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Integrating Hybrid-Flexible Course Delivery with General Education Computer Science Courses

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Abstract

The Hybrid-Flexible (HyFlex) course delivery format was developed at San Francisco State University to make SFSU's instructional technologies master's degree program accessible to working adults [1]. Under the HyFlex model, instructors build content for both a fully online course and for a traditional 'face-to-face' classroom environment. Both have the same learning outcomes for each week, so that students can move between online and in-person participation in the course seamlessly.

This poster covers the adaptation of CSCI 159, Computer Science Problem Solving, to the HyFlex model. The implementation of this course differs from the model in that it was entirely online but implemented HyFlex principles.

Background

A typical class offered in the HyFlex delivery format has classroom, synchronous and asynchronous online content running simultaneously with students choosing to attend as many or as few of the classroom sessions as they want and complete other components of the course online. The course objectives are structured so that students can complete them in the classroom or online; the instructor does not favor or require one course delivery format over the other.

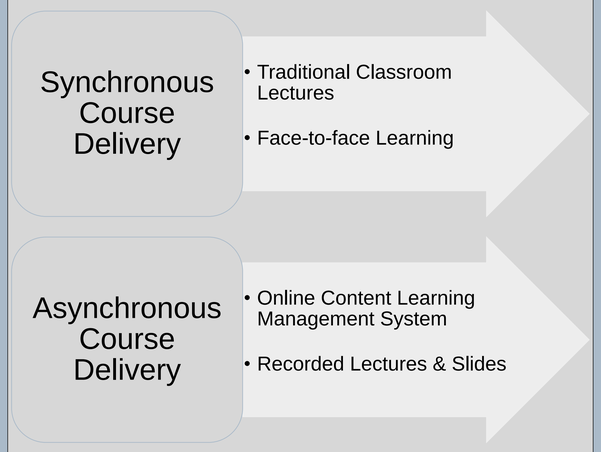

Figure 1. HyFlex Course Delivery Format.

The HyFlex model offers several advantages to both students and faculty. Students receive increased access to courses and more control over how and when to access the courses. Courses offered under the traditional classroom model sometime have conflicts where a student is forced to choose one class over another. Students juggling the responsibilities of part-time or full-time employment may not be able to regularly attend a scheduled classroom course. Students also benefit from more learning resources and opportunities, as HyFlex allows students to review the online course content on demand while still being able to take advantage of face-to-face instruction.

Design

In designing and implementing a HyFlex course, it is important to ensure that all of the student participation modes are meaningful, that all learning activities in the student participation modes lead to equivalent learning outcomes, and that students can choose how they wish to participate in the course freely [2].

CSCI 159: Computer Science Problem Solving is a general education course offered at North Dakota State University for beginning computing students. It is designed to provide students an introduction to computer science and teach them how the computer science discipline applies quantitative reasoning to analyze data, create algorithms, and solve real world problems. Students are introduced to information systems, networking, web site development, and how to write computer programs with Python.

Each week, recorded lectures, course slides, and related online materials are released via the university's Blackboard online course management system. A classroom component could be added where these lectures would be made available prior to the scheduled face-to-face classroom meetings. The classroom meetings, if offered, would be both streamed (synchronous online learning) and recorded for review later (asynchronous online learning).

Course resources and material are specifically chosen to be platform independent and can perform well on limited bandwidth. PythonAnywhere provides a full Python environment in a web browser in which students can share their Python consoles with each other or their instructor [3]. Other examples of platform independent, low bandwidth course resources are "How to Think Like a Computer Scientist: Interactive Edition" by the Runestone Interactive project [4] and Trinket.io's Hour of Python tutorials [5].

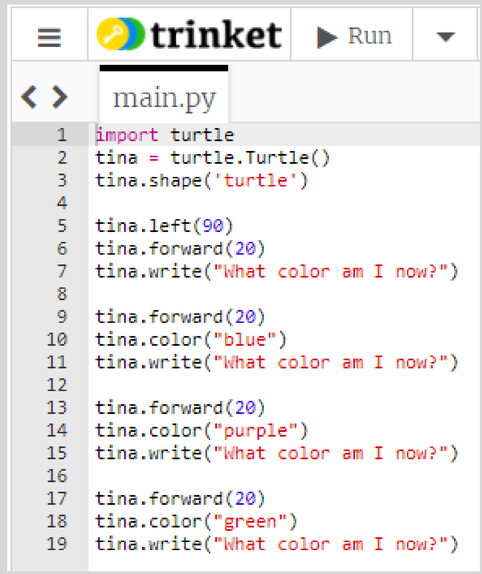

Figure 2. Web browser-based Python exercise, Visual Introduction to Python, (from hourofpython.trinket.io).

Conclusions

The HyFlex course delivery model allows CSCI 159 to be offered to a wide range of students and offers the same course content, regardless of how students choose to interact with it. The content developed supports students who prefer traditional classroom, synchronous or asynchronous online learning models. Students can freely move between different modalities of learning, which is a significant benefit during a global pandemic where students may be located on campus, in university housing or at a more distant residence and may need to attend online if asked to quarantine or if they become ill.

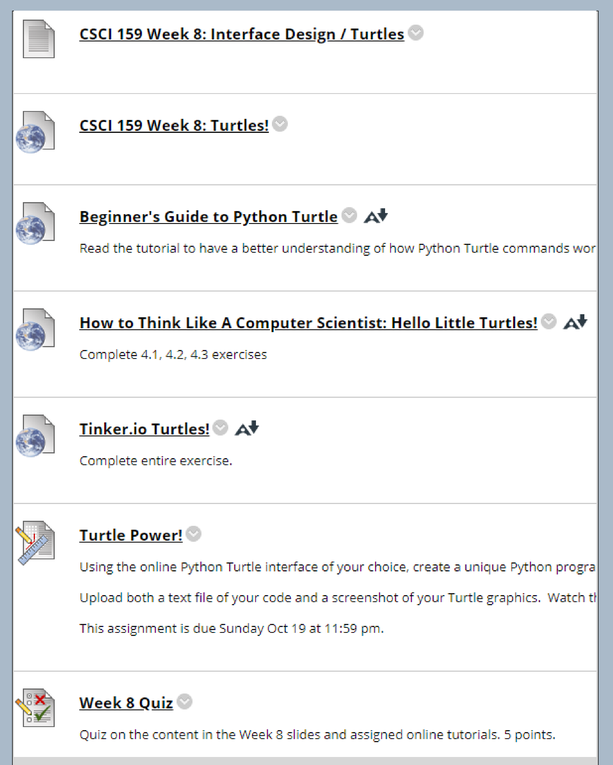

Figure 3. Example of Asynchronous Course Content, Csci 159 Week 8 Course Material, Assignments, & Quiz

References

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