



The Joint Initiative for Teaching and Learning on Global Health Challenges and One Health experience on implementing an online collaborative course

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ABSTRACT

The “Joint Initiative for Teaching and Learning on Global Health Challenges and One Health” piloted the online course “Global Health Challenges and One Health” in 2021. The present work documents this experience, lessons learned, and the future outlook of the course. A descriptive study was conducted based on the evaluations performed with the enrolled students and course coordinators. Of 30 enrolled students from graduate programs of six institutions from Brazil, Germany, Mozambique, and Kosovo, two unenrolled, and nine failed for not completing the activities. Therefore, 19 (63%) students completed the course. Some challenges identified were language and technology access barriers, difficulty scheduling group meetings due to different time zones, and high workload per credit in some institutions. Activities in groups conducted synchronously, such as debates, journal clubs, and case studies, were highlighted as those with higher impact in the learning process, having more participation of students when carried in small groups. Some students reported the establishment of research and work partnerships with other participants from partner institutions. The experience reinforces the importance of international exchange to improve collaboration between institutions and the impact of working in small interprofessional groups to develop technical, intercultural, and interdisciplinarity competencies necessary to human resources working with the One Health approach. The success of such international educational initiatives depends on overcoming barriers to implementation, which can be detected in institutional and course levels. Therefore, continuing evaluation of the course and improvements must be performed and involve all participants.

1. Introduction

One Health is defined as “an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems” [1]. The introduction of One Health in the curricula of universities is advocated [2–4] and reinforced by the Berlin Principles [5]. The approach contributes to reaching the Sustainable Developing Goals [2] and addressing the full spectrum of disease control [1].

One Health training should focus on core competencies, such as management, communication, informatics, values, ethics, leadership, teamwork, collaboration, roles, responsibilities, and systems thinking [6]. Active learning methods applied with small interprofessional groups to explore shared concepts and experiences are the best way to gain these competencies [4]. Online courses that integrate different countries are an innovative practice to improve education and training in One Health, expose students to cultural differences [3], and explore

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communication technology [4].

With the COVID-19 epidemic, there were shifts towards online teaching modalities [7]. In this scenario, the “Joint Initiative for Teaching and Learning on Global Health Challenges and One Health” (JITOHealth) piloted the joint online course “Global Health Challenges and One Health in 2021, with the plan previously reported in the One Health journal [8]. This paper documents the pilot experience, lessons learned, and the future outlook.

2. Material and methods

2.1. Study design

A descriptive study of the pilot course “Global Health Challenges and One Health” was conducted based on the evaluations performed throughout the course with the enrolled students and course coordinators.

2.2. Course structure and delivery

The course took place from 29 April to 1 July 2021, with nine weeks and a workload of 90 h. The weekly workload of ten hours was divided into two hours for module content, three hours for self-study, and five hours for joint project preparation. Asynchronous activities were available on the CIH Moodle platform (<https://cih-moodle.med.lmu.de/>) and six synchronous sessions (two hours) occurred biweekly.

The course applied the Collaborative Online International Learning (COIL) method and comprised five modules: 1) Interprofessional and collaborative practice in One Health; 2) One Health concepts; 3) Healthcare, surveillance, and One Health; 4) Bioethics in One Health; 5) Careers in Global Health and a joint project [8].

The joint project was the main evaluation form and was developed in groups during the entire course, integrating students from different institutions [8]. Students were assigned to groups covering one of the following topics: 1) Antimicrobial resistance; 2) Hepatitis; 3) Climate change; 4) Dengue; 5) HIV/AIDS; 6) COVID-19. The groups proposed methods to address these health issues by applying the One Health approach, considering interprofessional practice, principles of One Health, health policy, surveillance, and bioethical aspects.

Other groups activities were a case study of interprofessional teamwork in One Health, a journal club based on the criteria proposed by Davis et al. (2017) [9], and a debate on mandatory SARS-CoV-2 vaccination.

2.3. Data collection

Course evaluation was performed using distinct data sources: 1) Student's activity on Moodle, attendance of synchronous sessions, and dropout; 2) Structured questionnaires; 3) Focus group discussion with students; 4) Discussion among course coordinators.

2.3.1. Participant's activity on Moodle, attendance of synchronous sessions, and dropout

Participants' activity (“last access to the course”) on Moodle served to assess the individual interaction of students with the asynchronous course content. Zoom® presence lists were used to evaluate withdrawals and absenteeism in synchronous sessions and duration of attendance (minutes). To document reasons for dropout, coordinators actively contacted participants who did not complete the course.

2.3.2. Structured questionnaires

Participants evaluated each module and its activities regarding the following aspects: 1) Organization and content clarity; 2) Relevance of the topics covered; 3) Material adequacy. Students also evaluated their scientific background to keep up with the module's content. Answers were presented in a five-point Likert scale: disagree (when inadequate),

partially disagree, neutral, partially agree, and strongly agree (when adequate). Students were asked how many hours they needed to complete Moodle's activities: less than three hours, three to five hours, six to 10 h, 11 to 14 h, more than 14 h.

2.3.3. Open questions

Participants could answer three open questions for each module: 1) What did you like the most about this module? 2) What was not clear in this module? 3) What are your suggestions for improvement of this module? The final questionnaire included suggestions on how the course's guidance could be improved.

2.3.4. Focal group discussion

One week after the course conclusion, the local coordinators conducted focus group discussions with the participants from their institutions. Topics covered were: course load adequacy with the credits, videos' content and amount, impressions about the joint project, experiences working with students from other universities, and language issues. Finally, they stated the strengths of the course and favorite activities, the points for improvement, and activities that could be excluded.

2.3.5. Discussion among course coordinators

After each synchronous session, coordinators discussed their impressions of the activities and documented necessary adjustments and improvements.

After the course conclusion, module organizers assessed each module separately regarding 1) Success in meeting the learning objectives; 2) Participants' engagement; 3) Module's clarity; 4) Participants' impression. Facilitators then discussed which activities could be kept, excluded, modified, and additional content. Then, all coordinators evaluated the proposed changes. Finally, after the discussion, updates were implemented and will be available for the next cohort, which will start in April 2022.

2.4. Data analysis

Categorical variables were displayed as absolute and relative frequencies, and continuous variables were summarized with mean and standard deviation. A thematic analysis following the six steps of Clarke and Braun (2014) [10] was used to assess the responses in the open questions. A semantic and inductive approach was applied, meaning that themes' coding and development are based on content [10].

3. Results and discussion

3.1. Course enrollment, dropout, and participation

Thirty students from graduate Programmes (Master or Ph.D. level) of Universities from Brazil, Germany, Mozambique, and Kosovo registered for the course: nine from the Federal University of Espírito Santo (Graduate Program in Infectious Diseases and Graduate Program in Dental Sciences), five from the Federal University of Paraná (Graduate Program in Public Health), five from the Ludwig Maximilian University of Munich (Master of Science - Epidemiology), three from the Technical University of Munich (Master of Science - Health Promotion and Prevention), five from the Catholic University of Mozambique (Graduate Program and Continued Education Program), and one from Kolegi AAB (Master in Health Management).

After course initiation, two students unenrolled, and nine failed for not completing asynchronous activities and not contributing to the joint project. Hence, 19 (63%) students completed the course. A high dropout has been frequently reported in most of the online courses [11], reaching an average of less than 10% of completion in Massive Open Online Courses (MOOCs) [12]. Reasons for dropout are generally related to student, course, and environmental factors [13]. Of the 11 participants

who had dropped out, eight replied to the coordination, indicating one or more reasons. The main reasons were the perceived high workload ($n = 3$), difficulty to reconcile the course with work activities ($n = 2$), insufficient internet connection or difficulty in accessing Moodle ($n = 2$), personal issues ($n = 2$), time conflict due to other courses ($n = 1$), and poor language skills ($n = 1$). The limited number of students admitted in the course to enable COIL application may have contributed to the higher completion (63.3%) than MOOCs. Thus, some strategies to overcome dropout were facilitated, such as dialogue to understand students' challenges and issues, guaranteeing high quality of activities, and providing structured support [13].

Attendance on synchronous sessions decreased as the course progressed, and 12 students participated in all synchronous sessions. Nevertheless, the average time logged in the session was steady along with the modules (Table 1).

A reason for this low attendance could be the communication barriers. Studies show that online courses impact mainly on visual communication, once the instructors may not easily read students' non-verbal behaviors and whether or not they are assimilating what is being said [14]. Besides, the course was held entirely in English, which was not the mother tongue of most instructors and students. Non-native communication problems can be aggravated by barriers like technology/internet connection absence and physical issues such as eye strain [15,16].

3.2. Student grades

Nine students were graded 'zero' on the joint project because they did not attend group meetings or did not contribute to writing the project. These students were part of the groups working on the themes climate change ($n = 3$), antimicrobial resistance ($n = 2$), hepatitis ($n = 1$), COVID-19 ($n = 1$) and dengue ($n = 1$). The differential loss of members in the groups partially compromised the interdisciplinary and intercultural work in the activity. Of the 19 who concluded the course, the grades ranged from 8.3 to 10 (0 was the minimum, and 10 was the maximum score). A final project represents how well the student comprehended and practiced the notions learned during the entire course [17]. Therefore, considering the ones engaged in the joint project, their good grades represent an overall understanding of the lessons.

3.3. Course evaluation

3.3.1. Students' perceptions

3.3.1.1. Structured questionnaires. The number of respondents evaluating the individual modules on Moodle was around 50% for the structured questions and ranged from 15 to 25% for the open questions.

The students' perceptions of modules are displayed in Supplementary material. A limitation to interpreting this data is that the low response rate might lead to information bias. Also, because their answers were anonymous, we could not affirm the homogeneity of responses

Table 1

Students' attendance to the online synchronous sessions of the course "Global Health Challenges and One Health".

	Synchronous session					
	1	2	3	4	5	6
Number of students	28	25	22	18	17	13
(%) [*]	(93.3)	(86.2)	(78.6)	(64.3)	(60.7)	(46.4)
Average minutes on session (SD)	112.4 (0.9)	124.8 (4.1)	108.7 (2.5)	105.2 (3.9)	114.6 (7.9)	122.6 (3.2)

SD Standard deviation.

^{*} Percentage of students initially enrolled.

regarding the participant institutions. Moreover, we can not infer that those who gave feedback on module 1 are the same as those on other modules.

Students highlighted activities in small groups, debates, and the joint project as the most exciting parts of the course, underscoring the importance of the synchronous sessions to enable interaction with lecturers and peers. These interactions in One Health programs improve engagement and understanding of different perspectives, influencing student abilities [4]. The most challenging contents were related to the more incipient discussion in One Health, such as non-communicable diseases and bioethics.

Challenges anticipated in the planning [8] were confirmed during the execution, as noted by some students. Due to different time zones, resulting in a 5-h time difference, participants found it challenging to coordinate and schedule group meetings. Therefore, there were limited opportunities to meet all group members.

All students agreed with the relevance of the topics covered in all modules, and most of them said that the material offered was helpful. Furthermore, most students reported spending an average of 3 to 5 h and 6 to 10 h per week for asynchronous activities with variation between modules, demonstrating the adequacy of the modules with the planned workload.

3.3.1.2. Open questions. Three themes emerged in the open questions: 1) Creativity and diversity, 2) Application in real-life, and 3) Guidance and interaction.

Most participants mentioned creativity and diversity as positive features of the course. Participants highlighted activities on the roles of diverse professions to solve a One Health problem as a team, the evaluation tool for One Health epidemiological studies, and the videos. The activities incorporated essential aspects of active learning, focusing on shared concepts and experiences, and highlighting similarities among professions in One Health teamwork [4]. In the journal club, the use of the Checklist for One Health Epidemiological Reporting of Evidence reinforced the necessity of breaking professional silos and improving interprofessional collaboration beyond assessing the quality of reporting in One Health studies [9].

The debate on "Should the vaccination against SARS-CoV-2 be mandatory" was particularly commended by combining creativity in developing an opinion with guided literature and applying the gained knowledge throughout the course. In One Health education, such debate helps to promote a global and community perspective of social determinants of health, making students critically evaluate health policies [4].

Some participants mentioned the real-life relevance of the debate to current events. Others had difficulties understanding how to apply the One Health approach by different professions in everyday situations and economic and political matters. Some students suggested the inclusion of case studies to use the theoretical content.

Students would have more synchronous sessions, mainly because they felt overwhelmed by the number of videos and prefer a live session to discuss, ask questions, and interact with colleagues.

Within the final evaluation and suggestions, the wish for better guidance on the joint projects and types of assessment was most prominent.

3.3.1.3. Focal group discussion. Students reported challenges in the joint activities, such as an insufficient contribution of some members, difficulties in managing meetings, communication issues due to poor technology access and language barriers, and high workload demanded in some modules. In addition, students from institutions with higher workloads per credit perceived that the number of credits awarded was low, while in institutions with lower workloads per credit, the impression was that credits were adequate. Understanding the challenges faced by the students helps to develop strategies to overcome them in planning

the curriculum, in the development of instructions, and the supporting system of the course [10].

Some participants said that they were initially insecure about their language skills but could build up their confidence and be more active with time. Despite the lack of research evidence that the application of English medium instruction affects language literacy or is detrimental to content learning [18], students' self-reports reinforced this approach's beneficial outcome.

All participants highlighted how exciting it was working in highly-diverse groups in terms of countries, professions, and backgrounds. Some of them reported sharing common research interests and considering collaborating in the future. In other settings, students reported that classes with participants from different disciplines and interprofessional problem-solving helped increase knowledge of public health issues and improve attitudes to interprofessional collaboration [19].

3.3.2. Course coordinator's perceptions

The learning objectives were considered adequate and reached at the end of each module and the course. Coordinators perceived different levels of student involvement in synchronous sessions, with higher participation in discussions with a maximum of five participants in break-out rooms. This perception corroborates literature on One Health education that highlights that activities in small groups are the best to promote teamwork [4]. The primary constraints identified were the language barrier and the lack of preparation for the synchronous sessions. Improvement in course instructions was also necessary for some activities, especially those prepared asynchronously and presented in the synchronous sessions.

Coordinators perceived that mixing professionals and institutions in the course activities enriched the debates and collaborated to sensitize students on interprofessional and intercultural aspects necessary to work in One Health. This approach is also adopted in other programs that aim for interprofessional competencies development [19].

3.4. Proposed changes to overcome course limitations

3.4.1. Overall

The next course will incorporate strategies to mitigate critical issues detected. An information session with the local coordinator and potential participants will be held to avoid dropouts and guide students. In this session, the coordinator will present the course requirements and organization and highlight the importance of teamwork and attendance. Coordinators will answer any questions that may arise so that students can make an informed decision. In addition, credits were adjusted at the institution level to avoid discrepancies with the workload.

All instructions will be revised, and a Frequently Asked Questions (FAQ) document will be created [20]. Video subtitles will be made available to facilitate content comprehension [21]. The number of group activities was increased, whereas the individual ones were kept to a minimum, as debates and multi-professional focus on shared outcomes must be addressed and practiced in One Health education [4]. Besides, attending an international course does not guarantee intercultural and global competencies, being necessary for students to share experiences, be exposed, and integrate with others [22].

3.4.2. Interprofessional and collaborative practice in one health module

Additional material on skills and competencies for interprofessional collaborative practice will be included to clarify aspects expected in the One Health teamwork.

3.4.3. One health concepts module

Among Moodle's videos, the ones that were considered more general were categorized as 'mandatory.' Those more specific, about experiences and events, became optional. However, the student must choose one to answer a questionnaire. The journal club will be maintained as an individual activity, with a discussion in the synchronous session, and all

students will read the same manuscript.

A case discussion activity was added in which students will work in groups and present in the synchronous session. Case studies are an active learning method suggested in One Health courses to promote communication, collaboration, and problem-solving skills [4]. Support materials were added to the module to facilitate understanding the case study. Also, complementary literature was updated to cover the One Health developments in 2021 and 2022.

3.4.4. Healthcare, surveillance, and one health module

Two additional lectures on Universal Health Coverage and One Health and Health Policy and One Health were included to connect better the concepts covered in this module. In addition, the activity "Risk communication in the COVID-19 pandemic" was updated with videos published in different pandemic stages to explore possible changes in risk communication over time and highlight the challenges of keeping communication effective in the long term.

Furthermore, the topic of the debate was changed.

3.4.5. Bioethics in one health module

The main changes in this module will be to make the asynchronous activities more interactive and give students more opportunities to exchange and discuss, with a forum based on a video presenting One Health bioethical dilemmas.

3.4.6. Careers in Global Health module

Due to the predominantly positive feedback, this module will not have changes.

4. Conclusions

The online course Global Health Challenges and One Health was successfully piloted in six universities located on three continents. Overall, the course was well-accepted by students and coordinators. During the pilot, challenges were identified and addressed: some at the institutional level and others at the course level. For the full implementation of the course, the aim is to involve other universities, ideally from other countries, to extend the reach of this initiative. In addition, maintaining contact between coordinators and participants will enable the expansion and establishment of a global network for more significant action on One Health.

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CRedit authorship contribution statement

Creuza Rachel Vicente: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Funding acquisition, Project administration. **Fabian Jacobs:** Conceptualization, Writing – review & editing. **Denise Siqueira de Carvalho:** Conceptualization, Methodology, Writing – review & editing. **Kajal Chhaganlal:** Conceptualization, Methodology, Writing – review & editing. **Raquel Baroni de Carvalho:** Conceptualization, Methodology, Writing – review & editing. **Sonia Mara Raboni:** Conceptualization, Methodology, Writing

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Declaration of Competing Interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.onehlt.2022.100409>.

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