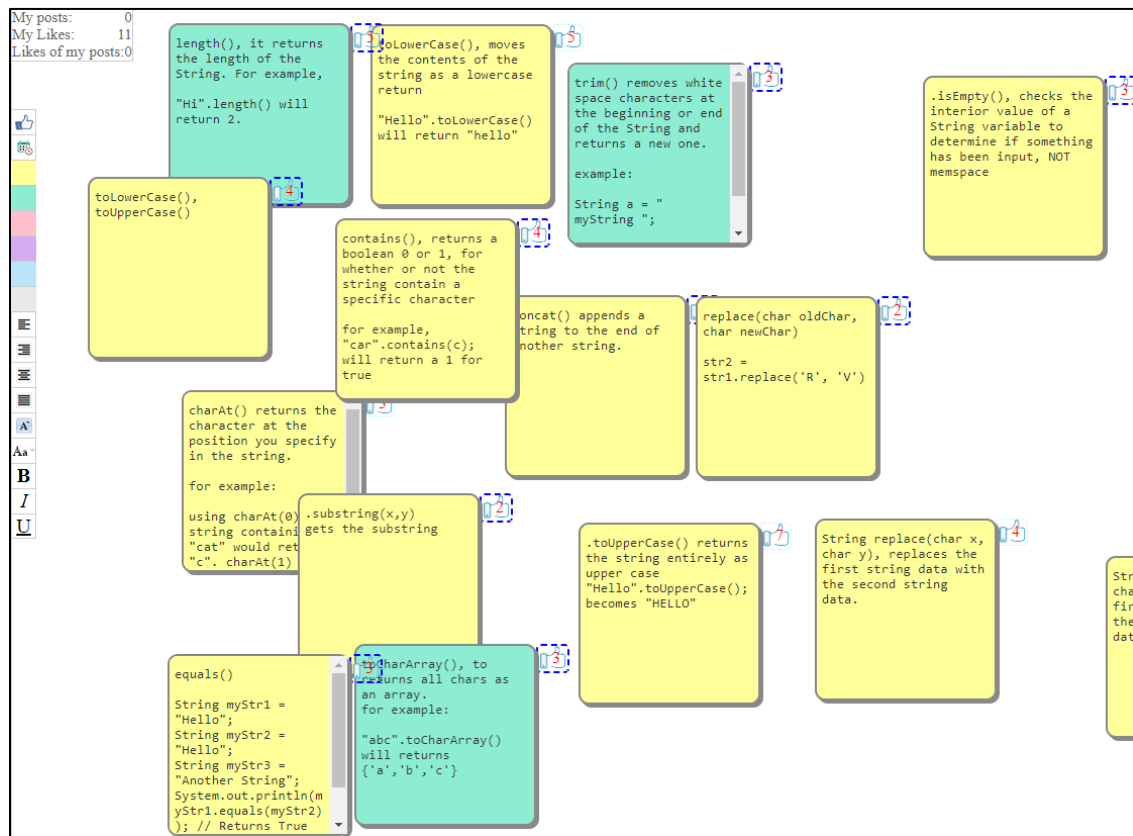


Figure 6: A sample collaboration board

Overall, collaboration boards enhance collaboration, facilitate communication, and promote active learning in educational environments. They provide a versatile platform for students and educators to collaborate effectively, share ideas, and collectively work towards achieving common goals.

Conclusions and future work

Student engagement and student interest during class instruction are important conditions for active learning. Student engagement and interest during instruction are important conditions for active learning. Engagement, which has an important relationship with learning motivation, influences students' levels of persistence to overcome challenges. Lack of student engagement and absence from face-to-face lectures and tutorials, in turn, can lead to poor academic performance (Esposito & Weaver, 2011; Romer, 2020; Stanca, 2006).

However, students can easily become discouraged at attending lectures and tutorials across both online and face-to-face settings. Few students like watching someone lecture (face-to-face or synchronous online) nonstop for an hour. Chunk the lecture into shorter segments; find natural points to break up the content and engage students with the following activities: live survey with pre-prepared questions or open poll activity, kahoot or tournament on the topics covered in class, pose questions that require students to collaborate their contributions to the questions with google doc, GroupMe, or collaborate editing tools embedded in the LMS, for programming classes and transfer demo coding to individual students. In order to achieve the desired learning outcomes, it is critical to provide a compelling presentation and well-designed activities that engage everyone while conveying information seamlessly and effectively.

This paper proposed a practical framework for fostering student engagement that can be easily implemented through an LMS. The framework provided practical guidelines to integrate activities to motivate students to engage in the learning process. The LMS system provides RESTful web services to seamlessly integrate proven engagement activities into the learning content to foster active learning, assess their performance and improve learning outcomes.

This study was intended to provide a practical framework which can be easily transformed into actual instructional settings through easy-to-implement activities to engage students in the learning process; hence the improvement of learning outcomes can be achieved through the implementable activities suggested in the framework. To assess and evaluate the effectiveness of embedding student engagement activities into learning content, we plan to conduct a control group study to compare learning outcomes under different instructional settings, including face-to-face, synchronous online, and online instructional modes. Data will be collected and analyzed from both indirect and direct assessments.

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