New Orleans JAZZED about Engineering Education

Paper ID #14446

Fluids Friday! A Method for Improving Student Attentiveness and Learning in the Classroom

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Fluids Friday! A Method for Improving Student Attentiveness and Learning in the Classroom

Abstract

This project introduces a pedagogical technique designed to help improve student attentiveness and energy in a lecture class. This idea was motivated by early morning classes in which students are tired and have difficulty paying attention and remaining focused. This work offers a relatively simple but effective approach which takes only about 5 minutes of class time once per week. The basic idea is to start off the class period with interesting a fun material that is somewhat related to the course material. This helps to capture students' attention, wakes them up a bit, and gets their interest and energy flowing early in the period. Following this activity, the remaining class period can be treated as normal, but can "ride the wave" of student interest. Results from an anonymous student survey indicate that on average students strongly agree that they enjoy this activity and have more energy afterwards, and agree that it is beneficial to their overall learning in the course. Anonymous student comments from the survey as well as the student evaluations for the course also support the effectiveness of this concept.

Introduction

One of the major challenges facing undergraduates is time management[1]. This struggle with time management sometimes causes students to decide to sacrifice sleep in order to get more time into their day. Sleep hygiene is particularly important for students because alertness is connected to learning[2]. Additionally, students experiencing a lack of sleep are particularly susceptible to poor learning in passive learning environments[3]. While addressing this issue is important[4], rather than simply encourage students to get more sleep, a different approach was considered which focused on increasing student attentiveness in the classroom regardless of their personal sleep habits. Students are more likely to pay attention if they are interested and energized by the class content. This work is also motivated by the idea that students are more likely to open up and listen if the barriers between teacher and student are reduced[5]. This creates a more welcoming classroom environment which can facilitate student interaction and participation[6].

The hypothesis of this work is that by starting a class period with interesting and motivating material, even if not fully relevant to the course material for the proceeding lecture, students are more likely to maintain their interest and attentiveness for the remainder of the class period. Students tend to become more engaged in the learning experience when they are having fun[7,8]. Previous work has considered the use of games[9] and robotics[10] to motivate students to learn and have fun at the same time. This work proposes a simple approach, which takes up only approximately 5 minutes of class time, in order to "start strong," which aims to keep listeners attention[11] and can be effective for group learning[12]. While this idea was implemented in a very specific manner, it is very likely that this idea could be implemented in a variety of ways in order to achieve the same objective.

Implementation

The proposed learning experience was implemented within an undergraduate fluid mechanics course. In the studied semester, this course was offered in two sections, scheduled for Mondays, Wednesdays, and Fridays at 8:00-8:50 am (Section 1) and 9:00-9:50 am (Section 2). On every Friday in each section, an activity named "Fluids Friday!" was conducted for the first 5 minutes of the class period. This activity was run through a digital slideshow, consisting of four primary components:

1. An introductory slide containing a fun picture conveying the message "We are happy that it is Friday!"
2. A picture revealing the "Fluid of the Week" with a link to a video containing educational and/or entertaining content pertaining to the selected fluid
3. Facts/Trivia about the "Fluid of the Week"
4. Comics/humor about the "Fluid of the Week"

Each introductory slide typically contained a picture of an animal in a silly pose, such as a squirrel stretching his hands up in the air and a quote saying "It's Friday!," or a dog with a crazed look on his face saying "Did somebody say Friday!?," or a panda bear on a rocking horse saying "It's Friday, let's rock!" The introductory slide is projected in the front of the classroom for students to see and discuss before the class period begins.

Once class time officially starts, the students are encouraged to "drumroll" by banging their hands on their desks/tabletops. This accomplishes two purposes. First, student excitement and anticipation is enhanced for the great reveal of the "Fluid of the Week," and second, the physical activity increases student blood flow and helps to improve their alertness and energy. Following a sufficient amount of "pumping up" time, the "Fluid of the Week" is revealed with an image containing the fluid. Sometimes the fluid is obvious, and other times the students need to think and guess as to what the picture is showing. Whether the students correctly determine the fluid or not, a video is then played which demonstrates something about the fluid. Sometimes these videos contain educational fluid mechanics content, sometimes they introduce interesting discussion points related to fluid mechanics, and other times the videos contain just something interesting or fun for the students.

In an effort to include some additional educational content, various "fun facts" or trivia about the "Fluid of the Week" is included to diversify the learning experience and impart some additional knowledge that is typically not presented in engineering curricula. This again can pique student interest, produce a well-rounded education, and offer students a little "something extra." Finally, to conclude the "Fluids Friday!" event, students are offered light-hearted and fun humor (usually comics) related to the "Fluid of the Week." For example, for the fluid of the week of liquid oxygen, the following joke was provided, "Ice bucket challenge? I only get out of bed for a liquid oxygen challenge." These humorous additions help to break down the barriers between teacher and student, thus helping to provide a more casual and interactive learning environment.

Results

In order to assess the effectiveness of this idea, a survey was given mid-semester to gather student feedback. This survey used traditional Likert item ratings as outlined in Table 1, in order

to quantify their response to various prompts, which are detailed in Table 2. In addition to these prompts, students were given space to provide any additional comments or feedback.

Table 1. Rating System for Student Survey

Numerical Rating	Likert Scale
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

Table 2. Survey Prompts

Prompt	Prompt Description
A	I enjoy the "Fluids Friday" sessions
B	I find the "Fluids Friday" sessions to be distracting to my learning
C	I would like the "Fluids Friday" sessions to continue
D	I wish more courses had things like "Fluids Friday" to help maintain my interest
E	I am more likely to attend a Friday class session if "Fluids Friday" is being done
F	I have more energy for the rest of the class period following "Fluids Friday" sessions
G	I think the class time spent on "Fluids Friday" could be better spent working on textbook material
H	I find the "Fluids Friday" material offensive
I	"Fluids Friday" is my favorite part of the course
J	I look forward to "Fluids Friday" each week
K	I think that "Fluids Friday" sessions are beneficial to my overall learning in this course

Note in Table 2 that there are some control prompts mixed into the survey in order to assess possible negative outcomes of this activity. In particular, students agreeing to prompts B, G, and H are indicating that this activity is negatively affecting their learning experience, and the desired value from a pedagogical perspective for these prompts would be disagreement. This survey was administered to two sections of a fluid mechanics course, receiving responses from 25 students in the first section and 16 students in the second section, for a total of 41 student survey responses.

First, the responses for all 41 student surveys were compiled and the mean, median, and mode responses were calculated. These statistics are provided for each of the survey prompts (detailed in Table 2) in Figure 1. The control prompts (B, G, and H) are relatively easy to distinguish in Figure 1 since the average responses have small Likert ratings as desired. This indicates that students do not think that this activity is negatively impacting their learning. Now, focusing on the positive statements in the survey, it is shown in Figure 1 that students overall have reflected very positively on this experience. In an average sense, students agreed or strongly agreed to each of the positive prompts in the survey.

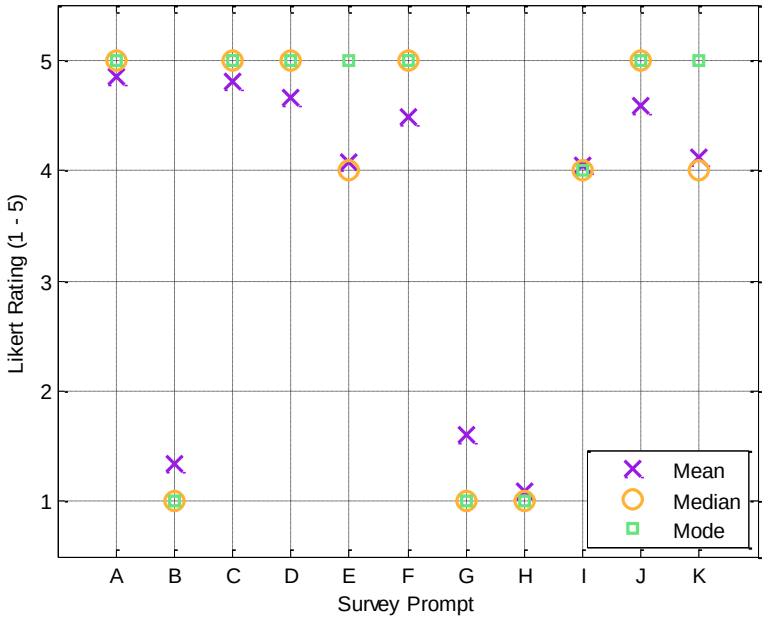

Figure 1. Statistics for Student Survey Responses

Since the survey was given to two different sections of the course, it is interesting to analyze the differences between an 8 am and 9 am section of the same course. The mean student survey responses are shown individually for each course section in Figure 2.

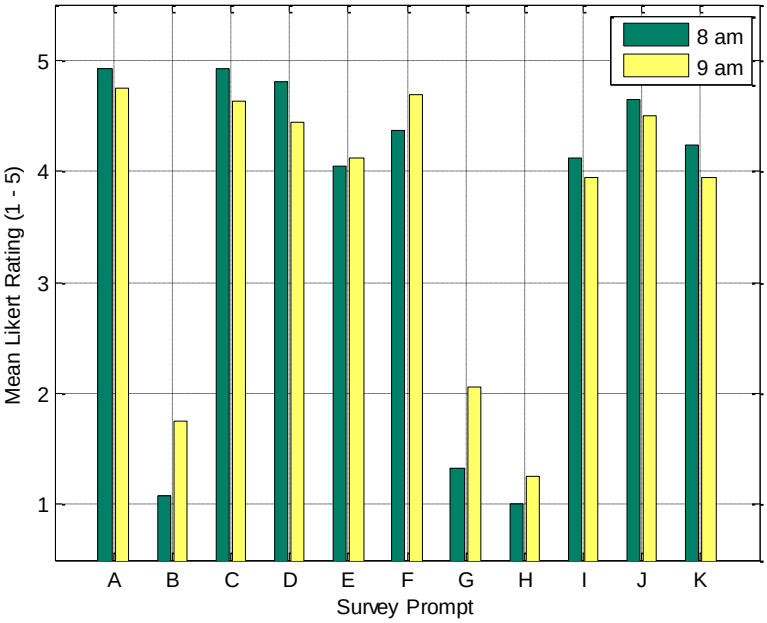

Figure 2. Comparison of Mean Student Survey Responses for Different Sections

It is shown in Figure 2 that while responses were generally similar, there are some minor differences in the student perception between the sections. One observation to note is that students in the 9 am section gave reasonably higher responses to the control prompts B, G, and H. While still disagreeing on average, they did not disagree as strongly as the 8 am section. Also, the 8 am section had generally higher responses on average to most of the positive

prompts, with the exception of E and F. The higher average responses from the 9 am section for E and more significantly F, demonstrate that students in that section are energized and motivated by the Fluids Friday activity, however they seem to be more skeptical as to its overall benefit. This may be an indication that the effectiveness of this type of activity is more apparent earlier in the day, when students are more likely to be more tired. This does, however, raise some other questions about the student population. For instance, are students who register for an 8 am section more likely to be attentive and willing to learn than those who chose a 9 am section to try to get more sleep? There are of course other factors that can influence student registration, which makes this a complicated area to pursue. Nevertheless, despite any minor differences between the two sections, it is reasonably clear from the student survey responses that this activity can provide a positive benefit to students.

In addition to the numerical responses, students were also given space to provide any additional comments anonymously. Not all students provided feedback in this space, but some responses were given. All of the provided responses are listed here (as written by the students, with only minor corrections for grammatical errors):

- I think Fluids Friday makes the course fun and relates real world things to the class material
- Fluids Friday keeps me awake and focused on Friday mornings at 8 am which is a tough thing to do. Although Fluids Friday does take up some class time, I think it makes me more productive for the rest of class. Plus, it's fun and informative!
- Fluids Friday is the only reason I kind of like Friday and come to class
- TGIFF
- Keep it up
- Fluids Friday is why I get out of bed in the morning
- Helps engage my interest in the course overall
- It adds much needed context, clarity, and at times levity to the overall course
- Especially for a Friday at 8 am Fluids Friday is a must
- It keeps me interested in the course!
- I feel many of the many concepts I will remember will be from Fluids Friday
- Might be better served on a Monday to wake people up. No alliteration though

Some unsolicited student feedback was also provided in the student evaluations for the course, as provided below:

- Fluids Friday presentations were one of the highlights of my year
- Fluids Friday was the highlight of my week
- The "Fluids Fridays" engage the audience on Friday mornings at 8 am
- Fluids Friday made class fun
- Fluids Friday was bomb
- Fluids Friday >> No Fluids Friday
- Fluids Fridays helped with attendance and getting through the week
- Fluids Friday yes
- Fluids Friday was a great way to add new, interesting content

These comments help to capture the overall positive student opinion of this activity.

Conclusions

This work proposes an idea for improving the student learning experience in the classroom in order to combat natural student tendencies for lack of sleep and difficulty paying attention. Both formal and informal student feedback indicated their appreciation of this activity. Overall this project was determined through student assessment to be successful in improving student attentiveness, energy, and enthusiasm in the classroom.

Acknowledgments

The author would like to thank the spring 2015 fluid mechanics students for their participation, feedback, and support of this experimental project.

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