

Evaluating the Impact of Online Delivery of a Process Dynamics and Control Course

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Process Dynamics and Control

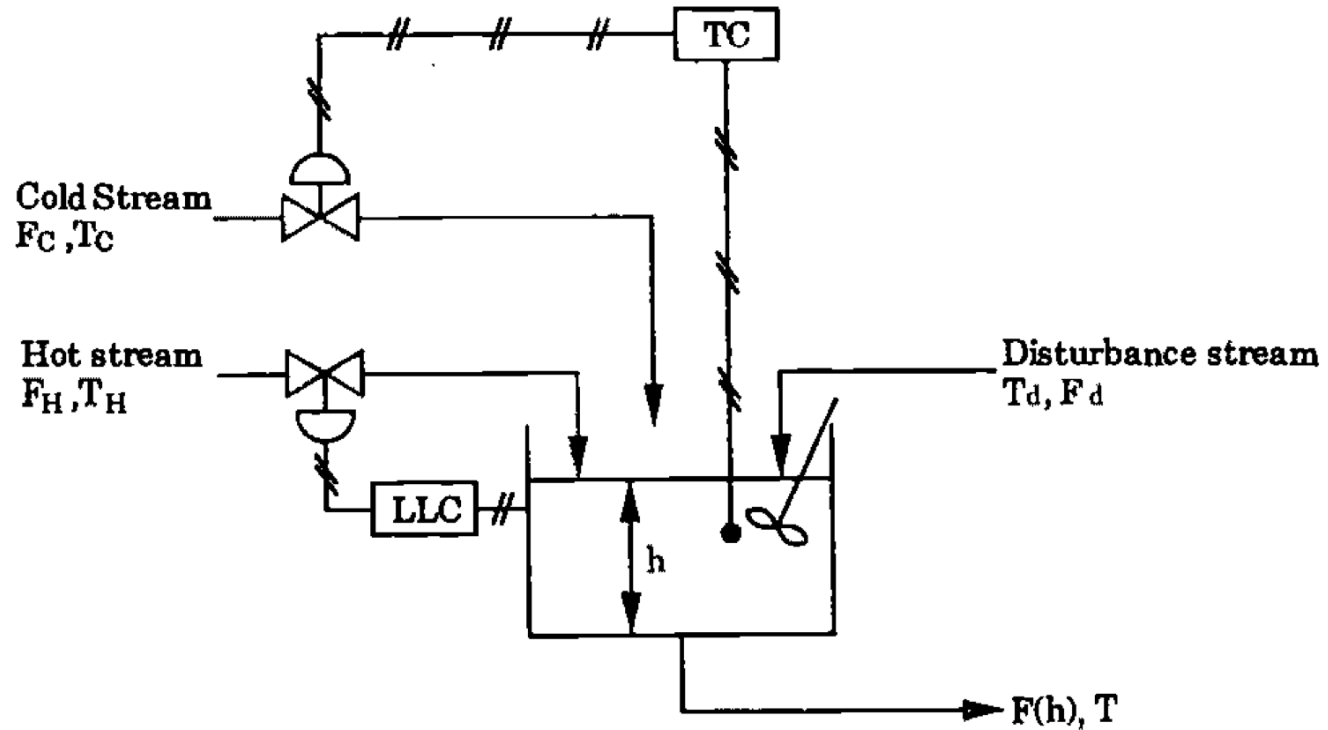


Figure 20.1. Stirred mixing tank requiring level and temperature control.

Process Dynamics and Control

- “The **response** of the primary output variable of a certain chemical process **to a unit step change** in the primary input variable is ...”



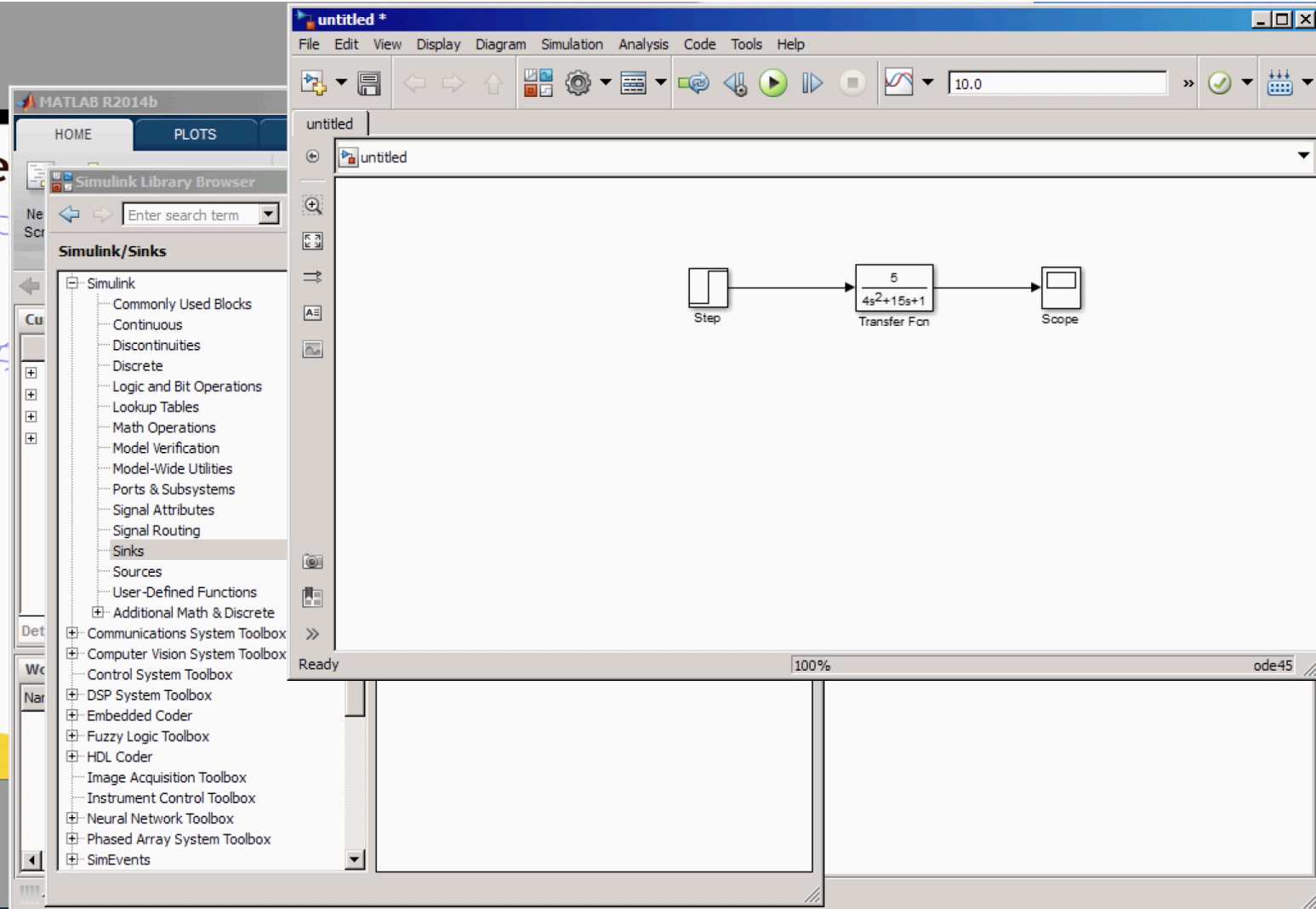
Simulation-Infused Classes

Second Order

$$\tau^2 \frac{d^2 y}{dt^2} + 2\zeta\tau \frac{dy}{dt} + y = K$$

$$y(s) = \frac{K}{\tau^2 s^2 + 2\zeta\tau s + 1}$$

$$3 K$$



Does online delivery of Process Dynamics and Control enhance learning?

- Asynchronous learning, re-watching
- Simulations simultaneously

COHORT #1 (Traditional)

- In-person, n=22
- Three 75-minute “lectures” per week, 15 weeks
- 31.25 hours of instructional time in the classroom
- Weekly homework assignments
- **Weekly simulation-based problem solving assignment**
- 3 midterms
- **1 final exam**



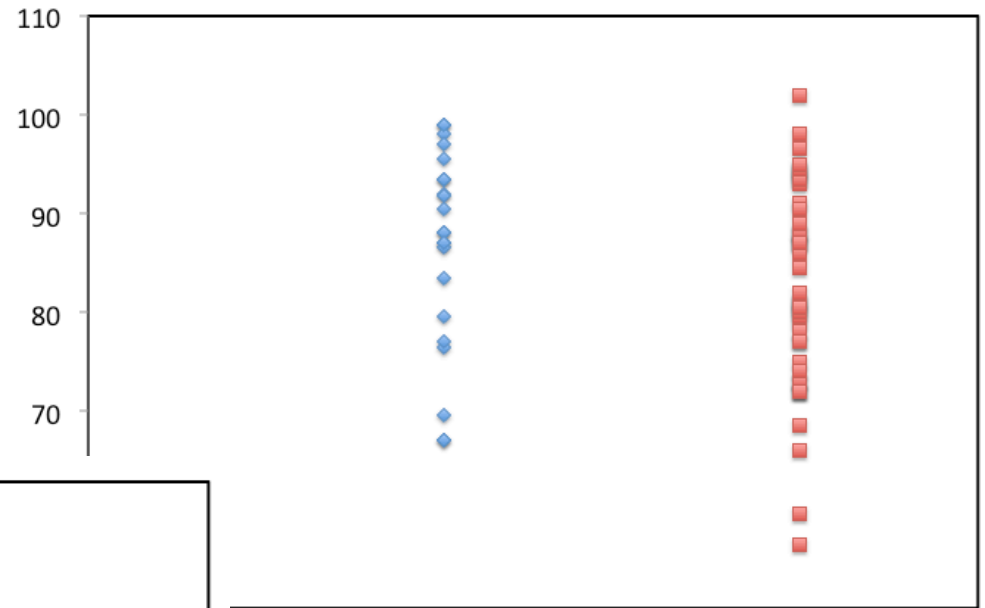
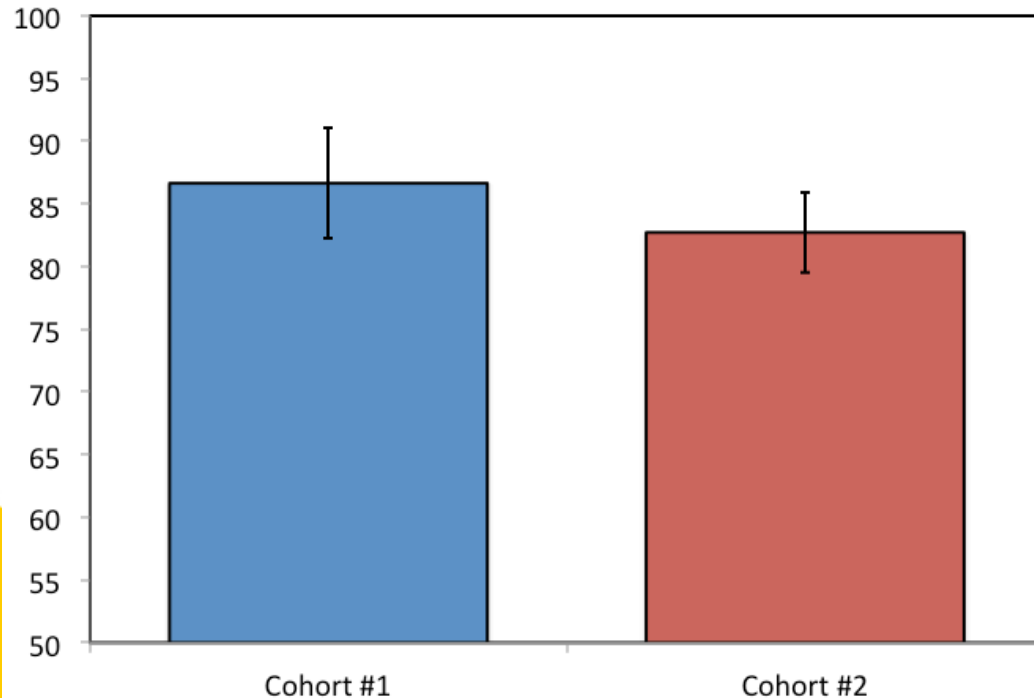
COHORT #2 (Online)

- Online, n=43
- Entirely online, except in-person exams
- 17.6 hours of posted voiceover lectures
- Weekly homework assignments
- **Weekly simulation-based problem solving assignment**
- 2 midterms
- 1 project
- **1 final exam**



Final Exam Performance Unaffected

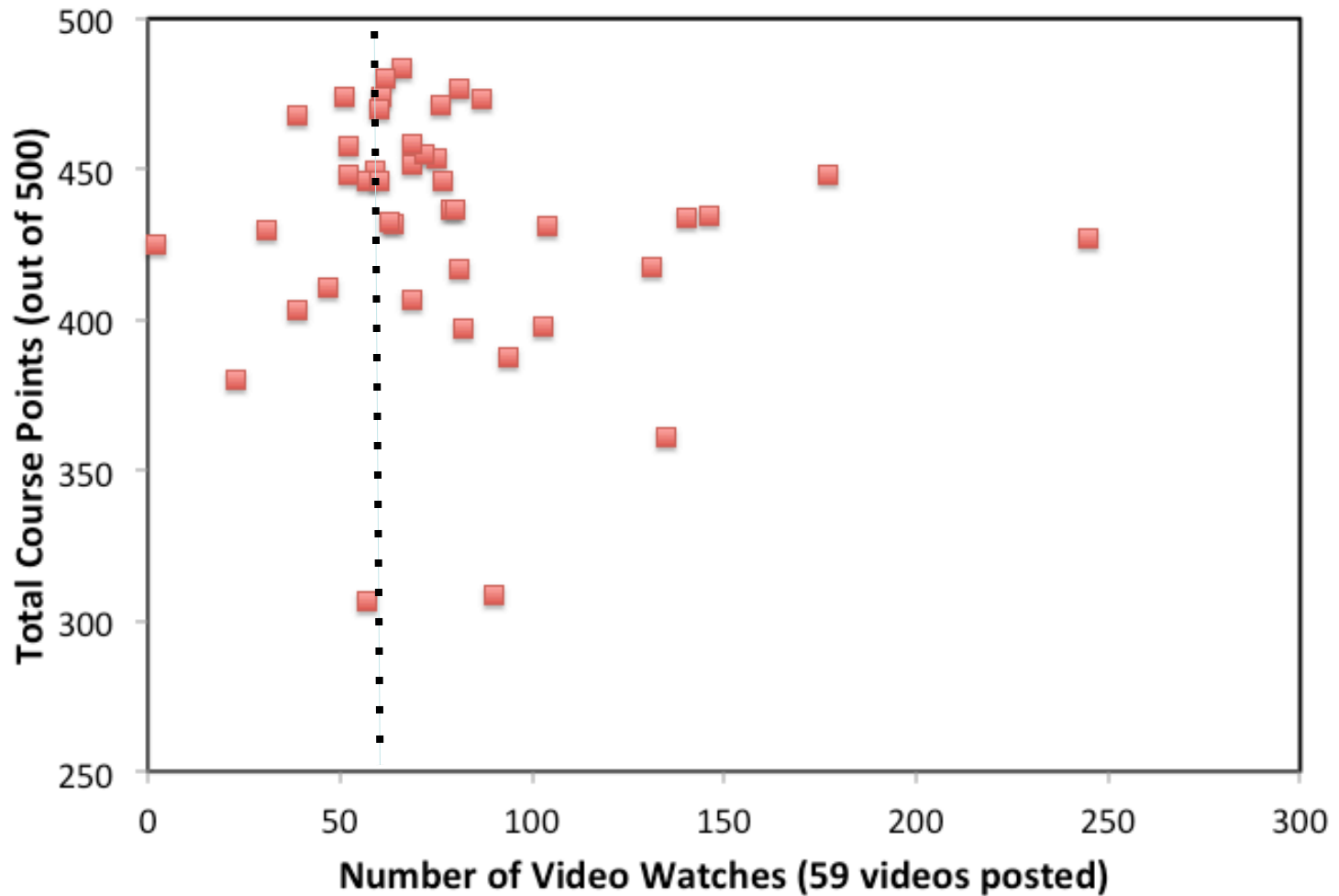
*Same exam questions,
format, and delivery.*



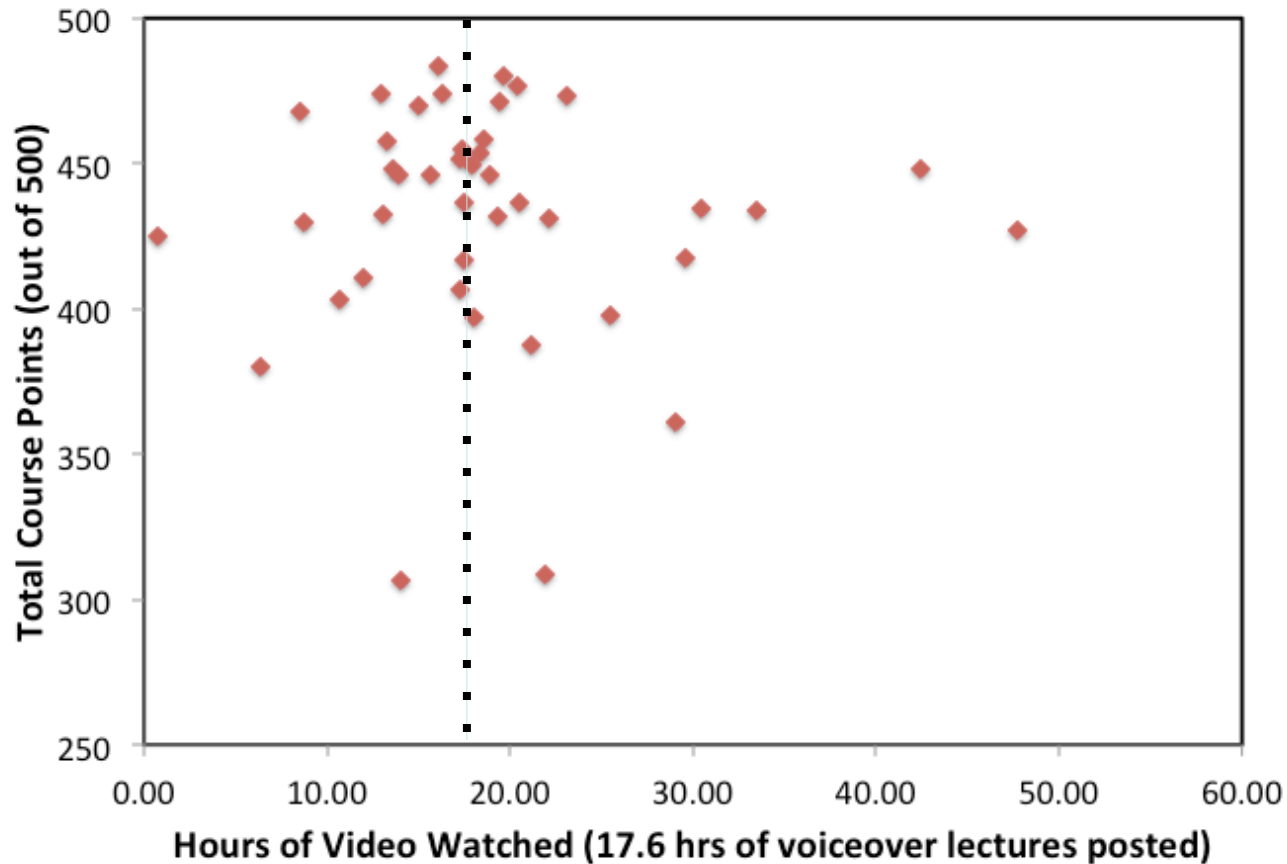
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Number of Videos Watched

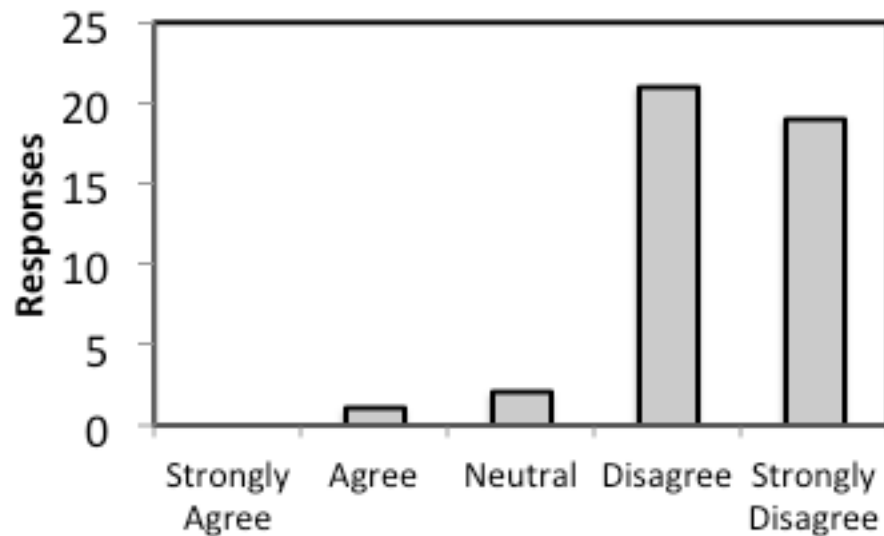


Hours of Video Watched

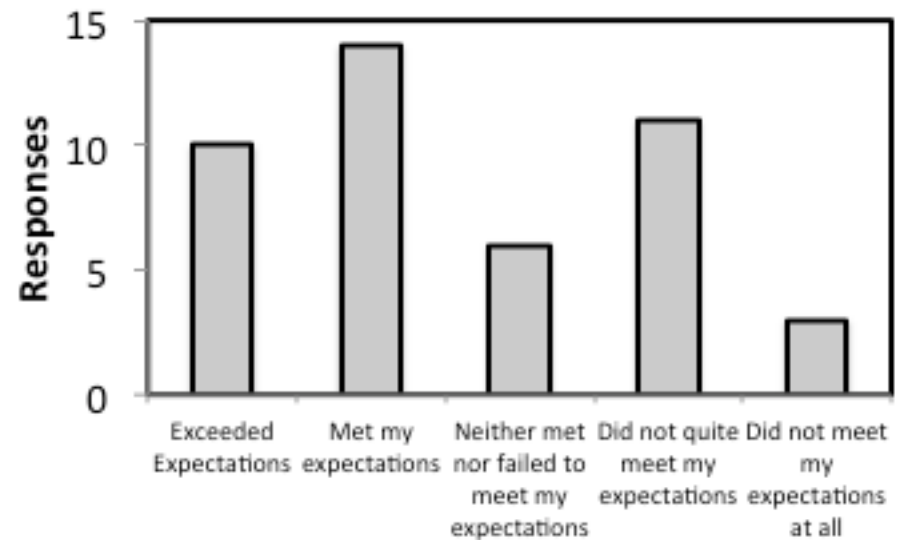
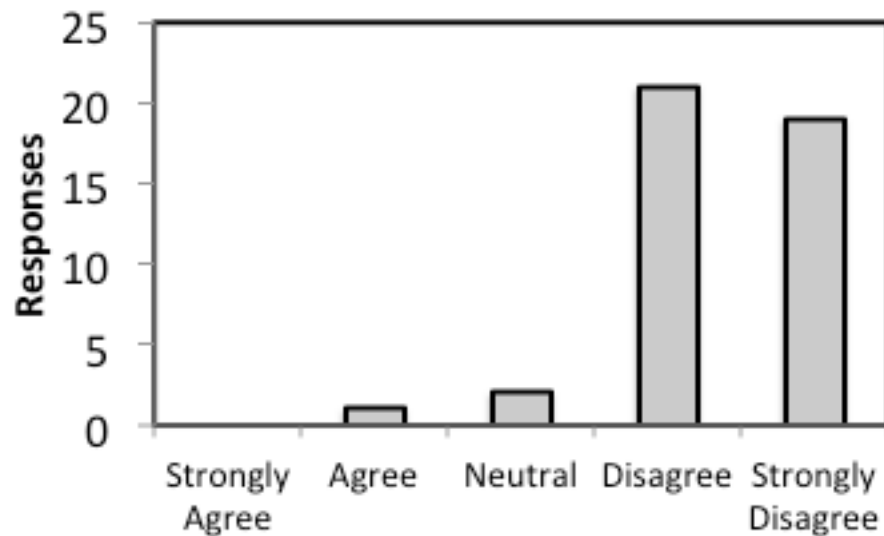


Student Perceptions and Feedback

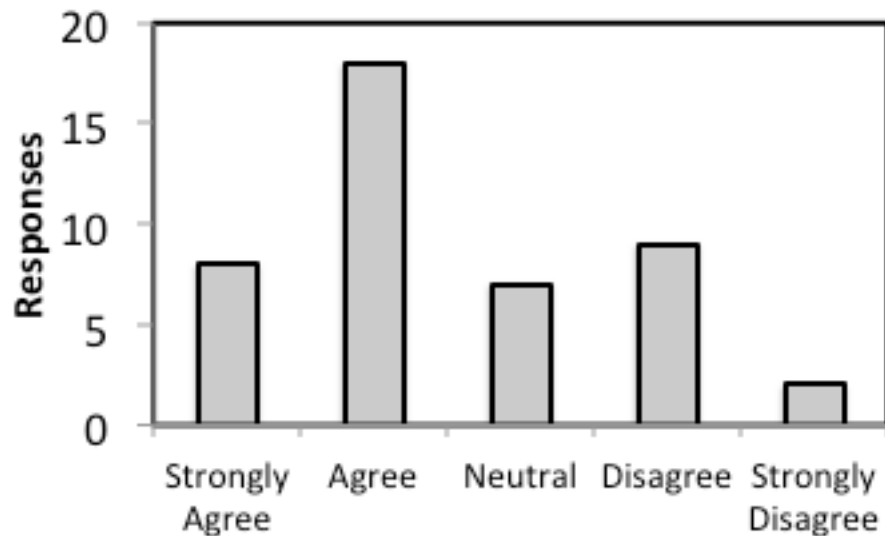
I am excited about taking this course in an online format.



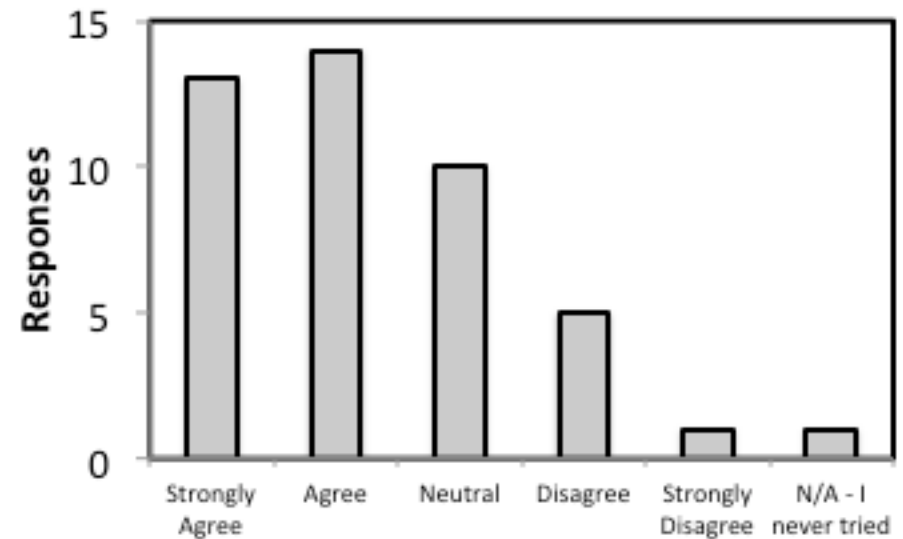
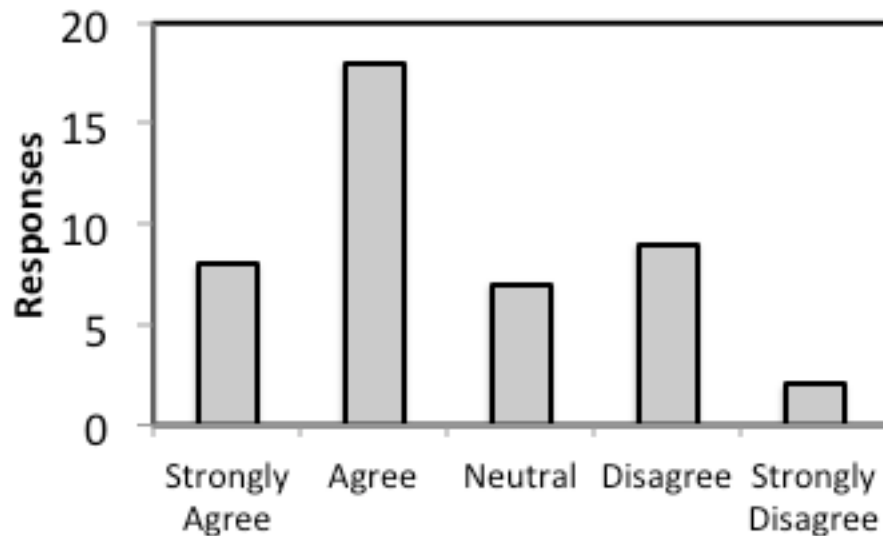
Now that I have completed the Process Dynamics and Control online course, I feel that taking the course online:



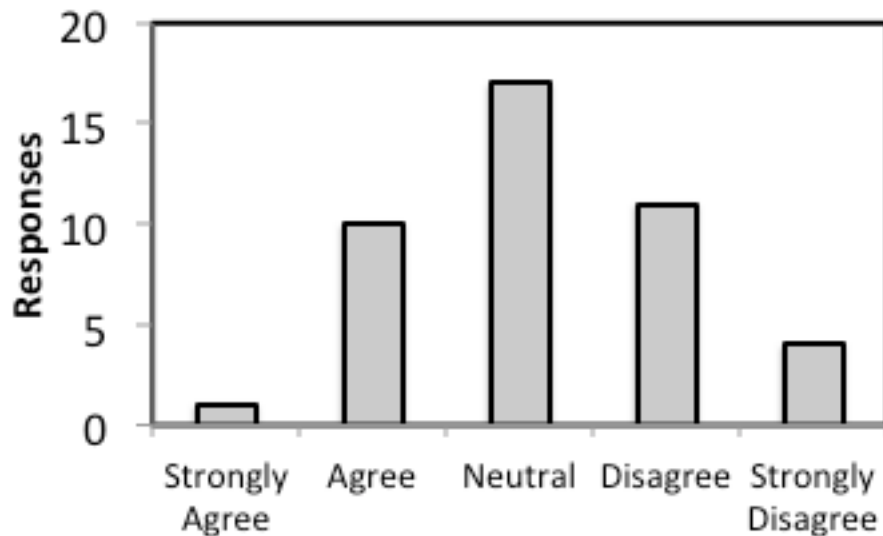
I am nervous that I will not be able to interact with the instructor efficiently in an online learning environment.



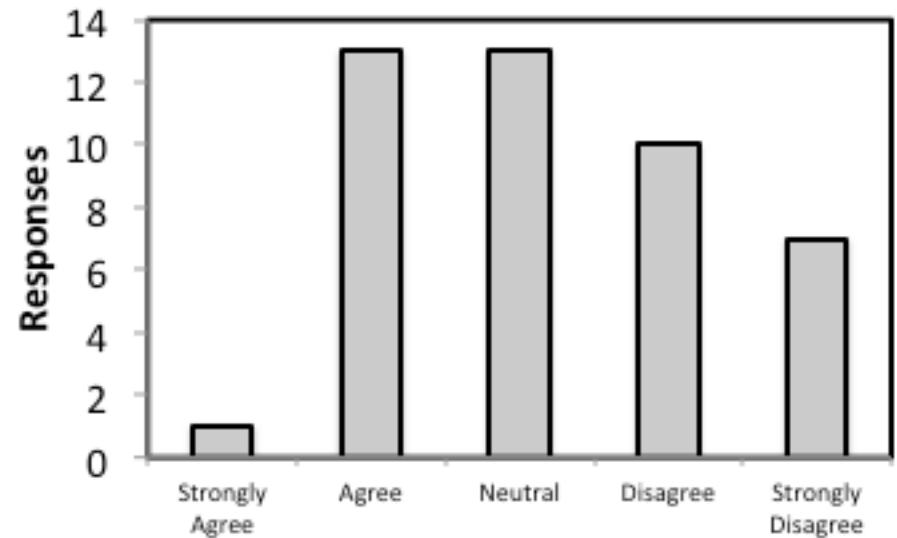
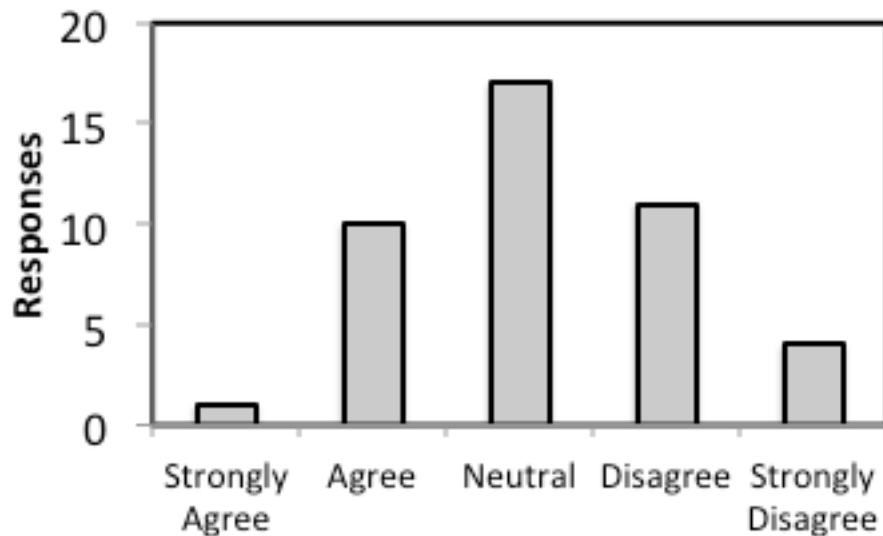
I felt that I was able to interact with the instructor efficiently in this course.



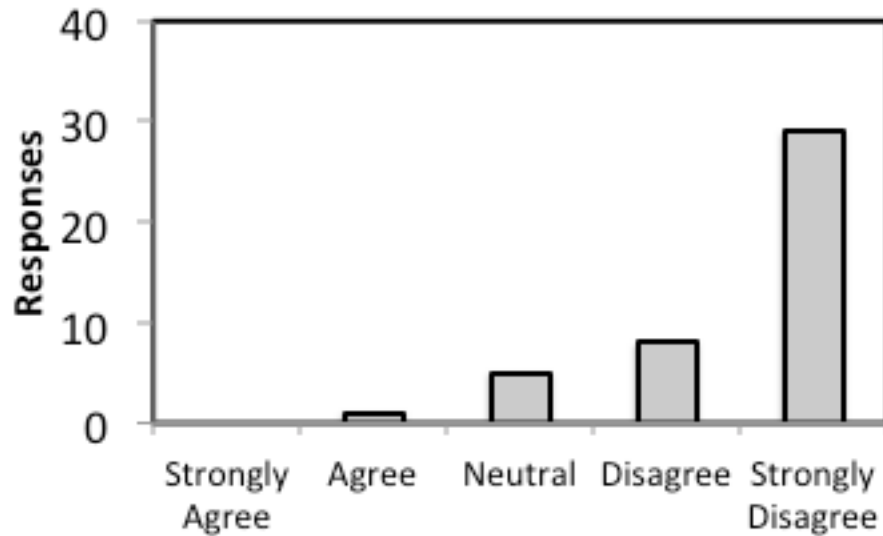
The idea of asynchronous (on my own schedule/at my own pace) learning is appealing.



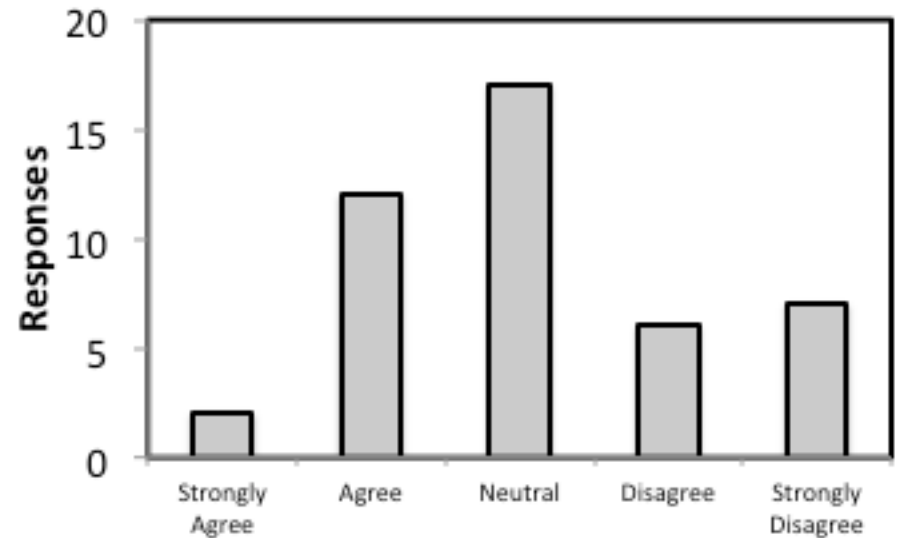
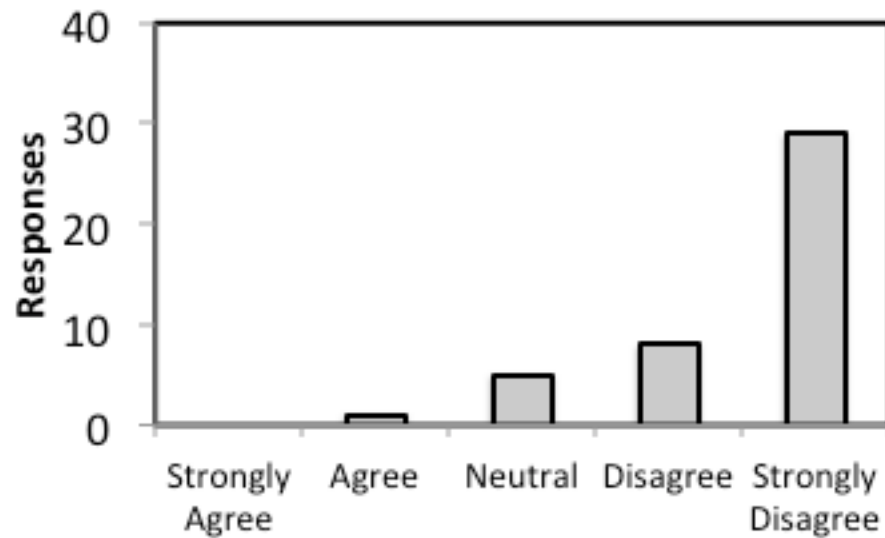
Asynchronous learning (learning on my own schedule/at my own pace) was beneficial in this course.



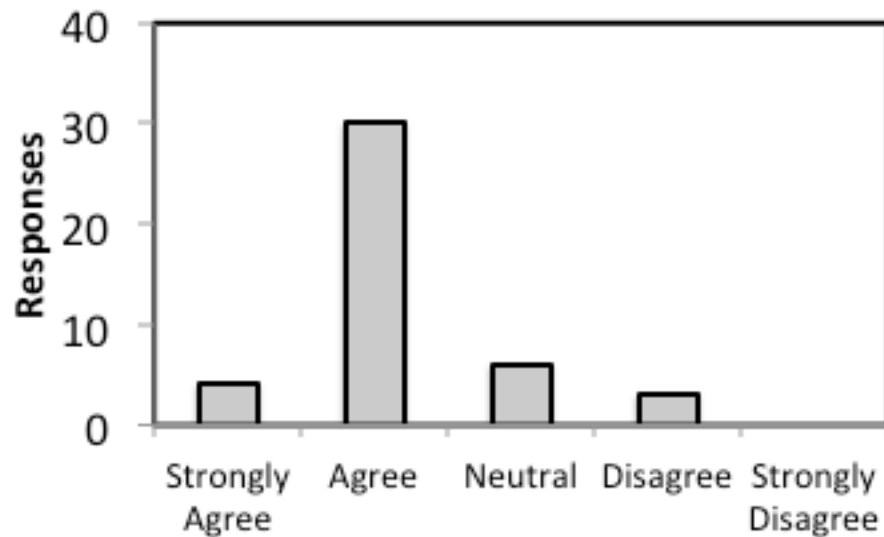
I enjoyed my previous online course(s).



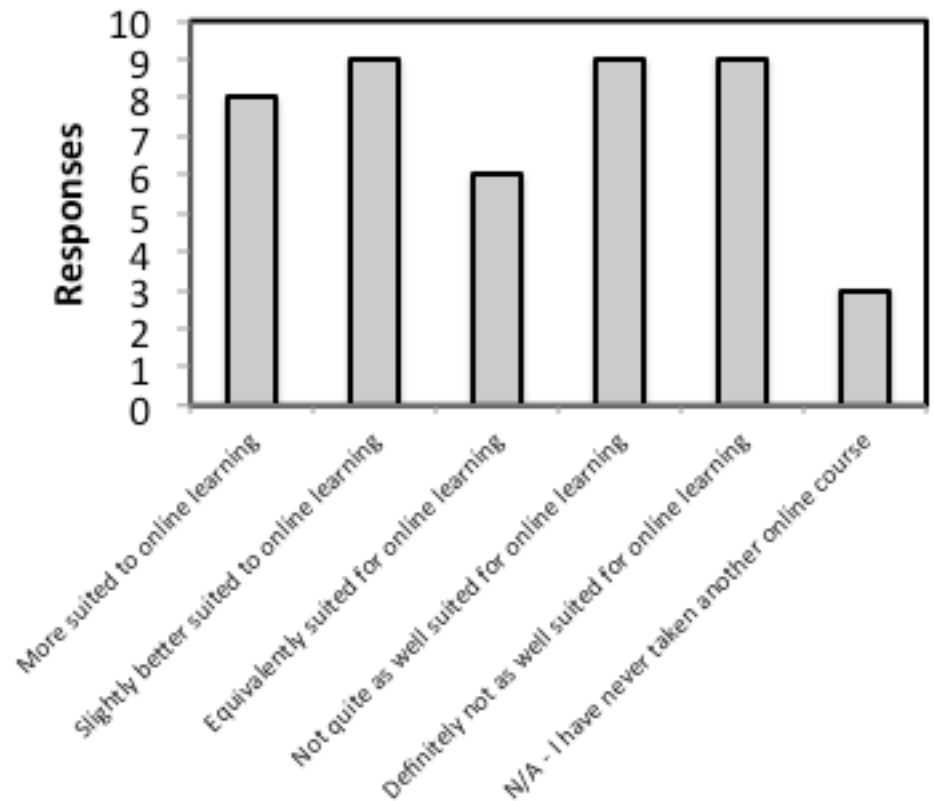
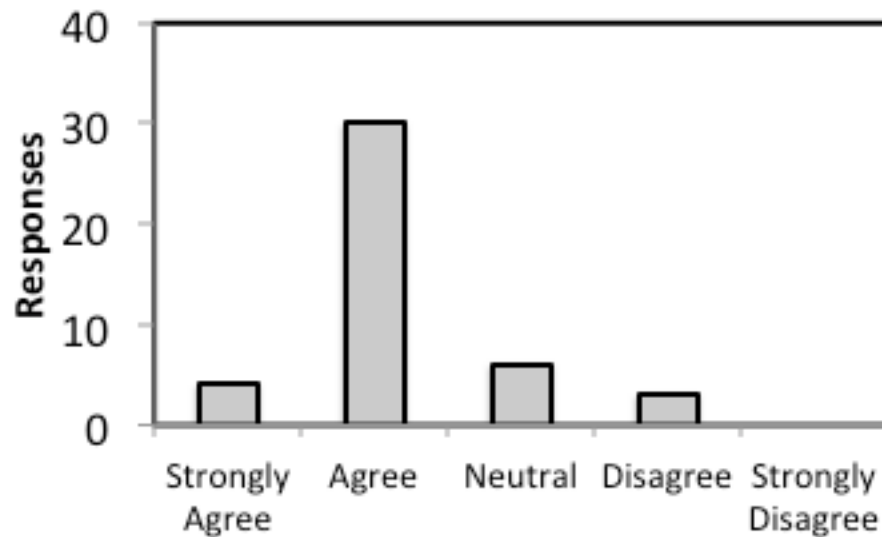
I enjoyed this online course(s).



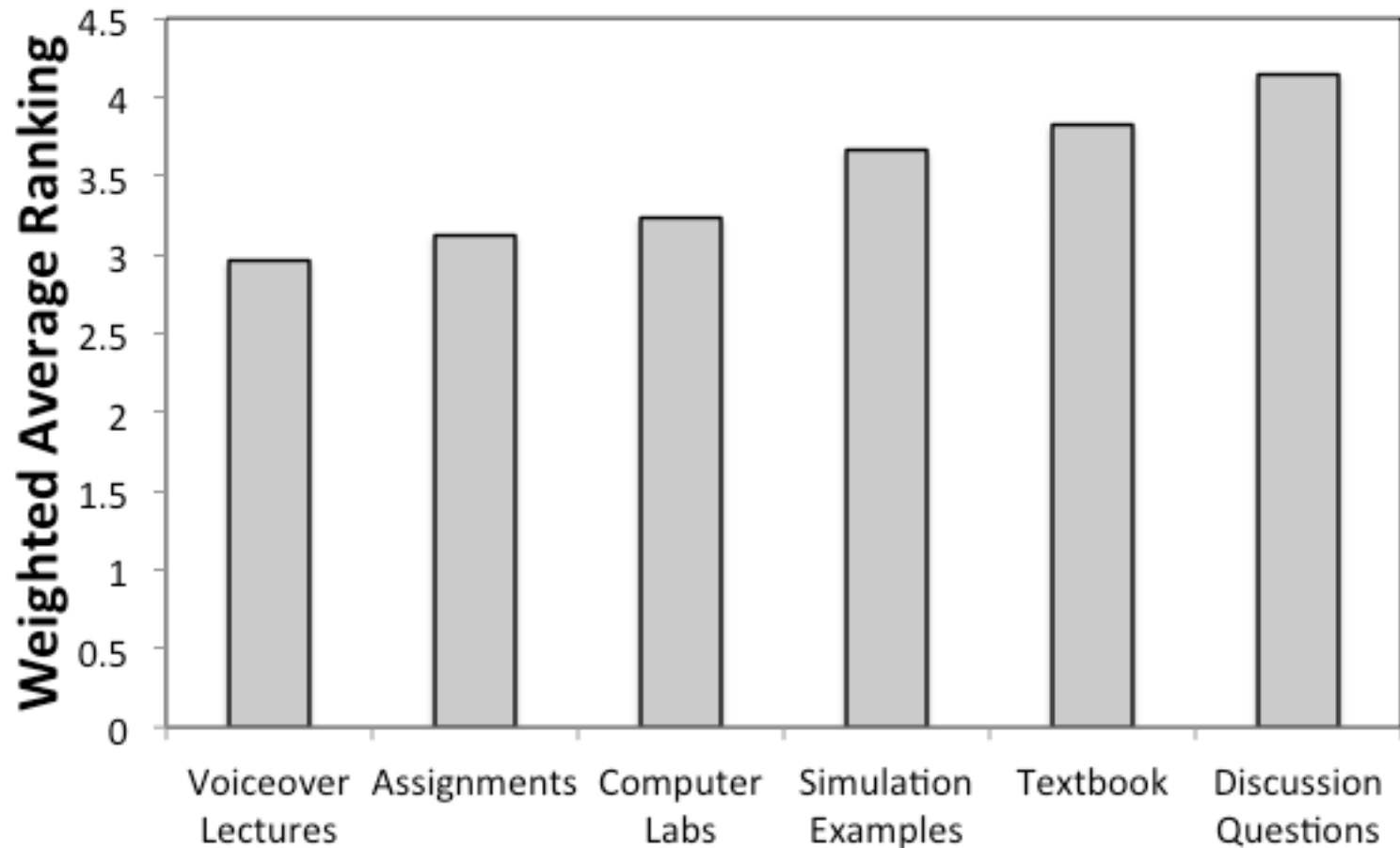
I am willing to approach this course with an open mind, as I can appreciate that different courses may require different learning skills.



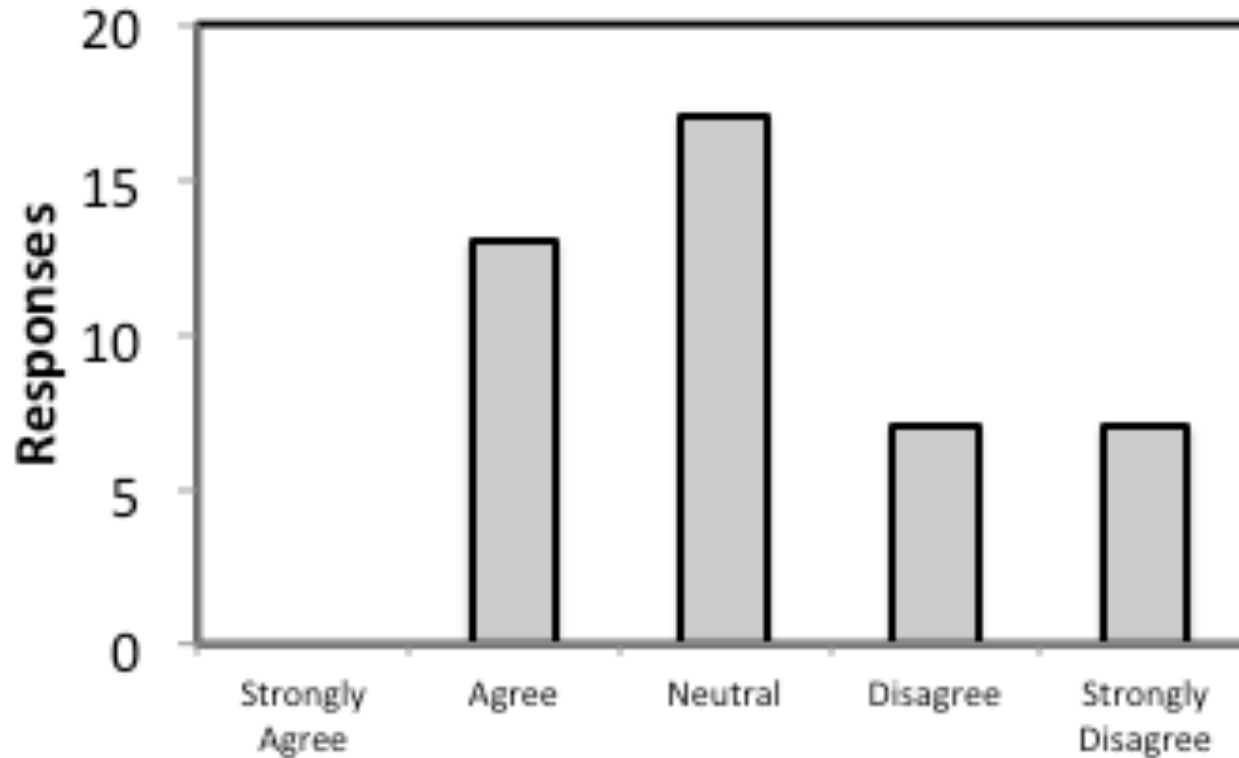
Compared to other online courses that I have taken, I feel that this course was:



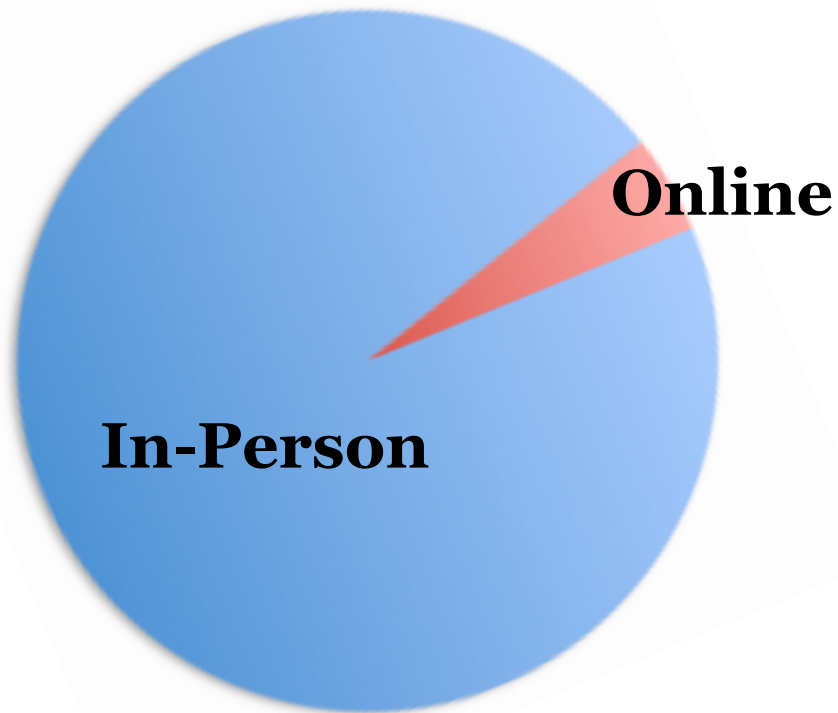
Rank these aspects of the course from 1 (most helpful) to 6 (least helpful):



This course has changed my perception of online courses.



If given the choice for this course, I would choose:



Conclusions

- No harm, no foul – online delivery neither beneficial nor detrimental.
- Students underappreciated the value of:
 - Asynchronous learning
 - Ability to (re)review lectures
 - Self-directed discovery through simulations
- Implications for programs struggling to find instructors who can/want to teach process control.

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