
Fully Integrating Remote Students into a Traditional Classroom using Live-Streaming and TeachBack

FIE 2016

William Tarimo & Timothy Hickey
Computer Science Dept., Brandeis University
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OUTLINE

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2. Background & Motivation
3. Tools: TeachBack & Echo360
4. The Experiment
5. Results
6. Current Work

Summary

Studying the effects and feasibility of adding optional remote attendance to a class using

- Synchronous interactive experience for both remote and F2F students
 - Echo360: live-streaming of class meetings
 - TeachBack: Web-based class-wide interactions

Research Interests:

- F2F class attendance/absenteeism
- Learning outcomes and styles
- Use of class resources - lecture recordings
- Feasibility and perspectives

Background & Motivation

- Traditional instructional model (same time and place) is still dominant
 - Unbounded avenues of F2F and real-time interactions and communications
- Growth and adoption of remote and distance education
 - Changing styles and needs of learners and teachers
 - Advancement of IT

TOOLS USED

Echo360 & TeachBack

Echo360 { echo360.com }

- Echo360 Lecture Capture System
- Fitted in select lecture halls at Brandeis University
 - ◆ Recording Recording
 - ◆ Live-Streaming
 - ◆ Archiving and Later VOD
- There are alternative streaming/recording products

TeachBack




- an in-classroom web application designed to support active and interactive learning and teaching activities

Main features:

- Questions - a clicker-style ARS
- Feedback - a rapid feedback mechanism
- Forum - a monitored in-class help & discussion forum
- GroupWork - a clicker-style Think/Pair/Share assessment system
- Stats - students participation and assessment stats
- + Others

User Account

 TeachBack

wtarimo Logout

William

Past Courses


William

Course

Lecture

Activity

Tool





William Tarimo


✉ wtarimo@brandeis.edu
👤 wtarimo


My Current Courses 6

Enroll/Create New Course

 **94A: EL94a**
Brandeis: Wed 17:00-18:00
Instructor: Timothy Hickey

 **MKTYP CS**
Farber 101: Tue,Fri 12:30-14:00
Instructor: Hickey


 **CS155B: Computer Graphics**
Gzang 124: Tue,Fri 9:30-11:00
Instructor: Hickey

 **BIOL42A: Physiology**
Gerstenzang 123: Mon,Wed,Thu 08:00-08:50
Instructor: Maria Miara

TeachBack Announcements 0

🔔 NO CURRENT ANNOUNCEMENTS. Create new in a Course page.

Feedback - Student View

 TeachBack

mjane Logout

Lecture

Activity

Forum 6

Questions 4

GroupWork 4

My Activity Stats

Mary

Intro to Computer Science!

Welcome: Intro

Lecture Presentation: Introduction to CS

Tool

Activity Page: Lecture Presentation: Introduction to CS

Rating: ☆☆☆☆☆ 0

0 Rate

We'll cover basics about computer software and hardware.

My Activity Notes

Edit

YOU HAVE NOT WRITTEN ANY NOTES FOR THIS ACTIVITY!

Version 0.8 · About TeachBack · Contact Us · Report Technical Suggestions/Issues

Bored

Current/Latest Feedback State: Bored

Engaged

Confused

Bored

Optional Short Comment (50chars)

Submit

Submit a sentiment that reflects your current state

Feedback - Instructor

William

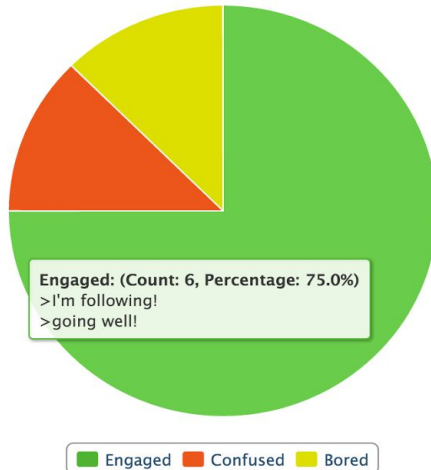
Teachback Workshops

First Lecture

First Activity

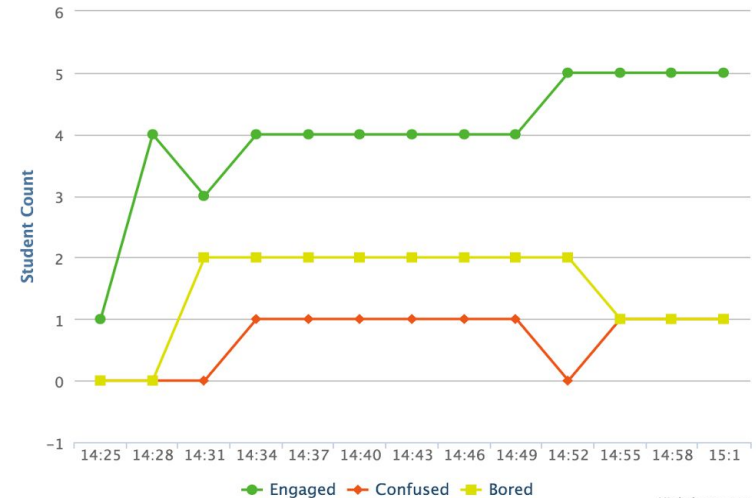
Feedback

Latest Feedback Summary



Highcharts.com

Class Feedback Timeline





Highcharts.com


Forum


 Lecture


 Activity


>  Feedback


>  Forum **22**

>  Questions **3**


>  GroupWork **0**

>  Activity Stats

>  Edit Activity


 William

 3D Animation

 L06: Logic

 Levels

 Forum

 Posts **22**

 Create New Post

 All Posts  Questions  Resolved  Unresolved  Notes  Interesting  Confusing  My Posts  Private  Popular








I haven't remained lost the entire class. That's never happened before!

 Note |  at 10:42, 1 year ago |  By  |  1 comment |  20 views |  1 recommend



FPS

The bullet shoots in the same direction regardless of the avatars orientation pls help

 Resolved |  at 10:24, 1 year ago |  By  |  1 comment |  16 views



Flowers shoot downwards

When I shoot, the flowers shoot downwards not across. How do I fix this?

 Resolved |  at 10:24, 1 year ago |  By  |  1 comment |  7 views




invisible plane

How did you make the plane invisible?

 Unresolved |  at 10:17, 1 year ago |  By  |  2 comments |  6 views

Questions - Instructor View

 TeachBack

wtarimo Logout

Lecture

Activity

Feedback

Forum 1

Questions 5

GroupWork 0

Activity Stats

Edit Activity

William

Computer Graphics

L05: Transforms

First Activity

Questions

Activity Questions 5

Create New Question

rot

find the rotation matrix for the angle 0.5 radians around the x axis $\cos = 0.878$ $\sin = 0.479$

Responses: 39, ✓ 23/39: 58%

Correct Answer:

[1 0 0 0; 0 0.878 -0.479 0; 0 0.479 0.878 0; 0 0 0 1]

matrix mult

[1 4 6; 0 3 2] * [1 2; 2 3; 5 10]

Responses: 40, ✓ 29/40: 72%

Correct Answer:

[39 74; 16 29]

apply matrix to vector

what is [1 2 3; 5 5 0] * [1 4 6]'

Responses: 40, ✓ 30/40: 75%

Correct Answer:

[27,25]' or [27 25]' or [27; 25]

matrix mult

what is [0 1; -1 0] * [3 5]'

Responses: 41, ✓ 27/41: 65%

Correct Answer:


[5; -3] or [5, -3]' or [5 -3]'

Can you multiply two 4x4 matrices together?

Responses: 40

12

GroupWork - Instructor View

 TeachBack

wtarimo Logout

Lecture

Activity

Feedback

Forum 4

Questions 1

GroupWork 4

Activity Stats

Edit Activity

William

Computer Graphics

L15: Prototypes

First Activity

Group Questions

Group Tasks 4





Create New Task

Group Tasks 4

Student Groups 14





Spin the objects in the scene
Write the code that goes in the render method which will make all of the objects (except the plane and lights) continually spin

InGroup: 16, ✓ 12/16: 75%
Individual: 31, ✓ 12/31: 38%





operations on a scene
write a javascript expression which, when you run it in the developer console moves every object up 1 unit

InGroup: 24, ✓ 16/24: 66%
Individual: 34, ✓ 13/34: 38%





Point3D
Create a Point3D class with a constructor, and add, dot, toString methods
z = new Point3D(1,2,2)
w = new Point3D(1,1,1)
console.log(z.dot(w))

InGroup: 25, ✓ 20/25: 80%
Individual: 35, ✓ 22/35: 62%


multiplication
add a multiply method to the Complex class
and you should cut/paste in the Complex.prototype code here ...

InGroup: 30, ✓ 20/30: 66%
Individual: 35, ✓ 16/35: 45%

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Participation & Performance Stats

 TeachBack

wtarimo Logout

William

Course

Enrollment 4

Edit Course

Course Stats

William

Intro to Computer Science!

Lecture

Activity

Tool

Course Page: COSI 101: Intro to Computer Science!

Volen 101 · M,W,F 10:00 - 10:50 · Instructor: William Tarimo
Spring 2014 · Harvard University

Class Activity Stats

Select range for lecture dates! Default: Course start to end dates.

Start Date 01/14/2014

End Date 12/31/2015

Questions Stats

Forum Stats

Feedback Stats


GroupWork Stats

Attendance Stats

At Risk Stats

Full Name	E-mail	%C	Pts.	Correct	InCorrect	Ungraded 0	%Answered
Mary Jane	mjane@email.com	100.0%	6.0	36.0	00.0	0/0	50.0%
John Smith	jsmith@email.com	0%	0.0	00.0	00.0	0/0	0%

Attendance Stats

 TeachBack

wtarimo Logout

William

Course

Enrollment 43

Edit Course

Course Stats









Class Activity Stats

Select range for lecture dates! Default: Course start to end dates.

Start Date08/28/2015End Date12/18/2015

Questions StatsForum StatsFeedback StatsGroupWork StatsAttendance StatsAt Risk Stats

Active Participation · Showed Up Only · Absent

Full Name	Email			
		18	0	8
		18	1	7
		21	0	5
		21	0	5
		22	1	3

THE EXPERIMENT

The Experiment

Class: Fall 2015

- Flipped Computer Graphics class - 41 Students.
- 26 Class Meetings
- Offered optional remote attendance from class 11.

Data:

- TeachBack attendance, engagement and performance.
- Echo360 data.
- Final exam and course grades.

RESULTS

Effects on Absenteeism

- Overall class attendance remained the same, counting remote attendance
 - Part 1: 2.9 absentees/day & Part 2: 2.875
 - Part 2: On average /day: 75% physically in class, 18% remote, and 7% absent
 - Anecdotally, more students tend to miss classes towards end of semester

ABSENTEEISM, GROUPED BY NUMBER OF CLASSES MISSED BY STUDENTS
DURING PARTS 1 AND 2 OF THE COURSE.

Missed Classes	Students (Part 1)	Students (Part 2)
0	23	17
1	11	12
2	5	8
3	0	2
4	2	0
6	0	2

Student Use of Lecture Recordings

- 72 semester absences > 24 (33.3%) watched recordings of missed classes
 - During Part 1: 35.7%
 - During Part 2: 31.8%, only slightly lower

Student Use of Live-streaming

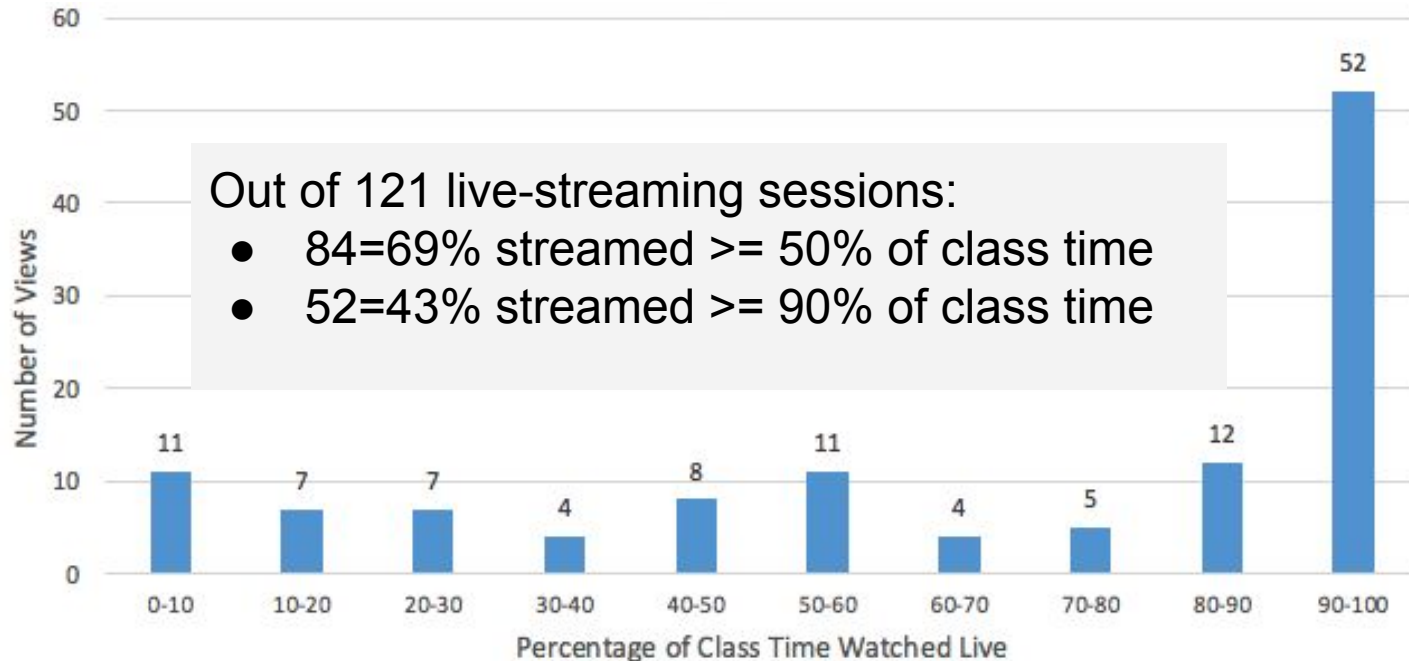
REMOTE ATTENDANCE, GROUPED BY NUMBER OF CLASSES
LIVE-STREAMED BY SPECIFIC STUDENTS.

- Students embraced the remote option
- 75% of students tried at least once
- 18% of students tried >50% of the 16 classes

Classes	Students	Percentage of Class
0	10	25%
1	10	25%
2 - 5	14	32%
7 or More	7	18%

Student Use of Live-streaming

- Students were committed to streaming-lectures while remote



Effects on Learning Outcomes

- Has insignificant effect on course performance compared to absenteeism

LINEAR REGRESSION ANALYSIS: MODIFIED COURSE GRADE VS. ABSENTEEISM AND REMOTE ATTENDANCE.

Item	R^2	P-Value	Coefficient
Remote Attendance	0.011	0.519	-0.261
Absenteeism	0.211	0.00283	-2.081

Effects on Learning Outcomes

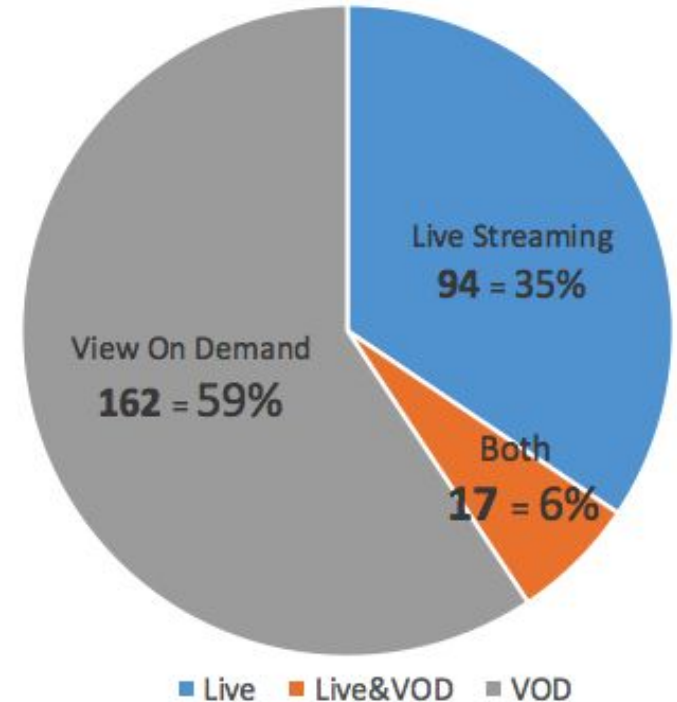
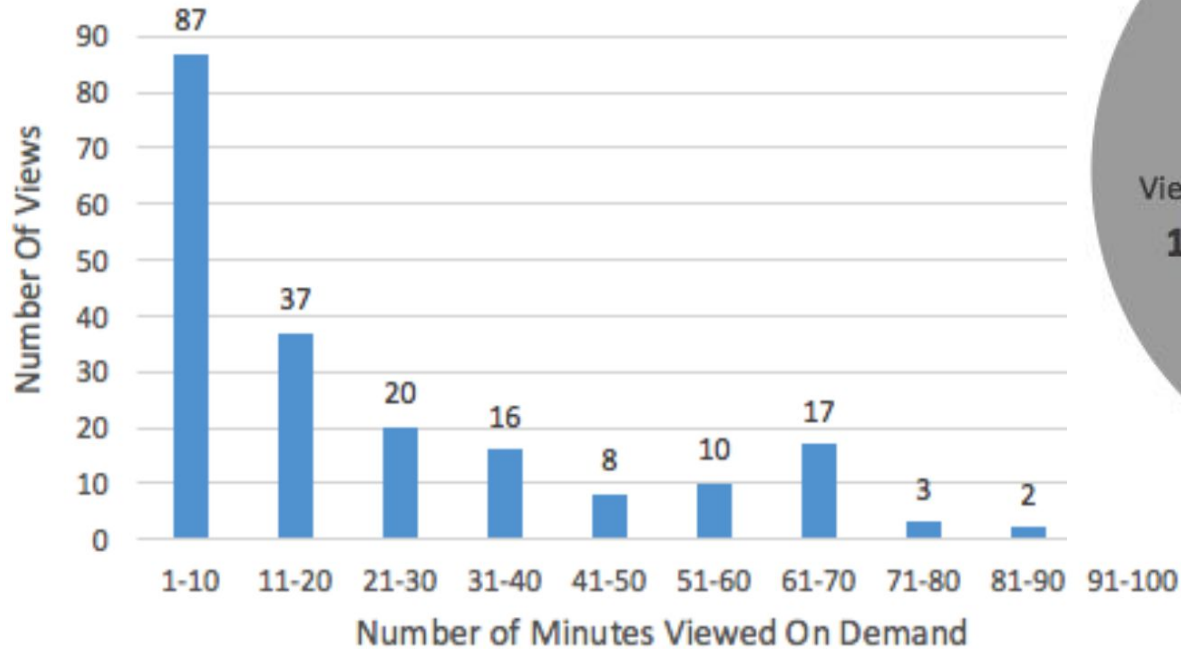
- Has insignificant effect on participation grade compared to absenteeism

LINEAR REGRESSION ANALYSIS: CLASS PARTICIPATION GRADE VS.
ABSENTEEISM AND REMOTE ATTENDANCE.

Item	R^2	P-Value	Coefficient
Remote Attendance	0.0156	0.441	-0.476
Absenteeism	0.435	0.0000036	-4.568

Use of Lecture Recordings

- Popular resource for both remote and face-to-face attendees



Student Opinions

1. 51.5% - All or most courses at university should have the option
2. 30.6% - Just as effective or more, 50% thought it was inferior, 19.4% Didn't try the option
3. on scale [1, 5], 87.2% rated TeachBack as effective at 3-5
4. on scale [1, 5], 79.4% rated Echo360 as effective at 3-5.
 - a. Amid poor video quality complaints
5. Comments: Convenience, Anywhere attendance, Valuable Alternative
 - a. Risk of poor concentration.
 - b. Depended on good connection.
 - c. Better as an option.
 - d. Separate TeachBack groupings.
 - e. Good when not abused.

CURRENT & FUTURE WORK

Current Work

- A second run in **Introduction to 3D Animation** - Fall 2016
- 153 Students
- About $\frac{1}{3}$ of the class attending remotely
 - ≈ 45 students/class

The screenshot displays the TeachBack interface. On the left is a dark sidebar menu with the following items: 'Class Meeting', 'Activity', 'Feedback', 'Forum 5', 'Questions 3' (highlighted), 'GroupWork 0', 'Activity Stats', and 'Edit Activity'. The main content area on the right has a light blue header with a home icon and the name 'William'. Below this is a 'Question Summary' section with a blue header. The question text is 'Question: Where are you?'. Below the question, it shows '107 Responses Lis'. A list of responses follows, each with a dropdown arrow, a row of four colored status icons (green, yellow, red, and a pencil icon), and a count in a grey circle. The visible responses are: 1 in ar, 2 other, 10 at m, 65 Olin, and 29 in m.

TeachBack

Class Meeting

Activity

Feedback

Forum 5

Questions 3

GroupWork 0

Activity Stats

Edit Activity

William

Question Summary

Question: Where are you?

107 Responses Lis

1 in ar

2 other

10 at m

65 Olin

29 in m

THE END!

Thank You!

Time For Questions

wtarimo@cs.brandeis.edu & tjhickey@brandeis.edu

{ teachback.herokuapp.com }



From Fall 2014

1,697
Unique
Users

64
Courses

202
Student
Notes

1,086
Questions

41,135
Question
Answers

2,260
Course
-Enrollments

374
Class
Meetings

413
Class
Activities

105
GroupWork
Tasks

3,875
Task
Responses

1,140
Forum
Posts

6,730
Forum
Comments

10,723
Feedback
Records