



# Active Learning in an Actuarial Curriculum

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## Outline



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- 2 Active Learning
- 3 Online Learning Tools
- 4 Appendix - Online Learning Tools



## The Threats



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- Distance Education
  - Has been popular at least since the 1890's in the form of correspondence courses carried out by the mail service
  - Big advantage - Access to Learning
    - Flexible programming allows learners to participate who may not be able to otherwise, e.g., traditional academic calendars may not match a person's work and family responsibilities
- In 2013, we thought that "massive open online courses" (MOOCs) may be the biggest threat to traditional academic brick-and-mortar universities



## MOOCs



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- MOOCs (massive open online courses) are generally free and open to the public
- Many courses are taught by well-known and respected professors from prestigious universities
  - These universities partner with commercial providers, e.g., Coursera, edX, Udacity, Udemy
  - See Adam Butt's *Introduction to Actuarial Science* at edX, <https://www.edx.org/bio/adam-butt>



# MOOCs



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- Most focus on traditional (video-captured) lectures (high quality)
  - Most suitable for the high self-motivated learner
- Adaptive learning platforms (e.g., Khan Academy, Carnegie Mellon, DataCamp) are the next threat



# Our Response - KDBIN



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- In response to these (real or perceived?) threats, the Wisconsin School of Business engaged in a curriculum restructuring
- It is known to us through the acronym KDBIN (pronounced "kay-dee bin")

Table. Types of Learning Outcomes

Learning Outcome	Description (From the Students' Perspective)
Knowing (K)	My conceptual expertise and awareness of facts, frameworks and theories
Doing (D)	My ability to execute and demonstrate what I have experienced
Being (B)	My understanding of who I am and how I match with the values of the university and my profession
Inspiring (I)	My understanding of who I could be and how I could inspire others
Networking (N)	Who I interact with and how I relate to others



## KDBIN and the Actuarial Curriculum



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- For each outcome, we identify several *activities*, or *processes*, that naturally support the outcome.



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- For each outcome, we identify several *activities*, or *processes*, that naturally support the outcome.
- These activities are categorized as:
  - Coursework
  - Faculty Mentorship
  - Student Actuarial Club
  - Industry Partnership (Co-Curricular Learning Board)



# KDBIN and the Actuarial Curriculum



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- For each outcome, we identify several *activities*, or *processes*, that naturally support the outcome.
- These activities are categorized as:
  - Coursework
  - Faculty Mentorship
  - Student Actuarial Club
  - Industry Partnership (Co-Curricular Learning Board)
- Through this process, we are learning to address
  - Holes in our program that we were not aware of (e.g., ethical training)
  - Specify the type or combination of activities most appropriate to support each learning outcome



# KDBIN Example



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Outcomes	Coursework Activities	Faculty Mentoring Activities	Student Club Activities	CCIB Activities	Assessment
Communication (Doing)	<ul style="list-style-type: none"> <li>• Develop the ability to present analysis in a confident, organized, coherent manner</li> <li>• We stress data and graphical communication, an important area often overlooked even in business school communication courses.</li> <li>• Communicating results to non-technical audience</li> </ul>	Through technology enhanced learning activities, students practice communication by constructing tutorials using Camtasia	Student presentation at club events, student panels at club events, student officer and class officer opportunities	Student Ambassador Program	• For each event (Number of students attended overall, by class, excluding officers, number of unique students)
Critical Thinking (Doing)	Develop critical thinking to solve complex problems from first principles				
Leadership and Teamwork (Doing, Being, Inspiring)	<ul style="list-style-type: none"> <li>• By working together with fellow students as a team, demonstrate the ability to work cooperatively to complete assignments.</li> <li>• Working with others to decide on a project task, collect, necessary data, create and analyze results, and summarize in coherent fashion</li> </ul>	Through technology enhanced learning activities, students practice work cooperatively to construct innovation learning tools	<ul style="list-style-type: none"> <li>• The clubs promote leadership by developing club officers, class representatives to officer meetings, and tapping students to help organize specific events</li> <li>• Mentorship program. Improve relationships within club between upper and under classmen; Give advice to underclassmen on a variety of topics including resumes, class selection, interviewing. Provides upperclassmen with leadership experience; Enables underclassmen to become more engaged in the program and have a peer mentor they can look up to.</li> <li>• Create feeling of community and promote friendships and valuable networking within our club.</li> </ul>	Ambassador Leadership Program	(The number of student-driven initiatives.) • Number of students participating in mentorship program, Number of Unique Students Overall (by class, number of officers, class officers, other special opportunities
Research, Theory, and Practical Application (Doing)	Linking actuarial coursework together to understand the interconnectedness of the discipline	Through technology enhanced learning activities, students develop skills for making practical learning tools that can be used in the workplace			Survey of former students taken "n" (e.g. 1) years after graduation



## Active Learning



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- Develop premium learning content through *active learning*
- **Active Learning** - an approach to classroom activities in which students engage the material they study through reading, writing, talking, listening, and reflecting.
  - A traditional instructor is sometimes referred to as the “sage on the stage,” where the teacher does most of the talking and students are passive.
- Proponents of active learning suggest augmenting classroom activities by talking and listening in small groups, and having students write, read, and reflect on material.
  - See for example <https://cei.umn.edu/active-learning>
  - Active learning can also refer to an online textbook that includes interactive features.
- Active learning promotes a **deeper learning** goal: *The ability to learn how to learn independently.*



## Flipped Classroom



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- One approach to active learning is to reverse (or “flip”) the roles of homework and lecture in a class, known as a “flipped” classroom
- Teaching a flipped class is a tremendous amount of work, at least the first time
  - UW technology experts suggest taking 3 semesters to build up your resource base



## WISGel Learning Space



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### ▶ Wisconsin Collaboratory for Enhanced Learning (WisCEL) on 4<sup>th</sup> floor of Wendt

#### ▶ Active Learning Lab

- Technology-enhanced, active learning at group tables
- Support for peer collaboration with digital displays and whiteboards for group sharing

#### ▶ Break-out rooms of varying sizes with flexible seating

#### ▶ Consultation space

- One-on-one & small groups



Photo by: Mark Riechers,  
UW-Madison College of Engineering



## Flipped Class Design Mechanics



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- I had two sections, 55 and 45 students, with a graduate student and several undergrad assistants.
- This is the second semester of Actuarial Mathematics (junior senior class)



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- I had two sections, 55 and 45 students, with a graduate student and several undergrad assistants.
- This is the second semester of Actuarial Mathematics (junior senior class)
- Students must come to class (two 75 minute classes per week) – this is not a distance alternative
- At home, they watch 48 video clips over the course of the semester, each ranging from 8 to 15 minutes. They take a quiz at the end of the clip to prove that they have watched it.



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- At home, they watch 48 video clips over the course of the semester, each ranging from 8 to 15 minutes. They take a quiz at the end of the clip to prove that they have watched it.
- Mondays - start with a 10 minute quiz on assigned problems that they do at home. The rest of the class period is spent either working on a computer (Excel assignment) or optional problems
- Wednesdays - they work in assigned (by me) teams on problems that they turn in at the end of the period.
  - In class, they are constantly working with neighbors (on Mondays) or team mates (on Wednesdays). They spend most of the time teaching each other. I, and two assistants wander through the class providing one-on-one (or one-on-four) help.





## Flipped Class Results



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- After 9 weeks of the semester, I reverted to lecturing once a week for 25 minutes. This action was based on student feedback.
- The next semester, I used the “hybrid” or the “blended” approach, a combination of live classroom lecture and active learning. Far better than a pure flip.
  - Capture selected pieces and required students to view these off line, just as you would with certain parts of a textbook.
  - In deciding what pieces to do live, it is helpful to use the KDBIN framework (what inspires a student?).



## Other Approaches to Active Learning



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- We have a regression course and comparable course in health analytics where we use this hybrid model
  - Each class is a combination of lecture and hands-on activities (using R to analyze data).
- We have two exam tutorial classes (1 credit hour) for probability and interest theory that utilize active learning
  - 4 - 6 students per table working collaboratively on problems
  - Each table has a student who leads the table through the problem
  - Student leaders stand and use whiteboards to document problem solution - this develops presentation and communication skills
  - Faculty member provides guidance as necessary



## Web Based Learning Tools



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- Web based learning tools can be used to promote active learning
  - Web based tools allow us to reach learners that we never could before
  - Even (or especially) for institutions that wish to offer a premium learning experience, Web based tools can be used to augment the classroom experience, make our students more efficient learners.
- Developing web based educational tools that are freely available to all is important for our future as a profession. Personal experience includes:
  - Online exam review videos, sponsored by the Society of Actuaries Center of Excellence Grant
  - Online textbook on Loss Data Analytics (currently being developed)
  - A regression course using the Datacamp learning platform (currently being developed)



## Concluding Thought



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- Our goal, as educators, is to offer a premium learning experience
- Developing innovative educational content is just as exciting as research - creativity is rewarded!
  - Sadly, current reward systems of most universities do not encourage educational innovation



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# Thanks for Attending!



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- This is a three-year project funded by the Society of Actuaries - we were eligible to compete for this as a Center of Actuarial Excellence
- Grant ended in 2013



## Society of Actuaries Learning Grant



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- This is a three-year project funded by the Society of Actuaries - we were eligible to compete for this as a Center of Actuarial Excellence
- Grant ended in 2013
- Purpose: To develop technology enhanced learning (TEL) tools to provide new ways for students to master classroom material.
- Tools are available anytime and anywhere a learner chooses.
- This is learning enhancement (supplement to the classroom), not distance education.
- These tools are freely available for the public, e.g., **your** students.



## Online Actuarial Exam Videos



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- The Wisconsin Technology Enhanced Learning (TEL) site is best known for exam preparation videos
  - Site has over 450 student-produced videos on the preliminary actuarial exams (P through C)
  - Since we went live in 2013, about 120 thousand visitors from 150 countries
  - Last year, over 30 thousand (unique) visitors
- More than just exam prep! We have information on Excel, R-Commander, making graphs, and so forth...
- <http://instruction.bus.wisc.edu/jfrees/UWCAELearn/default.aspx>



# Wisconsin TEL Visitors



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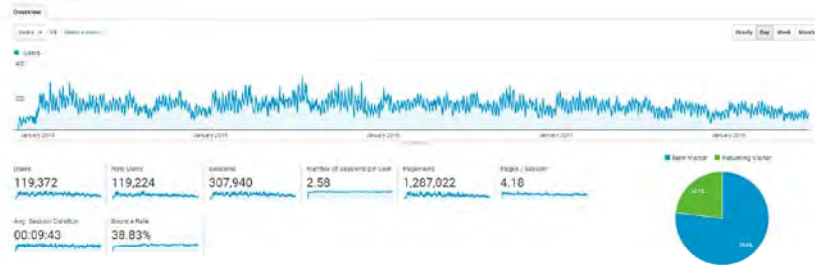
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# Wisconsin TEL Visitors



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Country	Users	% Users
1. United States	30,197	58.61%
2. Canada	8,278	10.25%
3. China	1,530	2.97%
4. Hong Kong	1,219	2.37%
5. Taiwan	1,052	2.04%
6. Malaysia	1,033	2.01%
7. South Korea	868	1.69%
8. United Kingdom	830	1.61%
9. India	765	1.49%
10. Philippines	655	1.27%