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Author	Amadae, S M;Carter, Caro;Christie, James;Finnegan, Colum;Keskiivari, Kim;Nyokabi, Kamau;Ruohonen, Ada
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## RESEARCH REPORT

# Flipping the classroom to generate learning content: students as authors of a textbook on planetary risk

S.M. Amadae, Caro Carter, James Christie, Colum Finnegan, Kim Keskiivari, Kamau Nyokabi, Ada Ruohonen

*University of Helsinki, Finland; University of Cambridge, United Kingdom*

### Abstract

**Context:** The case study was conducted at the University of Helsinki with a cohort of 33 master's students enrolled in a 10-credit module on International Politics. The course combined lectures and writing workshops aimed at having students producing a publishable textbook on nuclear weapons and planetary risk. This experimental class design was motivated by the absence of suitable resources for the topic and to challenge the common practice of having students produce disposable assignments.

**Aims:** The dual objectives were to create a high-quality open-access textbook exploring various aspects of nuclear weapons and planetary risk and to challenge the common framework that seek MA coursework as disposable. The instructors sought to increase student engagement through active learning strategies, employing a flipped classroom model to generate learner-generated content, in order to enrich the educational experience and produce a valuable academic resource.

**Methods:** The implementation unfolded in a structured five-stage process over approximately 12 months. It started with assigning student responsibility for a chapter in the textbook and supporting their production using a flipped classroom setup in which students prepared before class and engaged in writing workshops to develop their content for the textbook. The subsequent stages included evaluating the quality of student-generated content, involving students in the editorial process, and refining those contributions until they met publishable standards. The course culminated in the publication of an open-access textbook.

**Findings:** Student feedback indicated strong positive outcomes from the approach. Participants reported high satisfaction rates with the flipped classroom strategy, noting improvements in learning outcomes, increased student pride in contributing to a published work, and enhanced confidence in their research and writing skills. Qualitative feedback emphasized the meaningfulness of the experience, though students expressed a desire for better communication about each other's work. The textbook produced by the students has been published in an open access format and forms the basis of a MOOC on the topic.

**Implications:** The study highlights that MA students can produce high-quality academic content when guided appropriately. It supports the use of a flipped classroom methodology with a majority of students reporting improved learning outcomes and high satisfaction with the course design. These outcomes suggest that a collaborative, learner-centred approach in higher education can yield significant educational benefits. The positive reception from the MOOC based on the textbook also indicates its wider applicability and potential beyond the initial classroom setting, reinforcing the benefits of open pedagogical practices that can enhance student learning and engagement.

**Keywords:** active learning, cooperative learning, higher education, open educational resources, students as authors, flipped classroom, teaching controversial issues

## Context

The class was run at the University of Helsinki in Finland and consisted of 33 students taking a 10-credit module on International Politics. The class lectures took place over seven weeks and consisted of a three-hour morning seminar, followed by a three-hour afternoon writing workshop in weeks 3 to 6. The students were all at the master's (MA) level. Prior to running the class, the instructor devised a draft table of contents, and each student was assigned a chapter.

## Motivation, focus and questions

The initial motivation to generate a textbook on nuclear weapons and planetary risk was the lack of existing introductory text suitable for an MA cohort on the topic. There is no single resource that draws together the many facets and dimensions of nuclear weapons, their history, context, technology, politics and risks. To address this lack of material, we devised an approach that would both centre student voices in such a project and share the workload, making the development of a textbook in a short amount of time a more realistic goal.

A second key motivation was a recognition that the work produced by MA students is typically disposable (Wiley et al., 2017). What this means is that, upon completion, the research works produced by MA students are graded and then returned to the student to be forgotten, never to see the light of day again. It has been proposed that changing the final product generated by the students from a disposable essay to a more enduring piece of work can better motivate students to engage with the material, and thus more effectively learn (Hollister, 2020; Wiley et al., 2017).

Thus, there were two distinct challenges that we set out to meet in tandem: 1. To develop a high-quality introductory textbook on nuclear weapons and planetary risk, and 2. To treat MA coursework as publishable research as a means to motivate students and improve learning outcomes.

To implement an approach to content generation and pedagogy that could meet these two challenges, we drew on established resources in the active learning tradition (Bonwell & Eison, 1991; Chi, 2009), an approach to teaching that seeks to shift from a passive lecture-based format to having students take a more active role in their learning. The specific approach we deployed was a form of **flipped classroom** (O'Flaherty & Phillips, 2015; Rotellar & Cain, 2016). In our setup the students attended morning lectures, after having already reviewed course material at home, and then attended a weekly writing workshop, with the instructor guiding them in their work on the chapter drafts (King, 1993). We also drew on a second approach inspired by the active learning tradition, known as **learner- or student-generated content** (Ribosa & Duran Gisbert, 2022; Arruabarrena et al.,

2019). The idea is that students are capable of producing content for other learners, and this approach can improve their own learning outcomes. This method is inspired by the idea that teaching is itself a powerful means to learn. In our setup the instructor led the students in the production of learner-generated content during class time, flipping the normal format wherein they would write their essays in isolation.

A related approach that aligns well with the methodology we developed is known as **open pedagogy** (Hollister, 2020; Wiley et al., 2017). Here the idea is that pedagogical materials should be open source, often in a wiki-style format, and dynamically student generated. The open pedagogy approach underpins the design we implemented here, and the subsequent Massive Open Online Course (MOOC) course we developed based on the textbook put these principles into practice. Open-source and open-access educational materials are a crucial component of education both in the university and beyond.

Furthermore, given the gravity of our topic here, namely nuclear war, the importance of offering accessible open-access educational resources that can be utilised by the public more broadly, and inform political and policy positions, is crucial. This theoretical approach led us to develop two research questions:

- RA1: Does the flipped classroom method facilitate and improve students' research, writing, and content creation skills?
- RA2: Is the flipped classroom protocol we developed an effective means to generate an introductory textbook for other students?

Prior to running the course, we were unsure about the feasibility of having MA students produce content in this manner, and about their possible enthusiasm for engaging in a novel educational format. We hoped that this approach would lead to the generation of high-quality content while improving their learning outcomes and student satisfaction but were not sure in advance if this would be the case. The success criteria for our investigation were if the flipped approach we utilised was effective in producing positive learning outcomes, if the students found the class design, format and pedagogy effective at enhancing learning outcomes, as well as if the content produced was of sufficient quality to be included in a textbook.

## **Inquiry plan and activities**

From beginning to end the process of running the course, refining the content, publishing the textbook and gathering student feedback took place over the span of 12 months. This period can be subdivided into 5 distinct stages.

### **Stage 1: Initial flipped classroom implementation: November – December 2024**

We implemented our flipped classroom with learner generated content design in an MA course during the autumn semester of 2024 at the University of Helsinki. The course was titled *Advanced Theories of International Politics* and was worth 10 credits in the European Credit Transfer System (ECTS) which standardises University coursework across the EU. We had 35 students enrol in the class, of which 32 participated throughout, and 31 completed their chapter for the eventual textbook. At the beginning of the semester, we worked with the students to develop the textbook outline. Each student was then assigned responsibility for one chapter. Then the instructor helped to decide on chapter sections and gave guidance on references. The structure of the course was as follows: a three hour morning seminar on International Politics, the content of which was unrelated to the chapter topics the students were working on. The morning session was followed by a three hour writing workshop in the afternoon. The writing workshops comprised the flipped classroom component, with the students working on their chapter drafts in class supervised by the instructor. The supervision entailed outlining and structuring each chapter, identifying pertinent sources, and guiding students on research strategies. The instructor was also available during office hours for any additional questions and for help with revising their drafts. At the end of term, the students presented their chapter drafts as an in-class exercise during the morning lectures, and they received peer feedback. Throughout the course, peer review was encouraged between the students.

### **Stage 2: Initial study evaluation by research team: January – February 2025**

After Stage 1 it was unclear if the flipped classroom with learner-generated content approach we deployed had generated usable, shareable and publishable content suitable for an open-access textbook on nuclear weapons and planetary risks. Thus, in Stage 2 the research team, consisting of two MA interns and the Principal Investigator (PI), systematically evaluated the quality of the student-generated chapters. Team members read through each chapter thoroughly, assessing them for academic quality, conciseness, and topic discipline. Each chapter was assessed along these dimensions, and the team held regular meetings throughout January and February to discuss their findings and reach consensus on which chapters could proceed to the editorial stage with minor revisions, and which would entail additional development.

The evaluation revealed that the standard was relatively high overall, with most students demonstrating strong research capabilities and the ability to engage effectively with complex topics in nuclear international security. However, the assessment also identified that a significant amount of additional editing and refinement would be required to bring the material up to the required standard for professional publication. This included strengthening citation practices, improving structural coherence, and ensuring consistent authorial voice and style across chapters.

During Stage 2 the PI also evaluated and marked the additional student exams which were based on the morning seminar sessions on International Politics, treating these as standard examinations separate from the textbook chapter evaluation. This dual evaluation process allowed the PI to assess both the students' mastery of course content and their capability to contribute to publishable scholarly work.

### Stage 3: Incorporating students into study evaluation: March – May 2025

After assessing the materials generated by the students, we arranged an additional seminar session. During this session we shared the research paper evaluations with the students. We discussed the quality of their work and described the additional revisions that would be required to bring the content up to a standard suitable for publication. A majority of students (31/32) indicated that they wished to go ahead with publication.

The students who were interested in proceeding with the publication plan were then asked to sign publication consent forms indicating that they were comfortable with their work being edited by the research team and finally published in an open-access textbook. Several of the students were asked to revise some sections of their texts when their original texts were below the required standard. Additionally, chapters that were created by students who did not wish to continue were reassigned to other students to complete on a voluntary basis. All students were told that texts would then be further edited to be rendered publishable by the research team (eventually expanding to include two post-docs). Students were told they would individually receive a primary authorship credit for the chapter they wrote, in an edited volume.

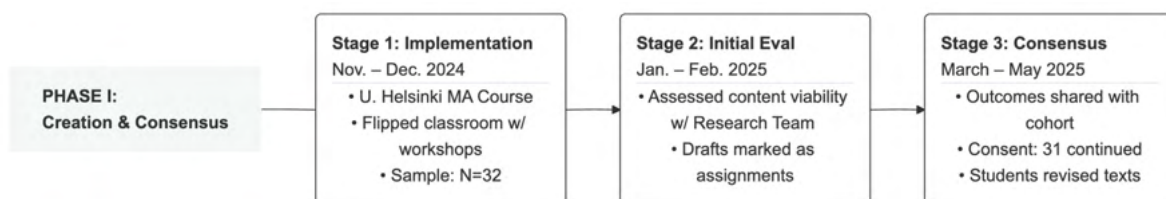


Figure 1: Phase 1 (Stages 1-3) of Flipped Classroom Learner-Generated Content Experiment

#### **Stage 4: Rendering student created content publishable: June – September 2025**

Following the evaluation and initial feedback stages, we undertook a comprehensive editorial process to transform the student-generated chapters into publishable content suitable for an open-access textbook. This stage involved the PI, MA interns, and postgraduate team members working collaboratively to copyedit, revise, and enhance the student texts. Chapters were assigned to team members based on their areas of expertise within the fields of nuclear weapons and planetary risk, ensuring that each chapter received substantive review from someone with relevant domain knowledge. The editorial process included multiple rounds of internal peer review, with reviewers providing detailed feedback on academic rigour, clarity of argument, and alignment with open-access textbook standards. The team also integrated new scholarly citations to strengthen arguments and updated existing references to ensure accuracy and consistency with standard citation formats.

In three cases, students from the course volunteered to contribute additional chapters or collaborate to improve chapters that were substandard, expanding the textbook's coverage and deepening specific topic areas. The copyediting phase was completed by July 2025, followed by substantive revisions throughout August, with final formatting and citation standardisation completed by the end of the month. In total 31 students contributed 32 chapters, and the open-access textbook was published in September 2025.

Our aim throughout this stage was to replicate the standard academic process of using research assistants and postgraduate researcher contributions to generate publishable output at the professional level, with the crucial difference being our commitment to granting students authorship credit for their individual intellectual contributions. This approach acknowledged the students as the primary contributors to their chapter rather than merely anonymous research assistants. Thus, in the final textbook the students were given sole credit as the author for the chapter they wrote (the supplementary materials include the final table of contents for the textbook which illustrates the author credit format we adopted). As such, the class successfully transformed what were disposable assignments into enduring outputs.

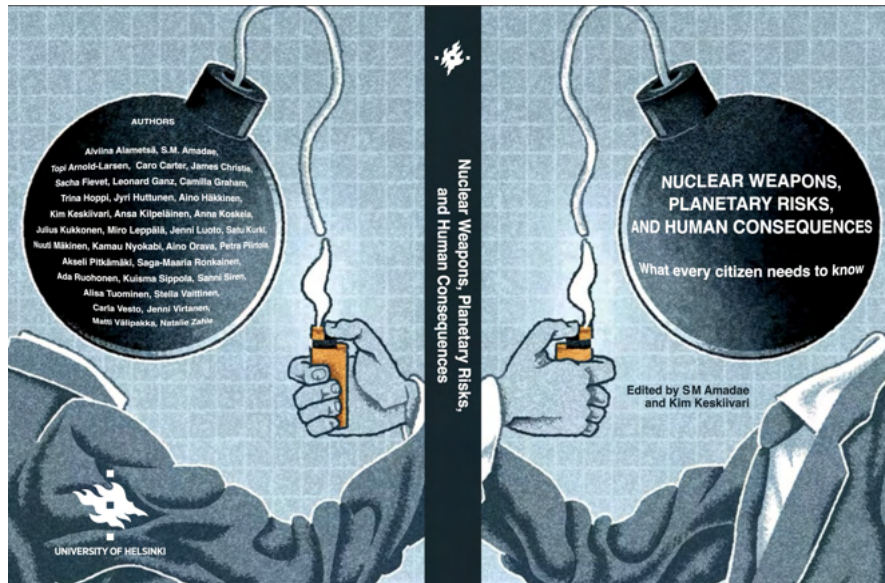


Figure 2: Cover of the Textbook

### Stage 5: Final study evaluation: October 2025 – January 2026

The final stage of our inquiry focused on systematically evaluating the effectiveness of the flipped classroom pedagogy with learner-generated content for improving students' research, writing, and content delivery skills. We employed multiple methods of evaluation to gather comprehensive data on both the original course participants and subsequent users of the published textbook.

In order to gather feedback on the class design and student outcomes, at the end of October 2025 we asked the 31 students who had completed the original course to participate in an anonymous online survey regarding their learning experience. The survey utilised Likert scales ranging from 1 to 5 to measure students' self-reported learning outcomes, pride in their work, confidence in their research and writing abilities, and attitudes towards the editorial process their chapters had undergone. Additionally, the survey included open-ended questions to gather qualitative feedback on the strengths and weaknesses of the course design and implementation. Of the 31 students contacted, 15 responded to the survey, providing us with both quantitative and qualitative data on their experiences.

In January 2026, we implemented a pilot MOOC (Massive Open Online Course) based on the published textbook, titled "Nuclear Weapons: Planetary Risks, and Human Consequences" (PVK-501). The MOOC was designed as a self-paced, text-based course explicitly designed to make the student-generated content accessible to a global audience through the open university platform. The pilot course attracted 34 enrolled students. We conducted an additional online survey to

discover how students found the open university MOOC course. This assessed the online format, quality of the textbook, accessibility and the effectiveness of the quizzes. Initial feedback received was very positive, with all respondents giving high scores on the various dimensions being assessed. This multi-method evaluation approach allowed us to assess both the pedagogical impact on the original student authors and the broader educational value of their published work.

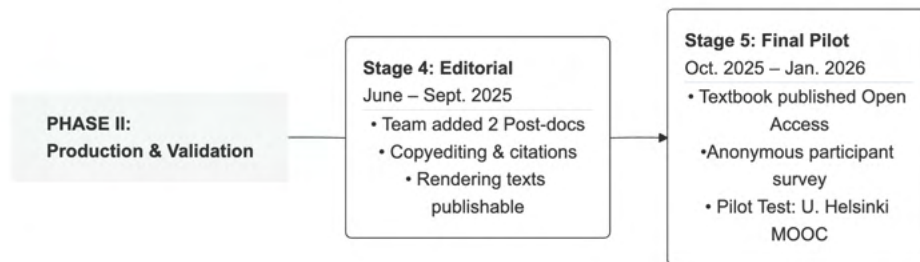


Figure 3: Phase 2 (Stages 4-5) of Flipped Classroom Learner-Generated Content Experiment

## Ethical considerations and relationships

In running the class and preparing the publication process several ethical considerations arose. Firstly, as the final publication of the text was voluntary, it was stressed to students that their grade was not in any way linked to the ultimate publication of the text. The grade they received for the class was determined by several assignments, including the quality of their chapter draft, and they had the option to opt out of the final publication without penalty.

Those students who did agree to proceed to the publication stage were then asked to sign consent forms which indicated their willingness for their work to be copyedited and included in the final textbook. This ensured they were informed about the future use of their work, and the manner in which they would receive authorship credit for their chapters.

A final ethical concern arose during the student feedback surveys, in both cases: to ensure the anonymity and confidentiality of the participants in the online survey, we did not collect participants' email addresses or otherwise link their responses to their identity. Additionally, the survey included a consent field, where participants could indicate their willingness to have their qualitative feedback paraphrased as part of the research.

## Findings

Based on the follow-up online survey the students were invited to complete after taking the course, we can make some general claims about the experimental classroom design. With 15

students completing the survey, we had a good response rate of 48% (in spite of some students graduating and therefore possibly not receiving our message inviting them to participate in the survey). Overall, the results suggest strong positive outcomes from the flipped classroom approach as implemented in this case. We have included the full results in the appendix and chose a few representative findings to reproduce here. In each case the students were asked to respond to a query on a 1–5 Likert scale, with 1 indicating “don’t agree” and 5 “completely agree”.

Having completed the course, and seen how their chapters formed a final textbook, students reported high agreement that student-produced textbooks had pedagogical value (Figure 4).

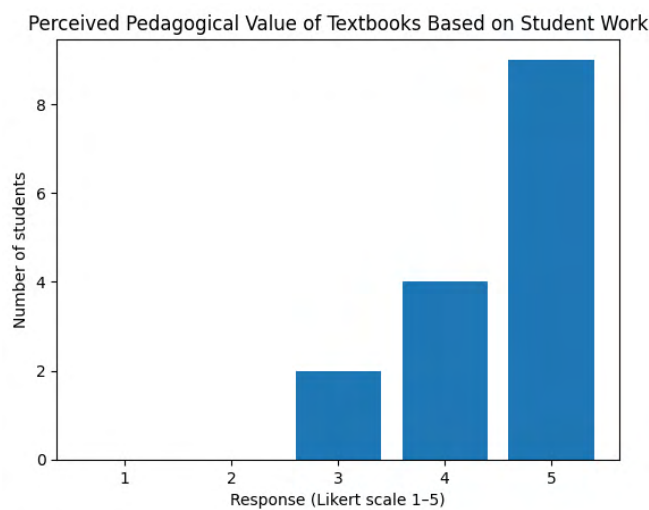
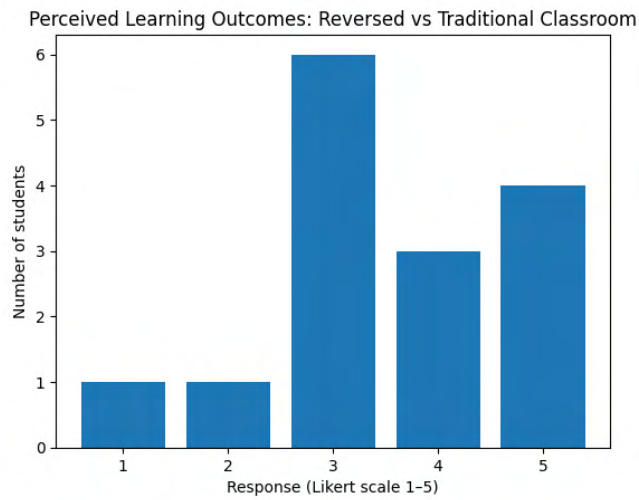


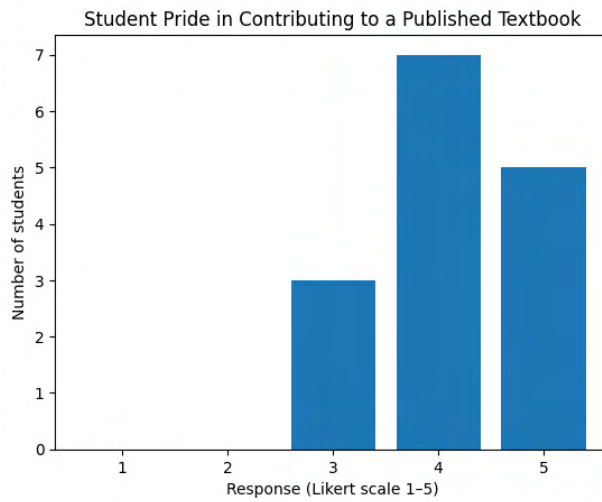
Figure 4: Perceived pedagogical value of student-produced textbooks

Additionally, they reported moderate to high agreement when asked if “Compared with other, more traditional, class formats I found I had better learning outcomes in the reversed classroom format” (Figure 5). This indicates that a reversed classroom was perceived by the students as improving learning outcomes.



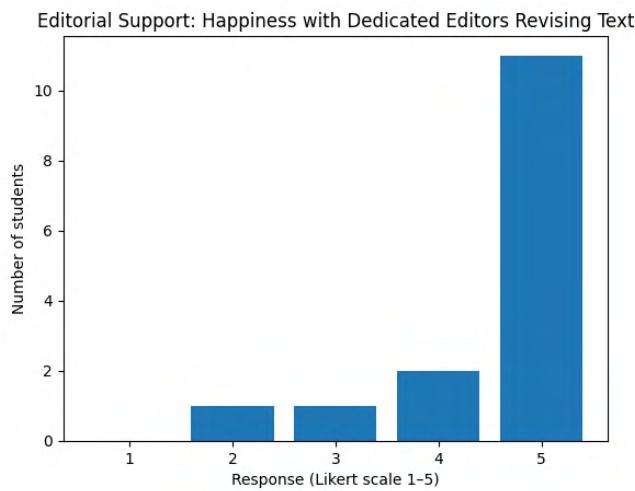
*Figure 5: Agreement that reversed classroom improved learning outcomes*

Furthermore, students reported high levels of pride in their final contributions to a published textbook (Figure 6), with substantial confidence growth over the project timeline.



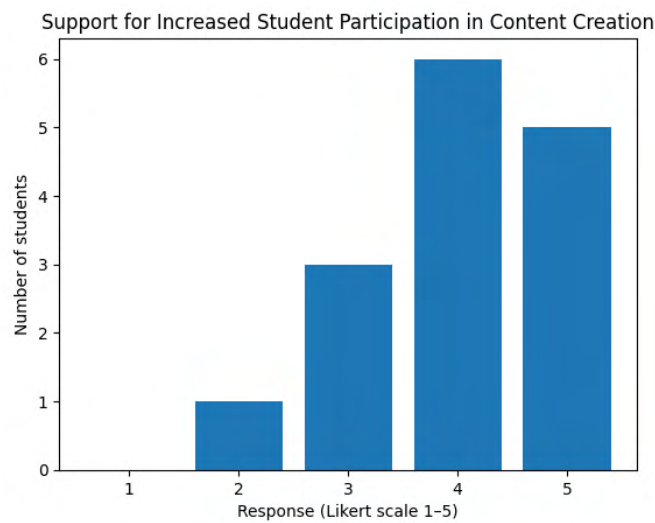
*Figure 6: Student pride in their contributions*

The students also reported very high satisfaction with the input provided by the editorial team (Figure 7).



*Figure 7: Happiness with Editorial Input*

Overall, having completed the course students showed strong support for students having a role in content creation (Figure 8).



*Figure 8: Support for Student Role in Content Creation*

This feedback demonstrates that the students perceived the novel pedagogical design as providing significant benefits. In particular it fostered a sense of student agency and pride in content creation. The survey also indicates that the students felt heightened engagement when writing for an external audience. Qualitative feedback indicated that the prospect of publication significantly increased both intrinsic motivation and the care taken in their work for some students.

In addition, the general grades received by the students for the chapter assignment component of the course were higher than normal, indicating students had positive learning

outcomes from the class design. In specific, the overall grading average for the chapter assignment was higher than normal by approximately .5 on a 5-point scale given typical outcomes for research essays.

The second component of the survey gathered qualitative data from the students, who were asked to report on their experience in the course, and to give some feedback on how the course could potentially be improved. Generally, the course received highly positive testimonials from participating students. The following paraphrased quotes are illustrative of the general tone:

- “Contributing to the textbook turned this course into a really meaningful learning experience.”
- “In my opinion, it was an excellent approach, and I’d love to see more master’s programs incorporate similar projects. It really drove my motivation.”
- “The course kept me engaged and inspired me to dig deeper into the subject matter.”
- “My skills in research and academic writing have noticeably improved.”

The qualitative feedback suggested that the flipped classroom approach is effective. This is likely because it places students in the role of active learners by giving them responsibility for sharing what they are learning with others. In addition, throughout the course students were highly engaged in the workshops as demonstrated by (a) their voluntary participation, and (b) their attentive interrogation of their research questions.

As part of the online survey, we also asked participants to offer feedback on improving the course design. The main point to emerge was that the students would have liked to learn more about the chapter drafts that the other members of the cohort were working on. Though each student had presented their chapter to the group during the morning class sessions, it is clear based on the feedback received that this was not sufficient for effectively communicating the content across the group. This suggests that the reverse classroom design we implemented had the downside of siloing aspects of the content the students were working on, an issue that should be addressed in future implementations.

## **Reflective evaluation on the process**

From the perspective of the team involved, several aspects of the inquiry process worked particularly well, chief among them the editorial workflow established during Stage 4. The success of the project relied heavily on assembling a strong editorial team with complementary skillsets and

assigning specific roles (line editing, copyediting, proofreading) that allowed team members to work efficiently in a coordinated chain. This division of labour enabled the team to maintain high academic standards while achieving rapid turnover.

This editorial input involved a significant time dedication from the team, as would be the case in any academic publishing context. There were multiple rounds of revision and significant back and forth between team members. This time commitment is one key factor that must be considered for any future implementations of this class design. Though the students produced high-quality research, their outputs were not publishable without additional editing work.

As a result, the PI's role in facilitating collaboration among team members and leveraging each person's strengths proved essential to transforming 32 student-generated chapters into a cohesive, publishable textbook within the compressed June–September timeline. This collaborative editorial model represents a key supportive condition for success that could be replicated in similar learner-generated content projects.

A central challenge emerged around student involvement in the post-course editorial stages. While a cohort of students initially expressed keen interest in collaborating on editing their chapters following submission of final papers, this enthusiasm diminished substantially after course completion. Team members felt isolated from the students during the editorial process which was undertaken months after the course was completed. This disconnect, between the hope for student involvement and actual student interest, can be seen as an important learning point about student participation in such a context.

For others conducting similar approaches, we would thus advise modifying the structure of the course to sustain student engagement over the editorial phase. One approach might involve shifting or expanding the course timeframe (only ten weeks in our case) to encompass the editorial stages or offering additional credit for continued collaboration during Stages 4 and 5 (though keeping course credit delinked from final publication). Making this engagement mandatory would have the added educational benefit of involving the students in a true-to-life peer review process.

Despite these challenges concerning student participation, the project demonstrated that master's-level students can indeed generate high-quality open-access scholarly content when provided with appropriate guidance, such as writing workshops, and editorial support. This finding is supported by the successful textbook publication, the response to the MOOC, and the positive student survey responses regarding their learning outcomes and pride in the work.

The culmination of the project in the production of an open-access, widely available textbook on nuclear weapons coupled with the MOOC is an extremely valuable resource, in our opinion, and makes a strong contribution to the open pedagogy movement and to public discourse addressing nuclear weapons in general.

## Next steps

The next immediate steps are to publicise the innovative flipped classroom open pedagogy design we have developed and to promote further the role of students in generating open pedagogical materials for other students (Hollister, 2020). Based on our findings this is a viable, successful and student-endorsed means of running a class, and for producing a textbook for other students.

The textbook itself, dealing with the global risks of nuclear weapons, is of broad public interest and fills a clear niche in the market. To ensure it reaches as wide an audience as possible, we intend to promote it across a range of channels in addition to widely advertising the MOOC course currently available from the University of Helsinki based around the textbook.

The original vision for this project was to develop a wiki-style online repository for the content developed by the students. This content could then be reused, updated and developed further by later cohorts of students taking the International Politics module. However, time constraints meant that we could not realise this vision during this implementation of the course. In future iterations we would aim to develop such an online resource and then use it across several cohorts.

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## Supplementary materials / resources

- Full survey results from the initial course
- Open-access textbook *Nuclear Weapons, Planetary Risks, and Human Consequences* produced by the students, available at: <https://www.repository.cam.ac.uk/items/51a4b10b-15e1-4483-9396-c738ddbdf7cc>
- Table of Contents from the textbook listing authorship credits
- Link to Nuclear Weapons: Planetary Risks and Human Consequences MOOC:  
<https://studies.helsinki.fi/courses/course-implementation/otm-d71c95f3-8085-496d-9cb9-32649ec96811/PVK-501>

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