Teaching Ergonomics to a New Generation (Z)

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Thomas & Sesek
Teaching Over Time

- **1980s** Chalkboards, flipcharts, transparencies
- **1990s** Transparencies, PowerPoints, online links and low-res video
- **2000s** Outreach/distance learning (asynchronous), learning management systems, multimedia, flipped classrooms
- **2010s** “Live” online, short videos, virtual reality, simulations, gamification
- **2020s** ???
Background

- **INSY 3020**: Occupational Safety & Ergo
- **Broad coverage** of Safety, Ergo, & HF
- **Team taught** (2 faculty, 1 or 2 TAs)
- **Good feedback** from alumni
- Excellent “**recruiting course**” for future grad students
- Subscribed by **students from across campus**
Background

• Initially taught by “lecture model”
• Experimented with “Class Flipping”
• 2005 & forward
  - Students less attentive
  - “Communication” became more difficult
  - Declining student satisfaction
• 2012 – present Sesek & Thomas team
• 2013……evaluation by Biggio Center for Teaching and Learning
Where We Were (2012)

• Doing well – good average scores 4.9/6.0

• Positive comments, but…
  – “I absolutely love Dr. Thomas, _but_ the material is not exactly exciting”
  – “class was _boring_ and tedious at times”
  – “we need more _examples_ of how to solve _actual_ problems”
  – “videos _should_ be _shorter_ , broken up more”
  – “never actually learned _how to apply_ concepts”
  – “more hands on _experience_ ”
Where We Are (2018)

• Still doing well –average scores 5.4/6.0

• Representative comments:
  – “I thought I would hate this class but I really enjoyed it”
  – “makes the class fun and brings concepts into a real world setting that makes them easier to grasp”
  – “Being given examples in class is very helpful, like having a video of unsafe work and being asked what they are doing wrong. I liked the idea behind the study buddy project”
Biggio Center Comments  
Spring 2013

• New generation of students
• Products of “No Child Left Behind”
• Less interested in “general concepts”
• Shorter attention spans: 12-15 Min Max
• Like technology in classroom
• Active, “hands-on” learners
• Appreciate mix of structure, freewheeling and different viewpoints
Biggio Recommendations

• Shorten and consolidate traditional “sage on the stage” lectures…preferably < 15 minutes
• AVOID “detailed ppts”…and overuse of ppts
• Use mix of “structure” and “freewheeling”
• More “engagement” via questions & working through examples
• Hands-on interactive demos…involve class members
• “Real world”…video clips, outside/expert speakers
• Use “student group” arrangements during class time…assign problems, present & discuss solutions in class
• “Use technology” where you can
Generation Definitions

- **GREATEST GENERATION - AGES 89 AND OVER**: 3 million
- **SILENT GENERATION - AGES 71-88**: 26.2 million
- **BOOMERS - AGES 52-70**: 72.9 million
- **GENERATION X - AGES 36-51**: 65.9 million
- **MILLENNIALS - AGES 19-35**: 75.5 million
- **GENERATION Z - AGES 18 AND UNDER**: 77.9 million

Source: AARP Magazine, Pg. 14, Dec 2016-January 2017
“Who” is Generation Z?

- **Born** approximately 1993-2012 (Presently 6-25 years old)...but lines get “blurry”
- **Our entire undergraduate population** and some graduate level
- **Many of YOUR new hires** in industry!
Gen Z-Characteristics

• Recession marked
• Wi-Fi Enabled
• Multi-Racial, most diverse generation to date
• Sexually Fluid
• More religiously diverse (including more non-believers)

Millennials Vs. Gen Z

Millennials
• Entitled
• Idealist
• Creative
• Dependent

Gen Z
• Persistent
• Realist
• Innovative
• Self Reliant
Gen Z-Characteristics

• Concerned about:
  – Growing income gap, declining middle class
  – Student debt (many forego or delay college)
  – More anxious and stressed than other generations
  – More cyber-bullying than the millennials

• More entrepreneurial
  – Not your mother’s lemonade stand – social media/web savvy, 3-D printing and customization, drop shipping
Gen Z-Characteristics

- **More liberal and more conservative!**
- **Liberal on social issues**
  - Same sex marriage
  - Transgender rights
  - Gender equality
- **Conservative regarding personal risk**
  - Postpone risk taking and “rights of passage” such as driver’s licenses, sex, and alcohol
  - Like children of the 30s, but with computers
Gen Z-Characteristics

• Change acceptance has traditionally been difficult, but **Gen Z** may be **better equipped** to handle the **rapidly changing world**. Disruptive technologies have become common place, if not the norm.

• **The grew up with “edutainment”** and expect this type of education/training

• Frequently **share opinions and refer to other opinions** – “**Yelp Generation**”
Gen Z Communication

- Communicate via technology
- Writing and speaking skills not as refined as previous generations
- Obtain most of their information via the internet – hence, trust issues regarding this information (“fake news”)
- Prefer face-to-face meetings when trust may be an issue – but, ... less prepared for such meetings
The Nature of Work is Changing

• Unprecedented flexibility and new income opportunities (Airbnb, Uber, Lyft)
• Workers can swipe on and off of work.
• Both companies and workers much less “loyal” than in the past.
• Workers are seeking more than just money they want fulfillment, purpose and to be working for a “good”, socially responsible company
Gen Z vs. Millennials

• More willing to work overtime – if they see the benefit (more work = more pay)
• Stronger work ethic
• Desire to change the world, but more realistic than their millennial peers
• They are competitive and pragmatic
• They seek feedback and crave constructive critiques – they want that feedback immediately
“Short” Attention Spans

- They are labeled with short attention spans like every generation before them.
- “Competition” for attention has increased more than attention spans have decreased:
  - More compelling formats and multi-media
  - Rapidly changing technologies
- Perhaps a better question: why did previous generations tolerate such poor training and education?!
“Short” Attention Spans

• **Boring is boring**: generations of workers have slept through their safety training

• Should we fault this generation for demanding what science demonstrates is more effective?

• **This generation rates everything** (from Yelp to RateMyProfessor.com) – they are accustomed to providing and using feedback
Key Gen Z Differences

• **Millennial student** to professor – “Explain why my grade is so low!” Visits dean.

• **Millennial parent** to professor – “Why am I paying for my child to fail your class? You need to ‘fix’ this!” Visits dean.

• **Gen Z student** to professor -- “Why is this important? Why should I learn this?” They want to be convinced that the class has value.
Gen Z Hurdles to Overcome

- Focused on grades over learning and concerned about “making the cut”
- Gen Z often appears to be impatient since they are always seeking immediate feedback
- Decreased importance on formality (hair, piercings, tattoos, clothing)
- Perceived as “lazy” rather than “efficient” (e.g., do we need this step?)
Helping Gen Z

• They need practice with face-to-face communication.
• They need help with writing, presenting, and general professionalism.
• They learn best from and appreciate training that is:
  – Succinct and efficient – scrollable!
  – Visual, simplified and, ideally, hands-on
  – Relatable and honest – perfection not necessary!
We Studied Our Teaching

• A desire to continuously improve led to the following actions:
  – Surveyed high-achieving students
  – Received feedback from the Biggio Center for Teaching and Learning
  – Focused on constructive critiques from student evaluations
  – Tested various lecture techniques and concepts
  – Studied the data on participatory behaviors and the link to performance
Actions Taken

- Downplayed formal lecture time...to 10-15 min or less (chunks) and supplemented with multi-media – frequent breaks for questions, demonstrating concepts, showing video/images
- Organized into groups, use of group assignments and presentations
- Ramped up participatory activities in class:
  - more Q & A and associated internet searches
  - “question/answer ball” and other ”games”
  - equipment and procedure demonstrations – in class
Group Activity
Demo Activity
Hands-On Activity
Summary

• Today’s students are different
  – Different technologies and expectations
  – Active, hands-on learning style
  – Exploratory and experiential learners
  – Interested in Application and Usefulness
  – Want things explained in familiar terms and with familiar examples – and “NOW” – they want immediate feedback

• We were inspired to improve the student experience
Summary

• Traditional “Sage on the Stage” (lecture based) teaching model is *NOT* effective with current students

• Our students respond well to active “Guide on the side” teaching strategies

• We are continuing to experiment with our teaching strategies and analyzing the results
Enhancing Classes for Gen Z

• Always begin on time
• Start with a question, example, challenge, or case study -- grab attention
• Break up lectures into manageable “chunks” punctuated by images, examples, and participatory activities
• Keep students “on call” for questions or “volunteering” in small groups
Which way to room 521?
Systems Approach

• Stress **global concepts** and repeat these themes in each section of the class. **Begin and end class with most important takeaways.**

• Emphasize **problem solving approaches** rather than specific solutions. **Solve a realistic problem.**

• Highlight the **interdisciplinary nature** of occupational safety and ergonomics (OSE) and **team-based approaches**.
Bring Examples and Demos

Let students compare for themselves. Take time to discuss pros/cons of different designs.
Compare Old and New

Students enjoy seeing “old” technologies! Compare to familiar technologies.
Show Examples of Good and Bad and Contrast Them

Don’t throw out bad designs, bring them to class!
It’s OK to be Wrong – It’s about Learning!

Audience participation with an “answer” helps grab their attention
Make Examples Relatable
Show Solutions: Especially from *Your* Workplace

Include as many of your own pictures and examples as possible
Don’t Just Talk about Science, Do It!

You should be willing to endure what your students or employees must endure.

Core Temp
99.2° F

Core Temp
100.5° F
Students Inspired to Test Classroom Concepts

Student plunged their head into ice water to test the “dive reflex” themselves.
Now that you have seen some examples: here are some data

- We studied the impact of participation in activities outside of class.
- Students were awarded extra credit for participation.
- Could earn up to 5 percent extra credit.
- Statistics do NOT include extra credit.
- We wanted to measure the impact of these activities on class performance.
- 280 students, 2 classes (2015 and 2016)
Outside Activities

• Encouraged participation in activities outside of class & studied impact
• Students were awarded extra credit for participation
• Could earn up to 5 percent extra credit
• We wanted to measure the impact of these activities on class performance
• 280 students, 2 classes (2015 and 2016)
Activities Ranged in Level of Engagement

1. Join an OSH related society such as ASSE
2. Submit exam and quiz questions
3. Participate in on-line forum (through Canvas classroom management tool)
4. Bring materials (items, videos, pictures, case studies, etc.) into the classroom (includes shooting a video with Dr. Sesek and posting to Canvas)
5. Attend a safety-related seminar and summarize what you learned and submit
Results

• **Strong positive impact** on class attendance and performance

• **Strong statistical correlations:**
  – grades and attendance
  – grades and participation in extra credit activities both in and outside of class
# Results: Participators vs. Non-Participators

<table>
<thead>
<tr>
<th></th>
<th>In-Class Discussion Material</th>
<th>Submit exam questions</th>
<th>On-line Forum Participation</th>
<th>Safety Society Membership</th>
<th>Attendance of a Safety-Related Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P-value</strong></td>
<td>0.0219*</td>
<td>&lt;.0001*</td>
<td>0.001*</td>
<td>0.0011*</td>
<td>0.0007*</td>
</tr>
<tr>
<td>Difference Raw Mean Score of Those Submitting Minus Raw Mean Score of Those NOT Submitting</td>
<td><strong>2.79</strong></td>
<td><strong>4.28</strong></td>
<td><strong>3.48</strong></td>
<td><strong>3.44</strong></td>
<td><strong>4.37</strong></td>
</tr>
</tbody>
</table>

*“Bump” in grade associated with participation*
Extra Credit up to 5 points
1 pt = 20%, 2 pts = 40%, ..., 5 pts = 100%
Grades as Function of Number of Extra Credit Activities

<table>
<thead>
<tr>
<th>Score vs. Extra Credit Participation</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>80.0</td>
<td>79.3</td>
<td>38.57895</td>
<td>94.21053</td>
</tr>
<tr>
<td>82.6</td>
<td>82.6</td>
<td>61.36421</td>
<td>100.7895</td>
</tr>
<tr>
<td>86.1</td>
<td>86.1</td>
<td>57.10263</td>
<td>100</td>
</tr>
<tr>
<td>85.4</td>
<td>85.4</td>
<td>64.61526</td>
<td>96.63158</td>
</tr>
<tr>
<td>87.3</td>
<td>87.3</td>
<td>75.97211</td>
<td>96.35211</td>
</tr>
<tr>
<td>88.5</td>
<td>88.5</td>
<td>74.23105</td>
<td>100</td>
</tr>
</tbody>
</table>

# Extra Credit Activities: 39, 93, 56, 43, 29, 20

% A: 8, 22, 21, 30, 38, 40

% F: 5, 0, 2, 0, 0, 0

Total: 280
Lessons

<table>
<thead>
<tr>
<th></th>
<th>In-Class Discussion Material</th>
<th>Submit exam questions</th>
<th>On-line Forum</th>
<th>Student Memberships</th>
<th>Safety-Related Seminar Write Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-value</td>
<td>0.0219</td>
<td>&lt;.0001</td>
<td>0.0010</td>
<td>0.0011</td>
<td>0.0007</td>
</tr>
<tr>
<td>Significant Difference*</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Difference** (Score without Extra credit &amp; without attendance)</td>
<td>2.79</td>
<td>4.28</td>
<td>3.48</td>
<td>3.44</td>
<td>4.37</td>
</tr>
<tr>
<td>Percentage of students participating in each assignment</td>
<td>78%</td>
<td>30%</td>
<td>35%</td>
<td>36%</td>
<td>19%</td>
</tr>
<tr>
<td># of students participating in each assignment</td>
<td>217</td>
<td>83</td>
<td>97</td>
<td>101</td>
<td>52</td>
</tr>
</tbody>
</table>

- This biggest “pay offs” were the least participated in activities
- The more involved, the bigger the benefit
Results

• Overall…\textit{very positive feedback} from students

• \textbf{Much stronger} student engagement

• \textbf{Improvement in attitude} of students

• \textbf{Better} teacher-student \textit{dialogue}

• Reflected in narrative comments in AU Evaluations

  \textit{“My favorite course”}

  \textit{“Best course I have had at AU”}

  \textit{“Everyone should take this course”}

  \textit{“All engineers should take this course”}
Translation to the Workplace

• The same factors should impact learning in the workplace (we need to study that too!)
  – Encourage active participation
  – Give assignments and have employees present their findings to their colleagues
  – Give “extra credit” by connecting extra curricular activity to your incentive programs (recognition = incentive)
  – Ask employees to present different portions of the safety training
  – Ask employees to bring examples to safety meetings (like the “safety share” concept)

• Your ideas? Please Share them with us!
Thank You for Your Attention!
Any Questions?

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Center for Occupational Safety, Ergonomics, and Injury Prevention
At Auburn University
Some References

Books on the Subject
• *iGen, Why Today’s Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy – and Completely Unprepared for Adulthood* -- Jean M. Twenge, PhD
• *Meet Generation Z, Understanding and Reaching The New Post – Christian World* -- James Emery White
• *Generation Z Goes To College* -- Corey Seemiller and Meghan Grace

Articles on the Subject
• *Communicating with Gen Z Employees: The Modern Manager’s Guide.* Written by Rise Staff. ([https://risepeople.com/blog/author/admin/](https://risepeople.com/blog/author/admin/))
• *Practical Leadership: Everyday Advice For Managers And Leaders.* ([http://crestcomleadership.com/](http://crestcomleadership.com/))
• *Ready or not, here comes Gen Z!* A3 Insider, The week in tech + trends, Robert Huschka
• *Workers are Bailing on Jobs Without Notice.* Industrial Equipment News,
• Joyce M. Rosenberg, October 3, 2018