Future of Online Education

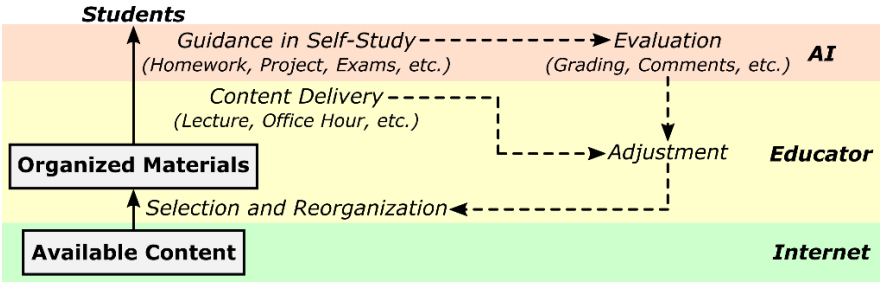
Online teaching is one of the most promising solutions to education inequality, but it is yet far from perfect. Pioneering institutes need to streamline the process of proposing, implementing, evaluating, selecting, and promoting new techniques to set up best practices.

I am privileged with the opportunities to teach and mentor in a wide variety of environments, from remote villages where one class had to hold student from different grade levels, to developed regions where undergraduate students are sponsored to try out research projects. Education is such a crucial resource to individuals. Online education is, in my opinion, one of the best solutions to bridge the gap of education inequality. Picturing myself as an educator who can contribute to such a cause has been the key motivation in my life. I am determined to develop a reference asynchronous online course on data analysis with as little active instructor intervention as possible, in order to, at large scale, cultivate interest for students to become lifetime learners and teach them the skills to master materials on their own.

Internet has enabled unprecedentedly convenient knowledge sharing, but online teaching is yet far from perfect. Not many educators have realized that **future online teaching has to compete with digital entertainment**. We will be competing for students' attention more and more intensely with online entertainment services, which is a new challenge for online teaching because this is less of an issue in traditional classroom setting. Because of this, I know I have to go above and beyond to not only deliver the materials but consistently engage the students. In my classes, I always strive to show how interesting the topics are, but at the same time, emphasize how useful the skills behind will be to the students. I believe these two complementary and mutually reinforcing motivations are the key to attract and keep students' attention. That being said, the quality of the online course is still the top factor affecting the learning experience. This is one of the reasons why I spend tremendous time and effort in active research projects. Mastering materials and the skills myself gives me the ability to identify the most important components and reorganize them in an easy-to-absorb manner. Also, I never felt ashamed of using all the small tricks I know to engage students, such as candies in in-person classes to encourage questions. For the same reason, I am not ashamed to admit that the virtual rewarding systems widely adopted in modern digital entertainment industries are extremely effective. I am in fact ready to implement them in my reference online course. I would emphasize learning, but take advantage of the scoring system because it serves as an effective motivation, and I will recommend the same to my colleagues.

The student-orient approach in course design and teaching has become more important than ever under this situation. Online educators must care about their students to prioritize effective learning over efficient teaching. While teaching and mentoring, I frequently ask myself the rule of thumb question "Will this help the student learn better, or just be more likely to make my life easier as an instructor?" For example, I am against the linear course structure popular in the current education practice, where, essentially, instructors assume topics covered once would be mastered by students. On the contrary, I believe multiple exposures of the same topic are crucial for students to truly master that topic. My lectures highlights high-level mental maps to help students properly set expectations and easily navigate through different topics, with repetitions in different formats, including preview, review, and example problems hitting previous introduced key concepts. And I am always ready to remind of the students a covered topic as needed. As another example, I am also not a big fan of the best practice of fragmented learning widely accepted by today's online courses, featuring short video segments with simple fact-checking questions in between. Properly training the students requires long, intense concentration from the students. Fragmented learning, at best, is only an easy way of delivering simple knowledge. Often, it may only provide an illusion to the students that they have learned something, because knowledge learned that way is hard to retain. I would instead try my best to increase the addictiveness of my online courses based on modern game design techniques, so that the students are willing to spend a lot of time and effort going through the materials. Even teacher's charisma or teaching behavior matters with this consideration. In my classes, I prefer the style of writing on the board compared with PowerPoint, to limit my speed to a degree that is easy for the students to follow.

Good online education is different from good traditional education. Good online education today is different from good online education a decade ago. The growth of online education and the rapid coverage improve of Internet over the past decade makes it possible for more and more people to get access to an overwhelming amount of free education materials online. Considering this, repeating existing courses in an online format now does not add much value. Developing new courses and better versions of existing courses is a better way. At the same time, **the rise of AI brings challenges and opportunities in online education**. With the fast development of super AI chatbots represented by ChatGPT, the normal standards and best practices will change dramatically again in the coming decade.



Instead of worrying about AI taking over me in an educator position, I feel excited about and is ready to explore this development in aiding me, so that I can reach more students without compromise of teaching quality. In the short-term, I am willing to rely on AI mainly or completely for guiding and grading students in self-study activities. This way, I can focus on selecting the best content to teach and developing techniques to better organize them and engage students. In the long-term, I believe the irreplaceable value of human educators lies in encouraging students to become interested in a topic, for example, as role models. Another implication of this fast AI development is that, although memorizing some knowledge is still required, the access to knowledge in general will be easier and easier, and the cost of fetching the correct knowledge will be lower and lower. Along this direction, teaching the skills of self-supervised education are more important compared with teaching specific knowledge. For this reason, I would also teach students the skills I use as an educator, including AI, so that they can preserve the attitude of active exploration and keep developing valid methodologies for solving problems out of my class.

At last, I would like to conclude my statement with a list of selected techniques for the reference online course I would like to develop myself. These techniques may appear aggressive with today's standards, but they can be easily tailored as need. And I am always open to collaboratively investigating their effects with other colleagues if they are interested in try them out.

- Modern Magic: Digital Signal Processing and Analysis
- 2D-matrix style structure: each element is a required/an optional module for a skill & topic combination.
    - Columns are skills to cover in an increasing difficulty from left to right, for example, signal generation, time domain representation, time domain techniques, time domain representation, frequency domain techniques, and large-volume data analysis.
    - Rows are example topics (materials) to respectively teach the skills in an incremental manner, for example, 1D signal (audio), 2D signal (image), 3D signal (geographic data), and large-volume data processing (machine learning).
- Game design applied to online teaching to boost motivation
    - Points for each completed required module and extra points for each completed optional module
    - Anonymous leaderboard with rewards for top winners
    - An interactive skill tree for this course to highlight study progress and provide extra study materials
    - Unlocking new modules and project-based challenges by earning points
- Community for peering mentoring: online study room and study groups
- Extra course evaluation: trend of participating students' grades in other courses before vs. after this course