

# Confessions of a novice Class Room Technology (CRT) user - Through the eyes of a new faculty member

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**Abstract** – This is a self-study of my learning and assessment of using classroom technology (CRT) as a beginning faculty in the Civil and Environmental Engineering Department at Tennessee Technological University (TTU). The idea of this self-study exercise originated after I was introduced to CRT at TTU including WACOM® tablet, Camtasia Relay® and an online learning resource called iLearn. As a part of this exercise, I assess my experience on using the CRT, following the conclusion of each class period for the courses I taught in fall 2012 semester. As the semester progressed, an informal student assessment was conducted to assess the benefits of CRT on improving student learning and briefly discussed here. The paper aims to highlight advantages and any limitations of implementing CRT, from a new or early career faculty’s perspective and intend to provide recommendations to future faculty in adapting to newer teaching tools.

*Keywords:* Classroom technology (CRT), WACOM interactive display, iLearn, Camtasia Relay, Self-study

## INTRODUCTION

Classroom technology (CRT), to my initial surprise, has been emerging over the past few centuries. It has evolved from use of the “Horn-Book” to “School Slate” to chalk board to overhead projector to computers to inclusion of web-based technology such as YouTube videos, and in-class audio and video recording [1][2]. The current statistics on the usage of computers in the United States (US) Schools is presented in Table 1. Over the past two and a half decades, the percentage of college-bound seniors with no prior computer coursework or experience decreased significantly from 26% to 9% while the increase in laptop ownership among college campuses increased from 53% to 76% between 2005 and 2007 [3].

This is a clear indication of increasing role of computers, Classroom technology (CRT) and web-based technologies in the higher education arena. Table 2 lists the increasing trends noticed among the “millennial” and newer generation students in the Higher Education Institutions in the US. Thus, a clear understanding of the implications of CRT or instructional technology (IT) for the classroom of the future especially for a beginning faculty like the author is important.

**Table 1:** Computer usage statistics in the US Schools. Source: Life in the Fast Lane [3]

Description	Percent
Schools with Multimedia computers	85
Schools with Internet access	64
Percent of 4 <sup>th</sup> graders using computers in school work	9
Percent of 8 <sup>th</sup> graders using computers in school work	10
Percent of 12 <sup>th</sup> graders using computers in school work	19

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Eighth Grade Teachers using computers in Geography	33
Eighth Grade Teachers using computers in History	33
Eighth Grade Teachers using computers in Reading	17
LCD or DLP Projects in classrooms	48
Interactive whiteboards	28
Digital Cameras	64

**Table 2:** Modern Technology statistics in the US Colleges. Source: Edudemic [1]

<i>Dependence on Technology - Out of 500 students interviewed</i>	
Students said they cannot study without technology	73%
Students using keyboards to take notes and not on paper	70%
Students using email to communicate with professors	98%
Students using digital devices to create presentations	65%
<i>Student Spending on Technology</i>	
Total amount spend on electronics	\$13 Billion
Cost reduction of digital textbooks compared to printed textbooks	40%
<i>Future High-Tech Classroom</i>	
Total college students taking one or more online classes	12 million
Expected number of students taking one or more online classes by 2014	22 million

A survey of literature indicated considerable amount of research performed on CRT/IT for the engineering classroom including its application and impact on learning, knowledge and retention. This paragraph briefly discusses few of these studies. Glennan and Melmed [4] classified CRT/IT into three categories or types of software including: 1) content-type, 2) *tools* and, 3) *instructional management* [5]. The second type of IT is content-type software that are packages developed specifically for instructional purposes. These packages are developed for use in educational environments and can include intelligent tutoring systems, online simulation materials, and electronic textbooks. Tool-type CRT are applications or packages developed for purposes other than education, such as word processors, spreadsheets, and structural analysis software. Instructional management software packages are designed to assist in the administrative duties of a teacher, such as relating coursework to curricular requirements, tracking student progress, and maintaining course calendars. Some of the examples are iLearn™ learning Environment, Blackboard learn™. Tables 3 and 4 lists the applications of some of types of software in engineering classes.

Table 3. Applications of Content-type CRT/IT in Engineering Classroom. Source: St. Clair [5]

<b>Study</b>	<b><i>Content-type software</i></b>
Aminmansour [6]	Electronic text book with distinct chapters and exercises for students; designed for steel design course, designed as a supplement; this was not intended to be a replacement to standard course text and lectures.
Dymond [7]	Operated a website of course information divided up into core concepts with links to external sites that contain content pertinent to the topic or concept. – predecessor to Learning Environment Products such as iLearn™ Learning Environment and Blackboard learn™.
Riley and Pace [8]	Implemented multimedia in classroom; developed PowerPoint presentations; used during class and were also posted on a server for student access.

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Samek and Landry [9]	Computer-based simulations in class to illustrate complex concepts in Mechanics classes; simulations based on Working Model™ and MathCad™.
Issa et al., [10]	Used an interactive CD-ROM to teach construction safety to both undergraduate and high-school students; software with different modules for various safety issues – integrated with a mix of video and other presentation media; interactive software.
Angelides et al., [11]	Presented actual engineering projects to students in the form of multimedia-supported case studies; Case studies were put online for students to use in a senior level course where aspects of planning, design and construction are taught and designed to help students relate their educational experiences to real life problems.
Nolan and Shields [12]	Measurement of Stream Discharge by Wading; this video was used in field experiments in the author’s CEE 6520 Open Channel Hydraulics graduate course.
Sulbaran and Baker [13]	Virtual construction environment to visualize construction situations in 3D and other angles (specifically for crane selection process).
Thukral and Gramoll [14]	An online Engineering Media Lab complete with electronic textbook, shockwave animated lectures, java applet calculators (to calculate unit vectors, cross products, truss member loads, etc.), quizzes and tests.
Henderson and Click (Personal Communication)	Many instructors have used the world wide web to post lecture notes or provide students with visual information. In our Civil & Environmental Engineering Department, the author uses iLearn learning environment to post class notes (with blanks for students to fill out); Dr. Craig Henderson and Dr. Steven Click at TTU, use iLearn and records in-class video lectures and uses tablet technology and post them on iLearn Learning Environment for later review.

St. Clair [5] assessed the long-term effects of technology use in the Engineering Classroom on Learning and Knowledge Retention and involved testing various sections of undergraduate mechanics course. The results indicated that technology use increased student’s problem-solving efficiency and that IT can make the educational process more efficient without hindering long-term knowledge retention. He concluded that much research in IT, both in engineering and in other fields, *do not include measures of retention*. Some of the studies which do include retention measures take place in fundamentally different settings than college-level engineering classrooms and thus may not transfer appropriately. Of the remaining studies, that do have retention measures and are in settings similar to college level engineering courses, the maximum retention intervals are three to four weeks, an interval that is a fraction of a semester and shorter than desirable for most instructors. Knowledge on the frontiers of research in CRT and IT will be crucial for beginning tenure-track faculty like the author in gaining understanding on balancing traditional instructional methods with advances in information and technology. This review of existing CRT and the feasibility of using CRT by beginning faculty is the motivation of this self-study.

Table 4. Applications of Tool-type CRT/IT in Engineering Classroom. Source: St. Clair [5]

Study	Tool-type software
Hein and Miller [15]	Programming and presentation aspects of spreadsheets to enhance Structures courses; They developed learning modules in a common (unnamed) spreadsheet program that contained animations, graphics, simulations, calculations, audio clips, charts, and diagrams for various types with structural mechanics.
St. Clair [5]	Most common software commonly used in Engineering Class (such as AutoCAD,

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	Matlab, ArcGIS, Excel, Office, PowerPoint)
Meyer and Ressler [16]	They used 2 structural design packages in a steel design course : a) CME-Truss, and , b) LRFD92
Muscarella et al., [17]	They used unusual tool, a program called STACKER; They used it to not only performed complex structural matrix operations for the students but also presented how and why the operations are being done, thus instructing and calculating simultaneously.
Dr. Software [18]	Dr. Frame, is a 2D structure modeling environment that is used in a number of different industrial settings
Kalyanapu – this study	Other software that are used in CEE at Tennessee Technological University – Excel, MATLAB, HEC-HMS, HEC-RAS, EPANET, ArcGIS. I used these software in my classes (CEE 3420, CEE 4420 , CEE6520) for simulating drainage basin flows, flow routing, flood modeling, culvert modeling, drainage basin delineation (Example of a video demonstration of an ArcGIS tutorial can be found here: <a href="http://cmat.tntech.edu/akalyanapu/CEE_4420_-_Watershed_Delineation_using_GIS_-_Flash_%28Large%29_-_20120911_02.56.56PM.html">http://cmat.tntech.edu/akalyanapu/CEE_4420 - Watershed Delineation using GIS - Flash %28Large%29 - 20120911_02.56.56PM.html</a> )

### SELF ASSESSMENT

The objective of this paper is to perform a self-assessment of my learning and assessment of using classroom technology (CRT) or Instructional Technology (IT) as a beginning faculty in the Civil and Environmental Engineering (CEE) Department at Tennessee Technological University (TTU). With advances in computers and technology, newer hardware and software are available for the teaching community. In this context, the idea of this self-study exercise originated after I was introduced to CRT resources at Tennessee Technological University include WACOM® tablet, Camtasia Relay® during our fall faculty retreat and an online learning resource called iLearn. As a part of this exercise, I assess my experience on using the CRT, following the conclusion of each class period for the courses I taught in fall 2012 semester. The two course that I taught in fall 2012 semester were: 1) Engineering Hydrology - CEE 4420 (Undergraduate elective course, that I taught the first time) and 2) Open Channel Hydraulics - CEE 6520 (Graduate course, teaching for the second time). I started using three CRT namely, iLearn, WACOM® interactive display technology and Camtasia Relay® software. The readers should note that I attended a teaching workshop (half day) for iLearn at TTU and attended a 1 hour presentation and demonstration for WACOM interactive display technology and Camtasia Relay software.

**iLearn:** *iLearn* is the official online learning resource at the Tennessee Technological University. It is a learning management system, one of various learning environments commercially available, used for organizing, and managing online learning resources. This paper will only focus on my self-assessment using iLearn environment. Using iLearn environment, one can organize the course materials into modules including:

- 1) Class module – to upload electronic lecture notes, example problems, online webpages,
- 2) Homework module – to upload homework assignments,
- 3) Grades module – to upload student grades for class assignments,
- 4) News tool – to make class-wide announcements and,
- 5) Email – to interact with enrolled students through iLearn-email.

The reader should not that the functionalities of iLearn may be even more but there aforementioned features were used by me. I started implementing iLearn Course Management since Spring 2012 for the CEE 3420 (Hydraulics – Undergraduate course). It was encouraging to see students quickly adapt to communicating with me using iLearn. I continued using iLearn going into Fall 2012 semester and currently have iLearn for CEE 6520 and CEE 4420.

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**WACOM Tablets & Camtasia Relay:** During the Fall 2012 faculty meeting, I was introduced to CRT availability at TTU. During the meeting, Dr. Steven Click (CEE at TTU) demonstrated the ease of using these techniques. At the beginning of Fall 2012 semester, I implemented the Cintiq interactive pen display monitor technology developed by WACOM in my class room. CEE Faculty including Dr. Henderson and Dr. Click submitted a proposal and received TTU technology grants to install WACOM monitors in selected classrooms in the CEE department. WACOM Cintiq interactive pen display monitors include an LCD monitor along with WACOM's digital pen (<http://www.wacom.com/products/pen-displays/cintiq>). For a regular Windows based desktop computer, the original monitor can be replaced with this WACOM monitor and after installing appropriate software, this monitor will function as an additional touch-based interactive device in addition to being the monitor. In addition, Microsoft and Adobe (and perhaps other software manufacturers) have specific software that is compatible to use this WACOM monitors. Specifically, in CEE, the software that is used for in-class notes and instruction include Microsoft Windows Journal, Adobe Annotator and Microsoft PowerPoint. I began using Windows Journal software on WACOM tablets for my two courses (CEE 4420 & CEE 6520).

Camtasia Relay is an educational software that is available through the Tech Institute at the Tennessee Technological University. It is a screen recording and sharing software that lets instructors record the computer screen that is being displayed during the class. It is also capable of recording the voice at the sametime. After the completion of the recording, the user (e.g., class instructor) uploads the recorded content to a specific server location (usually educational institutions need to dedicate a central location to upload and process this recorded videos) after which the recorded video is processed and optimized into a web-compatible format. The user will then be notified after the video is ready and a web link will be provided. This weblink will then need to be distributed to the students to view the video and review the class. For more information, readers may visit - <http://www.techsmith.com/camtasia-relay-overview.html> . An example of the Camtasia Relay recorded video is found at the end of this paragraph. While I was still unsure about using Camtasia Relay to record the lectures, during the class periods in CEE 4420, a student suggested if the class lecture can be recorded. Sensing interest from that student, I performed an informal poll in the class and realized that the general consensus for the students was to have a recorded lecture that they can use for review at a later time. So, I started recording the lecture immediately. For the following few lectures, I listened to my lectures and eventually became comfortable to the idea of recording class lectures. After that period, I started sharing the recorded lecture with the class (around the 4th week of the semester). Following this experience, I started to record lectures for CEE 6520 also. For your reference, you can watch a video demonstrating watershed delineation exercise using GIS here: [http://cmat.tntech.edu/akalyanapu/CEE\\_4420\\_-\\_Watershed\\_Delineation\\_using\\_GIS\\_-\\_Flash\\_%28Large%29\\_-\\_20120911\\_02.56.56PM.html](http://cmat.tntech.edu/akalyanapu/CEE_4420_-_Watershed_Delineation_using_GIS_-_Flash_%28Large%29_-_20120911_02.56.56PM.html).

I did not notice any significant increase in the time commitment for me to use iLearn, Camtasia Relay and WACOM tablet. On average, I am spending 10 – 15 minutes before and after class to post materials on iLearn, log-in to Camtasia Relay and using WACOM tablet.

## RESULTS

To test the effectiveness of CRT implementation in my Fall 2012 courses, I encouraged students to fill out a mid-term assessment survey of the effectiveness of the CRT for my two courses. Table 5 summarizes the students response for CEE 4420 (Undergraduate course) and Table 6 represents the student response for CEE 6520 (Graduate course). Students commented on the use of CRT, including Camtasia Relay video recordings of lectures using the WACOM tablets. One CEE 6520 student noted “*Doing examples in class and being able to refer back to electronic notes or video if need be.*” as one aspect of the course that the student found **effective**. Another CEE 4420 student commented “*I enjoyed going back and watching the video. It helped me to see how a problem was done.*” Another CEE 4420 student commented “*The lecture videos are very useful for completing my notes and for answering questions that arise during homework.*”

From this preliminary qualitative assessment, it is observed that integrating CRT for both undergraduate and graduate level courses is found to be useful for the students in their review of classes for working on homework assignments and preparing for mid-term exams.

Table 5. Student response to CRT during Mid-term Assessment for CEE 4420 (total student responses: 7; Total enrolled - 12)

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Technology	Number of Responses				
	No Opinion	Not Useful	Little Useful	Useful	Very Useful
Class Lecture Videos (Camtasia Relay)	1	0	1	2	3
WACOM Tablet Computer & Windows Journal	0	0	1	2	4
iLearn Learning Environment	0	1	1	3	2

Table 6. Student response to CRT during Mid-term Assessment for CEE 6520 (total student responses: 5; ; Total enrolled - 5)

Technology	Number of Responses				
	No Opinion	Not Useful	Little Useful	Useful	Very Useful
Class Lecture Videos (Camtasia Relay)	0	0	1	2	2
WACOM Tablet Computer & Windows Journal	0	0	0	3	2
iLearn Learning Environment	0	0	1	1	3

**SUMMARY**

Advances in computers and technology has made it imperative for a need for engineering faculty to embrace classroom technology or instructional technology (IT) for the classroom. Specifically for beginning faculty, the knowledge about the frontiers of research in CRT and IT is crucial for gaining understanding on balancing traditional instructional methods with advances in information and technology. Thus study briefly reviews existing CRT and the feasibility of using CRT by beginning faculty in undergraduate and graduate courses. I briefly present my experience in using three CRT namely, iLearn, WACOM® tablet technology and Camtasia Relay® software. To test the effectiveness of CRT implementation in my Fall 2012 courses, students were requested to fill out a mid-term assessment survey of the effectiveness of the CRT for my two courses. From this preliminary qualitative assessment, it is observed that integrating CRT for both undergraduate and graduate level courses is found to be useful for the students in their review of classes for working on homework assignments and preparing for mid-term exams. The future of this work is to continue to monitor the effectiveness of these three CRT in my undergraduate and graduate classes and gather more student feedback on these CRT. A higher number of student participation will improve the assessment of CRT and also will improve any quantitative assessment of student learning and performance that can be done through questionnaire and quizzes.

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disciplines and discussed various pedagogical issues and learning theories. He is interested in understanding the complex interaction that water has with urban systems, climate, energy development and its impact on sustainability. He and his graduate students are currently working on developing and implementing a sustainability decision making framework for floodplain management, and developing a Monte Carlo based Uncertainty Analysis framework, and improving accuracy of digital topography data and other data needed for realistic flood prediction. For more information about Alfred, please visit: <http://iweb.tntech.edu/akalyanapu/index.html>