ADOPTING A "FLIPPED" INTERACTIVE PEDAGOGY USING TEACHBACK

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ABSTRACT

In this tutorial we give a hands-on introduction to adopting a 'flipped' interactive CS classroom using TeachBack, an interactive classroom application that we have developed as part of our research into educational technology. TeachBack is a redesign of 'The Affective Tutor' [1], now with new and improved functionality with ability to handle hundreds of simultaneous users engaged in real-time activities.

Teachback is a lightweight clicker-based audience response system with additional features for supporting back-channel communication and feedback from the students. It also provides statistics on student performance in formative assessments and participation. TeachBack allows students and instructors to engage in online dialogues and discussions about class material. These discussions can be driven by the instructor or left to the back-channel among students alone. We provide functionality for students to give instantaneous personal cognitive and affective feedback to the instructor on how the students are feeling about the class. Students can give feedback at various points during the lecture of their own choice. Alternatively, an instructor can ask all students for feedback at any particular point. TeachBack allows for a highly interactive pedagogy that involves all of the students, TAs and the instructor.

There is growing evidence that *flipped* classrooms enhance students' participation, motivation and engagement [3]. TeachBack was used to facilitate a partially flipped pedagogy in our 284-student CS101 class. Class meetings started with pre-class assigned readings with a mandatory reading reflection or short quiz due before class. The 50-minute class sessions were composed of 3-5 interactive activities including short lectures, written feedback from students, problem solving challenges, and coding challenges, often using a Think/Pair/Share methodology.

Our goal is that after attending this tutorial, participants should be able to return to their colleges and use TeachBack to make their classes much more interactive by engaging all students in experiential activities while allowing the instructor to view the class performance and participation in summary and per individual students. In this tutorial we will give a detailed hands-on training and demonstration of our flipped pedagogy using TeachBack. Our audience will be students, faculty, and school administrators willing to adopt flipped classrooms using computer-mediated tools. We will also give free access to TeachBack on our servers for the tutorial and for the rest of the calendar year (2015) for any CCSCNE 2015 attendees that want to try it in their classes.

TUTORIAL OUTLINE:
- Overview of how we used TeachBack to flip several CS courses
- Live Demo - creating two courses for student and instructor views
  - Creating Lectures and Activities and Enabling Components
  - Customizing Courses and Lectures
  - The Feedback Component and its uses
  - The Forum Component and its uses
  - The iResponder Component and its uses
- Overview of TeachBack tools for real-time analysis of student performance

- - ○ Course Stats -- Who is at-risk?
    - ○ Activity Stats -- What did my students understand (or not?)
  - ● Overview of Pedagogy enabled by Teachback
    - ○ Interactive Think/Pair/Share for Coding or Debugging
    - ○ Immediate Feedback Quiz Review with iResponder
    - ○ Active backchannel during activities
    - ○ Pivoting during a class session
    - ○ Interactive Recitations

REFERENCES

[1] Hickey, Timothy J., and William T. Tarimo. "The Affective Tutor." *Journal of Computing Sciences in Colleges* 29.6 (2014): 50-56.
[2] Willey, K., and A. Gardner. "Flipping your classroom without flipping out", 41st SEFI Conference, 16-20 September 2013, Leuven, Belgium, (2013) 211-219.
[3] Musib, Mrinal Kanti. "Student Perceptions of the Impact of Using the Flipped Classroom Approach for an Introductory-level Multidisciplinary Module." CDTL Brief, 17(2), 15-20.

ABOUT THE PRESENTERS:

- ● Timothy J. Hickey is a Professor of Computer Science at Brandeis University. He received his PhD in Mathematics from the University of Chicago in 1986 and has been involved in teaching and research at Brandeis since then. His research interests include Educational Technology, Broadening Participation in Computer Science, Graphics, Game-design, Scientific Visualization, Collaborative Editing, Interval Arithmetic, Curriculum Development, Scholarship on Teaching and Learning.
- ● William T. Tarimo is a Ph.D. Student in Computer Science at Brandeis University. His research focuses on educational technologies. William received his M.A. in Computer Science from Brandeis University, and B.A. in Computer Science and Mathematics from Connecticut College. At undergraduate I conducted various research works on using (Cyclic) Genetic Algorithms to learn optimal and adaptive walking gaits for 4 and 6 legged servo-robots.