

## Background

Despite the many recent advances in genetic research and applications, genetic literacy among the general public is still poor. We designed a fully online general education course covering the basic genetic concepts and the societal practices that have been impacted by genetics and genomics.

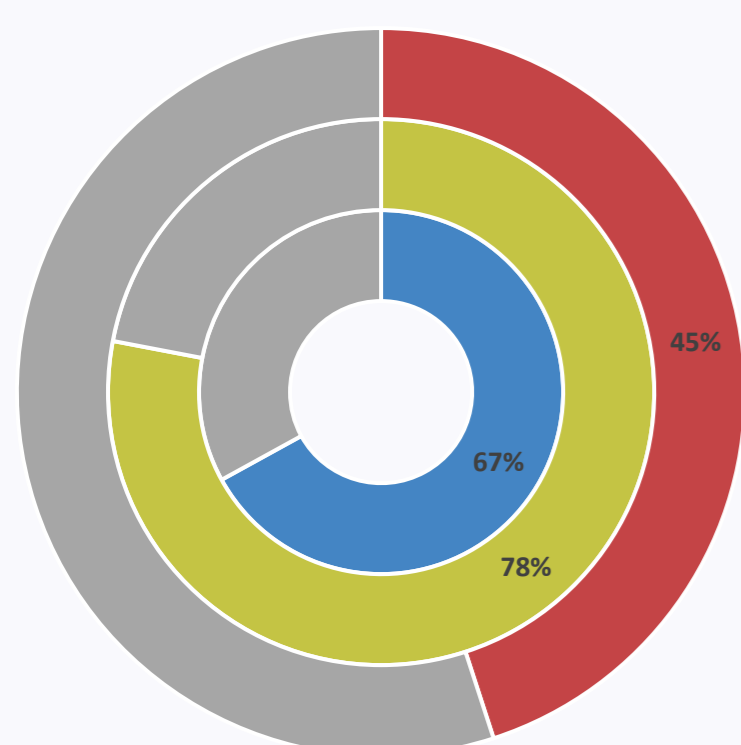
Designing engaging asynchronous courses is inherently challenging. Having to accommodate students with diverse educational backgrounds from different levels of study added to this challenge.

## Intervention

The course, "Genetics and Society", was designed with a scaffolded modular structure, with each module building on the previous. Gagne's nine events of instruction were applied to design learning and assessment activities in each module. Appropriate educational technologies were then used to develop and deliver these activities.

## Evaluation

Student reflections submitted at the end of the course were analysed for recurring themes related to course structure (110 students addressed at least one aspect).



67% of students mentioned they found the **course structure engaging and easy to follow**.

78% of students mentioned they liked having a **variety of learning and assessment activities**.

45% of students mentioned they **enjoyed and learnt from assessment tasks**.

Event	Example from the course	Technology used
 <b>1- Gain attention</b>	<ul style="list-style-type: none"> <li>A media article/video where the topic of the module was recently mentioned</li> </ul>	Module introduction - Online activity using H5P course presentation tool
 <b>2- Inform learner of objectives</b>	<ul style="list-style-type: none"> <li>Learning objectives of the module</li> </ul>	
 <b>3- Stimulate recall of prior learning</b>	<ul style="list-style-type: none"> <li>A brief summary and questions highlighting relevant key points from previous modules</li> </ul>	Mini-lectures – Three pre-recorded videos per module, 12 -15 min each
 <b>4- Present the content</b>	<ul style="list-style-type: none"> <li>Mini-lectures discussing genetic applications relevant to the module</li> <li>Reading and video resources highlighting examples of genetic applications</li> </ul>	
 <b>5- Provide guidance</b>	<ul style="list-style-type: none"> <li>Reading and video resources on relevant genetic concepts to help unpack the mini-lecture content</li> </ul>	
 <b>6- Elicit performance</b>	<ul style="list-style-type: none"> <li>Questions and activities to guide the application of genetic concepts</li> </ul>	Online learning activity with adaptive feedback using Adobe Captivate
 <b>7- Provide feedback</b>	<ul style="list-style-type: none"> <li>Built-in adaptive feedback for the questions/activities + Optional live Q&amp;A sessions</li> </ul>	Moodle quiz, at the end of each module Moodle forum, open throughout each module
 <b>8- Assess performance</b>	<ul style="list-style-type: none"> <li>Short quiz on module content</li> <li>Discussion forum on ethical, legal and social implications of a genetic application relevant to the module</li> </ul>	
 <b>9- Enhance retention and transfer</b>	<ul style="list-style-type: none"> <li>"Capstone" assessments;</li> <li>Critical review of a media article on a genetic application</li> <li>Practical report</li> </ul>	Submitted via Turnitin, due mid- and end of term respectively

## Key benefits of adapting the model in course design;

### 1- Allowed for creating a personalised learning experience while ensuring constructive alignment of each learning and assessment task with the learning outcomes, at both course and individual module level.

"...my genetics and overall science knowledge was not the best [but] this course was beginner friendly where I was able to learn comfortably and at my own pace...I was able to consistently learn every week with the different modules that integrated both video lectures and readings both which I enjoyed equally. This experience meant a lot to me as it was out of my comfort zone, but I really enjoyed learning applications that I can apply to my life."

"There were various learning mediums to ensure engagement and to create a fun and safe space to ask questions and voice concerns. These include lectures, videos, diagrams, discussion forums and games within modules. Learning in this course was refreshing and new in this sense...This experience for me was quite relaxing as I was able to work at my own pace."

### 2- Enabled presenting complex genetic concepts and applications through a variety of activity types in each module.

"I think this course is probably one of the well-structured subjects I've ever had. It catered to a lot of learning styles such as auditory learning for mini lectures, kinesthetic learning as the discussion forum and visual learning such as reading article/ online module...having a combination of these assisted in reiterating my knowledge of the topic. Personally, I feel myself becoming disengaged with 3 x 1 hour lectures every week, so having smaller lectures and other activities to do was so refreshing and constituted my learning."

"the learning experience in this course is so nice and good, the course is well-structured with each module present in different formats, including an introduction, mini-lectures and also the learning activity. These formats provided me a guide and allow me to understand and work through the module step-by-step. I learnt the module more and more depth by using different formats. It was a really good learning experience for me."

### 3- Allowed for seamless integration of assessments with the learning activities, making them an extension to learning as opposed to stand alone tasks.

"I enjoyed writing the critical review the most within this course. I really enjoyed researching on the topic that I chose... Another [activity] I enjoyed was the discussion forums. I've never actually done one in any of my courses and I enjoyed seeing my classmates' differing perspectives on each topic and receiving feedback from them."

"what I found greatly beneficial was the weekly quizzes provided at the end of the week...it tested my knowledge and sought out to see how much information I had absorbed from the lecture material. This furthered my learning journey as I was provided with feedback, which allowed me to reflect on my responses and correct any previous misunderstandings I had towards specific weekly content."

"the practical assessments were interesting and steered away from the stereotypical assessments which is appreciated."