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Framework for the development of massive open online courses (MOOCs) in response to disease outbreaks

Developed by the UK Public Health Rapid Support Team

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Rationale

An essential component of any outbreak response is communication of accurate information. The spread of false information and misinterpretation of public health messaging can have serious and damaging consequences. Implementation of public health measures to reduce the spread of disease outbreaks, often require individual interpretation of risks and mitigations. Success of public health interventions can be influenced by how well the disease and its control measures are understood by those affected. MOOCs present a number of opportunities to support shared understanding of public health interventions and uncertainties during disease outbreaks

In February 2020, The London School of Hygiene & Tropical Medicine partnered with FutureLearn to develop a massive open online course (MOOC) on the coronavirus-19 (COVID-19) disease outbreak with the primary aim of countering the growing spread of misinformation on the pandemic. In line with its mandate to support capacity building for outbreak response in low- and middle-income countries, the UK Public Health Rapid Support Team (UK-PHRST) led the development of this course - tailoring its content and style to maximise its accessibility to audiences in low- and middle-income countries.

Two iterations of the course have now been completed with experiences from the first informing how the second course was run. Over 200,000 course enrolments from 186 countries were observed and close to 100,000 comments were shared between course participants and educators. The course was well received with 98% of students completing the end of course survey reporting that the course either met or exceeded their expectations. 98% also reported that they gained new skills and 84% reported having applied their learning from the course. The high level of expressed gratitude from students during the courses suggested a potential gap in opportunities for free online courses to support education and individual decision-making during disease outbreaks.

Our experience with this MOOC also suggests that open education, building individuals' own capacity to question, to query the data, reports and guidance on disease outbreaks is needed. And that MOOCs are complementary to the circulation of accurate information, providing a sustainable approach to countering the spread of misinformation.

How to use the framework

This framework has been developed by the UK-PHRST to share learning from its development of the MOOC, *COVID-19: Tackling the Novel Coronavirus*. Links to tools and templates used in the development of this MOOC are included at relevant points in the framework as examples.

The framework details a stepwise approach to the development and delivery of a MOOC in the context of a disease outbreak. Before attempting the steps, it is important to have agreed the topic of study and course aim(s). The course aim(s) are often based on an identified need that has led to the decision to develop the MOOC. For example, the aim of the MOOC, *COVID-19: Tackling the Novel Coronavirus* was to address spread of misinformation on the COVID-19 at the time.

Key considerations for development of a MOOC in the context of disease outbreaks, based on lessons learnt are included at the end of the document.

Stepwise approach

Step 1 – Develop a core team

The core team will be the individuals that will work on the project ideally from start to finish. This team should, at the very least, consist of individuals with the following:

- Subject matter expertise
- Pedagogy expertise
- Knowledge of (or willingness to learn) how to use your chosen online platform

To facilitate an efficient process, it is also important to ensure there is adequate senior buy-in for the project. This buy-in can raise the profile of the course within the organisation and fast track its production.

Step 2 – Define the target audience

Who is likely to take this course? Will the course be open to a specialised group or the general public? To develop a course that speaks to the diverse needs of its students, early discussions on who the students will be is essential. The following questions can help in defining the target audience.

1. Who are the students for whom you're designing this course or who will be interested in taking a course on this topic? (e.g. what is their age, cultural background etc)?
2. Where are they in their overall course of study on this topic?
3. What physical setting might they be in when engaging with the course (e.g. noisy environments, public spaces)?
4. What devices or connectivity might they have access to?
5. How digitally literate are they?
6. Have they previously learned online (will you need to include guidance to support time management for online learning if it is new to them)?
7. What emotional factors or external stressors might impact their ability to succeed on the course?

These questions are designed to enable a better understanding of your target audience. This will then inform a course design that is tailored to the needs of the student – supporting greater likelihood of success on the course. The questions included above are just a guide and may need adapting depending on your context.

Step 3 – Develop intended learning outcomes

Intended learning outcomes are sometimes called course objectives. This is what students will be able to do on completion of the course. As an example, the intended learning outcomes for the MOOC, *COVID-19 Tackling the Novel Coronavirus* were:

1. Describe how Covid-19 emerged and was identified
2. Discuss public health measures for COVID-19 applicable in different contexts
3. Summarise what is needed to inform the response to COVID-19 going forward

These were the learning outcomes for the whole course. It is also helpful to have intended learning outcomes for each individual activity in the course. [A sample of the intended learning outcomes for each Step \(activity\) on the MOOC, COVID-19: Tackling the Novel Coronavirus is included here as an example.](#)

The table below is designed to support development of the intended learning outcomes for your course. Start by defining the level of study – e.g. secondary school, university level. Then look at ‘what students do’ at that level and use the descriptive verbs to start to define each intended learning outcome.

Level of study	What students do	Descriptive verbs
Graduate school (master’s degree)	Create Develop own ideas or provide own view point	Construct, design, create, develop, write, formulate
Graduate school (master’s degree)	Evaluate Justify own view point or decision	Evaluate, appraise, argue, judge, select, support
Undergraduate study (first degree)	Analyse Distinguish between different aspects or parts	Compare, contrast, examine, experiment, question, criticize, test
Undergraduate study (first degree)	Apply Use information or use information in a new way	Use, demonstrate, illustrate, operate
Secondary school or lower	Understand Explain idea or concept	Explain, classify, recognize, report
Secondary school or lower	Remember Recall information	Recall, list, repeat, reproduce, state

Table 1: Anderson's taxonomy and level descriptors; Adapted from Sun, Y. M. (2007) and Wilson, L. O. (2006) – Retrieved 01.04.2021 from <https://www.evolvedschool.co.za/amp/2013/02/26/critical-thinking-making-it-work-in-your-classroom>

Step 4 – Decide your course structure

Over how many weeks will your course run? What topics will be covered in each week? How many hours a week will students need to spend on the course. The table below provides the course overview for the MOOC, *COVID-19 Tackling the Novel Coronavirus*. The course ran over three weeks with students expected to engage with 4 hours of work each week.

Course overview
Course summary: The course is about the outbreak of novel coronavirus (COVID-19) following its emergence in December 2019 in Wuhan, China. It covers what is known on the disease outbreak, what are the practical implications for response and what is needed for the future.
Target Audience: Those working in health and/or those interested in the response to COVID-19
Learning outcomes: On successful completion, participants will be able to: 1. Describe how Covid-19 emerged and was identified 2. Discuss public health measures for COVID-19 applicable in different contexts 3. Summarise what is needed to inform the response to COVID-19 going forward
Structure: Week 1: What is known about the outbreak of COVID-19? Week 2: What are the practical implications? Week 3: What more do we need to know?
Duration: 3 weeks, 4 hours per week

Table 2: Course overview for the MOOC, *COVID-19 Tackling the Novel Coronavirus*.

Step 5 – Decide modes of delivery and potential contributors

The teaching materials consist of two components – content and mode of delivery.

The digital platform that is being used for the course will determine the modes of delivery you have available. Typically, the following options will be available: video, audio and article. Select the mode of delivery for each part of the course with the audience and intended content in mind.

Parts of the course that are more complex may be better presented using videos with animations. Other parts that are likely to need updating (e.g. parts that contain dates or key events) are better assigned modes of delivery that can be easily edited - like articles. Aim to have a relatively even spread of different modalities in each week of the course.

Select content contributors based on their availability and knowledge on the topic. Have two or three contributors in mind for any one lecture, article or audio component. This is particularly important when developing a MOOC during a disease outbreak as the content contributors may also be actively involved with the disease outbreak and can be called away at short notice. Careful consideration should also be given to ensure there is a balance of genders, ethnicities and geographies (if applicable) in those contributing to the course.

Step 6 – Develop course content

With course aims, intended learning outcomes and modes of delivery outlined, it's helpful to provide these together when contacting course contributors. [An example of the information pack provided to course contributors for the MOOC, COVID-19 Tackling the Novel Coronavirus is included here.](#)

The information packs were tailored for the contribution required, with each contributor receiving the specific intended learning outcomes for their part, set questions they were to address in their contribution, and an example of the type of content they would be required to produce.

Note: To save time, there is often the consideration of using teaching materials designed for a different course. The process of adapting that material to suit the current course can be very time consuming and it is often more efficient to create new materials.

The process of developing course content can involve numerous stages and individuals. For example, developing a course video can involve the following stages: script development, review and amendments to script, recording (home based or in a studio), editing recordings, transcription, uploading. It may be helpful to develop a spreadsheet that allows you to chart where you are up to with the development of each Step of the course. [This Excel spreadsheet provides a template for charting progress against each course Step.](#)

Step 7 – Plan course facilitation

Disease outbreaks are highly political, heightening the need for close monitoring of observation of comments posted on the course. The plans for course facilitation may vary depending on expected student numbers. For the MOOC, *COVID-19: Tackling the Novel Coronavirus*, over 200,000 students were enrolled, predicting high volumes of comments and questions from students and a systematic approach was adopted to facilitate course discussions. This systematic approach is described below.

The course facilitation team was divided into three cohorts:

- Hosts (individuals who had a good understanding of the digital platform and who had moderated online courses)
- Mentors (middle-grade academics or practitioners with knowledge of the topic)
- Educators (senior academics or practitioners with expertise on the topic)

Course Hosts reviewed all course comments, removed comments which breached codes of conduct, managed technical queries, and referred academic questions from course participants to course Mentors using a shared [Excel Facilitation Spreadsheet](#). Course Mentors then reviewed the shared spreadsheet and addressed student comments or questions included there, to their level of expertise. Questions that required further review or a more expert response were then referred by the Mentors to the course Educators.

[Here are the instructions provided for the course team to explain this approach.](#)

The use of a shared spreadsheet to support the facilitation of course comments can foster a sense of community and shared action amongst the course team. The use of additional shared platforms (e.g. regular group meetings or shared text-based discussion channels) for the course team to discuss ideas or troubleshoot concerns is also recommended.

To encourage student engagement, develop questions to pose to students in the introduction to each part of the course and ask students to consider that question as they engage with that part of the course. Then, at the start of the comments sections, repeat the same question and ask students to share their responses. This can be a way to steer the course discussions. If possible, fix the question to the top of the comments section so that learners see it first.

Frequently asked question (FAQ) documents can prove helpful during the facilitation as they can address a large proportion of the questions, leaving room for more in-depth discussion. During the course, it is helpful to keep a list of frequently asked questions to feed into FAQ documents that can be used as an additional resource in subsequent runs.

Key points to consider when developing a MOOC rapidly

- Senior level buy-in can be critical to the development of any course. It raises the profile of the course and opens doors which can fast track the process.
- A small focused core team consisting of individuals with relevant expertise – on the course topic, on pedagogy, and on the use of your chosen platform - supports rapid development of the course aims, intended learning outcomes and structure.
- There is a need to plan for shifting demands throughout the course development (e.g. student enrolments may exceed expectations, content contributors involved in managing the outbreak may suddenly become unavailable). Having course coordinator(s) who has a handle on all components of the course is essential to manage the challenges and opportunities that may arise.
- Establishing clear communication channels, between the coordinator(s) and the team is critical to the success of the project. This can take the form of regular structured meetings and/or use of shared communication tools (e.g. shared docs, shared email accounts).
- Providing course contributors with specific instructions tailored for their individual contribution (including templates and/or examples for the contribution required) helps reduce the time the contributor needs to spend when developing content.
- When facilitating a large cohort of learners, a systematic approach is needed.
- If planning to run the course more than once, the use of FAQ documents in subsequent courses (based on questions asked on the first course) can be very helpful and timesaving for both the students and the course facilitators.
- During the course, fostering a sense of community and cooperation amongst the course facilitation team needs to be prioritised. Otherwise you may miss key learning opportunities. Regular calls/meeting with the course facilitation team - where team members are encouraged to present challenges and potential solutions, and/or using a shared platform for the team to share ideas and concerns – are potential ways to achieve this.

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