



## CEE Anytime Anywhere Preliminary Report on Mid-term Evaluation Survey <sup>1</sup>

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### BACKGROUND

The purpose of the CEE Anytime Anywhere project is to re-allocate resources such as instructor time, lab space, and classroom time while maintaining student satisfaction and performance. In a pilot of this project, several specific changes were made to an introductory engineering course (CEE 220: Mechanics of Materials). First, the course included two types of online quizzes: one associated with the weekly readings and one administered in conjunction with the homework assignments. The intent of these quizzes was to encourage students to learn and study outside of class, thereby re-allocating classroom and instructor time. Second, several CEE 220 tutoring options were offered: two weekly sessions at the Engineering Advising and Student Center and one weekly evening session at C.L.U.E. (Center for Learning and Undergraduate Enrichment). Finally, space and resources were made available for students to participate in lab sessions outside of the regularly scheduled time.

The Office of Educational Assessment (OEA) was contracted to evaluate the impact of these innovations on student satisfaction and performance and to collect data that might inform program improvement. As an initial evaluation activity, a brief online survey was administered to students in the course. Questions focused on the innovations described above: whether students were satisfied with them and how they could be improved. This report presents preliminary findings from this survey.

### METHODS

During the sixth week of the course, all 90 students in the CEE 220 course were invited to take part in an online survey about CEE 220. To recruit participants, invitations were sent via e-mail, announcements were made in class, and a link to the survey was included in the online reading assignment quiz. This report summarizes responses from 42 students (46.7%) in the course.

The survey consisted of 17 questions separated into four sections, each addressing a different course innovation: (1) online reading assignment quizzes; (2) online homework quizzes; (3) tutoring sessions; and (4) alternate lab session times.

### RESULTS

This part of the report presents descriptive results and brief evaluator comments for each section of the survey. Frequencies and other descriptive statistics are presented for numerical ratings. For each open-ended question, responses were coded into relevant categories. These response categories are presented below along with several representative or notable quotes/paraphrases.

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<sup>1</sup> Submitted as part of the evaluation of the CEE Anytime Anywhere Project

## Section 1: Pre-Lecture Reading Assignment Quizzes:

### Descriptive Results

Question 1: What percentage of the pre-lecture reading assignment quizzes have you completed?

Q1: Options (N = 42)	Frequency	Percentage
Less than half	1	2.4%
50% - 75%	1	2.4%
76% - 85%	1	2.4%
86% - 95%	13	33.3%
All of them	26	61.9%

Question 2: When do you usually look at these reading assignment quizzes for the first time?

Q2: Options (N = 42)	Frequency	Percentage
Before I have done the reading assignment	11	26.2%
While I am doing the reading assignment	13	31.0%
After I have completed the reading assignment	18	42.9%

Question 3: What are the benefits of completing the reading assignments themselves? What additional benefits (if any) do you gain from completing the associated reading assignment quizzes?<sup>2</sup>

A total of 41 participants responded to this question.

Comments about Reading Assignments		
Response Categories	Frequency	Percentage <sup>3</sup>
Help in understanding the lecture	14	33.3%
Necessary for completing the homework	2	4.8%
Comments about Reading Assignment Quizzes		
Response Categories	Frequency	Percentage
Highlight key concepts/tell us what to read	10	23.8%
Motivate to read/keep up to speed <ul style="list-style-type: none"> <li>• <i>"I usually fall behind in readings around this time in the quarter, but since there is a little pressure, from the quiz, I tend to do the readings and do the quiz."</i></li> <li>• <i>"The reading assignment quizzes make me at least look at the text, in other classes this would be different."</i></li> </ul>	9	21.4%
Show me what I know and don't know after doing the reading	8	19.0%
Help in understanding concepts, provide additional review/application	5	11.9%

<sup>2</sup> For this question, participants were asked about the usefulness of the reading assignments and the reading assignment quizzes. The table separates the two questions, and there is a category for comments that did not specify whether they referred to the reading assignments or the quizzes.

<sup>3</sup> Percentages do not sum to 100% because participants gave multiple, codable responses; each percentage represents a proportion of the total number of surveys completed (42).

Help prepare for class <ul style="list-style-type: none"> <li>“OK, time for honesty. Occasionally (about 25% of the time) I just look at the quiz and keep putting in answers until I get them all correct. But do not be mad. This is still getting me to think about the material before class so I am prepared with an open mind (and a few questions) at the time of lecture.”</li> </ul>	4	9.5%
Quizzes are not helpful, other negative comments <ul style="list-style-type: none"> <li>If I don't do the reading, it will show up on my mid-term score. I can take responsibility on my own for the reading</li> <li>Too many of them, adds to workload burden (2)</li> <li>Only do the quizzes because I have to; I learn better in lecture</li> </ul> <p>Note: three of these six individuals also made positive comments about the quizzes.</p>	6	14.3%
Additional Comments		
Response Categories	Frequency	Percentage
Helps to understand the lecture/class material (reading assignments or quizzes not combined)	6	14.3%
Other <i>Lecture, quizzes and reading are well aligned</i>	1	2.4%

Question 4: How might this aspect of the course (pre-lecture reading assignment quizzing) be improved?

A total of 31 students provided codable responses to this question.

Response Categories	Frequency	Percentage <sup>4</sup>
Nothing should change – it's fine, great!	14	33.3%
Provide more warning about due dates <i>Warning on the web page's main page</i>	2	4.8%
Fewer quizzes per week <i>Just one per week</i>	2	4.8%
Other Specific Suggestions (listed below)*	11	26.2%
Additional Positive comments <ul style="list-style-type: none"> <li>“The feedback comments are helpful when reviewing wrong answers.”</li> <li>“We can attempt them until we understand the concepts and I think that is important. It takes a lot of stress off completing the quiz for a deadline and promotes actual learning.”</li> </ul>	2	4.8%
Other comments <ul style="list-style-type: none"> <li>Go through the book in order instead of skipping around.</li> <li>“I do find the quizzes (sic) a little annoying. But I think that it is still effective”</li> </ul>	2	4.8%

<sup>4</sup> Percentages do not sum to 100% because participants gave multiple, codable responses; each percentage represents a proportion of the total number of surveys completed (42).

\* Other than the two suggestions listed in the table above (“Provide more warning about due dates” and “Fewer quizzes per week” -- each mentioned by two participants), students provided eleven specific ideas about how the quizzes could be improved:

- Make the quizzes even more specific, so we know what the MOST important things are
- Create questions that can be answered by only one reading of the text – none that require more teaching or particularly complex concepts
- When re-taking the quiz, keep those answers that were correct, so they don't have to re-enter them.
- Eliminate true/false questions – they can be answered just by guessing and do no encourage concept learning or retention.
- Post reading assignment and quizzes for the following week before the week-end; easier to schedule time that way.
- Make it easier to print out the quiz questions and correct answers as a future study guide.
- Give the quiz once after both the reading and lectures have been completed to ensure that the concepts were learned
- Eliminate the reading quizzes
- “Not give answers all the time. Gives you an out to get around the reading. but it's good at time because you might not be able to do the reading at certain times, but can still get the points.”
- Put the page number next to each question
- Instead of making quizzes mandatory, provide some extra credit to students who complete all the quizzes or a certain number of them.

Question 5: Please indicate how much you agree or disagree with the following statements about the **reading assignment quizzes** (NOT the homework quizzes):

	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Mean	SD
Without the quizzes, I would struggle in figuring out the readings.	6 (14.3%)	14 (33.3%)	9 (21.4%)	11 (26.2%)	2 (4.8%)	2.74	1.15
I usually read only those parts of the text that help me figure out the answers to the online quiz questions.	8 (19.0%)	10 (23.8%)	11 (26.2%)	11 (26.2%)	2 (4.8%)	2.74	1.19
Compared to other classes, I understand lectures in this course better because of the quizzes.	1 (2.4%)	6 (14.0%)	13 (31.0%)	17 (40.5%)	5 (11.9%)	3.45	0.97
I would complete the quizzes even if they did not count towards my grade.	4 (9.5%)	15 (35.7%)	13 (31.0%)	8 (19.0%)	2 (4.8%)	2.74	1.04
Overall, I think the reading assignment quizzes definitely help me in learning the course material.	1 (2.4%)	2 (4.8%)	7 (16.7%)	22 (52.4%)	10 (23.8%)	3.90	0.91

### **Evaluator Comments**

On the whole, students' reactions to the reading assignment quizzes were positive. Although there were a few negative comments in the open-ended responses, many students commented that the quizzes provided added value by highlighting important concepts in the readings, helping them understand the content, showing them what they did and did not know after completing the reading, preparing them for

lecture, and motivating them to keep up with the reading. When asked how to improve these quizzes, one third of participants said they could not be improved; many other individuals provided thoughtful suggestions for improving this aspect of this class.

In their numerical endorsements of statements about the reading assignment quizzes, students generally agreed that these quizzes helped them learn the course material. However, they did not generally agree that they would complete the quizzes even if they were not required. This suggests that the quizzes are particularly useful because they provide external motivation to complete the reading and review it. In response to Question 3, one individual pointed out “I must use this space to comment on the third part of Question 5 below [‘Compared to other classes, I understand lectures in this course better because of the quizzes.’]. It is not the quizzes themselves that help so much in understanding the lecture...It is the reading. And it is the quizzes that provide motivation to do the reading.”

## Section 2: Homework Assignment Quizzes

### *Descriptive Results*

Question 6: Please indicate how much you agree or disagree with the following statements:

	<b>1 Strongly Disagree</b>	<b>2 Disagree</b>	<b>3 Neutral</b>	<b>4 Agree</b>	<b>5 Strongly Agree</b>	<b>Mean</b>	<b>SD</b>
The feedback provided by the homework quizzes helps me to identify mistakes in my homework solutions.	3 (7.1%)	5 (11.9%)	8 (19.0%)	15 (35.7%)	11 (26.2%)	3.62	1.21
The questions in the homework quizzes contain useful hints on how to solve the problems.	1 (2.4%)	7 (16.7%)	12 (28.6%)	13 (31.0%)	9 (21.4%)	3.52	1.09
Receiving immediate feedback about my solutions is worth the effort it takes to submit them electronically.	1 (2.4%)	0 (0.0%)	1 (2.4%)	13 (31.0%)	27 (64.3%)	4.55	0.77
Overall, I think the homework assignment quizzes definitely help me in learning the course material.	1 (2.4%)	0 (0.0%)	4 (9.5%)	13 (31.0%)	24 (57.1%)	4.40	0.86

Question 7: How might this aspect of the course (homework quizzing) be improved?

Thirty-seven participants responded to this question.

Response Categories	Frequency	Percentage <sup>5</sup>
Nothing, the quizzes are fine as is	8	19.0%
More feedback: Hints/Tips <ul style="list-style-type: none"> <li>• <i>Like Physics Tycho System (4)</i></li> <li>• <i>A link to helpful hints and tips</i></li> <li>• <i>List of common mistakes</i></li> </ul>	8	19.0%
Make it possible to submit the homework questions individually, so that feedback is immediate instead of having to cycle through the review page and quiz again if you want to complete it question by question. <ul style="list-style-type: none"> <li>• <i>Like Physics Tycho System (2)</i></li> </ul>	4	9.5%
More leeway for small errors, such as rounding, units, decimal point, sign <ul style="list-style-type: none"> <li>• <i>It is frustrating when you are only wrong by a power of 10, but think you are completely wrong.</i></li> <li>• <i>Maybe make the questions multiple choice</i></li> </ul>	4	9.5%
List quiz questions with homework assignments, so can do simultaneously	2	4.8%
Other suggestions (listed below)*	6	14.3%
Other comments <ul style="list-style-type: none"> <li>• <i>"It would be nice to get our written homework back to study before the midterms."</i></li> <li>• <i>It doesn't work correctly on all browsers</i></li> <li>• <i>Some of the problems are too complex, long, and time consuming</i></li> <li>• <i>"Problems involving drawing graphs or plotting data on paper are really awful."</i></li> <li>• <i>Timing of work: Questions on homework quizzes during the week before the mid-term were not relevant to exam. No new material before an exam (that isn't on the exam)</i></li> </ul>	8	19.0%

\* The six other suggestions for improvement were as follows:

- Make it possible to save correct answers so don't have to re-enter
- Provide an option to print out individual questions
- Faster server
- Provide feedback for CORRECT answers as well as incorrect ones
- "If I could log back into the homework quiz even after it is due so that I can study it before tests."
- A brief Q & A session during lecture about the quizzes

<sup>5</sup> Percentages do not sum to 100% because participants gave multiple, codable responses; each percentage represents a proportion of the total number of surveys completed (42).

### **Evaluator Comments**

Again, response to the homework quizzes was generally positive. Students' numerical ratings indicated that they generally found the homework quizzes useful and particularly appreciated having instant feedback. In fact, in the open-ended responses, several students asked that there be more feedback and perhaps more hints and tips about completing the questions. In several responses, students referred to another online homework system, "Tycho," used in introductory physics courses. The features of this software that students appreciated were additional hints and the ability to submit and receive feedback on one question at a time. In the Moodle system, if a student wants feedback on one particular question, he/she has to go to the review page, then re-enter the entire quiz again. This was a feature of the quizzes that several students thought could be improved. It might be worthwhile investigating how the Tycho system works and whether it could be adapted for the CEE 220 homework quiz questions.

### **Section 3: Out-of-Class Support**

#### **Descriptive Results**

Question 8: How many times have you attended the CEE 220 sessions at the Engineering Advising & Student Center OR at C.L.U.E.?

<b>Q8: Options (N = 42)</b>	<b>Frequency<sup>6</sup></b>	<b>Percentage</b>
Never	24	57.1%
Once	5	11.9%
Two or three times	1	2.4%
One session a week	7	16.7%
More than one session a week	5	11.9%

*Questions 9 and 10 were completed only by students who attended at least one tutoring session.*

Question 9: Which tutoring sessions did you attend? (Check all that apply)

<b>Q9: Options (N = 19)</b>	<b>Frequency</b>	<b>Percentage<sup>7</sup></b>
CLUE (Mary Gates Hall, Monday night)	8	19.0%
Engineering Advising & Student Center (Lowe Hall, Tuesday afternoon)	15	35.7%
Engineering Advising & Student Center (Lowe Hall, Thursday afternoon)	5	11.9%

Additional analysis: Number of students who use one, two or all three of the tutoring options available

<b>Number of tutoring options used</b>	<b>Frequency</b>	<b>Percentage</b>
None	23	54.8%
One	10	23.8%
Two	5	11.9%
All three	4	9.5%

<sup>6</sup> Note that in this question, 18 participants said they had attended one or more sessions. However, in subsequent questions, 19 participants indicated they used tutoring services. This discrepancy might have been due to respondent error or oversight.

<sup>7</sup> Percentages do not sum to 100% because participants were allowed to select multiple responses; each percentage represents a proportion of the total number of surveys completed (42).

Question 10: Please indicate how much you agree or disagree with the following statements about the tutoring you have received for this course:

	<b>1 Strongly Disagree</b>	<b>2 Disagree</b>	<b>3 Neutral</b>	<b>4 Agree</b>	<b>5 Strongly Agree</b>	<b>Mean</b>	<b>SD</b>
Tutoring helps me solve my homework problems.	0 (0.0%)	0 (0.0%)	1 (5.3%)	8 (42.1%)	10 (52.6%)	4.47	0.61
Tutoring helped me preparing for the 1st midterm.	0 (0.0%)	2 (10.5%)	9 (47.4%)	7 (36.8%)	1 (5.3%)	3.37	0.76
There is an adequate amount of tutoring available for this class.	1 (5.3%)	1 (5.3%)	2 (10.5%)	6 (31.6%)	9 (47.4%)	4.11	1.15
Overall, I think the tutoring offered for this class definitely helps me in learning the course material.	0 (0.0%)	0 (0.0%)	1 (5.3%)	9 (47.4%)	9 (47.4%)	4.42	0.61

### ***Evaluator Comments***

Although tutoring sessions were used by a little less than half of the respondents, those who did take advantage of these services agreed that they were helpful in learning the course material. In particular, the tutoring sessions helped with homework more than with the mid-term. The vast majority of students (79.0%) who responded to these items agreed or strongly agreed that the amount of tutoring available for this course was adequate.

One piece of information that might be useful to collect in the future is why students do not use tutoring services. Some might feel they do not need it, but others might be prevented from using because of scheduling or other logistical issues (e.g., staying on campus at night for CLUE is inconvenient). Collecting data from non-users might serve to improve and extend the tutoring available for CEE 220.

### **Section 4: Alternate Lab Times**

#### ***Descriptive Results***

Question 11: Have you participated in a lab outside of the regularly scheduled lab times (as agreed upon by your lab group)?

<b>Q11: Options (N = 42)</b>	<b>Frequency</b>	<b>Percentage</b>
No	39	92.9%
Yes	3	7.1%



Questions 12 and 13 were completed only by students who answered “No” to Question 11.

Question 12: If you did not attend an alternate time session, why not?

Of the 39 students who said they did not attend an alternate lab time, 35 responded to Question 12.

Response Categories	Frequency	Percentage <sup>8</sup>
Scheduled time was perfect, great, everyone happy with it	21	53.8%
Scheduled time was the only one that would work, could not schedule another time	6	15.4%
Already had the time blocked out, committed <ul style="list-style-type: none"> <li>Based work schedule on the lab time</li> <li>“No particular reason. Having the lab session at the scheduled time pre-commits everyone in the group to get together.”</li> </ul>	6	15.4%
Rescheduling too much of a hassle, hard to communicate with group	3	7.7%
One or more person in the group considered wanting to do another time, but couldn't work it out <ul style="list-style-type: none"> <li>“My lab group had wanted to switch to a different time, but it wasn't offered.”</li> </ul>	2	5.3%
Suggestions for improvement, encouraging use of alternate times <ul style="list-style-type: none"> <li>Put the alternate times on the schedule, so you can sign up</li> <li>“If you want to keep the groups random, have people that want to switch to a different time sign up for that time, and then pool those people into a group, instead of forcing us to keep the same group from the beginning.”</li> </ul>	2	5.1%
Wanted TA help – thought this was not available during the alternate times	2	5.1%
Other comments “It is a nice option though.”	1	2.6%

Question 13: If you did not attend an alternate time lab session because your group could not decide on a mutually convenient time, would you consider changing groups if it meant your lab session would be held at a more convenient time for you?

Q13 Options (n = 39)	Frequency	Percentage
Yes	8	20.5%
No	14	35.9%
Maybe	14	35.9%

Questions 14 through 16 were for students who had participated in an alternate lab session time.

Only three respondents indicated they took part in a lab session at an alternate time. Judging from their open-ended responses, these individuals were most likely in the same group. They decided to have their lab at 9:30am instead of 8:30am to get some extra sleep, which they valued. One individual in the group also thought they were more efficient because they were better rested. According to their numerical endorsements of several statements, all three of these individuals agreed that they knew who could

<sup>8</sup> Percentages do not sum to 100% because participants gave multiple, codable responses; each percentage represents a proportion of the total number of individuals who said they did not participate in an alternate lab time (39).

answer their questions during their session and that they were just as efficient as groups that participated in the regularly scheduled class time.

Question 17: Do you have any additional comments about the innovations made to this course (reading and homework quizzes, out-of-class support, and alternate lab times) or the course in general?

A total of 25 participants provided additional comments

<b>Response Categories</b>	<b>Frequency</b>	<b>Percentage<sup>9</sup></b>
Positive comments about the class in general/professor (additional highlights listed below)* <ul style="list-style-type: none"> <li>• <i>Like the structure of the course (3)</i></li> </ul>	14	33.3%
Positive comments about specific aspects of the class <ul style="list-style-type: none"> <li>• <i>Interactive PowerPoint slides are cool and useful</i></li> <li>• <i>Like the homeworks being moved to the day after the quiz sections.</i></li> <li>• <i>Like having the web site</i></li> </ul>	3	7.1%
Positive comments about the innovations <ul style="list-style-type: none"> <li>• <i>Online quizzes are terrific, help me learn material, nice to get immediate feedback (3)</i></li> <li>• <i>Afternoon tutoring sessions are great</i></li> </ul>	6	14.3%
Concerns/suggestions about the class in general <ul style="list-style-type: none"> <li>• <i>Workload</i></li> <li>• <i>Faster server for web site (4)</i></li> <li>• <i>"I feel like the professor could move a little faster over the theory in lectures to try to work in more example problems"</i></li> <li>• <i>Web site is a little busy: (3)</i></li> <li>• <i>Have homework due on Thursday nights so can work on them in spare lab time.</i></li> <li>• <i>Model of group work from another course: bonus if all members of group score well on exam, meeting outside lab, and using lab time to do HW problems.</i></li> <li>• <i>From the beginning, tell us that the class isn't curved –serves as a motivator</i></li> <li>• <i>Lectures are sometimes confusing (but that is that case with other classes) and mid-terms seem a bit long.</i></li> </ul>	12	31.0%
Concerns/suggestions about the innovations <ul style="list-style-type: none"> <li>• <i>Quizzes encourage guessing as opposed to learning</i></li> <li>• <i>All of these extra things can be somewhat hectic if not on a regular schedule.</i></li> <li>• <i>"at times the quizzes can be overwhelming, but at the same time I feel like I need them in order to understand the concepts."</i></li> </ul>	3	7.1%

<sup>9</sup> Percentages do not sum to 100% because participants gave multiple, codable responses; each percentage represents a proportion of the total number of surveys completed (42).

\* Below are some highlights from the positive comments about the course and the instructor:

"And I think that the prof is really really hardworking. He finished grading the midterm on the same day that it was given! That's a lot of work especially for a class of 80 + students. His lecture slides are also terrific. They're really helpful and it definitely took a lot of time for him to prepare his slides. Lastly, he's a very nice guy. He took the time to come to lab sessions (most profs don't do that) and walk around checking out how we're doing. I think he needs a promotion or raise or something like that. Definitely the best prof I've ever had!"

"Dr. Mackenzie is a good teacher. He is able to communicate complex ideas in a way that makes complete sense. many smart people do not have that gift and I wonder why some of THEM are professors. Good Job! to Prof. Mackenzie and all of his graduate assistants!"

"I have never felt so confident in an engineering course. Professor Mackenzie is the best professor I have ever had, period. He has made the class more enjoyable, very understandable and fair. All the extra innovations made to this course has really helped me in learning the material. I wish every class I took were set up this way. I think I would have much better grades and learn this stuff for the long term and not just for tests short term."

"I think you are doing an excellent job with this class. It is one of my favorite classes and I attribute that mostly to your enthusiasm about the class and the high level of availability of help."

"I think the professor does a lot for the class, and he is always there to provide us with extra help. He is also very good about responding to emails."

### ***Evaluator Comments***

In regards to the alternate lab time, it is fairly clear that this innovation did not quite get off the ground: only three students opted for a different lab time and it was only one hour later than their scheduled time. In looking at comments from the students who did not choose this option, it seems that they were reluctant or even unable to switch times once they had committed to a scheduled lab period. In some cases, individuals built their schedules (class and/or work) based upon these times.

In the future, it might be worthwhile presenting this option at the very beginning of the course or even in the schedule of classes when students register. One lab section could have a "TBA" or "FLEX" listed as its time and students could sign up for that if none of the existing lab times were convenient. One student suggested that groups could be organized initially according to their schedules, thereby allowing them to find a mutually agreeable alternate lab time. Before implementing the alternate lab times on a broad scale, it might be advisable to implement another pilot incorporating some of these suggestions. Doing so would allow for some fine tuning and additional feedback from students about the convenience and adequacy of support during these sessions.

Students' final comments affirm their positive reactions to the innovations and the course in general. Several pointed out again that the quizzes were useful in learning the course material. Several others commented that they liked the structure of the course and one went so far to say, "I wish every class I took were set up this way." There were only two comments about the impact of the innovations on the workload; one of these individuals went on to say that although the quizzes were somewhat overwhelming, they were useful. Overall, survey results indicated that the course was successful in extending learning beyond the engineering classroom, particularly in its use of online quizzes and tutoring sessions.