



## **Enhancing undergraduate student learning experience in an environmental engineering course through use of technology and industry partnership**

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# **Increasing undergraduate student learning in an environmental engineering course through use of technology and industry partnership**

## **Abstract**

As New Zealand's education system, NCEA, does not mandate chemistry learning in upper two standards of higher secondary education for the admission to engineering, it poses significant challenges for the academic staff involved in environmental engineering courses as environmental chemistry is an integral part of the curriculum. It was evident from past experiences and course evaluations that New Zealand's domestic, undergraduate students, without adequate knowledge of high school chemistry, get easily dispirited by the course content if taught with the traditional approach. Hence, to improve students' understanding of the course content and class participation, we experimented with two strategies for an environmental engineering course: introduction of online quizzes and frequent guest lectures from industry leaders.

The online quiz component was not designed as a replacement for traditional assignments; rather, it was a supplementary tool for enhancing students' learning experience. However, it aided in reducing the length and a total number of assessments. Also, another objective to use online quizzes was to test students on assigned readings in addition to lecture material. Many of these assigned readings were meant for supplementing students' basic chemistry knowledge and to help them in learning advanced environmental chemistry concepts. The instructor generated a multiple choice, online quiz for each of the three modules of the course with the help of an external online testing website, 'ClassMarker'. Each quiz had an average of 50-60 multiple choice questions with five options. Results of the quiz were available upon completion of the quiz so that students were able to review their answers immediately.

In addition to online quizzes, emphasis was placed on making students understand the importance of practical aspects of learning environmental chemistry. Although engineering academics have expertise in teaching and research, they often lack the complete knowledge of current industrial practices. In addition, professionals working in the field can provide first hand evidence of applicability of concepts taught in the class. Hence, six guest lectures from industry leaders were scheduled throughout the course to emphasize importance of learning environmental chemistry concepts for practical applications.

The success was measured by carrying out two surveys after the course completion: first through the University's learning management system about the effectiveness of the course instructor as an indirect measurement and the second was a direct measurement through the external online survey (with SurveyMonkey) with questions designed specifically to address the effectiveness of online quizzes. All respondents of the first survey agreed that the instructor stimulated their interest in the subject and presented material that assisted in their understanding of the subject. Nearly all respondents also agreed that the instructor used educational technologies that supported their learning and encouraged their engagement in the learning process. For the second survey, students felt positive about the opportunity to become more engaged with the course material, to be better prepared for class, and to learn and comprehend the course material than simply memorize it.

## Introduction

Course instructors assign textbook and external readings to students for a variety of reasons, most commonly because it is often impossible to present all recommended course material during class time<sup>1</sup>. Completion of assigned readings before a topic is covered in class allows students to better comprehend the class material, and it also increases in-class participation and student interactions<sup>1-3</sup>. Unfortunately, based on my personal experience as well as from the literature, it appears that student compliance with reading assignments in college courses has steadily declined over time<sup>4-6</sup>. There can be a variety of reasons associated with this decline, including increased presence of electronic gadgets in our daily lives<sup>7</sup>. Hence, it is worthwhile to ponder if, instead, can these gadgets and technology be used for the benefit of the student learning?

Teachers need new techniques to increase student reading and class participation for a better understanding of their assigned course material. One such technique involves examining students through frequent quizzes on reading assignments<sup>3</sup>. Having regular in-class quizzes can encourage students to pay closer attention to the assigned reading material as well as the course content, which can improve their understanding not only of the reading material, but also of the lecture material presented in the class<sup>3,8,9</sup>. In addition, frequent quizzes may lead students to study regularly during the semester rather than cramming just before the final exam<sup>3,5,9</sup>. However, it is reported that although scheduled or surprise in-class quizzes can motivate students to complete the assigned reading, students tend to view such quizzes as punishment depending on how those are administered<sup>6,9</sup>. Hence, it is utmost important to administer these quizzes optimally.

A variety of ways to administer in-class quizzes exist and different methods may vary in effectiveness. For example, use of randomly administered quizzes (i.e., neither completely surprise nor scheduled for a particular date) may result in higher levels of reading compliance<sup>10</sup>, and selection of subsets of questions from large question banks can reduce the likelihood that students will simply memorize response options without learning the material<sup>11</sup>. Furthermore, the literature suggests that presenting feedback separately after the student answers each question, including both information about accuracy and a source of additional information, can enhance the learning experience for students<sup>1,12</sup>. Pedagogical research findings also suggest that online class quizzes for assigned readings can provide students with a variety of positive learning outcomes<sup>13,14</sup>. For example, the use of online administered quizzes has been shown to motivate students to complete assigned readings, increase participation in class discussion, and improve performance on exams for material covered both on the quizzes and in class<sup>12,15</sup>.

However, there is still a disagreement about whether and how frequent online quizzes affect student performance and their overall learning experience. Bonham et al. (2003)<sup>16</sup> and Engelbrecht and Harding (2004)<sup>17</sup> noted that online assessments (as compared to manually marked paper assessments) resulted in no discernable difference in student performances over a range of summative assessments. Likewise, Smith (2007)<sup>18</sup> found that online quiz scores showed higher correlation with final examination marks than laboratory or assignment marks. Grimstad and Grabe (2004)<sup>19</sup> found that students who completed voluntary quizzes significantly improved their exam performances. However, their conclusions were explained by good students being both motivated to take voluntary quizzes and likely to do well on exams. Brothen and Wambach (2001)<sup>8</sup> cautioned that mandatory quizzes only improve exam performance if students employ an efficient strategy of using the quizzes to test their own knowledge of the material, rather than attempting to use the quiz to learn the material.

Furthermore, a set of precautions were suggested by Angus and Watson (2009)<sup>20</sup> for successful administration of periodic online quizzes, including collecting frequent student feedback about e-assessment.

Given the mixed conclusions concerning the impact of quizzes on the class performance and certain limitations of New Zealand's education system, NCEA, we decided to evaluate the effectiveness of the addition of frequent, online quiz component to the assessment of environmental engineering courses in improving the learning experience of students. The study is relevant not only for New Zealand but also for other countries where students admitted to engineering don't necessarily have adequate chemistry background required for environmental engineering courses. Our hypothesis was that introducing frequent online quizzes will assist students in being more interactive in the class by effectively learning chemistry concepts through additional reading material required for quizzes.

I first experimented with the idea of adding online quizzes in my courses in the previous semester. Student verbal feedback was positive for that pilot project. It encouraged me to pursue this project more actively with a motivation to understand if there is indeed a relationship between these two factors. If administered properly, we also hypothesise that online quizzes will be able to save time for instructors in the long run, which is a significant advantage in this age of ever increasing expectations from an academic citizen. In addition, it is expected that with the use of the online quizzes, significantly more class time will be available for active learning activities and other small group activities for instructors. Hence, the project was designed as a service not only to students but also to class instructors.

In addition to online quizzes, we also introduced industry guest lecturing component for helping students learn importance of practical aspects of learning chemistry for environmental engineering careers. Although engineering academics have expertise in teaching and research, they often are not at the forefront of implementation of state of the art engineering solutions for solving real world problems. As demonstrated by D'Este and Perkmann (2011)<sup>21</sup>, faculty members benefit from the influx of corporate expertise, and students gain knowledge about high-throughput technology and commercial applications of fundamental principles learnt in the class or through additional readings. Merritt (2001)<sup>22</sup> also highlighted that universities should include industrial research component in their courses and invite industrial experts as guest lecturers who can provide industrial perspective on these issues. Hence, our hypothesis was that students will learn course content more effectively if they can see the practical importance of the class material including additional readings through industry guest lecturing.

## **Objectives**

The motivation for this project was two-fold. The major component was trying to understand the effectiveness of frequent online quizzes in enhancing students' learning experience with more interactive assessment. The second motivating factor was to study if active industry participation in our courses can also benefit student learning and increase their satisfaction and class performance.

## **Methodology (The Plan of Action)**

I introduced the idea of online quizzes in the Semester 1 (March-July 2015) last year. We conducted two online quizzes in the environmental engineering Part 3 (year 3) course (ENVENG 341) of the Semester 1. After receiving a positive verbal feedback from those

students, I implemented a more detailed version of the plan in this Semester 2 (July-November) course (ENVENG 342). We designed 4 online quizzes, worth 3% each. Overall student assessment was broken down in the following manner for this course: final examination in theory and problems (40%); midterm examination (20%); assignments (24%); online participation on Piazza (4%); and online quizzes (12%). The following paragraph will focus exclusively on the methodology used in online quizzes.

We generated a multiple choice, online quiz for each of the three modules of the course with the help of the reading material posted through the online learning management system (Cecil). For creating these quizzes, questions were generated from research articles, case studies, and book chapters assigned as recommended readings for this course. The quizzes were written with the third-party software called 'ClassMarker'. Each quiz had an average of 50-60 multiple choice questions with five possible answers each. The 'ClassMarker' has a number of inbuilt functions which allow instructors to design all quiz items in randomized order, along with a randomized test bank of answers. Settings on 'ClassMarker' also can be used to prohibit students from printing material on the screen, thus preventing them from easily printing out the quiz questions. This procedure was used to deter students from cheating by making it difficult to copy and share quiz questions and answers. All students were encouraged to use smartphones to take the quiz. Complaints arising as a result of any technical difficulties were rare and were easily resolved. 'ClassMarker' also allows the quiz settings to be adjusted so that students can navigate through the quiz easily and can change their answers until the quiz is submitted. Results of the quiz were available upon completion of the quiz so that students were able to review their answers immediately.

In line with the above-mentioned objectives, the study sought to investigate the link between frequent online quizzes and student learning by testing the connection between student exposure to the online learning assessment and class performance. As 2015 was my first year of teaching the course, I could not directly compare the class performance of students from previous year. However, we carried out the indirect measurements through student course feedback survey and through external survey ('SurveyMonkey') designed specifically to evaluate effectiveness of online quizzes. In addition, to accomplish the above-mentioned secondary objective of the study, we took the help of student verbal feedback, students' feedback through learning management system survey, students' attendance, and students' enrolment statistics in 2015 and 2016 to evaluate effectiveness of industry guest lectures in increasing student interactions in the class.

### **Intended Benefits**

It is hypothesized that the use of frequent, online quizzes and industry guest lecturing would allow the instructor to engage students in more active learning, group work, and class discussions. It also was expected that the online quizzes coupled with guest lecturing from the industry would be viewed positively by students as an effective means of learning the course material. Students were expected to report that the online quizzes helped them study and gain mastery of the course material throughout the semester rather than simply cramming before a comprehensive exam in order to improve their performance. They were also expected to engage more actively in the class through industry guest lectures as a result of understanding practical importance of material covered in the class. Overall, we expected that students will face fewer difficulties in learning some of the advanced environmental chemistry concepts covered in the class as a result of better understanding of chemistry fundamentals through additional readings and realizing their practical applications.

## Measurement of Success

The success of incorporating online quizzes, as an effective means of assessment, and industry guest lecturing was measured in a number of ways:

1. Through Cecil about the effectiveness of the course instructor and the course itself as an indirect measurement,
2. Through external online student survey with questions designed specifically to address the effectiveness of online quizzes as a direct measurement,
3. Through attendance recorded during the industry guest lectures,
4. Through comparison of student enrolment statistics before and after the course, and
5. Through personal feedback obtained from students, either verbally or through written communication with the instructor.

## Results and Discussion

Ten out of a possible 25 students (40%) completed the assessment questionnaire on Cecil, based on the effectiveness of instructor for ENVENG 342. Students' responses to all Likert scale questions are presented in Appendix 1 below. Thirteen out of a possible 25 students (52%) completed the assessment questionnaire on 'SurveyMonkey' based on the effectiveness of online quizzes for ENVENG 342. Students' responses to all Likert scale questions are presented in Appendix 2 below.

All respondents of this Part 3 course survey on Cecil agreed that the instructor stimulated their interest in the subject and presented material that assisted in their understanding of the subject. Nearly all respondents also agreed that the lecturer used educational technologies that supported their learning, and the lecturer stimulated their engagement in the learning process. The majority of the respondents of the survey on online quiz effectiveness agreed that online quizzes were helpful to their learning, increased their engagement in the course, increased their interest in the course and made them better learn the course content. Students felt positive about the opportunity to become more engaged with the course material, to be better prepared for class, and to learn and comprehend the course material than simply memorize it. More than half of the respondents indicated that online quizzes may be useful in other courses.

The average attendance for the lectures, including guest lectures, throughout the semester was 90%, and it remained steady from the Week 3 of the Semester (after the official enrolment closure period of the University) till the end of the course. This was particularly significant statistics considering that all lectures were video recorded and were available to students immediately after the class conclusion. The average class attendance for previous year for the same course was 65%. The significant jump in attendance was linked to the students' active participation and interest in the course content.

In addition to attendance, students' enrolment statistics showed significant improvement in 2016 (after the redesigned course) compared to 2015 (before the redesigned course). For 2015, before we implemented the above changes in the curriculum, we had only 25 students enrolled for environmental engineering Part 3 courses (ENVENG 341 and 342). However, after implementing the above measures, enrolment for 2016 has already jumped to 47 (capped by the classroom capacity) for ENVENG 341 and ENVENG 342. Year 3 is a critical year for students of our Department as they decide their sub-specialization for their future careers. There are five sub-specializations available in the Department for getting bachelor's degree. Students can either choose from general civil, transportation, environmental,

geotechnical, or construction management. Having almost 100% increase in the student enrolment for environmental engineering courses was interpreted as success for our measures to improve class interactions and student learning for the Part 3 environmental courses.

Apart from these documented surveys and statistics, verbal and visual feedback is a key element in assessing effectiveness of implemented measures. During the duration of these courses, instructor was approached several times by students, personally or through email, to express their satisfaction with our new approaches, online quizzes and industry guest lecturing, implemented in the course. In addition to attendance, the class interaction level was also found to be high as students participated actively in discussions on the class topics. Students also appeared well prepared for each lecture and most of them did not struggle with the background material which was fundamental for most of the environmental chemistry concepts covered in the class. Again, this was attributed to the success of online quizzes in encouraging students to go through the required readings.

## **Conclusions**

The results demonstrate effectiveness of experimenting with online quizzes and industry guest lecturing to increase students learning experience in an environmental engineering course. However, I will add a note that such measures may not be beneficial to all courses. The use of online quizzes is highly recommended for any instructor teaching a course that requires that students to engage in a significant amount of assigned readings as was the case for us due to certain limitations of NZ education system. Many of the environmental engineering courses, however, fall in this realm as the field is highly interdisciplinary and require substantial knowledge of chemistry, microbiology, policy, and toxicology. Extensive knowledge of these fields is not considered mandatory for students' admission to engineering in most of the education systems around the world. In such cases, students will benefit from the use of online quizzes as they become actively engaged in the course material and study with greater frequency throughout the semester. Students will also engage more effectively in the course due to industry guest lecturing as they gain knowledge about practical applications of the class material.

Based on my experience, I will make some additional recommendations for the effective use of online quizzes and industry guest lectures including:

1. Online quiz settings should be designed to provide students with immediate feedback on their quiz grades. Students seem to appreciate such quick feedback.
2. To prevent students from cheating, the order of quiz questions, as well as their multiple choice answers, can be randomized. Settings can also be adjusted to prevent students from printing the quiz directly from the screen.
3. Based on the subjective comments received from the survey, it is also recommended that students may be allowed to review the previous quizzes and their answers before class exams to aid in their course exam preparation.
4. Selection of an industry expert should be done carefully as the person needs to highlight the message that class material learnt has significant practical application.

If administered in the above manner, it appears that frequent online quizzes and industry guest lectures are indeed making a positive impact on enriching the student learning experience. The benefit of increased class engagement of students appears well worth the initial investment of time required to set up the online quizzes and redesign course curriculum to accommodate industry lectures.

## Acknowledgments

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# **Appendix 1**

# ENVENG 342 Evaluation - Padhye

Enrolments: 25  
Responses: 10

ENVENG.342 SC 2015  
Environmental Engineering Design

Evaluation#:44200937  
Print Date: 8/30/2015

LS01	The lecturer was well prepared for the lectures	<p>Bar chart showing percentages for categories: SD, D, N, A, SA, NA. A=50, SA=50, others=0.</p>	<b>A+SA = 100.0%</b> <b>D+SD = -%</b> <b>NA = 0.0%</b>	<b>Mean: 4.50</b> <b>StdDev: 0.53</b>
LS02	The objectives of the lectures were clearly explained.	<p>Bar chart showing percentages for categories: SD, D, N, A, SA, NA. A=50, SA=50, others=0.</p>	<b>A+SA = 100.0%</b> <b>D+SD = -%</b> <b>NA = 0.0%</b>	<b>Mean: 4.50</b> <b>StdDev: 0.53</b>
LS03	The lecturer stimulated my interest in the subject.	<p>Bar chart showing percentages for categories: SD, D, N, A, SA, NA. A=50, SA=50, others=0.</p>	<b>A+SA = 100.0%</b> <b>D+SD = -%</b> <b>NA = 0.0%</b>	<b>Mean: 4.50</b> <b>StdDev: 0.53</b>
LS04	The way the lecturer presented material assisted my understanding of the subject.	<p>Bar chart showing percentages for categories: SD, D, N, A, SA, NA. A=60, SA=40, others=0.</p>	<b>A+SA = 100.0%</b> <b>D+SD = -%</b> <b>NA = 0.0%</b>	<b>Mean: 4.40</b> <b>StdDev: 0.52</b>
LS05	The lecturer used educational technologies (e.g., e-lectern, CECIL, audio-visual clips) in ways that supported my learning.	<p>Bar chart showing percentages for categories: SD, D, N, A, SA, NA. A=40, SA=40, N=20, others=0.</p>	<b>A+SA = 80.0%</b> <b>D+SD = -%</b> <b>NA = 0.0%</b>	<b>Mean: 4.20</b> <b>StdDev: 0.79</b>
LS06	I found the lecturer approachable.	<p>Bar chart showing percentages for categories: SD, D, N, A, SA, NA. A=30, SA=70, others=0.</p>	<b>A+SA = 100.0%</b> <b>D+SD = -%</b> <b>NA = 0.0%</b>	<b>Mean: 4.70</b> <b>StdDev: 0.48</b>
LS07	The lecturer responded to students' questions in a constructive way.	<p>Bar chart showing percentages for categories: SD, D, N, A, SA, NA. A=70, SA=30, others=0.</p>	<b>A+SA = 100.0%</b> <b>D+SD = -%</b> <b>NA = 0.0%</b>	<b>Mean: 4.30</b> <b>StdDev: 0.48</b>
LS08	The lecturer stimulated my engagement in the learning process.	<p>Bar chart showing percentages for categories: SD, D, N, A, SA, NA. A=50, SA=40, N=10, others=0.</p>	<b>A+SA = 90.0%</b> <b>D+SD = -%</b> <b>NA = 0.0%</b>	<b>Mean: 4.30</b> <b>StdDev: 0.67</b>
LS09	Overall, the lecturer was an effective teacher.	<p>Bar chart showing percentages for categories: SD, D, N, A, SA, NA. A=60, SA=40, others=0.</p>	<b>A+SA = 100.0%</b> <b>D+SD = -%</b> <b>NA = 0.0%</b>	<b>Mean: 4.40</b> <b>StdDev: 0.52</b>

# ENVENG 342 Evaluation - Padhye

Enrolments: 25  
Responses: 10

ENVENG.342 SC 2015  
Environmental Engineering Design

Evaluation#: 44200937  
Print Date: 8/30/2015

## What was most helpful for your learning?

- -a lot of useful topic was discussed in this paper  
-lecturer is very approachable
- Lecture recordings to go over and make sure I understood the concepts
- Lecture recordings.
- objectives of each topics are clearly written and helps a lot when students are doing revision
- real world examples of concepts
- Thanks for the lecture recordings!

## What improvement would you like to see?

- be more selective with class examples and more practice questions with answers provided, so we know we are on the right track when we finish the questions
- may include more exercise to help understand the topic
- Maybe some more practice problems to work through by ourselves :)
- More worked examples done in class or more tutorial sheets provided on cecil to do by ourselves or together in class
- n/a

# **Appendix 2**

## Lokesh Padhye

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**From:** Lokesh Padhye  
**Sent:** Tuesday, 22 September 2015 9:28 a.m.  
**To:** 'labb250@aucklanduni.ac.nz'; 'sbur161@aucklanduni.ac.nz'; 'jcha968@aucklanduni.ac.nz'; 'econ458@aucklanduni.ac.nz'; 'ydec845@aucklanduni.ac.nz'; 'cgos005@aucklanduni.ac.nz'; 'kham960@aucklanduni.ac.nz'; 'ghaw668@aucklanduni.ac.nz'; 'ohex319@aucklanduni.ac.nz'; 'ihsu672@aucklanduni.ac.nz'; 'kkud883@aucklanduni.ac.nz'; 'dkur948@aucklanduni.ac.nz'; 'tli553@aucklanduni.ac.nz'; 'jmcc462@aucklanduni.ac.nz'; 'dmil104@aucklanduni.ac.nz'; 'dmou920@aucklanduni.ac.nz'; 'lnew591@aucklanduni.ac.nz'; 'noli859@aucklanduni.ac.nz'; 'korr274@aucklanduni.ac.nz'; 'jqj305@aucklanduni.ac.nz'; 'ssac560@aucklanduni.ac.nz'; 'ssun044@aucklanduni.ac.nz'; 'jtay528@aucklanduni.ac.nz'; 'tvao282@aucklanduni.ac.nz'; 'gyuk716@aucklanduni.ac.nz'  
**Subject:** ENVENG 342 - Online Quizzes - Your Opinion

Dear all,

As we are shifting towards more interactive form of assessment to better engage students and improve learning, it is an appropriate time to understand your opinion about online quizzes. We have tried these for the first time in ENVENG 341 and ENVENG 342 this year and would like to know your opinion about the same.

The survey won't take more than a minute, and needless to say that your responses will be anonymous. Please complete the survey by Thursday night (11:45 pm). I expect everyone to participate as your feedback is important to support our goal of enhancing students' learning experience. Please click the link below to complete the survey.

<https://www.surveymonkey.com/r/TZV9GSQ>

Thank you,  
Lokesh

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Upgrade to get meaningful results: View all your responses and get powerful analysis. [View Pricing](#) →

# ENVENG 342 - Online Quizzes

## CURRENT VIEW

+ FILTER + COMPARE + SHOW

### No rules applied

Rules allow you to FILTER, COMPARE and SHOW results to see trends and patterns. [Learn more](#) »

## SAVED VIEWS (1)

**Original View** (No rules applied)

+ Save as...

## EXPORTS

## SHARED DATA

### No shared data

Sharing allows you to share your survey results with others. You can share all data, a saved view, or a single question summary. [Learn more](#) »

Share All

RESPONDENTS: 13 of 13

Export All

Share All

Question Summaries Data Trends Individual Responses

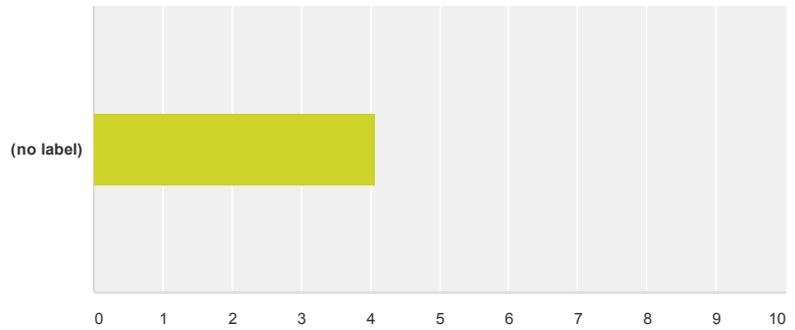
PAGE 1

Q1

Customize Export

## Online quizzes were helpful to my learning of the course material.

Answered: 13 Skipped: 0



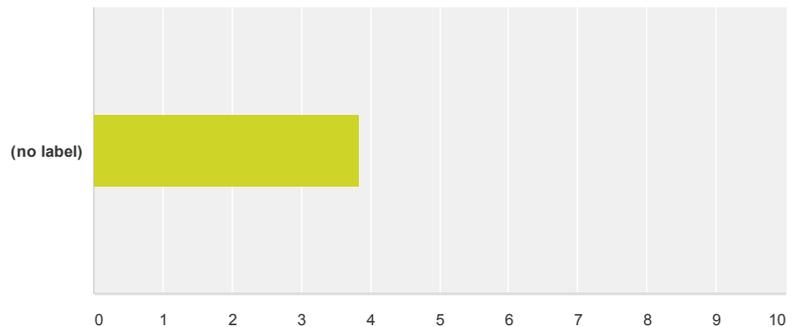
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	30.77% 4	30.77% 4	38.46% 5	13	4.08

Q2

Customize Export

## Online quizzes increased my engagement in the course.

Answered: 13 Skipped: 0



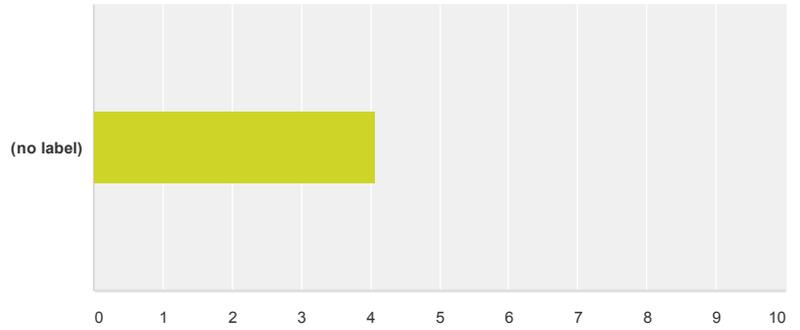
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total	Weighted Average
(no label)	0.00% 0	7.69% 1	23.08% 3	46.15% 6	23.08% 3	13	3.85

Q3

Customize Export

**Reviewing questions and answers at the end of the online quizzes was helpful.**

Answered: 13 Skipped: 0



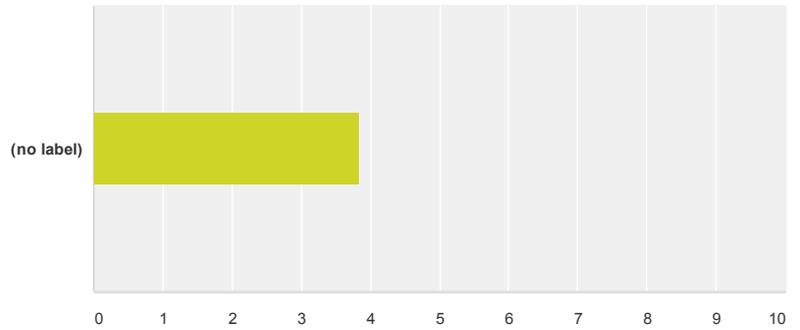
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	23.08% 3	46.15% 6	30.77% 4	13	4.08

Q4

Customize Export

**I would recommend adding online quizzes to other courses as well.**

Answered: 13 Skipped: 0



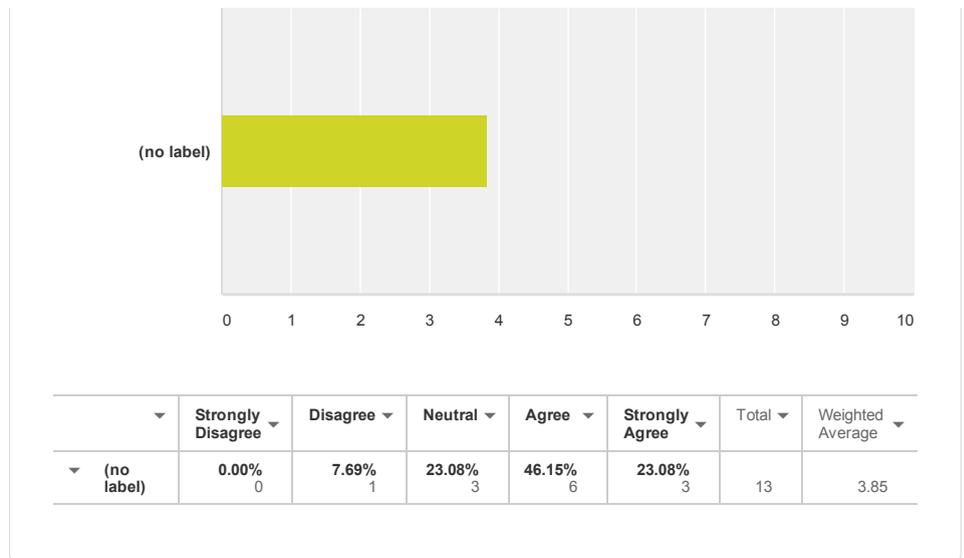
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	38.46% 5	38.46% 5	23.08% 3	13	3.85

Q5

Customize Export

**Overall, online quizzes increased my interest in the course and made me better learn the course content.**

Answered: 13 Skipped: 0



**Q6** Export

### Please provide any additional comments you have about online quizzes as a tool for effective class assessment.

Answered: 7 Skipped: 6

Responses (7)
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One thing that was a bit frustrating was that I couldn't go back onto the site later (i.e. when I got home) to go over any questions I got wrong. Just make sure that people know to print it as a PDF before logging out I suppose.

9/24/2015 10:55 AM [View respondent's answers](#)

The quizzes helped motivate me to be more systematic in my study approach, as a result I found studying for the mid-term and exam easier. I believe that the revision of the questions would be more useful if were able to have a copy of our tests. I also think that the quizzes become less effective if they cover more than 3-4 weeks of content. Overall I think that they were a good addition to the course and should be continued.

9/23/2015 8:45 PM [View respondent's answers](#)

An improvement would be to include more calculation based questions as they don't get practiced enough in test conditions until the exam/mid term.

9/23/2015 1:51 PM [View respondent's answers](#)

Please make the survey questions and answers available on CECIL or ClassMarker. They would be very useful as extra study material for mid-term and exam study.

9/22/2015 1:12 PM [View respondent's answers](#)

The online quizzes are great for small classes like 324 and 341, but with larger classes it would be too easy to cheat.

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