Moving the Laboratory into a Virtual Classroom:

A Case Study of LISC 391 - Integrated Life Science Laboratory

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In a normal term:

- One three-hour session weekly
  - Nine Experimental Weeks
  - Three Weeks for presentations and discussions
  - Office Hours as necessary
  - Teaching assistants
  - Teaching lab technicians

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Focuses on the Scientific Method

- Experimental Design
- Ethics: human and animal
- Sample size
- Data analysis
- Statistics
- Graphing

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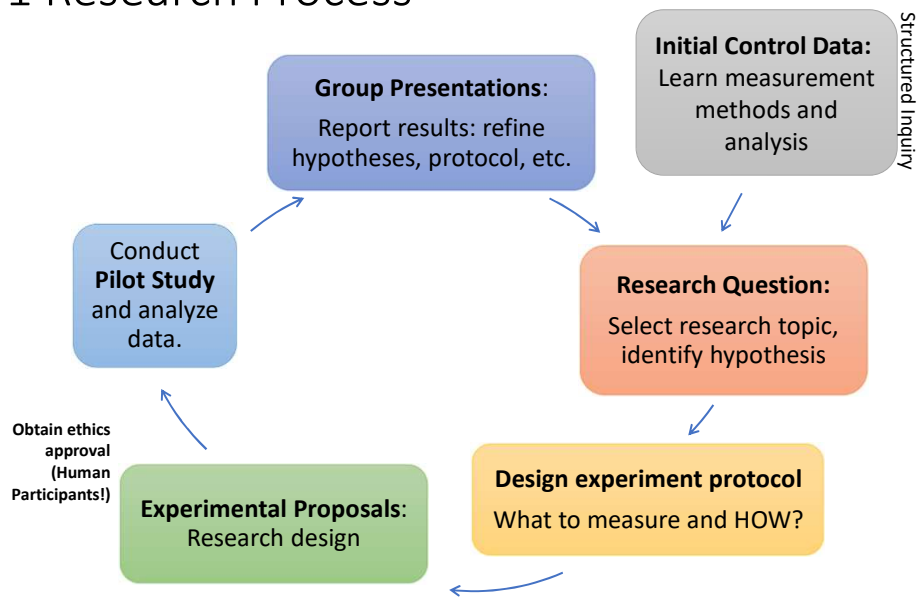
LISC 391 Research Process



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Scientific Communications

- Written reports = journal articles and grant applications
- Oral presentations = conference presentations, thesis defenses
- Poster presentations = conference poster presentations

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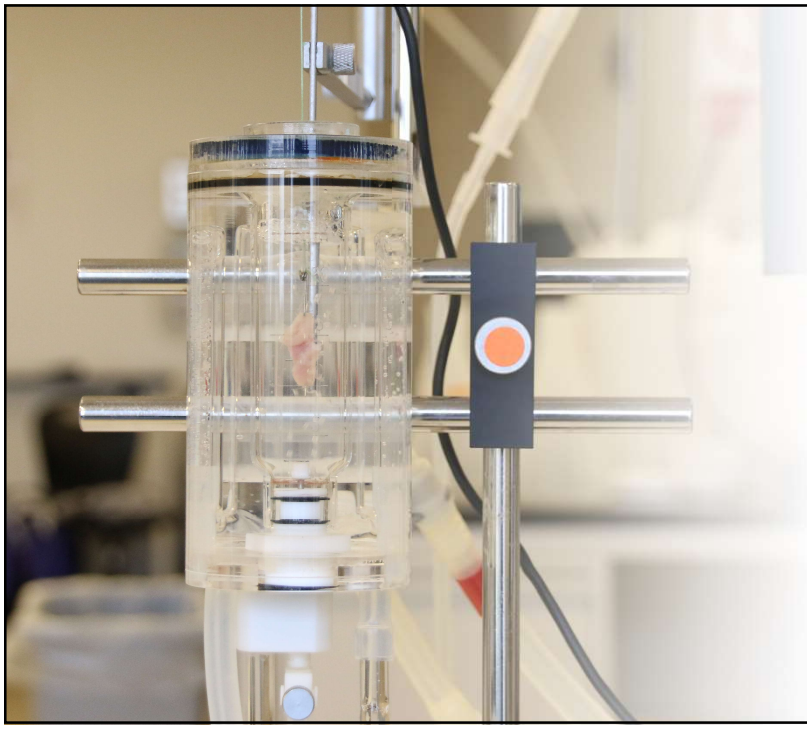

How do we achieve these goals remotely?

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New Remote Weekly Structure:

- Weekly announcements with reminders of course timeline
- One 90 minute recorded Zoom session:
  - 30-45 minute lecture with time for questions,
  - breakout rooms for collaboration with each other
  - OR presentations with questions and discussions
- Office hours: at least once weekly, more when needed
- Asynchronous individual and group lab work

- Remote Working in Groups module from the BHSc program

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Initial Survey on Group Work and Habits

- Grade Expectations
- Locations and Time Zones
  - Identify students who needed accommodations
  - Times for "live" sessions
- Group Member Matching
  - Paired if both requested each other
  - Had an "opt out" option, to prevent matching
  - Students felt their voices were heard.

Survey adapted with permission from ENPH 454: Rob Knobel and James Stotz

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Cognitive Neuroscience

- Research Participants:
  - Self administered coffee
- Human Ethics
  - Qualtrics consent forms
- Cognitive Function
- Appropriate Statistics
- Group Lab Report
- Pilot Studies

Psych Lab 101 4+
Neurobehavioral Systems, Inc.
Free

Free Application for Android and Apple

Prism
Analyze, graph and present your scientific work.

Free Academic Term Licenses

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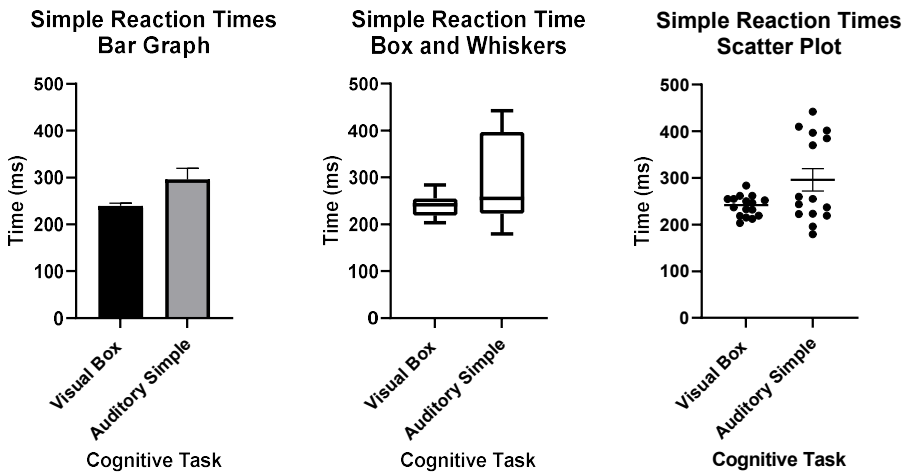
Data analysis from their own experiments:



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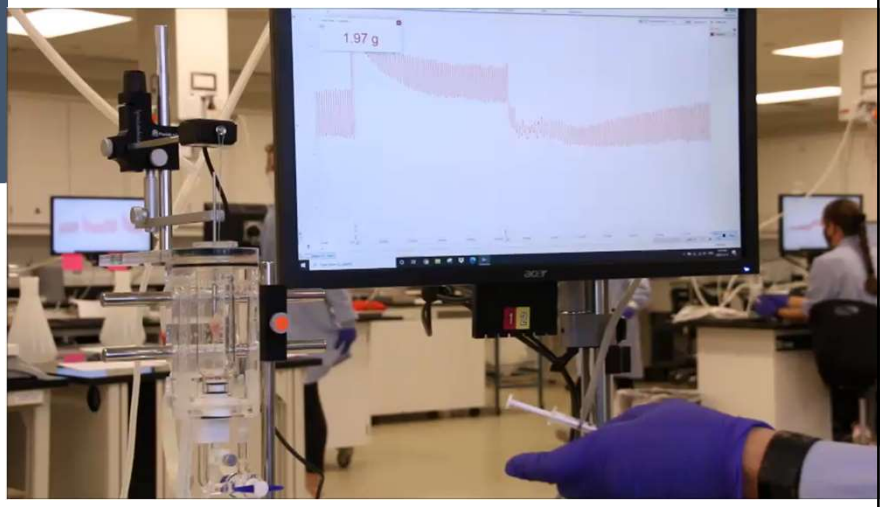
Translating LIVE SCIENCE! into a remote learning experience

Lab chart and Power Labs from ADInstruments for data collection and analysis



Thanks for the video recordings by Sarah Ferguson!

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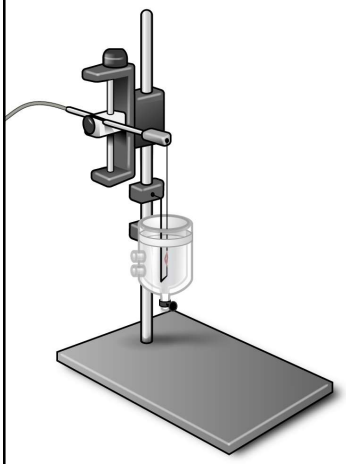
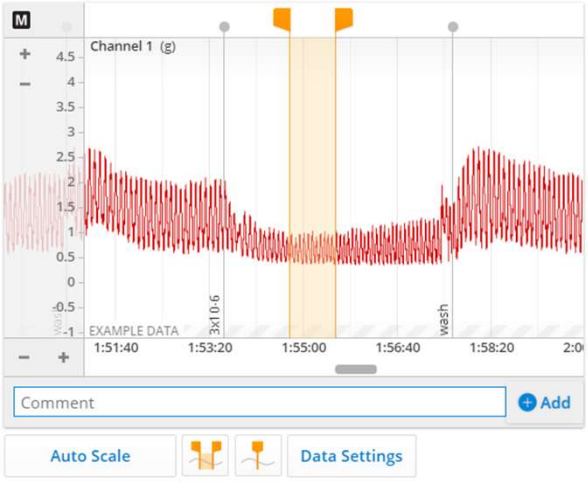
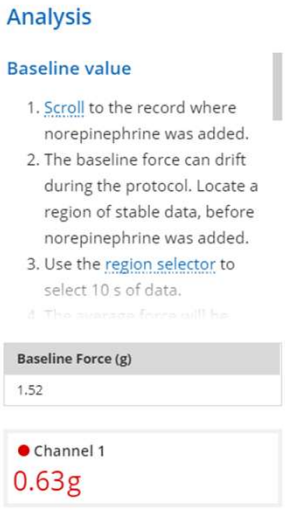
Lt Framework for Data Analysis

import data with step-by-step protocols and analysis







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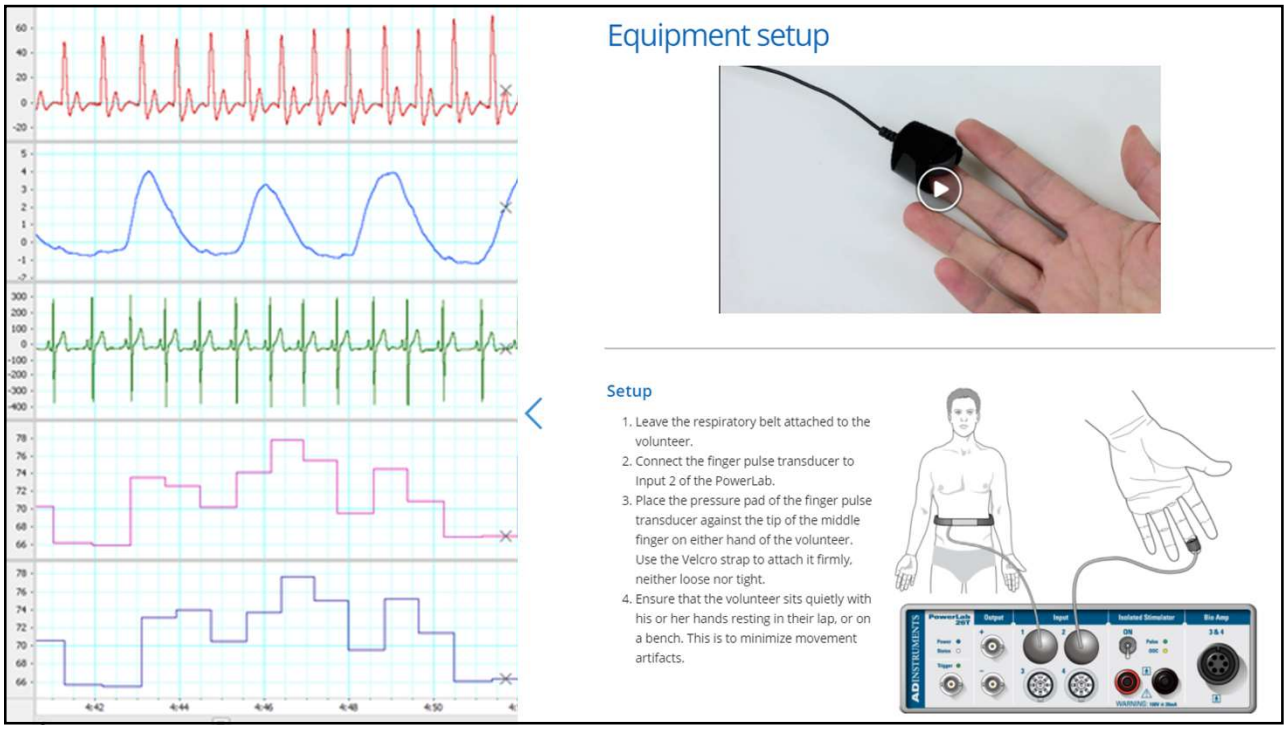

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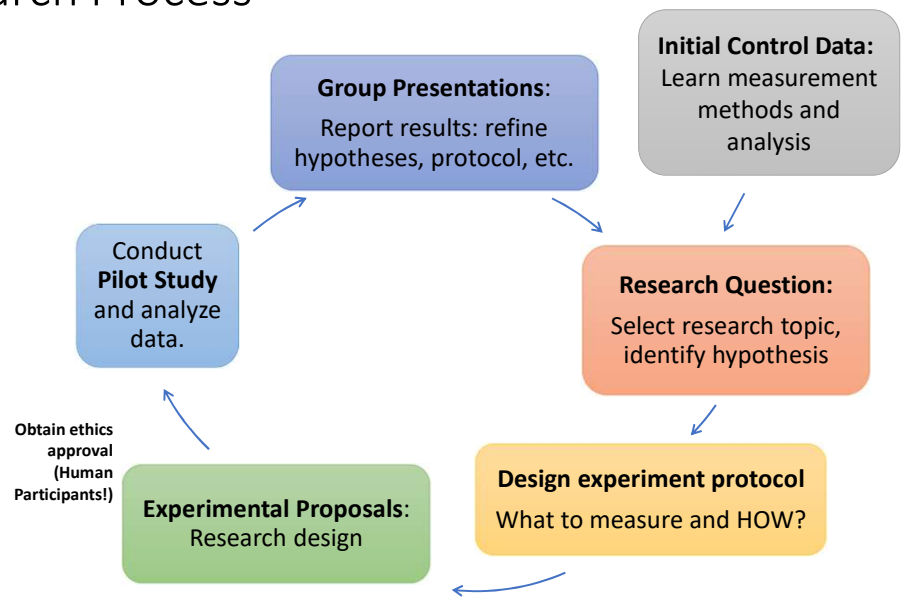
LISC 391 Research Process

Experimental Design Challenge: Cognitive function tests

Pilot Study: Proposed the pilot study after analyzing pre-recorded data



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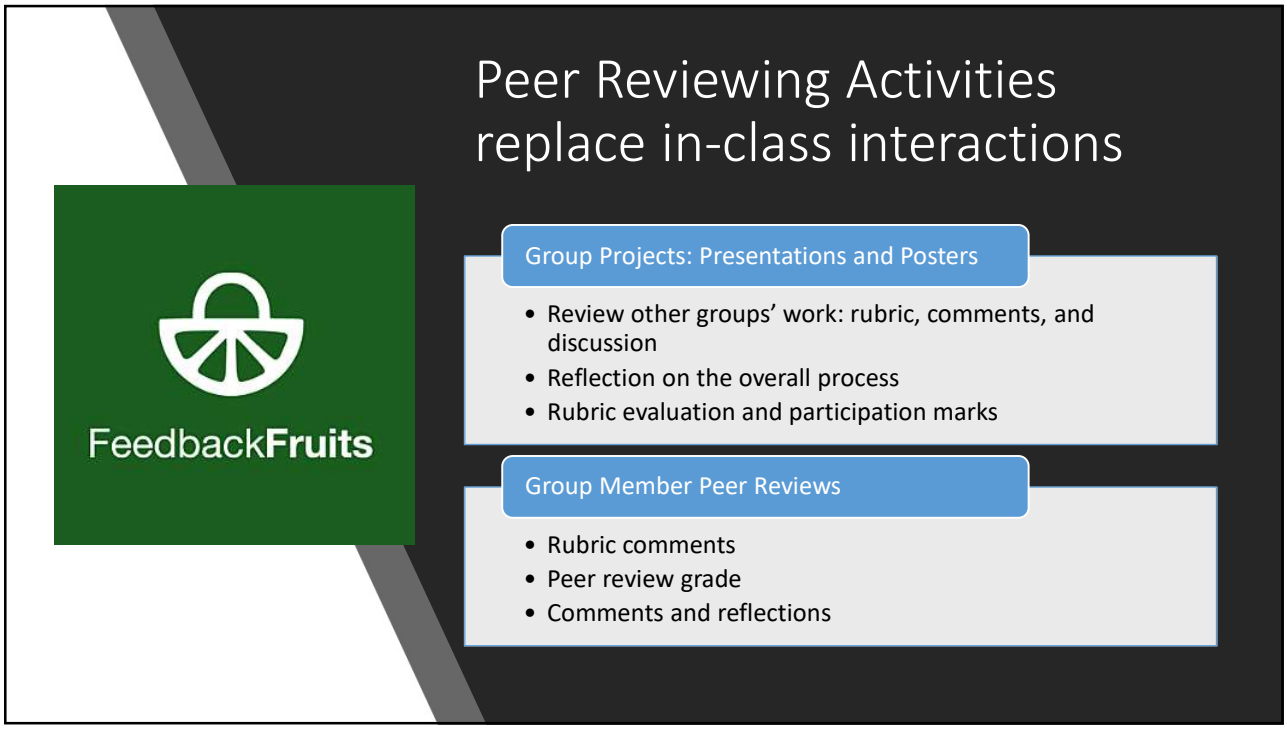
Peer Reviewing Activities replace in-class interactions
FeedbackFruits
Group Projects: Presentations and Posters
• Review other groups' work: rubric, comments, and discussion
• Reflection on the overall process
• Rubric evaluation and participation marks
Group Member Peer Reviews
• Rubric comments
• Peer review grade
• Comments and reflections

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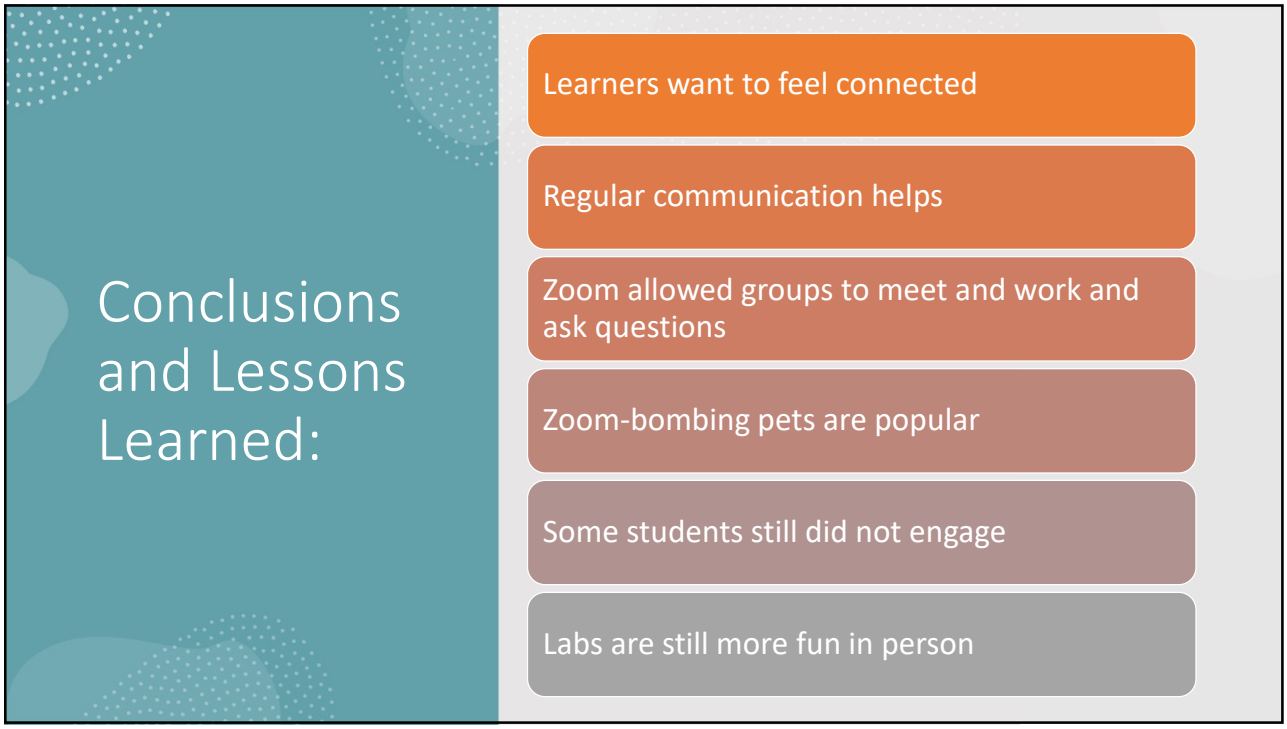
Conclusions and Lessons Learned:
Learners want to feel connected
Regular communication helps
Zoom allowed groups to meet and work and ask questions
Zoom-bombing pets are popular
Some students still did not engage
Labs are still more fun in person

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Student Feedback:

Overall I really enjoyed LISC 391! I was initially worried about a lab course online, but the instructor and TAs made it a wonderful and beneficial learning experience. I feel this course has strengthened my research skills and course material was interesting. In future I feel the set up in LT for online specifically would aid future students in this course. However, I found labs interesting and course work load manageable. Thank you for a wonderful experience!

LISC 391 is in fact one of my favourite courses that I have taken at Queens thus far. Not only do I find the course content very interesting and highly relevant with real world applications, but I also love the unique way in which the course is structured as it gives a much more interactive and engaging experience. I especially enjoyed the team-based activities which provided me with experience in scientific writing and presentation as well as group-based work. This is also the first course in which I have had to formulate scientific designs and create formal presentations and I found that this has really developed my ability to appreciate the importance of scientific research and its value in paving the way for further innovative advancements.

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Teaching Lab Technical Support:

- Emilie Ward
- Shannyn MacDonald-Goodfellow
- Rachel Klinoski
- Charlotte Hutchings
- Logan Bale and Yat Tse

Teaching Assistants:

- Robbie Kloosterman
- Rhiannon Hilton
- Heidi Riek

Thank You to the LISC 391 Lab Team

Previous Course Instructors (among others!)

- Don Maurice
- Alan Lomax
- Mandy Turner
- Susan Boehnke
- Nicolle Domnik

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