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Statistical Strategies: Meeting the Needs of Struggling Math Students through Self-Guided Interactive Media

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Meeting the Needs of Struggling Math Students through Self-Guided Interactive Media
2014 - 2015

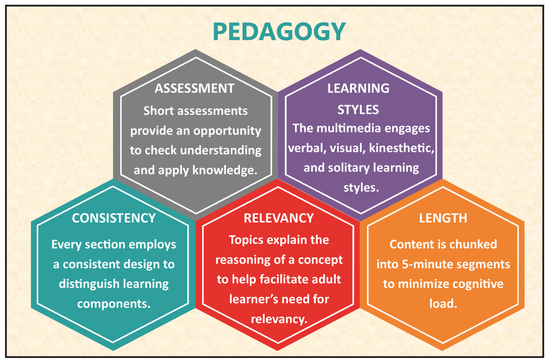
Need

- MATH 215 has been a gateway course with high DEWZ rates
- Not enough instructional time for online students
- Focused more on procedures than conceptual understanding
- Overwhelming scope and pace of covered material
- Students become easily frustrated, which impedes confidence and success

Theory

Students learn best
- By constructing knowledge
- By active involvement in learning activities
- By practicing the ideas and methods
- With consistent and helpful feedback
- If computers and calculators are used for procedural ease and visualization
- If students are aware of and confront their misconceptions
- If teachers do not underestimate difficulties

Garfield, J. How students learn statistics. *International Statistical Review.* University of Minnesota

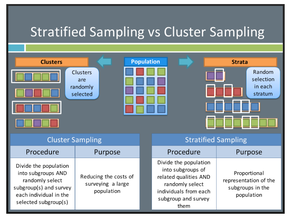


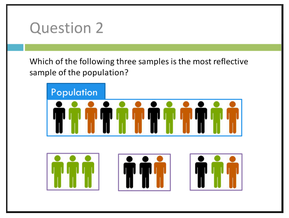
Redesign Recommendations

- American Statistical Society recommends that a successful introductory college level statistics course:
  1. Emphasizes statistical literacy and develops statistical thinking
  2. Uses real data
  3. Stresses conceptual understanding rather than mere knowledge of procedures
  4. Fosters active learning
  5. Uses technology to develop conceptual understanding and analyze data
  6. Uses assessments to improve and evaluate learning

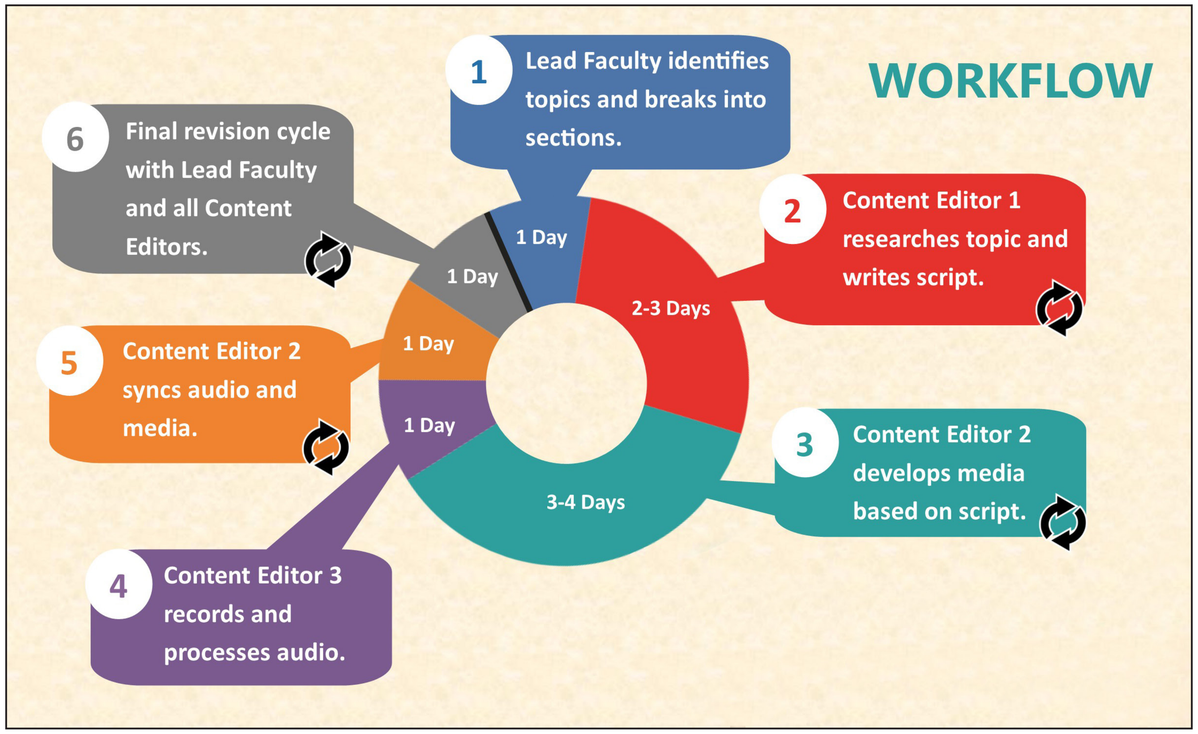
Multimedia Plan

- Use interactive modules with recorded lectures and conceptual questions with detailed, helpful feedback (active learning-confidence building)
- Provide additional topic videos, such as calculator tutorials, only in the modules where the videos are needed
- Provide an opportunity for self-assessment with explanatory feedback
- Include audio transcript for clarification and ESL learners
- Include three different types of interactive slides: informational, summary, and check your learning questions



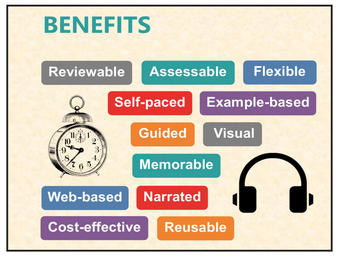


Multimedia Process



Results

- Created 28 multimedia pieces over the course of 7 months
- 6 hours of contiguous interactive instructional content
- Multimedia is topic-based, not dependent on textbook
- Multimedia can be reused in other courses
- Multimedia was implemented in MATH 215 for the Fall '14 term



Research Initiative

The MATH 215 Research Project has 3 stages:

Stage 1: Design Study
- Stage 1 will collect information on user experience in three different forms:
  - Usability testing: Survey 1 (Bug Report)
  - Student Perception: Survey 2 (Ratings of several characteristics)
  - Semi-Structured Instructor Interviews: Instructors will be given a short survey, then based on their answers, will be asked interview questions

Stage 2: Formative Evaluation
- Overall evaluation of the new course redesign

Stage 3: Summative Evaluation
- Long term study to include course outcomes and students' grade performances