



# Ontario College Mathematics Association: Case of the missing student?

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# Missing students

- A student was missing from statistics class.
- Next class, more students went missing
  - Is this a serial offense?
- More students went missing after the test?
- Prof. Moriarty checked other statistics classes.
  - Statistics students were missing across the school!
- A conspiracy of the missing?
- or a missing conspiracy?





# Sherlock investigates





# Case of the missing student

- Sherlock was stumped.
- He said, “I look for clues on a student. A tear in clothing, a stain, a broken watch, a small scratch, .... But these things are missing when the student is missing.”
- “We need is to look at the data.”



# Student success rates

- Like most colleges, student success rates in statistics are around 50%
- With online video, adaptive learning, blended, hybrid delivery, ....
  - We hit 90% student success consistently with over 10 different professors and in different programs.



# Elementary Dear Watson

- Every college course consists of
  - Questions
  - Lectures
  - Textbook
- Statistics has the same basics as every course.



# Dynamic versus static

- Your Smart phone social media student is **NOW, Dynamic, or BORED!**
- **Personalize**
  - Every student is working on a
    - different question,
    - different topic,
    - different difficulty level,
    - and even a different lecture
  - What students need is the right question in the right place for the right student **now**



# Question, question, Dr. Watson

- Overwhelmingly, past students said **more practice questions** would help the most
- We provide an Infinity Test Engine with billions of questions
- Automatic, instant grading speeds learning
- System adjusts difficulty to student ability





# Questions

- Questions are **adaptive**
  - Adjusted to student ability
- Questions are not verbose
  - We separate statistics issues from language challenges
- Questions start with simple calculations
  - Because many students are not confident
- We saw a 6% increase in student success
- Sherlock deduced some missing students were not murdered by a serial killer.



# Textbook

- In college, research indicates more than a third of students do not buy the textbook because it costs too much.
- We use a \$35 package, not a \$100 or \$200 book.
- Our book includes most a common error section and lots of examples.
  - Do you put a cone up blocking holes in the road?



# Lectures

- We have 60 online lectures
  - Do lectures anywhere - on a bus with a cellphone
  - Repeat the lecture as needed
- Our survey shows more than 50%, the majority, are ESL students in statistics.
- We saw another 6% increase in student success with online lectures



# Hybrid, blended, flipped

- We use a **flipped** classroom
  - Do lectures at home, do hard problems in class where your professor can help
- **Hybrid**
  - Lots of online content
- **Blended**
  - Learn online, learn in class,
    - learn, learn, learn, it is easy,
    - All you need 'learn'



# Traditional lecture kills...

- Traditional lectures kill student interest
  - students go missing.
  - You cannot personalize with traditional lectures
- Use a flipped, blended, hybrid delivery
- 60+ online lectures
  - Less than 15 minutes each



# High Score

- Using avatars
  - Avatars are affective learning
    - Princess Unicorn and Wasabi Pants won
    - Avatars are more emotional and so engaged
- No grades but motivational.
- Missing students can do 1000s of questions to get the high score



# Badges

- It feels good to get a badge
- I enjoyed getting a badge and I am the professor



# Dashboards

- **Before** the first test,
  - See what topics the class is struggling with
  - Drill down to which student is struggling
  - Offer help where needed
  - Reteach what is needed
- Not everyone asks for help.
  - Shy? Missing?





# Test generator

- We have a test generator
- Give me 3 level 6 probability questions, one coefficient of variance, and two binomial questions.... 2 seconds later you have the test, answers, and data.

The logo for WikiTest features a vertical black line on the left. To its right are three overlapping squares: a yellow one at the top, a red one in the middle, and a blue one at the bottom. The text 'WikiTest' is written in a blue, sans-serif font to the right of the squares.

# WikiTest

- Wikipedia gives content
- Wikipedia does not give tests to check understanding about the content
- We allow professors to build and share questions with up to 7 levels of feedback



# Alerts

- We have a multi-level alert system
- Research shows students prompted to work harder do better – including spillover to other courses without alerts



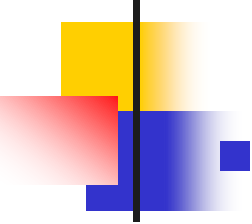
# JIT scheduling

- Students can start when they want
- Finish as soon as they want
  - Stuck in Russia without a Visa?
    - Do online lectures and questions now
  - Need to finish in 3 weeks to graduate?
    - Work at your own pace, online, now
- Faster is ok, slower is not for Admin or Regulatory reasons.



# Learning Analytics

- We keep data on how many times a topic textbook, question, or video is used by a student.
- Is there 'gold in them thar data hills?'
- Does reading improve results more than movies?
- Does reading and movies improve results more than just reading?

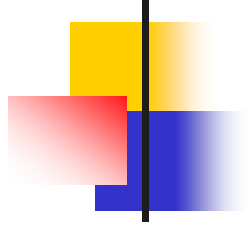
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- Sherlock says the data is the clue to missing students.
  - We went from 50% missing students to 10%.
    - We still have a few missing students.
  - It does not matter how wonderful the tools or professor is if students do not use them.



# Futures

- Gamification, themes, social media, cloud, robotics, machine learning, community mentors, and BYOD





# Questions?