Grounding the Use of Instructional Technology in Large Classes

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Out of necessity, when assigned to teach a large introductory class in Construction Science, we quickly learned the requisite instructional technology and its application. ‘Learning how to learn’ (Weinstein 1996) was the ultimate objective of this course. In the process, objectives, goals, syllabus, assignments, projects, evaluations, lectures, and presentation techniques had to be created. After teaching the course two semesters, we sought coaching from Texas A&M University’s Center for Teaching Excellence (CTE). This provided an opportunity to reflect on what happened, clarify the theories, examine our teaching philosophy and further clarify the principles that informed the framework for the course. This paper reports on the result of this reflection and is based on wisdom-of-practice scholarship (Weimer, 2006); therefore, it is experience-based and subjective. This paper follows the major lines of professional teaching practice, motivation, and findings from decisions made in the process. This paper also captures the evolution of the course, and the areas indicated for further research. More importantly, it advocates a method for teaching with instructional technology (Blackboard/Vista), which needs verification by other institutions, as this becomes an area of scholarship suitable for qualitative studies, quantifiable investigations, or descriptive research.

Key Words: Learning, Philosophy, Principle, Teaching Theory, Large Classes

Background

According to McKeachie and Svinicki (2006), “teaching skillfully may be less time consuming that teaching badly.” Aware that a professor’s time is limited, we sought ways to maximize doing good, while minimizing doing damage. A 325 student class management system was necessary to minimize administration and maximize communications so that everyone had the latest version of the syllabus, assignments, deadlines, quizzes and exams, and handle the many challenging day to day activities--a system that could operate as “information and communications central 24/7.”

This paper is based on the two types of literature found in the field of teaching by Weimer (2006): wisdom-of-practice scholarship and empirical research scholarship. Wisdom-of-practice scholarship includes personal accounts of change, recommended-practice reports, recommended-content reports and personal narratives. Empirical research scholarship on teaching includes quantitative investigations, qualitative studies and descriptive research. From the above divisions, this paper falls into the category of a recommended-practice report. This paper is derived from Schön’s work, Educating the Reflective Practitioner, 1995:

“We should think about practice as a setting not only for the application of knowledge but for its generation. We should ask not only how practitioners can better apply the results of academic research, but what kinds of knowing are already embedded in competent practice.”

This paper purports to be more than an anecdotal success story; rather, it embraces discipline and inclusive scholarship, recognizing that “knowledge is acquired through research, synthesis, practice and teaching,” paraphrasing the words of Ernie Boyer from a decade ago (Bloom et al. 1956).

General Principle
“We learn if we are extrinsically and intrinsically motivated to learn” (Hofer et al. 1998). In general, we view the classroom as an opportunity for teaching students how to eventually achieve freedom from the institutional educational system so that they may continue learning anything relevant, interesting or necessary in life. Teaching large classes requires a mindset that takes into account how students learn, and how to be efficient with administrative work and organization (see Fig. 1); along the way, students learn to take responsibility for their own learning (also referred to as self-monitoring or self-motivation).

![Figure 1: Operational Definitions adapted from Wolcott (2000, 2006)](image)

**Mindset**

Entry level courses, rather than focusing on details of information transfer, should teach students how to discern what is important, as well as where to find and how to filter information; essentially, how to learn and think. This is how teachers supplant magic (Fraiberg 1996) with science. McKeachie and Svinicki (2006) succinctly describe the classroom transition in six points: (1) What is important is learning, not teaching; (2) Teachers can occasionally be wrong; (3) Classes are unpredictable; (4) Major goal: continue learning after leaving college; (5) Learning mostly occurs outside the classroom; and (6) Reflect on what your students need to accomplish to learn how-to-learn. Presenting lectures rely on students’ reading and listening, offers passive learning (Bain 2004; Bligh 2000). Alternatively, discussions are considered the most effective way to learn (see Fig. 2). The ideal situation appears to be if the entire class, or sub-groups, are able to discuss a subject at their own pace. The guiding principle is that interactions that facilitate learning need not be limited to those with teachers.

![Figure 2. Gradations of Learning Modes (Adapted from McKeachie and Svinicki (2006))](image)
Faculty is charged with three objectives: teaching (knowledge transfer), research (grant oriented) and service (organizational preservation and improvement). Our focus on teaching has two major components: administration and teaching. Administrative tasks (preparation, assessment, evaluation, and grading) for very large classes, if approached in the same way as small classes, will consume an inordinate amount of time. Teaching tasks (individual student attention, motivation and counseling as well as lectures) for a very large class also require an inordinate amount of time (Brookfield and Preskill 1999). For the class in the present study, several tools were employed to maximize student interaction and minimize administrative time. For teaching, besides the ongoing departmental Academy, the professor enrolled in programs from the Center for Teaching Excellence (CTE), such as:

- Inquiry Based Learning Workshop
- Teaching with Blogs and Wikis
- Enhancing Critical Thinking Skills by Susan K. Wolcott
- Developing Students' Critical Thinking Skills by Susan K. Wolcott
- Course Development I: Beginning With the End in Mind
- Course Development II: Assessment and Feedback that Demonstrates Student Learning
- Teaching Large Classes Faculty Learning Community
- Teaching Academy, 2007
  - Writing Effective Learning Outcomes
  - Improving a Course Syllabus
  - Inquiry Based Learning
  - What Best College Teachers Do
  - Developing Student Capabilities
  - Assessment
  - Active Cooperative Learning
  - Project-Based Inquiry Guided Learning
  - Course/Curriculum Design
  - Peer Evaluation and Development Teaching

Complementing the class management knowledge gained through workshops was the adoption of a technological tool, Blackboard/Vista, which offers numerous means to manage a large class. Of the many features for course management, the most used ones are, in alphabetical order: Announcements (pop-up when students log in); Assessments; Assignments; Calendar; Discussions; Grade Book; Mail; Resources; Roster; Syllabus; Who is on Line. These features not only aid the professor, they also enhance communication with and among students in the class.

**Thoughts on Assessing Large Classes**

Learning assessments and evaluations are a major component of course administration. For this course, we investigated how assessments could become more of a learning tool (Brown 1978; Brown et al. 1986). In general, assessments require reasonable effort, yet they can be quite interesting. We sought ways to assist students in achieving mastery (demonstrated by a desire to know) rather than performance (demonstrated by a desire to impress). Students interested in mastery view mistakes as opportunities, while students interested in performance view them as character flaws. These two situations represent extrinsic (external reward) and intrinsic (self reward) motivations (Walvoord and Anderson 1998).

**Class set up**

The class covered twelve chapters and originally we decided assessed two chapters with a quiz, and then the same two chapters plus the next two chapters with an exam. After that, we altered the system to test every two chapters with a quiz, every four chapters with an exam and the entire course with a comprehensive exam, making the process semi-cumulative. Literature recommends assessing often when using it as a tool for learning.

Although assessment forms a large part of the academic experience, learning is both an individual and a social endeavor (Pan 2001). In general, the bonds with other students and the professor form a social support system that enhances student motivation, class attendance and participation. In this class example, Blackboard/Vista allowed each student to post a picture on the class roster, thus making it easier for students and the professor to learn students’ names, and form groups with others in the class (see Figure. 3).
Assessments measure how each student learns the essence, the building blocks, of the profession, materials and methods. Progress in learning is more important than grade progress, although a score indicates performance at one moment in time; as such, it carries for the student a certain level of related anxiety. Anxiety is an ongoing issue that must be treated throughout the semester--it starts with the first day and continues in every class. Sadker and Zittleman, (2004) indicate that student anxiety may be ameliorated through granting students a certain control over the assessment process.

Multiple elements influence final academic evaluations. Students can control many of them with their choices and actions: attend class regularly; participate constructively; persist when learning is difficult; devote time and effort in preparing for class; complete assignments according to requirements and on time (be responsible and responsive); take time to review individual progress with the professor and seek help when needed. Although a grade cannot be attributed to each of the above elements, holistically they are the elements that influence a top grade. Diminish any item and academic success is affected proportionally.

One step in mitigating anxiety was to boost familiarity with course and exam material. During the second week of class, students were given a fixed bonus point on the previous semester’s comprehensive final exam (CFE). For this bonus exam, we asked the students to not study, and use no books or notes--just become exposed to taking an exam with Blackboard/Vista and become exposed to the types of questions they would later encounter in an exam. This would be used later to measure students’ learning, but it also aimed to lower assessment anxiety for students.

Assessment Set-up

If students take an exam within a window where they can choose the day, time and place, how does one control cheating? Cheating is a major concern for any institution that is primarily focused on testing. If assessments are viewed as a method of learning, cheating is understood from one perspective. In this course syllabus, under the honor code, it stated that quizzes were to be taken alone, but exams could be taken individually, with another or in a group. As a matter of fact, each exam asks: Are you taking this exam: alone, with another, with two others, with three others or with more than three. Exams with a group option are a form of cooperative or learning cell, when viewed not from a purely evaluation point of view, but from a broader perspective as another opportunity for learning.

The students answered the question about how they were taking the exam with no self-incrimination. Very interesting results came from this experiment. Students, after taking the first exam in a group, realized that they were taking the exam multiple times, and the help from other students was minimal or not reliable (some even mentioned that they would have answered a question differently but were persuaded); these students took the remaining exams alone. This left those not at the top of the class helping one another; however, when comparing the grades students made on a quiz (alone) with those on an exam (possibly with others), there was no significant difference.

The database of questions was composed of several layers. The question set for any one chapter contained questions from previous semesters, questions that the students created and perhaps were adapted by the professor (from a low –level question to a higher –level question, per Wilhite 1983) and questions that the professor added, based on items covered in class but not in the text. Additionally, any question previously found to be ambiguous
was deleted from the database. Perhaps the large database of relevant questions and the fact that the computer randomized each test question to mitigate the possibility of any group of students seeing the same test, contributed to the quiz and exam grades being similar. However, the most important concept behind this set up is that the students were motivated to read the assignments and make up questions for a database they were able to see through the Blackboard/Vista Discussion section for each chapter. This gave them insight into what other students found interesting and important, plus the professor’s comments on the posted questions. This built their confidence in learning what was important to learn. The principle behind this was that “training students to generate thought-provoking questions enhances learning” Wolcott, 2000. This approach (students generating questions) goes beyond the think-pare-share.

Generally, students were encouraged to see how a question could be worded differently or information presented in a questioning form, and with practice, their questions were neither too easy, giving away the solution, nor too difficult, out of a recondite context that did not test knowledge. However, all questions required careful review by the professor, a linguistic editor, and a final review, with the overall mosaic of questions in the database chosen to see if a picture of knowledge and learning was somehow discernible. In other words, the assignment of writing a minimum of two questions per chapter, one T/F and one MC per student (a class of 200-300+ students generated a considerable number of questions) accomplished the following:

• The whole class became a discussion group, as well as established possible sub-groups for study
• Discussion and thinking about how an item of learning could be posed as a question with the goal of getting it included in the database (student advantage)
• Discussion about how a question could be altered and how it could re-appear as a higher-level question (this required that students think about the material mostly through discussions, Whilite 1983), per the following examples of questions that have been elevated in critical thinking (Prus and Johnson 1994; McKenna and Bull 2006):
  o (MC) How would you apply the concept of __________ in a construction site?
  o (MC) The limited capacity of __________ affects all of the following EXCEPT?
  o (MC) Researchers of metals and researchers in applications approach the use of __________ differently mainly because of:
  o (MC) Examine the validity of an argument and determine which is the weakest link.
  o (TF) Compare one theory with another
  o (TF) The following are important dimensions (points, criteria, characteristics, attributes) in a comparison
  o (TF) Evaluate, compare or judge the relative values of a ____________ in an argument.

The objectives were:
1. Present the students with multiple opportunities to practice and to see other students practice what is meant by the concept of active learning, self-learning, learning how to learn.
2. Provide plenty of examples of how to become self-learners by using bricks and mortar, nails and other common materials and processes as tools.
3. Model why it is important that they become self learners through lessons learned, case studies and the rationale (deeper thinking) behind common occurrences and processes.
4. Showcase how to evaluate the evidence behind a product or a manufacturing process, mostly using a historical perspective. In other words, demonstrate how to search for and analyze the rationale underlying what is done in construction. For example (based on Maier 1952 and Bloom’s 1956 Taxonomy):
   a. Clarification of a problem
      i. What do we know?
      ii. What data is relevant?
   b. What are the characteristics of an acceptable solution?
   c. What are the possible solutions?
   d. Evaluate these possible solutions against the criteria of the characteristics of an acceptable solution
The class then became one big study group, with sub-groups discussing the class material, in a total learning program (see Figure 4).

![Total Learning Program Diagram]

**Figure 4: Total Learning Program**

The comprehensive final exam at the end of the semester was an optional exam that students could take in a group or individually, open book and notes, with an ample window and sufficient time to finish. This took away the pressure for the students, especially if they scored higher than on a previous exam. For those that missed a quiz or an exam, even though there was an ample time window and they could have logged in and taken the exam from any computer in the world, the final exam option was their only make up opportunity.

Notice the standard deviation among quizzes (see Table 2) and among exams: they are precisely at acceptable values. The difference between the standard deviation for quizzes and that for exams is also within acceptable tolerances. The final grade has an even lower standard deviation. In the end, what students remember a week or a year after the course is more appropriately gauged by the pre-test comprehensive final exam compared to the Optional Comprehensive Final Exam, which supposedly was completed under minimal performance pressure, except for those that had missed a quiz or an exam.

**Evaluations – Optional Final Comprehensive Exams**

A final comprehensive exam typically brings an inordinate degree of anxiety to students, which may dissipate when it is made optional, as was the case for this class. Approximately 21% took the Optional Final Comprehensive Exam: 52% of those improved their grades, 10% already had an A and likely took it just to see how they did in relation to their own benchmark at the beginning of the course, and 38% took it and most likely did not have a missing quiz or exam, and did not improve their grades (see Table 1).
Table 1. COSC 253 Spring 2007
Class Statistics

<table>
<thead>
<tr>
<th>Final Grade/Total number of students</th>
<th>Actual Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>78</td>
<td>34%</td>
</tr>
<tr>
<td>B</td>
<td>115</td>
<td>50%</td>
</tr>
<tr>
<td>C</td>
<td>27</td>
<td>12%</td>
</tr>
<tr>
<td>D/F or dropped</td>
<td>9</td>
<td>4%</td>
</tr>
</tbody>
</table>

Final Comprehensive Exam Option

<table>
<thead>
<tr>
<th>Improved grades</th>
<th>25</th>
<th>52%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Had an A thus no grade change</td>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>Did not improve grade</td>
<td>18</td>
<td>38%</td>
</tr>
</tbody>
</table>

Evaluations – Final Grade

The assessment that best reflected what student will remember in a week, a month, a year, was the delta between what they knew when arriving in class and what they took with them, as manifested in the Optional Final Comprehensive Exam.

However, since the quizzes and exams were crafted with the primary intent of being tools for learning, and secondarily, for assessment, it can be inferred that the final grade was first a representation of learning and secondarily a comparison of each student with self and with the class. The class as a whole identified, to some extent, the questions or areas of interest, and crafted the questions, and the class as a whole determined which questions were ambiguous. The opportunity to take the exams as a group could also be construed as a benchmark of the class or sub group to which a student contributes, and against which they are compared (see Table 2). The average score and the standard deviations are within academic acceptable levels.

<table>
<thead>
<tr>
<th>Final Grade</th>
<th>Quiz #1</th>
<th>Quiz #2</th>
<th>Quiz #3</th>
<th>Exam #1</th>
<th>Exam #2</th>
<th>Exam #3</th>
<th>Syllabus Quiz</th>
<th>Optional Comp. Final Exam</th>
<th>Optional Comp. Final Exam</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>10</td>
<td>120</td>
<td>120</td>
<td>Point basis</td>
</tr>
<tr>
<td>83.7</td>
<td>79.1</td>
<td>80.6</td>
<td>83.8</td>
<td>160.1</td>
<td>170.6</td>
<td>158.0</td>
<td>7.6</td>
<td>58.7</td>
<td>85.8</td>
<td>Average</td>
</tr>
<tr>
<td>83.7</td>
<td>79.1</td>
<td>80.6</td>
<td>83.8</td>
<td>80.5</td>
<td>85.3</td>
<td>79.0</td>
<td>76</td>
<td>48.9</td>
<td>71.4</td>
<td>Average %</td>
</tr>
<tr>
<td>8.6</td>
<td>10.5</td>
<td>11.2</td>
<td>10.2</td>
<td>17.3</td>
<td>16.6</td>
<td>18.8</td>
<td>1.5</td>
<td>8.8</td>
<td>12.3</td>
<td>Std Dev.</td>
</tr>
<tr>
<td>24/16</td>
<td>20/20</td>
<td>20/20</td>
<td>20/20</td>
<td>20/20</td>
<td>20/20</td>
<td>5/5</td>
<td>60/60</td>
<td>60/60</td>
<td>T/F or MC</td>
<td></td>
</tr>
</tbody>
</table>

The professor’s questions based on class presentations that augmented the course content appeared to be the principal differentiator when reviewing with students the questions that they missed. If someone in the group was not present in class to capture what was discussed, there was a gap in the knowledge that the group or individual could not surmount.

Course Evaluation and Feedback

Table 3 is a comparison of the final course evaluations filed with the department. The course was also observed by the CTE and a critique made. The majority of students scoring the highest grades took the course exams individually. However, the ones that formed a group through discussion, and then interfaced with each other, learned
how to learn, as well. Most failing grades came from students that dropped out of the course for various reasons, but the system carried their presence until the end and they had to be accounted for with a grade.

Both courses were evaluated at the end of the semester. However since this course was taught during the fall, only one score applies as noted.

| Table 3. Student Evaluations: COSC Dept. average and Dr. Solis average |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Year                      | COSC Dept Average | Summer | Fall |
| 2006 Spring                | 4.142            | 4.386  |
| 2006 Summer                | N/A              | 4.265  |
| 2006 Fall                  |                 |        | 4.36 |

Conclusions

According to the student evaluations of the course, we can infer that lack of time for course preparation had no negative impact on either teaching or student learning. Minimizing the negative through the use of instructional technologies appears to have enhanced teaching and learning. The course management tool, Blackboard/Vista, along with enhanced class discussions, and student generation of relevant and insightful questions, promoted individual, collaborative, and cooperative learning. It also promoted an atmosphere that satisfied the students’ needs for social interaction.

Did the changes in teaching practice and use of technology help students achieve the course goals and learning objectives? Everyone that took the final comprehensive examination option had a remarkable increase in score from the pre-test FCE; students reported that they not only learned but enjoyed the course and research indicates that learning is more permanent when it is enjoyable.

How did the technology impact teaching and learning efficiently? From an instructor’s point of view, the integrated course management system enhanced the use of time for student interaction instead of grading and managing complaints. The instructor then put what was learned into practice, during the semester, then later more fully investigated the principles and theory behind the class’s management, and evolved the course for a third presentation with better preparation and management skills.

References


Appendix 1
Course Policy, Procedures, and Syllabus

Course Title: CONSTRUCTION MATERIALS AND METHODS I
Course No: COSC 253 – Section: 500
Class Days and Times: Tuesday and Thursday / 8:00 – 9:15 AM
Location: Zachry Building, Auditorium 102
Prerequisites: None
Semester: Fall, 2007
Instructor: Jose L. Fernandez-Solis Ph. D. / Dr. Solis
Office: Room: Building ARC - C, Room 306 H
Office Phone: 979-458-1058
Email Address: jsolis@tamu.edu
Office Hours: M-F 10:00 am – 12:00 Noon, and by appointment


From the Catalogue Course Description: Materials, methods and sequences of the construction process; emphasis on design, specification, purchase and use of concrete, masonry and wood.

Goals: Aristotle said: “Human beings become builders by building.” This course is an introduction to the process of building (construction). This process requires that we know what to build, when and where it should be built, how to build it, and the time and cost it takes to build it (why); then we build it. The acts of design and construction require:

- Extensive knowledge (both in breadth and depth of multiple subjects)
- Advanced understanding of the processes involved
- Sophisticated reasoning skills (critical thinking, problem solving, creativity, curiosity, concern and an ethical backbone, among others).

The goal of this course is for students to be challenged to grapple with ideas, understand and be able to identify concepts, re-think assumptions and examine their mental models of reality regarding construction.

Objectives: The general objectives for this course are:

- Knowledge: simple recognition or recall of material (identify the specific meaning of words and processes used in construction). This will be accomplished by presenting and discussing construction industry characteristics, professional practices, terminology, and conventions. In other words: “This is how we communicate in our discipline.”
- Comprehension: restating or reorganizing the material presented in such a way as to show understanding (such as contrasting and comparing information). This will be accomplished by presenting and discussing how the academic curriculum prepares the student for professional practice. In other words: “This is how we think in our discipline.”
• Application: problem solving to show how ideas are applied in new situations (such as new case study applications). We will showcase decision making and problem solving cases and involve the class in addressing problems through the use of clickers and group discussions posted on Web CT. In other words: “This is how we act in our discipline.”

• Analysis: separating ideas into component parts and examining the relationships (for example, the relationship of the past to the present and the future). For example, we will study the past and the present to inquire how the challenges of the future may be addressed. In other words: “This is how we apply rationality in our discipline.”

• Synthesis: combining ideas into a statement or product that is new to the learner (such as a group project that allows the students to showcase some of the knowledge gained). Although synthesis is an operation that requires extensive experience, we will showcase how synthesis may be achieved from the student’s current knowledge base. In other words: “This is how we continue to learn in our discipline.”

• Evaluation: judging by established standards (for feedback and diagnosis of both student learning and teaching presentations). Case studies that are discussed and resolved in class and in groups will then be evaluated by the class using the clickers. In other words: “This is how we argue the merits of progress in our discipline.”

Challenge for Adopting a Positive Personal Attitude:

Think of your professor as an executive in a very attractive company whom you want to impress with your work and performance in the hopes of gaining a very sought-after promotion. Act accordingly every day, every time, and at the end of your academic years you will be prepared for THE position for which you are aiming. Start by fully understanding the content of this syllabus.

Each time that a student asks a question that is answered in this syllabus, it shows a lack of attention to detail, a disregard for the scope of the work (in this case the class syllabus). For example, read carefully the next part to see whether or not there is a final exam in this class. What is unclear about this statement that will require students to send an email asking: “Is there a final exam in this course?” Believe it or not, some of you will. Now what would an executive think of this candidate for a promotion?

Policies and Expectations:

This will be an intense educational experience requiring that we all contribute to its success. You are expected to complete readings and other assigned work, including group assignments, prior to class in order to participate fully. Learning is a participative process, benefiting from student/teacher and student/student interaction. You are responsible for all material covered during class meetings and assignments. Since a portion of your grade is based on class participation, attendance will influence this grade.

Class Responsiveness and Responsible Performance:

Our industry is based on responsive and responsible performance. Your performance in this course will prepare you for our industry.

• Responsiveness means that the project submission complies with the scope of the work; that is, it is complete regarding requirements. In terms of the class, it means that your readings are completed before class and you are prepared to participate according to the expectations on this syllabus.

• Responsible performance means that the project is on time. LATENESS WILL NOT BE ACCEPTED: NO EXCEPTIONS; regarding class, it means that you are present and on time.

Assessments:

Examinations will cover the readings and lectures. Neither exams nor quizzes may be taken at any other time; that is, THERE ARE NO MAKE-UP provisions. There is no
Final Exam; however, students will be able to take an Optional Comprehensive Exam (OCE) to confirm what they have learned; if the score is higher than a previous exam, the highest grade will be counted. If the OCE score is lower, it will not affect the final grade.

**Attendance Policy:** Attendance is required. A late arrival to class is not acceptable. It is the responsibility of the student to obtain any missed information or handouts given in class from a classmate. You should exchange phone numbers or email addresses with other students in the class to facilitate note sharing, etc. When you miss class, it is YOUR RESPONSIBILITY to obtain information/notes/assignments from fellow students.

Attendance will be taken with your personal Student Response System (SRS) or eInstruction Remote Device also know as a “clicker.” The clicker is from CPS Classroom Performance System (CPM) remote device by eInstruction. It is ordered like a book: ISBN 978-1-88143-71-1 (CPS RF from eInstruction). You are responsible for purchasing and bringing your “clicker” to every class. No “clicker,” no attendance credit, even if you are there. Clickers will be used in class participation exercises to promote class involvement.

**Participation, Discussions and Leadership:** Design and Construction require working within and among disciplines. This implies participation, cooperation and collaboration at multiple levels and across lines of expertise. Each student is expected to develop some form of leadership through participation and discussions while avoiding arrogance, standing out or the opposite false modesty, shyness and aversion to spotlights. Students need not to stand up when asked a question or participating in a discussion, limit or gauge the time of your intervention so that others may have an opportunity to participate. Build trust in yourself and in others by sharing your questions, answers and discussions with your classmates. Enlarge your circle of leadership from family and friends to your classmates and later on your company and project. A proven way to learn a subject is to explain it to someone else: Become a tutor!

**Evaluation:** Final grades will be based on an aggregate point total for exams, classroom participation, quizzes and project. Course grading is as follows:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥ 90%</td>
<td>≥ 80%</td>
<td>≥ 70%</td>
<td>≥ 60%</td>
<td>≤ 60%</td>
</tr>
</tbody>
</table>

**Points:** The following table summarizes the points for this course. Group presentations will be graded for the entire group, and evaluation of team members will become part of the final grade. Make up exams/presentations for any reasons are not allowed. Project and exam grades will become final two weeks after they are returned in class. Class participation will contribute to the final grade and you must be present in order to participate.

<table>
<thead>
<tr>
<th></th>
<th>Points</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam I</td>
<td>120</td>
<td>12</td>
</tr>
<tr>
<td>Exam II</td>
<td>120</td>
<td>12</td>
</tr>
<tr>
<td>Exam III</td>
<td>120</td>
<td>12</td>
</tr>
<tr>
<td>12 Assignments @ 10 points each</td>
<td>120</td>
<td>12</td>
</tr>
<tr>
<td>6 Quizzes at 50 points each</td>
<td>300</td>
<td>30</td>
</tr>
<tr>
<td>Syllabus Quiz Bonus</td>
<td>20</td>
<td></td>
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<td>12 Assignments at 10 points each</td>
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<tr>
<td>Pre-Test Bonus**</td>
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**Pre-Test Optional Bonus:** You will be given the opportunity to take the Optional
Comprehensive Exam from the previous semester to acquaint you with taking a quiz or exam on
Web CT, the types of questions that you can expect, and to gain a glimpse of the subject matter
that will be covered in the course.

**Assignments:** Assignments are due at the end of the class period; **THERE WILL BE NO
LATE** provisions. Each assignment consists of two parts:

- Part 1 (5 pts) each student is to bring to class a minimum of one true or false and one
  multiple choice question from the chapter reading, written on a piece of paper with your last
  and first name on the top, the date and the assignment number. The questions with the
  answers should be on an aspect of the reading matter that caught your interest and should be
  written thoroughly. Students will also attach the page number where the question was found
  and write a paragraph on why these two questions were interesting, and any research that you
  have done on your own to gain further knowledge. You may also note any difficulty that you
  may be having with the readings or lectures. Students are encouraged to notate ideas and
  issues that come to mind during a lecture or a discussion and add them to the assignment.

- Part 2 (5 pts) students are to post the questions, answers, and page where the information can
  be found in the text on Web/CT Vista under “Discussion” on the file for the relevant chapter.

**Methods of Communicating:** You can ask for clarification via e-mail, in class, or in office
visit. Through Web CT/Vista you are able and encouraged to communicate with each other, your
group and the professor. I will endeavor to respond to your correspondence within 24 hours.

**WebCT/Vista/Blackboard:** Blackboard (who now owns WebCT/Vista) can be accessed via
http://onlinelearning.tamu.edu Note that this URL is different from the one used when accessing
older versions of Web CT/Vista. Exams will be posted in Web CT/Vista, with an ample window
of time. Evaluations (exams) provide feedback on the student learning process and serve as a
diagnostic tool for improving both student learning and teaching methods. The use of references
and books is not prohibited, but if used extensively will be a detriment in completing the
assessment. A pre-test will acquaint the students with this method of testing and will contribute
bonus points towards the final grade. In the first classes we will go over:

- Options for support in case they are needed
- Opportunities to give feedback about the class and the use of instructional technologies so
  that the professor can make minor adjustments when problems arise
- Clarify expectations on assignments and evaluations
- Later on, we will have periodic checks with the class and individually on the progress of
  using

**Academic Misconduct/Honor Code:** Students in this course are responsible for behaving in
accordance with TAMU Student Rules. The Aggie Honor System is found at:
www.tamu.edu/aggiehonor/ For this class the following applies:

- Quizzes will be taken individually
- Exams will be allowed to be taken either individually or in a group
Disabilities: Any student who believes or feels that he/she may need an accommodation for any sort of disability should contact the Office of Support Services for Students with Disabilities in Room 126 of the Student Services Building (phone number 979-845-1637) and contact Dr. Solis during the first week of the semester.

Computer Specifications: Students (especially those outside the College of Architecture - COA) should become familiar with and access http://thelab@langford.edu and those that require remote access must first access the system in the COA at http://thelab.tamu.edu/remoteaccess.asp. Direct any questions to the IT lab located on the first floor of the Langford building.

Lectures and Assigned Readings: The detailed list of lecture topics and assigned readings are provided. It is necessary for students to complete the reading before the lecture date, so issues and cases may be discussed more fully. The lectures may not follow the book readings exactly, but are designed to bring diverse information from various sources. The reading assignments, problem cases and discussion forums are integral elements of the course.

Method of Instruction: The course will consist of a combination of lecture, discussion, site visits, videos, presentations by industry professionals, and teamwork. Learning is approached as a participatory process, benefiting from student/teacher and student interaction. The class format is:

- Introduction
  - Objectives
  - Goals
- Subject matter
- Feedback, questions and answers

Guest Speakers: Guest speakers will be arranged for the scheduled days.

Cell Phones: All cell phones must be turned off in the classroom.

Conclusions: Academic success has multiple elements that influence the final evaluation that students can control with their choices and actions: Choose to attend class regularly, participate constructively; persist when learning is difficult; devote time and effort in preparing for class and completing assignments according to requirements and on time (responsible and responsive), take time to review their individual progress with the professor and seek help when needed. This is responsive and responsible acting.
<table>
<thead>
<tr>
<th>Class</th>
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<th>Reading Assignments</th>
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Appendix 2

COSC 253 Fall 06 Final Grade
Count: 324
Average: 83.8
Median: 85.8
Maximum: 96.6 out of 100
Minimum: 10.3
Standard Deviation: 11.51

COSC 253 Spring 07 Final Grade
Count: 251
Average: 78.2
Median: 84.6
Maximum: 96.4 out of 100
Minimum: 5
Standard Deviation: 22.3
Appendix 3

COSC 253-500 Construction Materials and Methods I – Spring 2008 by Jose L. Fernandez-Solis Ph.D.

Column Statistics for: Quiz 1

Count: 160
Average: 80.5
Median: 85.0
Maximum: 100.0
Minimum: 0.0
Standard Deviation: 15.22

A two chapter, open book, open notes, individual assessment, taken during a window that opened on Wednesday at 10:00 AM and closed on Friday at 4:00 PM with one hour duration.
COSC 253-500 Column Statistics for: Exam 1

Count: 166
Average: 85.6
Median: 87.5
Maximum: 100.0
Minimum: 50.0
Standard Deviation: 8.90

A four chapter (the two of the previous quiz and two new chapters), open book, open notes, individual assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with one hour duration.
COSC 253-500 Column Statistics for: Quiz 2

Count: 164
Average: 84.1
Median: 88.0
Maximum: 100.0
Minimum: 0.0
Standard Deviation: 11.70

A two chapter, open book, open notes, individual assessment, taken during a window that opened on Wednesday at 10:00 AM and closed on Friday at 4:00 PM with one hour duration.
COSC 253-500 Column Statistics for: Exam 2

Count: 161
Average: 80.3
Median: 80.6
Maximum: 97.5
Minimum: 42.5
Standard Deviation: 9.30

A four chapter (the two of the previous quiz and two new chapters), open book, open notes, individual assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with one hour duration.
A two chapter, open book, open notes, individual or in group assessment, taken during a window that opened on Wednesday at 10:00 AM and closed on Friday at 4:00 PM with one hour duration.
COSC 253-500 Column Statistics for: Exam 3

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<tr>
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<tr>
<td>Standard Deviation</td>
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A four chapter (the two of the previous quiz and two new chapters), open book, open notes, individual or in group assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with one hour duration.
A twelve chapter, 120 question assessment (taken from the last semester Final Comprehensive Optional Exam), open book, open notes, individual assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with two hour duration.
A twelve chapter, 120 question Final Comprehensive Optional Exam (FCOE), open book, open notes, individual assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with two hour duration. The only way of making up for a missing quiz or exam; the FCOE replaces the lowest quiz or exam (assessment) grade.
COSC 253-500 Column Statistics for: Final

Count: 179
Average: 77.4
Median: 84.9
Maximum: 97.7
Minimum: 9.0
Standard Deviation: 22.55

Final student grade distribution consisting of: Quizes 1, 2 and 3 at 100 point each; Exams 1, 2 and 3 at 200 points each; 100 for attendance/participation; 35 bonus points maximum from (syllabus 5 pts, pre-test (the previous FCOE) 10 points, attending a Rowlett conference featuring Linbeck construction company 10 points, Final Comprehensive Optional Exam 10 points.
Column Statistics for: Quiz 1

Count: 15
Average: 80.4
Median: 80.0
Maximum: 100.0
Minimum: 60.0
Standard Deviation: 12.52

Grade Histogram

A two chapter, open book, open notes, individual assessment, taken during a window that opened on Wednesday at 10:00 AM and closed on Friday at 4:00 PM with one hour duration.
COSC 601-600 Column Statistics for: Exam 1

Count: 15
Average: 88.3
Median: 87.5
Maximum: 100.0
Minimum: 77.5
Standard Deviation: 5.80

A four chapter (the two of the previous quiz and two new chapters), open book, open notes, individual assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with one hour duration.
A two chapter, open book, open notes, individual assessment, taken during a window that opened on Wednesday at 10:00 AM and closed on Friday at 4:00 PM with one hour duration.
A four chapter (the two of the previous quiz and two new chapters), open book, open notes, individual assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with one hour duration.
A two chapter, open book, open notes, individual or in group assessment, taken during a window that opened on Wednesday at 10:00 AM and closed on Friday at 4:00 PM with one hour duration.
A four chapter (the two of the previous quiz and two new chapters), open book, open notes, individual or in group assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with one hour duration.
COSC 601-600 Column Statistics for: Pre Test

Count: 13
Average: 63.7
Median: 63.5
Maximum: 74.0
Minimum: 58.5
Standard Deviation: 4.00

A twelve chapter, 120 question assessment (taken from the last semester Final Comprehensive Optional Exam), open book, open notes, individual assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with two hour duration.
A twelve chapter, 120 question Final Comprehensive Optional Exam (FCOE), open book, open notes, individual assessment, taken during a window that opened on Friday at 10:00 AM and closed on the following Monday at 4:00 PM with two hour duration. The only way of making up for a missing quiz or exam; the FCOE replaces the lowest quiz or exam (assessment) grade.
**COSC 601-600 Column Statistics for: Final**

- **Count:** 16
- **Average:** 85.4
- **Median:** 90.7
- **Maximum:** 94.2
- **Minimum:** 9.0
- **Standard Deviation:** 20.58

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**Grade Histogram**

Final student grade distribution consisting of: Quizes 1, 2 and 3 at 100 point each; Exams 1, 2 and 3 at 200 points each; 100 for attendance/participation; 35 bonus points maximum from (syllabus 5 pts, pre-test (the previous FCOE) 10 points, attending a Rowlett conference featuring Linbeck construction company 10 points, Final Comprehensive Optional Exam 10 points.