

TRESTLE Course Transformation Report Outline

Estimated length: 3-4 pages

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Course name: CSCI 2270 - Data Structures and Algorithms

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1. Intro

In this project, our objective was to develop a mastery based learning strategy for CSCI2270 to assess students' understanding of individual concepts and provide the additional resources they needed to be successful. Due to the size of the CSCI2270 course (~600 in Spring 2018 semester) and the resources required to shift the course, we did not implement the full features of mastery based learning in one semester. We were able to develop materials to scaffold students' understanding of concepts in the form of online videos. We were also able to survey students about the videos, including how useful they were, how often they referred to the videos, and additional videos they would like to see developed.

2. Course specific information

A. About the course

CSCI2270 is part of the first-year computer science courses, which include CSCI1300 – Introduction to Computer Programming in the first semester and CSCI2270 – Data Structures in the second semester. CSCI2270 is a four-credit course, which includes three, 50-minute lectures a week and one, 75-minute recitation meeting. The lectures are a fairly traditional lecture format, but also include occasional in-class activities. In recitation, students work together on activities designed to get them started on the weekly homework.

We consistently see students in this course with different backgrounds and levels of preparation. Students who took programming in high school are often already familiar with basic computer programming concepts, which helps them absorb advanced concepts in both semesters more quickly than students who are new to programming. In addition to having different experience prior to the class, students also learn at different rates once they're here, and students who need more instruction than their peers can quickly fall behind in a large class.

B. What did you do in the course transformation?

In this course transformation, we developed a series of online videos to help students with concepts presented in lecture. The videos were designed to supplement lecture material by going into more detail on pre-requisite knowledge than we could present in lecture. Jonathan Turner, a former CSCI 2270 student, developed videos on concepts that he found difficult when he was a student in the class. Jonathan also developed videos on topics identified by the course staff and students.

C. What assessments or documentation of impact were or will be used?

At the end of the semester, we surveyed the students about their use of the videos. The survey was administered through Qualtrics and included seven multiple choice and free-response questions, including

1. Have you watched any of the videos?
2. If you have watched the videos, which of the following describes your experience?
3. How hard was it to find the information you were looking for?
4. If you have watched the videos, have they influenced how much help you need from course staff (instructor, TA, CA)?
5. What were the topics of the videos that you found the most helpful?
6. What additional topics would you like to see?
7. Do you have other feedback on the videos that you would like to share?

Unfortunately, we only had a 10% response rate on the survey. Of the 43 students who responded to the survey, 53% said they watched the videos and found them extremely useful and 40% said they were occasionally useful. All respondents said they were able to find the information they were looking for, with 53% saying that it was easy to find and 47% saying they had to search for a while. The videos also reduced the help that students needed from the course staff, with 75% saying that the videos helped them answer their questions on their own.

The biggest criticism from students about the videos is that they didn't know they existed. The link to the YouTube channel was posted on the course website, but it was only advertised to the whole class once during the semester. An improvement for next semester would be for the course instructor to direct students to the videos relevant to the lecture on a more regular basis. Students also had suggestions for additional topics that they would like to see covered in videos.

The full survey results are included with the submission of this report.

D. How will you maintain the changes over time and across structures?

The videos are all included on a public YouTube channel that has been shared with the instructors for the Fall 2018 CSCI 2270 course. Ideally, they will share the videos with their students. If they don't, then the videos will be used again in Spring 2019, and additional contributions will be made at that time. There are minor differences in how CSCI2270 is taught each semester. It is possible that students viewing the videos from one semester could be confused if the information is taught slightly differently in their semester.

Another option for expanding use of the videos is to share with the computer science academic advisors that the videos exist. They could then share the link with struggling students during the semester.

E. Plans for future work

Our objective in this grant was to ultimately develop a full mastery based learning approach to CSCI 2270. After reflecting on this semester, I believe it will take many more semesters to accomplish this than originally planned. However, developing supplemental materials and an outline of where those materials fit in the course, will be extremely beneficial to many students and not as resource intensive as the original plan. This semester, we focused on videos. But, we have other media that we can use for supplemental instruction. I would like to develop additional, ungraded quiz and programming questions that students can use for self study.

In a mastery-based learning approach, students are allowed time to fully understand all concepts in a particular topic before advancing to the next topic. This approach is different than our current education model where we have a fixed amount of time to cover a given amount of information, and then we test students on this material and move on. Instead, with mastery based learning, students are allowed to review and test on information as often as they need to in order to learn the material.

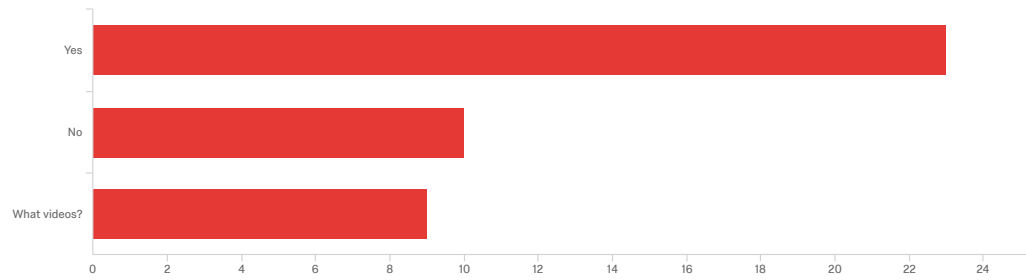
With our current resources, it will be difficult to implement the formal option of retesting, or testing at different times. However, we can provide students with the materials they need in order to learn the material in the time provided. In this way, we still fix the time, but we vary the amount of work that students do in that time. I believe that this approach moves us in the direction of mastery-based learning, but it puts it on the student to be self-directed to seek out the materials they need for their own learning. It also sets us up for the potential of a mastery-based learning curriculum in the future.

In our original proposal, we stated that we would like this approach to expand into other offerings in our curriculum. I still believe that this is an option. Several of our courses would benefit from supplemental materials. I will be discussing options with other course instructors, primarily teaching our lower-division courses, over the next six months.

Default Report

CSCI2270 - Video use survey
May 21, 2018 1:51 PM MDT

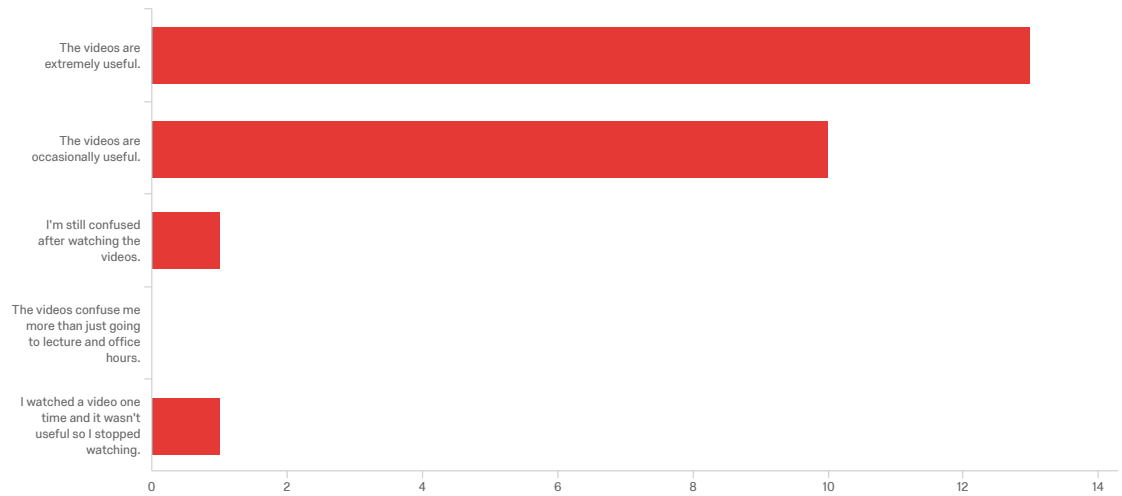
Q10 - Have you watched any of the videos?



#	Field	Choice	Count
1	Yes	54.76%	23
2	No	23.81%	10
3	What videos?	21.43%	9

Showing Rows: 1 - 4 Of 4

Q4 - If you have watched the videos, which of the following best describes your experience?

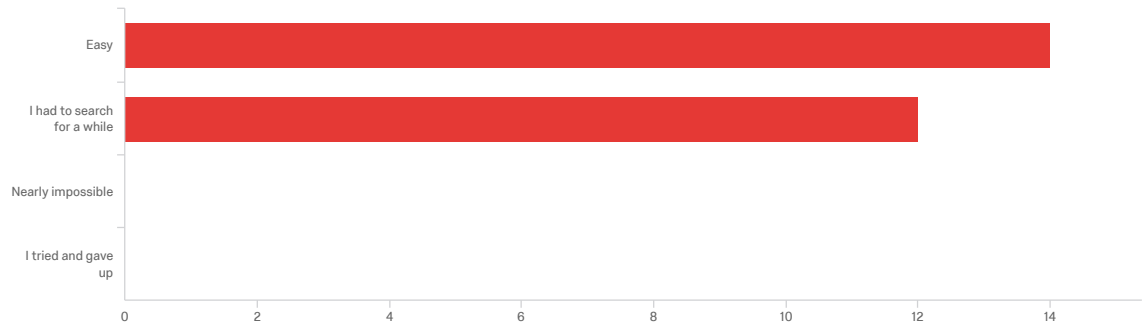


#	Field	Choice Count
1	The videos are extremely useful.	52.00% 13
2	The videos are occasionally useful.	40.00% 10
3	I'm still confused after watching the videos.	4.00% 1
4	The videos confuse me more than just going to lecture and office hours.	0.00% 0
5	I watched a video one time and it wasn't useful so I stopped watching.	4.00% 1

25

Showing Rows: 1 - 6 Of 6

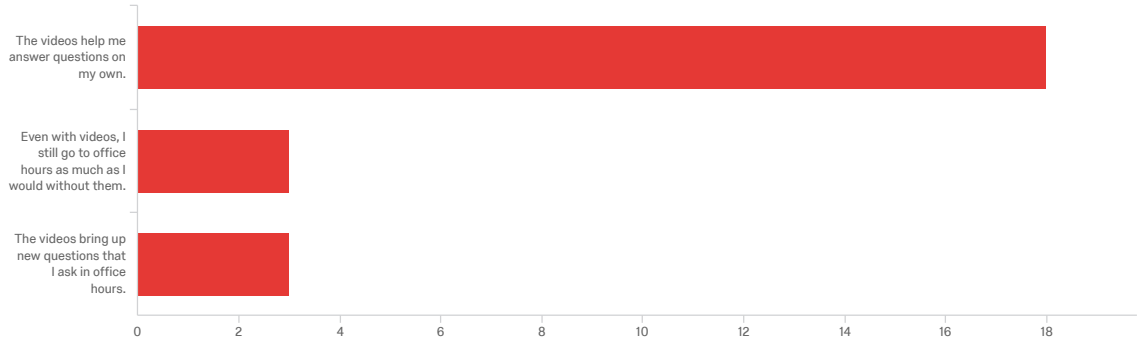
Q11 - How hard was it to find the information you were looking for?



#	Field	Choice Count
1	Easy	53.85% 14
2	I had to search for a while	46.15% 12
3	Nearly impossible	0.00% 0
4	I tried and gave up	0.00% 0

Showing Rows: 1 - 5 Of 5

Q5 - If you have watched the videos, have they influenced how much help you need from course staff (Instructor, TA, CA)?



#	Field	Choice Count
1	The videos help me answer questions on my own.	75.00% 18
2	Even with videos, I still go to office hours as much as I would without them.	12.50% 3
3	The videos bring up new questions that I ask in office hours.	12.50% 3

24

Showing Rows: 1 - 4 Of 4

Q6 - What were the topics of the videos that you found the most helpful?

What were the topics of the videos that you found the most helpful?

basic c++, file i/o, parsing, etc..

Command line, BST

linked lists, dynamic memory allocation

Pointers

LL, pointers

struct

Command line, reading in files

Doubly linked lists

Logistical questions

struct

argument command line

pointer

n/a

BST

Showing Records: 1 - 14 Of 14

Q7 - What additional topics would you like to see?

What additional topics would you like to see?

more on basic c++ functions and algorithms

Vectors, graphs

trees, graphs

Graphs

N/A

Red black trees

N/A

mapsno

every new materials that we learn from lecture

graph

n/a

topic of project

Vector overview

Showing Records: 1 - 13 Of 13

Q8 - Do you have other feedback on the videos that you would like to share?

Do you have other feedback on the videos that you would like to share?

I was not aware they existed

I would really like an entire mock assignment (from new file to completion) for each topic

I think having time stamps for steps/subtopics in the video in the description box would be extremely helpful. Thank you!

overall great, I wish there were more!

I was unaware that we have videos covering our class topics. If I had known, I would have loved to make use of them. Maybe announce them more frequently or add links to them in the starter code folder for relevant assignments?

no

N/A

no

I did not realize they existed!

n/a

they are good materials for learning by myself

I haven't watched any videos.

Showing Records: 1 - 12 Of 12

End of Report