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# Iterating on an Active Learning Model with Flipped Class and OLI

Teach a required design studies course to fifty students.  
Encourage active learning through qualities of learning spaces.  
Provide students practice and feedback to prepare for in-class activities.  
Simplify use of educational technologies.

|                                                                                                                                                 |                                                   |                                                                                                                                                                                                                                                                           |                                                                          |                                                                    |                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------|
| Peter Scupelli & Arnold Wasserman develop the first Design the Future (DTF) class.                                                              | Peter Scupelli and Arnold Wasserman co-teach DTF. | Peter Scupelli teaches iDTF.                                                                                                                                                                                                                                              | OLI-DTFS course and DTFS workshop piloted with graduate design students. | DF flipped classroom course is developed and taught on Blackboard. | DF flipped classroom OLI course redesigned and taught on Canvas. |
| 2012                                                                                                                                            | 2013                                              | 2014                                                                                                                                                                                                                                                                      | 2015                                                                     | 2016                                                               | 2017                                                             |
|                                                                                                                                                 |                                                   |                                                                                                                                                                                                                                                                           |                                                                          |                                                                    |                                                                  |
| In Fall 2016, the Design Futures class was taught in a lecture hall. It was difficult for students to engage in team based in-class activities. |                                                   | In fall 2017, the Design Futures class is taught in a design classroom with desks on wheels and wall sized whiteboards. Students can easily transition from class discussion, to individual work, to team based work. In class activities are individual and group based. |                                                                          |                                                                    |                                                                  |

## Flipped Classroom Design

Design Futures is a required design studies class for all third year undergraduate students in the products, communications, and environments tracks in the School of Design at Carnegie Mellon University. This seminar/survey course has been flipped to shift lectures and instruction to pre-class work via the Open Learning Initiative (OLI) course so that in-class time can be used for more interactive hands-on application activities and peer learning opportunities.

**The purpose of the OLI modules:** to provide students with pre-class exposure to and low-stakes practice with completely unfamiliar concepts and methodologies that are used in the field of Futuring, outside of the traditional approaches used in Design.

**Motivating Use:** Students were given full credit for doing the OLI modules; correctness of answers was not considered in the grades.

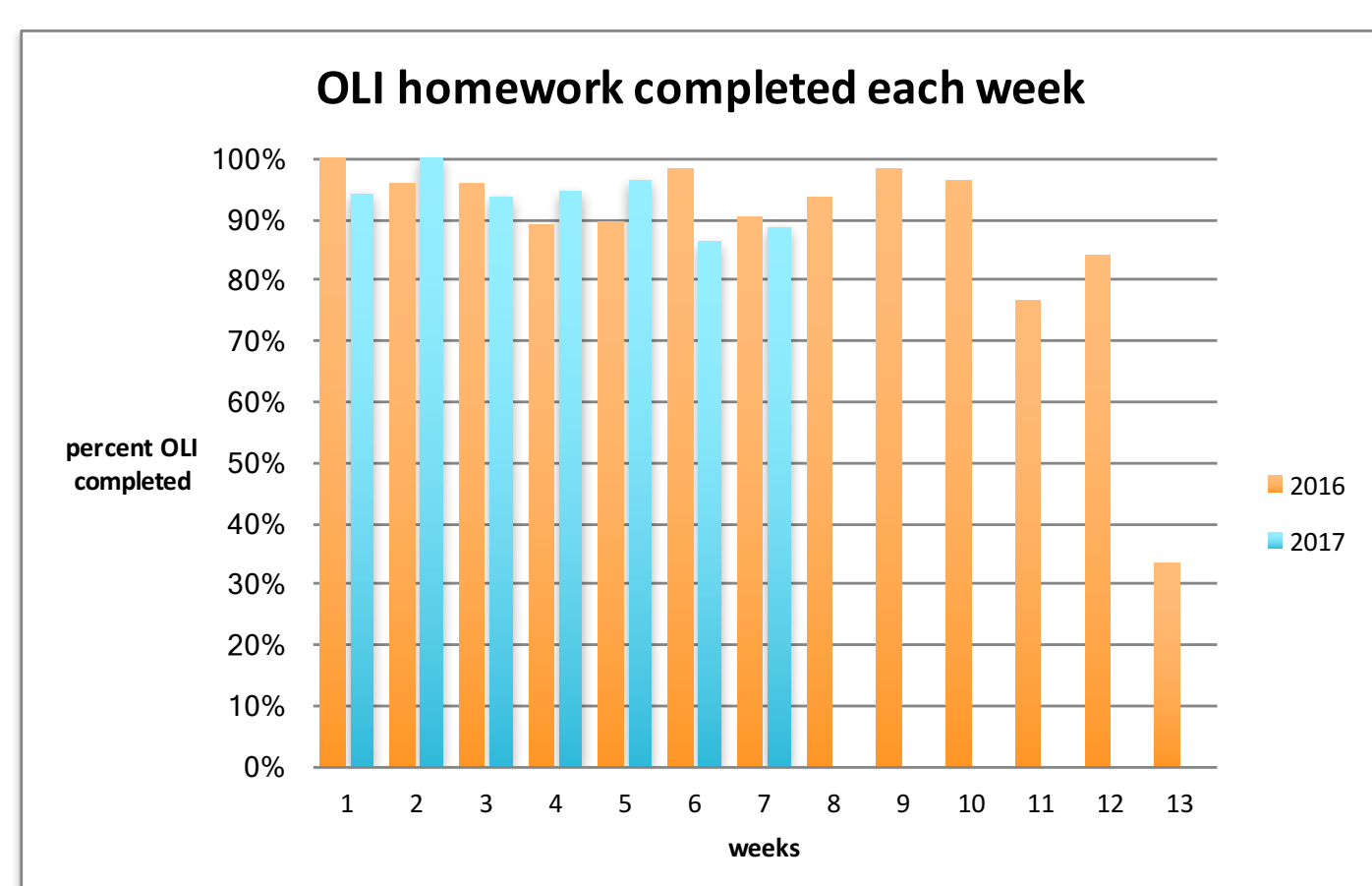
## Project Evaluation

### Measures:

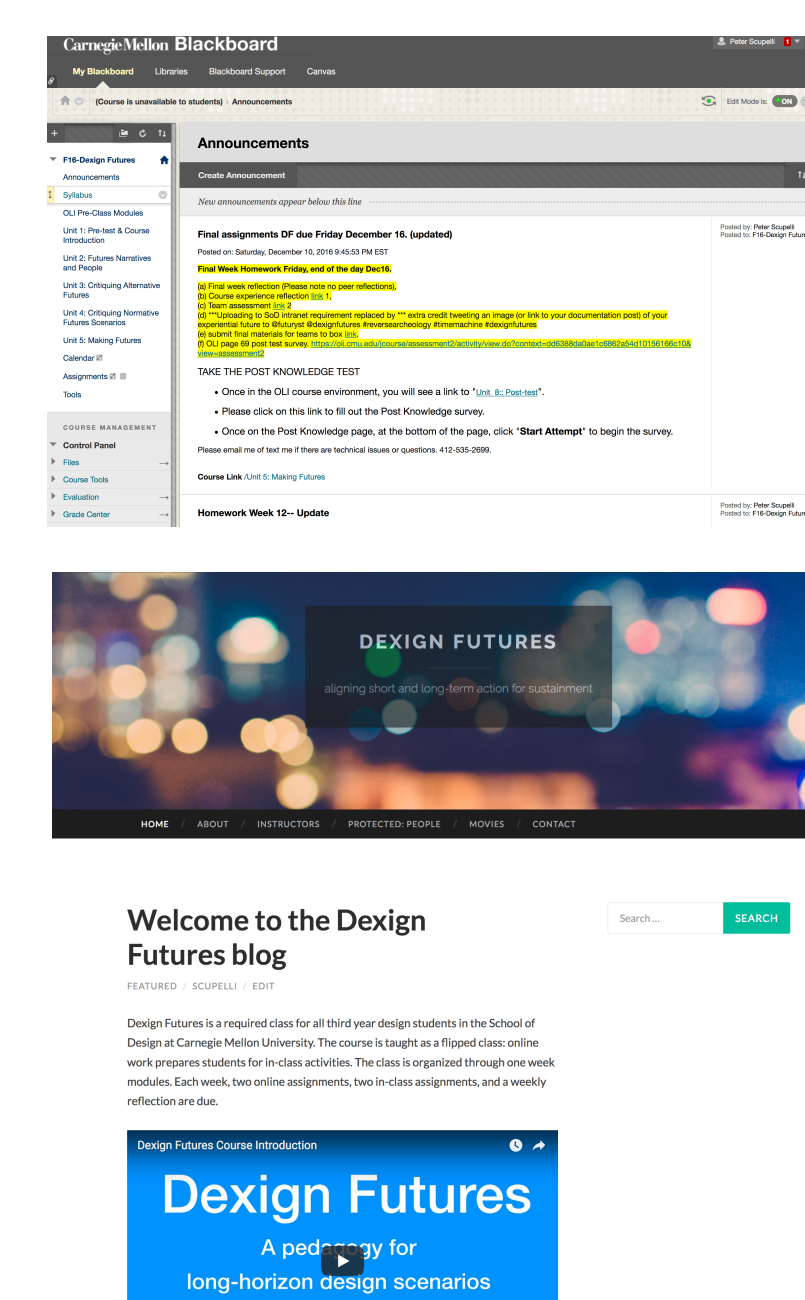
- OLI Pre- and Post-Tests
- OLI pre-class activities response data
- Student in-class work products
- Early Course Feedbacks
- Student Experience Survey
- Faculty Course Evaluations

**Pre- Post-tests:** The course instructor developed 20 questions as true-false statements based on course content/concepts. Question choices were presented using a four-point Likert scale (1= strongly disagree, 2=disagree, 3=agree, 4=strongly agree, 5=do not know). We chose to use the gradient Likert scale versus True-False binary choices to encourage students to reflect on the statements. We also included a fifth option "Do not know" to discourage guessing. Our grading included: "agree" responses for true statements as correct; and "do not know" responses as incorrect.

**2016 Pre- Post-test results:** 49 students completed the pre-test (13.90 SD 1.82 SE 0.26; 69.49% average) and post-test (15.96 SD 3.08 SE 0.44; 79.80% average). **On average, students scored higher on the post-test by 10.30%. This is a significant gain ( $t(48) = 4.49$ ,  $p < .0001$ ).**



|                                                                           | Fall 2016                                                                                                                                                                                                                | Fall 2017                                                                                                                                                                                                            |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sample OLI workbook page showing question types</b>                    |                                                                                                                                                                                                                          |                                                                                                                                                                                                                      |
| <b>Question Design</b>                                                    | <b>Full course:</b><br>Over half of the questions were Submit & Compare:<br>256 online questions:<br><ul style="list-style-type: none"> <li>127 Submit &amp; Compare (51%)</li> <li>125 Multiple Choice (49%)</li> </ul> | <b>First 7 weeks of course:</b><br>Reduced number of Submit & Compare:<br>149 online questions:<br><ul style="list-style-type: none"> <li>53 Submit &amp; Compare (35%)</li> <li>96 Multiple Choice (65%)</li> </ul> |
| <b>Mid-semester completion rate for Submit &amp; Compare questions</b>    | Approx. 75% of students meaningfully responded to Submit & Compare questions or skipped them altogether.                                                                                                                 | <b>15% improvement:</b><br>Approx. 90% of students meaningfully responded to Submit & Compare questions. (min 39.21%, max 100% SD 16.42%)                                                                            |
| <b>End of semester completion rate for Submit &amp; Compare questions</b> | 86% of students completed Submit & Compare questions with grade-based incentives. (min 12.21%, max 97.71% SD 17.21%)                                                                                                     | TBD                                                                                                                                                                                                                  |
| <b>Design iteration</b>                                                   | We speculate that having to write the answers was much more effortful than anticipated creating conditions for student exhaustion.                                                                                       | Incorporated more Multiple Choice concept questions paired with few Submit & Compare "generate knowledge" type questions.                                                                                            |



In 2016, we used four digital platforms to replicate traditional design studio interactions online.

**Blackboard Announcements** were used to communicate with students.

A daily agenda and assignments due page provided a daily structure.

Students completed their homework before class on the **OLI platform**. Students submit open questions to be discussed in class.

Weekly reflections were written on a **Wordpress blog** and submitted to **Turnitin PeerMark** for peer review.

*Students complained about the number of digital platforms and complexity of tasks.*

In 2017, we reduced the number of digital platforms to two.

**Canvas:** We changed the class activities to fit within the Canvas paradigm to reduce the number of places students needed to go.

Students completed their homework before class on the **OLI platform**. Students submit open questions to be discussed in class.

Weekly reflections were posed as a discussion and students comment on three of their classmates posts.

*Students suggested that the online discussion should have a small group in class discussion.*

*Students proposed OLI questions to be interactively discussed in class.*