Establishing Freshman to Senior Bookend Experiences to Provide Academic and Professional Introductions to Standardization

Mike Ogle

College of Engineering

University of North Carolina at Charlotte

Primary Goals

- Develop classroom resources to raise the standards awareness of freshman engineering students and senior students in the bookend classes of ENGR 1202 (Introduction to Engineering Principles and Practices) and ENGR 3295 (Multidisciplinary Professional Development).

- Share the resources with instructors and students by developing a website that allows instructors to assign materials and evaluate understanding through online quizzes (instructors choose questions).

- Increase instructor and industry awareness of the project and materials by presenting at an ASEE-sponsored conference.

Significant Accomplishments

- In Spring 2016, raised the standards awareness of over 385 freshman engineering students (81 CE, 99 EE, 171 ME, and 35 SE) in the first discipline-specific ENGR 1202 (Introduction to Engineering Practices & Principles) course.

- Raised the standards awareness of 208 junior/senior engineering students in the last mixed-discipline ENGR 3295 (Multidisciplinary Professional Development) course.

- Have developed a website structure to allow instructors to register and download lecture materials, make assignments for students, then require students to take quizzes based on a set of questions the instructor's select.

Undergraduate Team: December 2015

Primary Questions to Ask/Answer

- Do you recognize this? [symbols and designations from recognizable standards]

- Who develops standards? [to make the point that they do, eventually]

- What is ANSI? [to understand the traffic cop role vs. the developer perception]

- What is ISO? [to understand the similar international role and ANSI connection]

- Are standards law? [to understand voluntary, consensus building, but possible requirement of codes and directives]

- How long does it take? [to understand process steps and 2-4 year cycles]

- How many standards are there? [asked students for power of 10 magnitude]

- What discipline-specific professional organization is connected to the students' major [ASCE, IEEE, ACM, ASME, IISE, etc.]?

- Where can you find standards? [primarily point to NSSN, ANSI, and ISO]

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Dr. Mike Ogle, Principal Investigator

ENGR 3295 – Professional Development – Introduction to Standardization and its Career Impact

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General Prohibition Sign

"This safety sign cannot be used on its own and requires a supplementary sign to give further information about the action which is prohibited."

Designation

ISO 7010:2011 — Graphical symbols -- Safety colours and safety signs -- Registered safety signs

Responsible committee

ISO/TC 145/SC 2

Website reference: https://www.iso.org/obp/ui/#iso:grs:7010:2:P001

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What Is a Standard?

A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.

http://www.iso.org/iso/home/standards.htm

More Important, Why Standardize?

Interoperability (size, shape, frequency, voltage),
Performance (capacity, strength, lifespan, flexibility)
Safety (impact resistance, fire resistance, labeling)
Consistent terminology for the above functionality
Consistent tests for the above functionality
Consumer confidence to enable a market

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Evolution of the Student to Standards Professional

Freshman   Sophomore   Junior   Senior   New Hire   First Promotion   Standards Pro

Yes, you can develop to become the professional that is experienced and insightful enough to be one of the people the country and the world depends upon for development of standards that affect daily life

https://alphabytesoup.files.wordpress.com/2012/07/evolution_of_man.jpg

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All Standards, Specifications, Guidelines are not ANSI Standards, but all American National Standards (ANS) are ANSI Standards

So What Do You Get with an ANS Process?

- open, balanced group of interested/affected people (consensus body)

- broad-based, open public review/comment on draft standards

- anyone can comment and be considered during public review

- incorporation of approved changes into a draft standard

- right to appeal if due process was not respected

openness, balance, consensus and due process

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Standards: Enhancing Your Career and Your Life

Standards Awareness and Participation Provides:

Opportunity to learn about new technologies/practices

Early awareness regarding new tests/requirements

Opportunity to build your professional/personal network

Opportunity to be more valuable to your company

National and international travel to meetings

Pre- and Post-Lecture Response Data
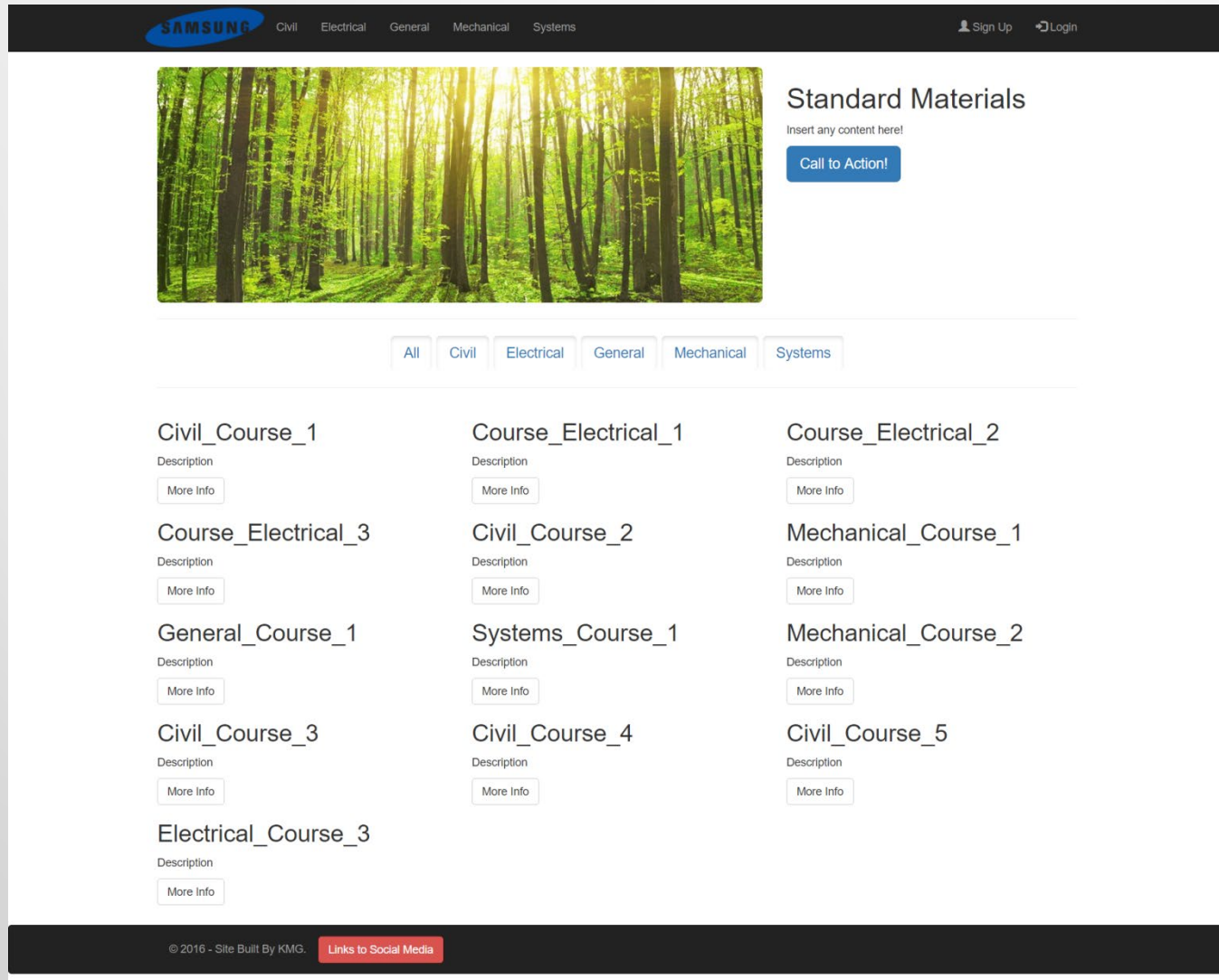
Civil Engineering 1202 PreTest answers									
AsLaw	ANSI	ISO	tANSI	tISO	ANSInum	ISOnum	ProfOrg	Find	Who
d	c		12	12	6	6	ASCE	online	Variations of government, ANSI, ISO, local, state, fed
d			12	24	5	5	interviews training		some engineers, experts from worldwide
n	c	no					ASCE	ANSI ISO websites	Government, industry, organizations like UL
d	American National Standardization Incorporated	no	12	24	5	6	ASCE	online	some are created due to safety precautions, some are created by the government, some scientists
							Intl Eng		the company that makes the products, and the local government for laws like the bike helmets
d			12	6		5	ASCE		Engineers working together
y									engineers
d			12	24			ASCE	online	engineers
d	National Standard	no	12	12	7	7	ASCE	online	System Engineers
d	c	no	6	12			ASCE	website	ANSI
d	Alabama's non-sense instruments	Interesting Science Objects	8	12	10	12	ASCE	internet	engineers and the government
d	American Network of Standard Implementors	no	7	4	7	9	ASCE	ASCE website	Engineers
n		Independent System Operators	9	7	12	10	ASCE	online	the people who are responsible for these standards, probably engineers
d	c	no	6	8	3	6	ASCE	internet	ANSI
d	American National Standards Initiative	Industry Standard Organization	6	12	3	4	ASCE	NSPE site	Federal & State Government agencies
d	c	no	18	12	5	6	ASCE	website	Government or international organizations develop many standards

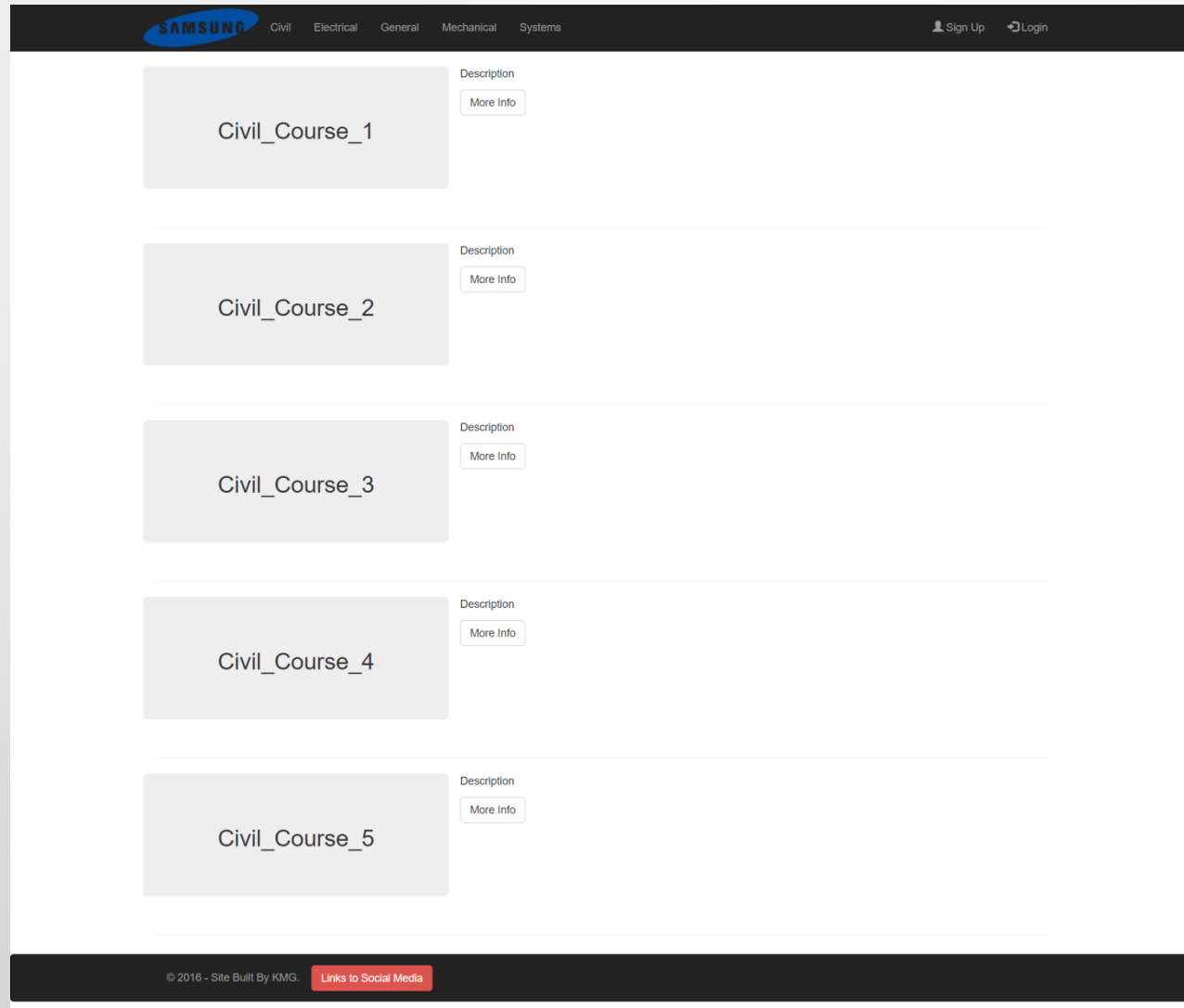# A Quick Look at the Website Structure

Administrator

Website

Faculty   Students
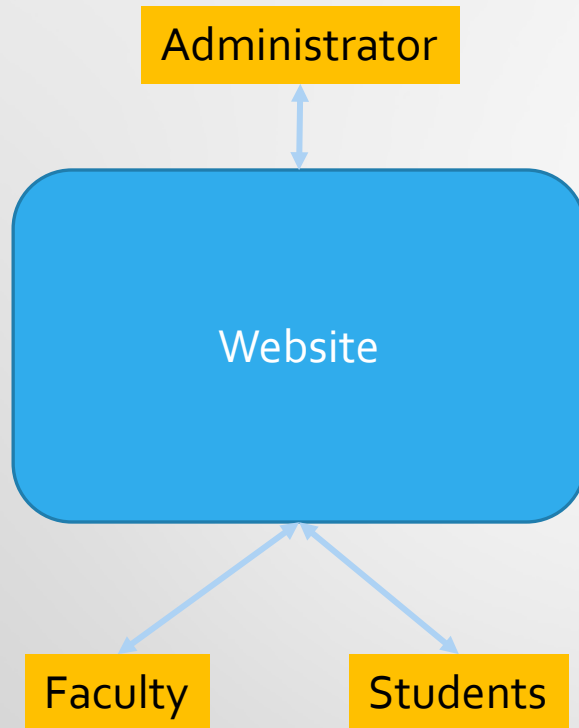
1) Instructor requests access
2) Admin approves access
3) Instructor downloads materials
4) Instructor creates reading list and quiz

5) Instructor invites students
6) Students create login
7) Students download materials
8) Students read/review materials
9) Students take quizzes

10) Admin sends results to instructor
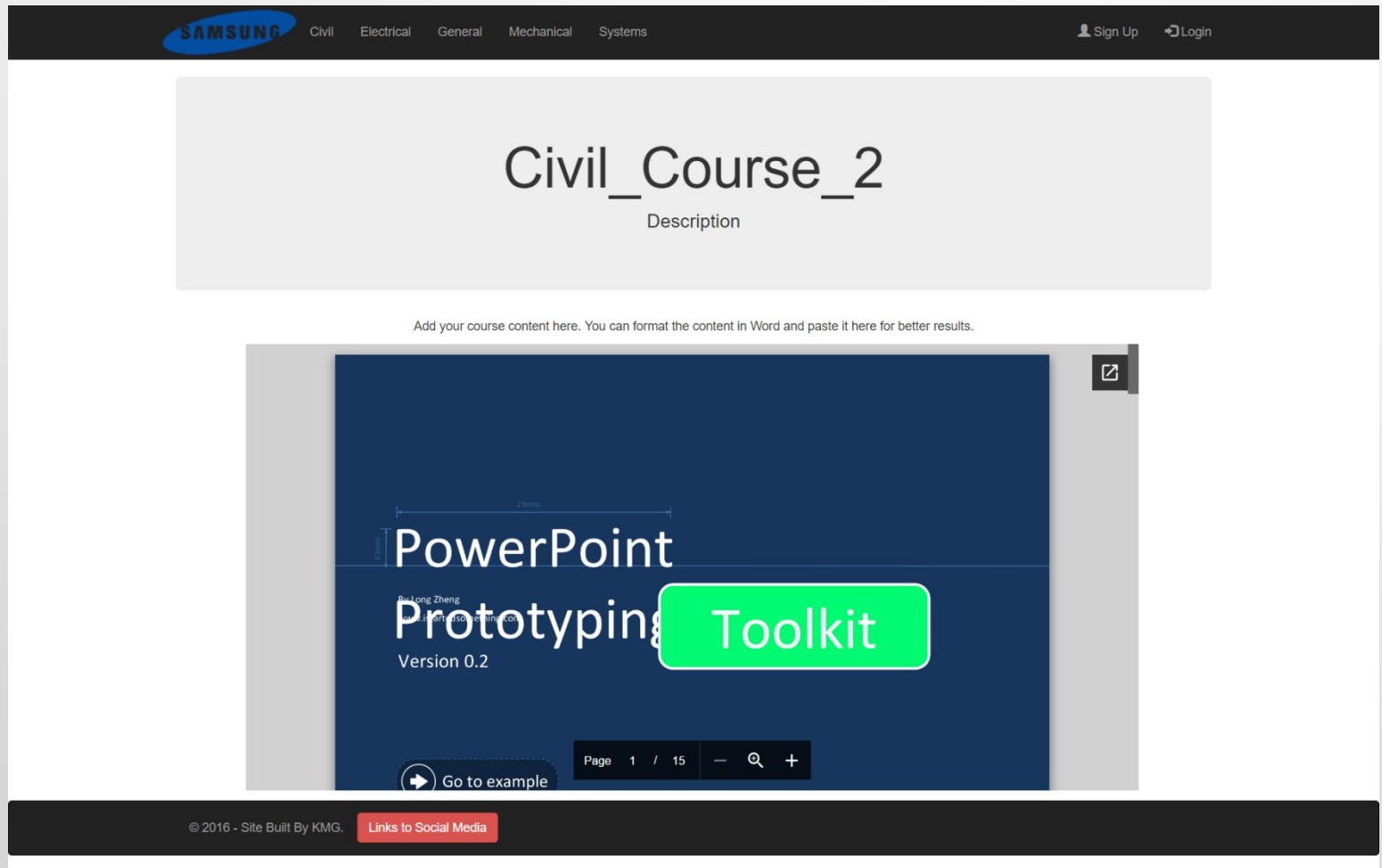11) Instructor sends results to student

12) Administrator adds content/questions

A Short, Five Slide Look at the Website

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Not Done from Original Objectives

- Did not ask each student to identify a standard as an out of class assignment. Various 1202 courses had too many students and too much variation in grading methods to make this work out the first time. Possibly in future.

- Did not have a new assignment added to the senior design classes. The two-semester sequence courses are packed with assignments, but may be able to add more to existing requirement regarding identification of applicable standards (a minor part of a grading rubric).

Lessons Learned

- Engineering students know very little about standards, developers, ANSI/ISO, process, structure, and their ability to be involved.

- Great amount learned from the undergraduate small team, listening to their thoughts once they received the basics of standardization.

- Students in classes were surprisingly engaged, answering questions and asking questions in what can certainly be a very dry subject.

- Need more time! More lecture time AND more outside of class assignment time.

From Proposal to Project: Project Management Challenges

- Some small adjustments regarding assignments for 1202 and 3295 courses. Did not properly anticipate the load and coordination issues with the professors.

- Overall impact is still strong, but it is a "one and done" experience currently. One lecture as a freshman and one as a senior.

- 2nd extension in progress. Project did not start until end of summer 2014, throwing the schedule off for trying to do lectures in 2015 (was in Spring 2016). Extended into 2016 and am now requesting a May 2017 completion date for analysis of data, final reporting and CIEC.

- The amount of funds and categories of spending were amazingly appropriate for this project, but I have noticed that the NIST standardization projects overall are extremely different in scope.

Still To Do

- Data entry from pre-lecture and post-lecture student answers is not yet complete.

- Analysis of data once entered. Planning to evaluate pre-lecture vs. post-lecture results on a summary basis (all pre-lecture answers vs. all post-lecture answers).

- Complete website and test with at least three instructors and their students.

- Write final report with all analysis completed.

- Present at 2017 CIEC (an ASEE conference) in February.

Future Plans/Needs

- Need to find another engineering professor that can be the point person to continue lectures, improve content, and manage website.

- Need to create more case examples, some with greater depth regarding history, need, roadblocks, best practices, lessons learned, etc.

- Need to add an out-of-class assignment to both the freshman and senior classes.

Upcoming Presentation in Feb 2017

Conference for Industry and Education Collaboration

Questions?

Contact Information

Mike Ogle, Assistant Professor, Department of Systems Engineering

University of North Carolina at Charlotte

Mike.ogle@uncc.edu

704-687-5918