Incorporating Computer Assisted Instruction in Actuarial Courses Russell Jay Hendel Towson University RHendel@Towson.Edu

> <u>EISTA</u> <u>Summer 2018</u> <u>Wed. July 11, 2018,</u> <u>6 PM</u>

The Players

<u>University</u>: Towson University, Md, CAE AiC: ADAPT in CLASS Software HISTORY: ADAPT was already used for students studying for SOA / CAS exams ISSUES: New: Implement ADAPT in classroom DISCUSS: Tweaks, Affect on Student

Towson University, Towson Md

- 60 majors; 75 graduate programs;22000 students
- 17:1 faculty student ratio
- 78% faculty have highest field degree
- Center of Academic Excellence (2002)
- Center of Actuarial Excellence (CAE) (2013)

Dept of Mathematics
1960-Pure math; Secondary education
1990-Applied math; actuarial math
Masters: Industrial Math; Math Education
Today: Actuarial Risk Management concentration and CAE:

- Strengthen actuarial academia
- Enhance academic research
- Encourage universities to advance actuarial
 Bridge: Business world & Academic world

AiC

- Society of Actuarial SOA preliminary Exams
 Vendors Problems, Texts, Software
 - Actex
 - Infinite Actuary
 - Coaching Actuaries (ADAPT)
- ADAPT = Adaptive Dynamic Actuarial Practice Tests
- AiC ADAPT in Class (20 Universities)

AiC – Important Features 1st: Discuss criteria for pedagogic excellence

Hendel, Leadership for Improving Success Through Higher Cognitive Instruction in Styron and Styron, Comprehensive Problem Solving and Skill Development for Next Generation Leaders 4 Pillars of Educational Excellence These replaces Bloom etc.;easier to use - Pillar 1: Executive Function (multiple brain areas) - Pillar 2: Goal Setting (challenging, short, clear) - Pillar 3: Attribution Theory (self + effort) - Pillar 4: Self-Efficacy (I can achieve ...)

AiC – Important Features Structured Curriculum, Specific Learning Objectives (e.g. Money Growth, Loans, Annuity (level, increase, decrease...)) $(\rightarrow Executive Function - multiple areas)$ 1500+ Problems (→ *Performance-success* major driver of self-efficacy) 10 Level of difficulties – (→ Goal Setting-need) challenge)

Self paced objective (→ Attribution: self, effort)

History of AiC

Started as software assistance

 Growth in # problems
 Growth in difficulty levels

 Now:

 Use in class vs. outside-supplement
 Currently about 20 institutions use it

ISSUES –

Classroom, tweak, students

- Used for 2 semesters (Fall 17, Spring 18)
- Student reaction Very Positive
 - Enables practice at one's own pace
 - Enables usage any place / time
 - Enables self-assessment of SOA-exam readiness

 Software provides alternative source of formulas and solutions(So students benefit both from instructor and class)

Classroom Use

Typical class day

 Lecture / Theory
 Illustrative class problems
 Homework Problems

Lecture – Illustrative – HW Problems

- Provided by instructor (me)
- Frequently deviate from ADAPT approach
- Book of Lecture notes online Chapter @ Class day
- http://www.rashiyomi.com/math/DrHendelsF MLectureNotes.pdf

Lecture – Illustrative – HW Problems

Illustrative Problems Before ADAPT, From Texts After ADAPT, From Software Software allows random and focused selection I prepare two problems sets @ lecture - Illustrative problems (used in class) - HW problems (must be completed by next class)

Lecture – Illustrative – HW Problems

Use textbooks before ADAPT, now use ADAPT Before ADAPT, 1 worked-out problem After ADAPT: 4-8 problems Before ADAPT, Instructor judgement After ADAPT: Use ADAPT's difficulty levels to create focused problem sets. Before ADAPT, one main issue @ topic; After ADAPT, can focus on all main issues

 Problems - Tweaks
 Instructor emphasizes rule of 4: Verbal, formal, geometric, computational (Hughes-Hallet).

 Need HW graded both on correctness of answer and correctness of use of *rule of 4* ADAPT solutions do not reflect rule of 4

 Students sometimes don't know "What did I do wrong" (can't understand ADAPT solution)

Problems – Tweaks, fixes

- Two HW vehicles per lecture
- ADAPT problem-set HW (auto graded!)
- FORM HW (problem from HW must have solution using *rule of 4;* Student graded on *method (presence of rule of 4))*
- End of semester: 20 quizzes; 20 form-HW
- HW Grade = Average of both
- Different HWs useful for diagnosis

Problems – Tweaks, fixes Students: "What did I do wrong?" I instituted email-tutorial (email help desk[©]) Student sends Adapt Question ID (or phone scan of problem) - Correct Choice - Problem Difficulty - **(Important)** Phone scan of their solution I: i) respond quickly, ii) identify where error made; iii) categorize error; iv) praise rest

Recent Tweaks, fixes

Past June 2018

- Some students failed SOA exam, attempt 1
- Told me: Many questions on topic X with certain features
- My response:
- Create problem sets with those features
- Create handouts emphasizing subtle aspects of theory
- Positive feedback from other students (passed)
 EISTA Conference, 2018, July
 11, 2018 Afternoon Session
 1. 17