Using R Markdown to Create Accessible Resources for Students with Visual Disabilities in STEM Classes

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Theoretical foundations

Interability communication theory

- **Personal**
  - **Social identity theory**
  - **Communication accommodation theory**
- **Group**
  - **Intergroup contact theory**
- **Cultural**
  - **Interactive acculturation model**

What is the problem?

- Educational resources aren't always accessible.
- Creating accessible resources for STEM is difficult.
  - Equations
  - Graphs
  - Tables
- Accessibility promotes
  - positive social identity,
  - communicative convergence,
  - affinity towards groups with different abilities, and
  - breakdown of cultural stereotypes

What is the problem?

Demonstration

How does this project answer the problem?

- **Project goal:**
  - **Create accessible course materials for statistics with minimal “extra” effort.**
  - **Use tools common in the field.**

- **Required resources**
  - **Course materials (syllabus, examination, homework assignments, and lecture notes)**
  - **Content creation software environment (Rstudio)**
  - **Content testing software environment (Canvas sandbox, PDF viewer, web browser, screen reader)**

About R Markdown

- **Based on Markdown**
  - **Plain text files**
  - **Platform agnostic**
  - **Easy to read and write**
  - **Creates accessible HTML and print-perfect PDF output**

- **Text-based formatting**
  - **# Headers**
  - ***italic***, ****bold****
  - **> block quotes**

About R Markdown

- Supports mathematical content
  - Syntax is based on the mathematical typesetting language LaTeX
- Executes code in the R statistical programming language
  - Accesses datasets directly
  - Creates reproducible documents, reports, and presentations
  - Used in classes for assignments and projects
  - Used professionally for reports and scientific articles

About R Markdown

- **Mathematical content examples**

$ a = b $

$$a = b$$

$ x^n + y^n = z^n $

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$ \binom{n}{k} = \frac{n!}{k!(n-k)!} $

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$ \int_{a}^{b} x^2 \,dx $

$$\int_a^b x^2\,dx$$

Artifact: Lecture notes

Demonstration

Artifact: Homework assignments

Demonstration

Artifact: Examination

Demonstration

Artifact: Syllabus

Demonstration

Future work

- Test with other software environments typical of learners with visual disabilities
  - Multiple web browsers
  - Multiple screen readers
- Solicit feedback from learners with visual disabilities
- Expand testing and feedback to include learners with other disabilities, including dyslexia and dyscalculia
- Develop best practices and accessibility checklists to be used by content creators

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For examples, resources, and contact information visit

eyer.us/aect