Utilizing Canvas to help teach a course with universal design of learning - a few practical strategies

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Chrys Vogiatzi's & Hongye Liu
Contents

• Recap of universal design of learning (UDL)
• Needs of students with disabilities
• What can Canvas offer us?
• Seven approaches of UDL on Canvas
• Examples and templates
• Acknowledgement
Universal design of learning

Why?

Universal Design for Learning Guidelines

Provide multiple means of Engagement
Affective Networks
The "WHY" of learning

Provide multiple means of Representation
Recognition Networks
The "WHAT" of learning

Provide multiple means of Action & Expression
Strategic Networks
The "HOW" of learning

What?

How?
Universal design of learning

**EQUALITY**
Everyone receives the same support, regardless of need.

**EQUITY**
Individuals given different support / accommodation to enable access.

**INCLUSION**
Everyone has access: No need for support / accommodation.

Illustration by Cora Hays, 2021

Slide credit to Keith Hays, 2021
Common Vocabulary

- UDL: Universal Design of Learning
- SWD: Students with Disabilities
- SWOD: Students without Disabilities
- LMS: Learning Management System
- Canvas: the adopted LMS at UIUC
- LTI: Learning Tools Interoperability
Needs of students with disabilities (SWD)

- Two surveys of students’ perspectives (SWD vs SWOD)
- One on multiple representations of contents
- One on learning management system
Findings about multiple modalities
A UDL-based Study on the Needs of Students with Disabilities in Engineering Courses

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THE PROJECT
This project presents findings from a UDL-based large-scale survey on the needs of students with disabilities in engineering courses in FA2020 and SP2021 in Grainger College of Engineering. We concluded that providing multiple representations of course content in engineering courses can benefit all students and particularly students with disabilities.

BACKGROUND
Under-Reporting of Students with Disability
- 19% of undergraduates reported a physical or cognitive disability (Hamrick, 2019)
- 75% of the respondents who reported a disability replied their disability needs were unmet
- 56% of students with disability did not register for support services

Universal Design for Learning
Universal Design for Learning (UDL) wants to improve learning outcomes for all students by recognizing that single methods of delivery, assessment and engagement are insufficient and may cause unnecessary hardships to minority students (Jones, 2018; Jones & Tech, 2009).

This project focused on the first principle of UDL: multiple methods of representation that give learners a variety of ways to acquire information and build knowledge.

METHODS
The Survey
The survey questions focused on the following three areas of interest:
1. Usages and satisfaction for each modality, including:
   - textbooks
   - lecture notes
   - PowerPoint slides
   - handwritten notes
   - lecture videos
   - captions
2. MUSIC construct evaluation
3. Demographics info, including:
   - gender identity
   - race/ethnic
   - disability disclosures
   - anonymous disability service status
   - domestic/international

303 undergraduate students from 49 different courses completed the survey. The students spanned 13 engineering or computer science departments. Table below shows the demographic statistics of disclosed disability status and gender. Among the 48 students with disabilities (SWD), most are with mental or cognitive disabilities. The few students who chose not to disclose their disability status are considered students without disabilities (SWOD).

<table>
<thead>
<tr>
<th></th>
<th>SWD</th>
<th>SWOD</th>
<th>Female</th>
<th>Male</th>
<th>Female SWD</th>
<th>Male SWD</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>48</td>
<td>255</td>
<td>176</td>
<td>177</td>
<td>32</td>
<td>111</td>
<td>303</td>
</tr>
</tbody>
</table>

Data Analysis
The following analysis was performed without personal identified information:
- Cronbach's alpha to check consistency
- Chi-squared tests and Wilcoxon tests for usages, satisfaction and MUSIC questions to find inter-group differences between SWD and SWOD and between female and male
- Correlation coefficients between usage and satisfaction for each course modalities

RESULTS
Usage and Satisfaction of Course Modalities

For both usage and satisfaction, a majority of responses indicates Class Transcribe/Transcripts and captions in other languages were never used or not available, but these modalities did exist in some of the courses we surveyed.

MUSIC Evaluations of Courses
Students' MUSIC evaluations are generally high, but 24% of the respondents disagree that the instructional methods used in the course held their attention.

SWD vs. SWOD

There is a difference for live Zoom lecture usage (p < 0.07) and for Class Transcribe/Transcripts usage (p < 0.002) between SWD and SWOD. SWD appears to use less live Zoom lecture (88% vs. 92%) and uses more Class Transcribe/Transcripts (88% vs. 64%).

RESULTS (CONTINUED)
SWD vs. SWOD (Continued)

SWD appeared to be more satisfied with Class Transcribe/Transcripts and textbooks, which both include text-based narrative.

Female Students vs. Male Students
Female students appeared to be less satisfied with instructor PowerPoint slides (p < 0.01), live Zoom lectures (p < 0.02) and discussion/lab sessions (p < 0.02), and less enjoyed the instructional methods used in their courses (p < 0.025) than male students.

DISCUSSION
- SWD have the highest satisfaction for Class Transcribe/Transcripts and textbooks, which both include text-based narrative.
- SWOD are more satisfied with office hours which involves more personal interaction.

Limitations and Future Work
Next round of data collection is needed to strengthen our conclusion and improve consistency of responses.

REFERENCES


Findings about LMS

• Background: A national survey (N=1800+) found SWD have been reported to strongly desire an LMS for their online learning
• Our survey dig into system level quality and the usage and satisfaction of SWD and SWOD regarding LMS components
# Survey Response Summary

## Demographic Statistics

<table>
<thead>
<tr>
<th></th>
<th>SWD</th>
<th>SWD-like</th>
<th>SWOD</th>
<th>Female</th>
<th>Male</th>
<th>Female SWD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 (23%)</td>
<td>35 (34%)</td>
<td>77 (76%)</td>
<td>38 (37%)</td>
<td>58 (57%)</td>
<td>13 (12%)</td>
<td>101</td>
</tr>
</tbody>
</table>

## Course Delivery Statistics

<table>
<thead>
<tr>
<th></th>
<th>Online</th>
<th>Hybrid</th>
<th>In Person</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26 (25%)</td>
<td>30 (29%)</td>
<td>40 (39%)</td>
<td>101</td>
</tr>
</tbody>
</table>
Key Results

- A large majority of students prefer one website, e.g., Canvas
Key Results

• A large majority of students think all courses should use Canvas

T–test p-value: 4.758716604637071e-09
mean: 0.8020833333333334
Key Results

• A large majority of students think Canvas made it easier for them.
Key Results

- A large majority of students think Canvas improved their effectiveness

T-test p-value: 0.0012170640844345996
mean: 0.5161290322580645
Key Results

• A large majority of students are somewhat pleased with Canvas

T-test p-value: 2.0467020409659848e-09
mean: 1.0161290322580645
Key Results

- SWD’s have a significantly stronger preference for courses using one website than SWOD’s
- Wilcoxon test p-value < 0.028
Key Results

- SWD’s are significantly less pleased with message posting on the course website than SWOD’s
- Wilcoxon test, p-value < 0.019
Key Results

• SWD’s who takes in-person class are significantly less confident compared to SWOD of in-person class for finding info on Canvas

• Wilcoxon test, p-value<0.04 * (*sample size is small)
Key Results

• We found a small group (n=9) we had been classified as SWOD had similarities with SWD group
• Students who do not have a disability but a condition that inhibits them from regularly attending class
• We grouped SWD and this group together as SWD-like
Key Results

• SWD-like’s are significantly less pleased with how teaching materials are being posted to the course website than SWOD’s
• Wilcoxon test, p-value< 0.006
Key Results

- SWD-like’s in an in-person class had a noticeably higher usage of video transcripts than SWOD’s
- Wilcoxon test, p-value < 0.015
  * (sample size is small)
Key Results

• SWD-like’s not in a in-person class had a significantly higher usage of group tools in Canvas
• Wilcoxon test, p-value<0.05 * (sample size is small)
# Key Results - Summary

<table>
<thead>
<tr>
<th>question</th>
<th>groups</th>
<th>p-value</th>
<th>mean 1</th>
<th>mean 2</th>
<th># responses 1</th>
<th># responses 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am pleased with message posting on the course website</td>
<td>SWD vs SWOD</td>
<td>0.018407</td>
<td>0.125000</td>
<td>0.742857</td>
<td>24</td>
<td>70</td>
</tr>
<tr>
<td>I am pleased by teaching materials (presentations, notes, readings, etc.) being posted on the course website</td>
<td>SWD-like vs SWOD</td>
<td>0.005333</td>
<td>0.942857</td>
<td>1.426230</td>
<td>35</td>
<td>61</td>
</tr>
<tr>
<td>Using Canvas has improved my academic effectiveness</td>
<td>SWD IP vs SWOD IP</td>
<td>0.018665</td>
<td>-0.285714</td>
<td>0.875000</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>I feel confident finding the information I am looking for in Canvas</td>
<td>SWD IP vs SWOD IP</td>
<td>0.021256</td>
<td>0.142857</td>
<td>1.250000</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>ClassTranscribe or transcripts of videos - Usage</td>
<td>SWD-like IP vs SWOD IP</td>
<td>0.014223</td>
<td>1.833333</td>
<td>-0.300000</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Group or collaborative tools in Canvas - Usage</td>
<td>SWD-like NIP vs SWOD NIP</td>
<td>0.043089</td>
<td>2.125000</td>
<td>0.611111</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Documents made available on Canvas - Rating</td>
<td>SWD IP vs SWOD IP</td>
<td>0.035975</td>
<td>2.300000</td>
<td>2.666667</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Canvas quizzes or tests - Rating</td>
<td>SWD-like IP vs SWOD IP</td>
<td>0.010026</td>
<td>1.111111</td>
<td>2.625000</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Canvas course calendar - Rating</td>
<td>SWD-like IP vs SWOD IP</td>
<td>0.042246</td>
<td>1.000000</td>
<td>2.076923</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>I would prefer that my course only uses one website (i.e. Canvas)</td>
<td>SWD vs SWOD</td>
<td>0.027453</td>
<td>0.869565</td>
<td>0.565217</td>
<td>23</td>
<td>69</td>
</tr>
</tbody>
</table>
Specific features that students appreciate

• Multimodal learning support, captioning, and easy to use forum functionalities
• Students preferred clean intuitive UI, student chat, and direct chat with professor functionalities
• Students preferred detailed feedback and the ability to match question with answers
Changes that students wish to see

• Unified, automated process for requesting accommodations in each class/CBTF
• Assessing student mastery of material in multiple ways (oral, written)
• Streamlining process for new innovations, i.e. new interfaces, websites, accommodations
Issues that students face in flipped classrooms

• Too many materials in too many different formats.
  • pdf/docx notes, mediaspace/Kaltura videos, Gradescope, etc.
• Difficult to coordinate during class time.
  • Much time is spent setting up the student workspace.
• Submitting requires taking pictures of handwritten work, compressing folders, converting to pdf, etc.
• Getting (timely and meaningful) feedback becomes difficult.
Why Canvas and what does Canvas offer?

- One unified system and consistent format across courses
- Innate accessibility checking and screen reader
- Unified calendar for all courses on Canvas
- Capability of LTI tools for extended functions
- Existing components/tools that can be utilized for UDL
- Canvas is the adopted LMS at UIUC
Seven UDL approaches on Canvas (I)

- Giving flexible deadlines in students’ assignments or formative assessments,
- Providing personalized prompt feedback to students
- Guiding students in collaborative learning
- Accommodating students to choose different formats to submit their assignments
Seven UDL approaches on Canvas (II)

• Providing students with multiple modalities of the same content in one place,
• Providing a unified calendar for all courses as deadline reminders
• Allowing students to use discussion boards and group space for informal meetings.
UDL Design Examples and templates
Acknowledgement

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References

• SIIP Implementation project “UDL based best practices including utilizing Canvas for the needs of students with disability”