Why are we here? A Study of Student Perspectives on Attendance in a Combined Lecture and Laboratory Course

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Abstract

This is a Work in Progress paper. The purpose of this study is to collect and analyze student perspectives on a digital systems course with both lecture and laboratory sessions, to gain insight into what motivates students to attend (or not attend) the scheduled class sessions. This Work in Progress paper discusses preliminary results from an end-of-semester survey in which students were asked to report their attendance along with their motivations to attend or not attend lecture and/or laboratory sessions. The survey responses were recorded anonymously, and responses to open-ended questions were analyzed using qualitative content analysis. Future work will repeat student surveys at several times throughout the semester and survey results will be supplemented with instructor observations. The broader goal of this study is not necessarily to increase attendance. Rather, the goal is to analyze students' perspectives on the utility of attendance, and to attempt to draw broader conclusions about student motivation in relation to class structure and environment.

Keywords: Motivation, Learning environment, Content analysis, Survey

Introduction

Lack of attendance is a common pain point for instructors. While instructors can provide grade-based incentives to encourage attendance, there may be inherent qualities of a course that increase or decrease a student's motivation to attend, especially for a student whose total workload requires them to strategically ration their time. There have been many prior studies on attendance and absenteeism involving surveys of student-reported reasons for attending or missing classes [1], [2], [3], [4], [5], [6], including studies specific to engineering courses [7], [8], [9] and hands-on learning environments [10], [11]. While it is generally accepted that active learning improves student motivation, there is a relative lack of research comparing hands-on learning with other active learning strategies in terms of student motivation in engineering courses [11]. The goal of the current work is therefore to study student perspectives on a combined lecture and laboratory course, to compare reported motivations from the same population of students across two different class structures that incorporate active learning.

The focus of this study is a sophomore-level engineering course on digital systems, where the scheduled class sessions consist of two weekly lecture sessions and one weekly laboratory (lab) session. Lecture sessions are instructor-led, combining lecture with active learning in the form of guided problem-solving. Lab sessions are largely student-led and hands-on, where students are provided with laboratory instructions and work at their own pace, with instructors and teaching assistants available to assist as needed. Attendance is not graded for either lecture or lab. Lecture slides are provided, and lecture recordings are made available after each class. While five of the 12 lab assignments require equipment that is only available in the classroom, it is possible for most students to complete the remaining lab assignments outside of the classroom. This course therefore presents a unique opportunity to gather perspectives from the same students on two

different styles of class sessions covering similar material, and to investigate how students' motivations may change as a semester progresses.

The current study addresses the following research questions:

1. What motivates students to attend scheduled class sessions with ungraded attendance?
2. Are there differences in motivating factors that depend on the structure of the class session (in this case, lecture versus laboratory)?

This paper presents preliminary results from an end-of-semester survey, and discusses plans for repeating the survey in a future offering of the course.

Methodology

The survey design was inspired by surveys of attendance in prior work [7], [8], [9], with the addition of open-ended questions, consisting of the following prompts regarding lecture sessions:

1. Please estimate the percentage of lectures that you attended prior to the first exam.
2. Please estimate the percentage of lectures that you attended after the first exam.
3. If you attend lecture, what motivates you to attend? If you do not attend, why?
4. In your opinion, how important is lecture attendance to performing well in this class?
5. Please provide any additional comments or clarifications on your answers regarding lecture attendance.

The same questions were asked regarding lab sessions, with the before/after point being the sixth lab instead of the first exam, because starting with Lab 6 the required equipment changes such that many students are able to complete labs outside of the classroom. Students were also asked as part of the survey whether they were able to complete the labs outside of the classroom. Responses to percentage questions were collected on a scale of 0 to 100 in increments of 10. Responses to the question on importance of attendance were collected on a five-level scale from "Not at all important" to "Extremely important". The survey was constructed and distributed using online survey software, and responses were recorded anonymously over a period of 38 days at the end of the semester, with one reminder announcement ten days before the end of the survey period. An inductive content analysis approach was used to identify and count occurrences of themes in the open-ended survey responses [12].

Preliminary Results

Out of 60 students registered for the course, 12 survey responses were recorded. One survey response contained the text "test answer" for each open-ended question, and was therefore excluded from analysis. Figure 1 shows the student-reported attendance percentages and perceived importance of attendance. Two students indicated that they were not able to complete the labs outside of the classroom; those students both reported lab attendance of 100% before Lab 6, 100% and 90% after Lab 6, respectively, and both students rated the importance of lab attendance as "Very important". Only two responses reported below 70% lecture attendance, and only one response reported below 70% lab attendance. For importance of attendance, 7/11 responses rated at least "Very important" for lecture attendance, and 8/11 responses rated at least "Very important" for lab attendance. Three responses rated lab attendance "Extremely important"

in comparison to one “Extremely important” response for lecture attendance. There was no apparent correlation between reported attendance and perceived importance of attendance.

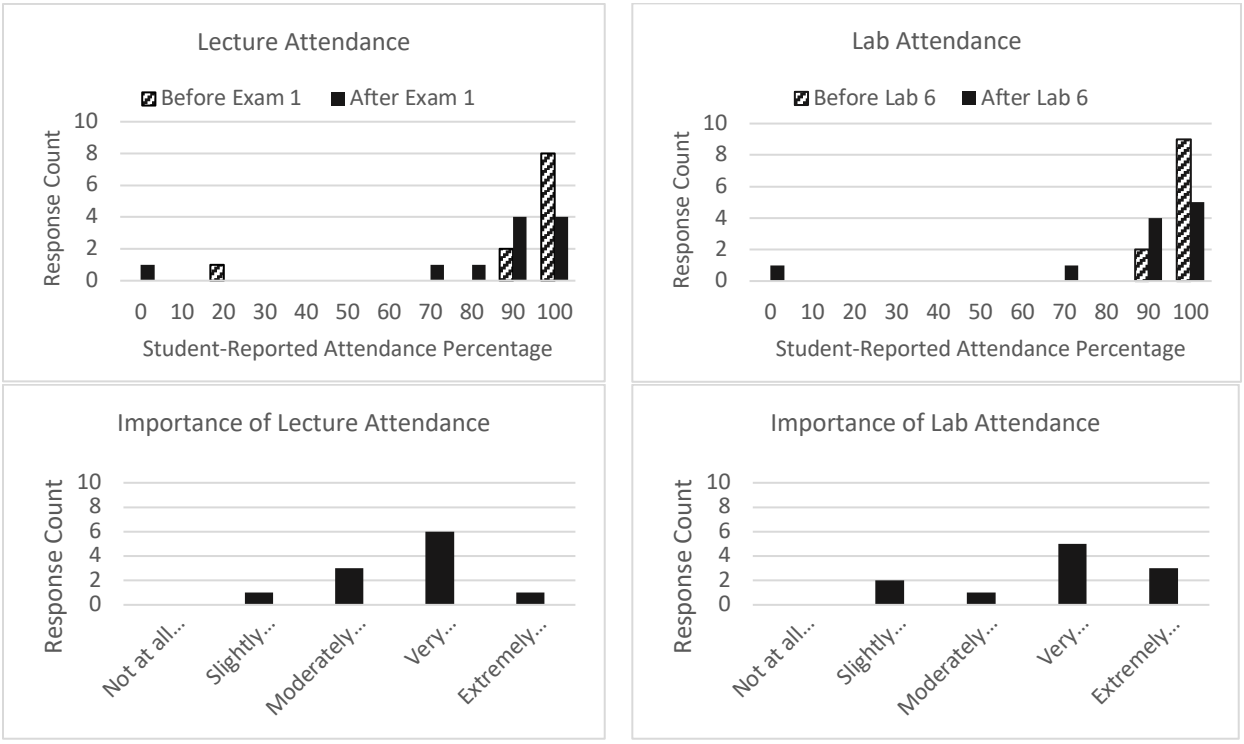

Figure 1: Student-reported attendance (top) and perceived importance of attendance to performance in the class (bottom), in lectures (left) and lab (right).

Figure 2 (left) shows the difference in reported attendance in lab versus lecture per student, with positive difference indicating greater percentage lab attendance. Figure 2 (right) shows the difference in reported attendance after versus before Exam 1 (for lecture) or Lab 6 (for lab), with positive difference indicating higher attendance after. With one exception, the results indicate only small differences in attendance between lecture and lab, or slightly higher attendance in lab, with attendance appearing to stay the same or decrease after Exam 1 or Lab 6.

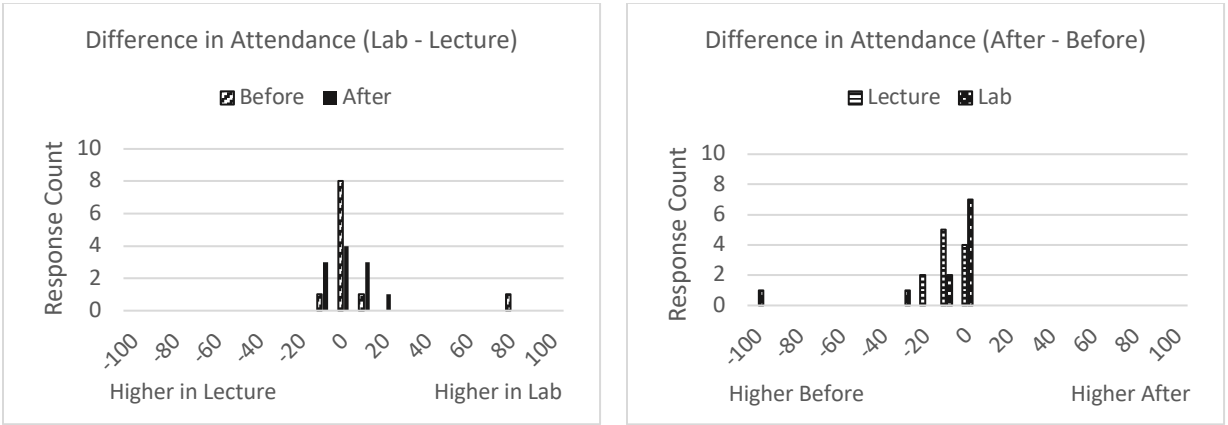

Figure 2: Difference in reported attendance between lab and lecture (left) and difference in reported attendance after versus before Exam 1 (lectures) or Lab 6 (labs) (right).

Responses to the open-ended survey questions were analyzed for (1) reasons to attend or not attend lecture, and (2) reasons to attend or not attend lab. Reasons identified in each response were categorized according to the following themes:

Reasons to attend:

1. Maintaining focus: Ability or motivation to pay attention to the material or start/focus on assigned work; being in a learning environment
2. Staying on schedule: Ability or motivation to keep up with work; avoiding falling behind
3. Guided learning: Being "walked through" class material, or given advice on the lab in a presentation format; access to the instructor and teaching assistants for questions
4. Interest: Interest in the material; enjoyment of the topics

Reasons not to attend:

1. Independent learning: Ability to learn outside of class, watch lecture recordings, or complete lab work independently
2. Lack of interest: Lack of interest in the material; lack of novelty
3. Illness/exhaustion: Physical illness or mental health; tiredness or overwork
4. Distractions: Too many distractions; needing a quieter place to work

An example of coding a student response to the survey questions about lecture attendance is provided in Table 1. The number of responses assigned each theme are summarized in Table 2. Due to the small number of responses, themes are included even if associated with only one survey response.

Table 1: Example of content analysis of an open-ended survey response

Prompt: If you attend lecture, what motivates you to attend? If you do not attend, why?		
Student Response Text	**Reasons Identified**	**Theme Categorization**
"I feel that in-person lectures are the best way for me to learn. It forces me to focus…I learn best being walked through the content in an active environment where the learning is like a conversation."	1. "forces me to focus" 2. "being walked through the content in an active environment"	1. Maintaining focus 2. Guided learning
Prompt: Please provide any additional comments or clarifications on your answers regarding lecture attendance.		
Student Response Text	**Reasons Identified**	**Theme Categorization**
"If I miss a lecture, I immediately feel very behind."	3. "feel very behind"	3. Staying on schedule

Table 2: Frequency of themes identified in open-ended survey responses

Lecture				**Lab**			
Reasons to attend		**Reasons not to attend**		**Reasons to attend**		**Reasons not to attend**	
Maintaining focus	6	Independent learning	3	Guided learning	9	Independent learning	5
Staying on schedule	4	Illness / exhaustion	2	Staying on schedule	6	Distractions	1
Guided learning	4	Lack of interest	1	Maintaining focus	4	Illness / exhaustion	1
Interest	3						

Guided learning was a theme across many of the survey responses as a reason for attending lab sessions, with students emphasizing access to teaching assistants as well as the instructor. Guided learning in the form of being "walked through" problems was mentioned in multiple responses as a reason for attending lecture as well. Maintaining focus and Staying on schedule were other common reasons for attending both lecture and lab. Ability to learn the material or complete lab work outside of class (Independent learning) was a common reason mentioned for not attending both lecture and lab, along with Illness/exhaustion. Lack of interest was mentioned only in the lecture context, and Distractions were mentioned only in the lab context.

Discussion and Future Work

Prior work surveying attendance motivation in engineering students has also reported illness as a common reason for lack of attendance [8], [9]. These prior studies along with [7] focused on engineering lecture environments and collected feedback from students in the form of agreement with statements describing reasons for attending. Both [7] and [9] found that students were motivated to attend by skilled lecturers and intellectually stimulating classroom environments. Petrovic and Pale [8] found that "Knowledge acquisition" was the primary reason for lecture attendance, and the capability to learn without attending was the primary reason for choosing not to attend. The most similar reasons in our preliminary results for attending lecture were Maintaining focus and Guided learning (related to engagement and knowledge acquisition). Our study identified these as reasons for both lecture and laboratory attendance, but with Maintaining focus as the primary reason for lecture attendance, versus Guided learning for laboratory attendance. We also identified Independent learning as the primary reason for not attending either lecture or lab.

Some students' responses, especially to the "additional comments" prompts, were phrased in a way that it was not clear if they were reporting their own motivations, speculating on the motivations of others, or commenting on the general utility of attendance. Similarly, many students mentioned the ability to learn or complete labs outside of class as a hypothetical reason to not attend, and then went on to explain why they chose to attend anyway. Lecture recordings were mentioned in several of these responses, so an analysis of the use of lecture recordings could be part of a future study.

The survey described in this paper will be repeated in an upcoming offering of the course, with attempts to address limitations that were revealed through preliminary data collection. The low participation rate will be addressed by providing an incentive to participate, and by providing multiple opportunities to respond throughout the semester. This may also address the very high attendance reported in the preliminary results, which indicates overrepresentation of students with high attendance/motivation to participate. Self-reported attendance percentages in the survey will be supplemented with instructor observations, but attendance will be taken discreetly to avoid overinfluencing students' motivation to attend. Because students were not uniquely identified in their responses, there was the possibility of duplicate responses (which may explain the "test answer" survey response). When repeating the survey, unique identifiers will be used to anonymize responses while avoiding duplicates, and to allow linking of responses across multiple surveys throughout the semester. A second instructor of the course will also be involved in the content analysis process to ensure reliability.

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