

# Collaborative MOOCs: a challenging experience

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## ABSTRACT

RESCIF is a French-speaking network with 14 faculties of technology from the North and from the South. One of their research themes is water and four partner institutions decided to build together a MOOC as tentative tool for disseminating knowledge and contribute to education of southern engineers. This MOOC “Rivers and Men” is thus an example of collaborative work. The paper gives some facts about the building process and the success of the course. Some reflections are proposed about the target and the actual audience and some preliminary conclusions are drawn about advantages and limitations of such collaborative approach.

## “Des rivières et des hommes” a collaborative MOOC

### The context: a collaborative network

The Network of Excellence in Engineering Sciences of the French-speaking communities (Réseau d'Excellence des Sciences de l'Ingénieur de la Francophonie – RESCIF) was created in 2010 by 14 universities of technology, seven from the North and seven from the South. The basic idea was, following the RESCIF declaration to “prepare a cohort of young engineers in emergent countries and universities through education in advanced technology, in order to initiate useful research for the development of their country”. Three domains crucial for the development of emerging countries were selected to promote common research programs: water, energy and nutrition. Indeed, while they weakly contribute to the climate evolution, developing countries are in the front line regarding the consequences in terms of natural disasters and food safety.

To take full advantage of the South-North network, it seemed more efficient to organize distance training than classical exchanges of teachers and students that are generally expensive and difficult to set up in intensive form, so disrupting the local lecture schedule with poor results due to a too dense supply of information. In that context, a MOOC approach appeared as well adapted to easy diffusion of knowledge at a reasonable rhythm.

Another logical consequence of functioning in network was the idea of collaborative work, in such a way that a collaborative MOOC appeared as evidence. The lead of the present project was taken by Grenoble INP who proposed “Rivers and Men”

(“Des rivières et des hommes”), as the theme for this experimental MOOC, a theme in line with the “water” topic and comprehensive enough to concern a wide audience.

However, to the knowledge of the authors, there were at the moment of the first initiative, no other example of such collaborative MOOCs, developed between different institutions, since MOOCs are often considered by universities as a promotional activity, in which the institution may stand out from the other ones. Another challenge was in the network constitution itself, with a part of members liable to offer knowledge and experience and another part more interested in receiving information and technology. It was rapidly decided to turn this apparent dissymmetry into an asset of the system: developing countries are rich in interesting problems. Floods and inundation, as well as pollution, are often huge in developing countries and means to face these disasters are often extremely limited. So, receipts from the North cannot be used as they are, and their adaptation to southern context is an exercise where exchanges between theoretical consideration and local experience are essential.

For timing reasons, it was chosen to build a season 1, where three partners in the North (Grenoble INP, Ecole Nationale Supérieure de Lyon and Université catholique de Louvain) and only one in the South (Vietnam National University –HCMUT) were involved, with the idea to enrich the MOOC for a season 2 with the collaboration of additional partners from the South.

## Target audience, content and organisation

The selected theme was rather wide with possible developments in varied directions: hydrology, hydraulics, land use, urban planning, or even some aspects of sociology and economics. Moreover, the partners, while all involved in science and technology, presented various profiles either in earth and life sciences, or in civil engineering. So, the target audience was not simple to define, neither regarding the required education level, nor their typical field of activity. After many discussions it was decided to focus on engineers outside the river domain but interested in widening their interest, and on technicians daily involved in activities related to river world (for instance measurement devices maintenance or data collection) but interested in upgrading their theoretical knowledge. So it was assumed that the learners would have a basic background in mathematics and physics, which revealed not completely true as some participants, interested in water resources management in general, did not have this assumed background.

According to the availability of the potential teachers, it was also decided to build a rather short course: one introductory week and four effective weeks, each of them with five sequences representing a 30-minute daily workload for the learners.

The four effective weeks were organized around specific themes. The first week presented environmental issues (pollution, eutrophication, reservoir sedimentation) and hydrological characterization of the watershed; the second week was devoted to river flow mechanics (uniform and non-uniform flow, hydraulic modelling, flood propagation); in the third-week sequences, sediment effects were added (initiation of erosion, sediment transport, river morphology, bank stability); and finally the fourth week was dedicated to interactions between rivers and human activities (for instance effects of urbanization) and to practical measurements of river characteristics.

Typically, each 30-minute learning session was organized as follows: a 12 to 15-minute video was supposed to give the information, the rest of time being devoted to quiz questionnaire with the possibility of scoring points. In practice, video duration varied from 9 to 18 minutes, depending on the difficulty of the topic, with an adapted length of the quiz questionnaire to keep the target 30-minute daily workload. At the end of each week, either a forum of discussion was suggested, or a more complete exercise was proposed, this latter allowing accumulating more score points. In the reality, it was observed that many learners needed multiple

viewings of the videos to assimilate them, mainly for lessons with mathematical requirements, with the consequence that they spent more time than expected for these lessons.

## From project to reality: facts and figures

The MOOC started on 3 November 2014 with an introductory week, called "Week 0". One week before the start, there were already about 2500 participants registered, and registrations continued until the limit date fixed on December 8, as illustrated in Figure 1, to reach a total number of 3456. During week 0, the participants were asked to give some elements of their profile, such as their geographic origin and their scientific and professional background, among others to check to which point the actual audience fitted the expected one. During this week they could get familiar with MOOC's rules, platform's tools and basic vocabulary.

As expected for a French-speaking MOOC, the participants originated mainly from French-speaking countries in the world, but not only. Participants also registered e.g. from Brazil, New-Zealand, Germany, United States. However, among the participants who posted their profile, the very large majority originated from France.

As regards the background of the participants, they were many professionals active in environmental or river training institutions, but not always with an engineering background. Some of those registered to increase their level of knowledge, some others to refresh their scientific knowledge, or simply to exchange with other professionals. Also, a large number of master but also undergraduate learners registered. The third group of participants consisted of persons in charge of environmental associations or active members of NGO. In this third group, not all the participants had the expected scientific level to follow all items of the course, which clearly appeared in the discussions during the MOOC. Nevertheless, the interest for the discussions was well present.

Looking now at the activity of the participants during the MOOC, it can be observed in Figure 1 that the number of participants who responded to the quiz at the end of each learning session decreased significantly during the first week, then remained almost constant, still with a low decrease rate, until the end, with numbers between 250 and 300, i.e. just below 10 % of the registered participants. Among those active participants, the grades obtained are shown in Figure 2: it ranges from 49 % for the end-of-week work of Week 3 which appeared the most difficult exercise to all the participants, to 92 %. Finally, 175 participants scored higher than 66 % on average

for all the exercises and obtained the final certificate, i.e. about 6 % of the registered participants, and about 70 % of the participants who remained active until the end. It is interesting to compare this number to the 175 learners who finally completed the final exercise of week 3, exercise that was over weighted in scoring.

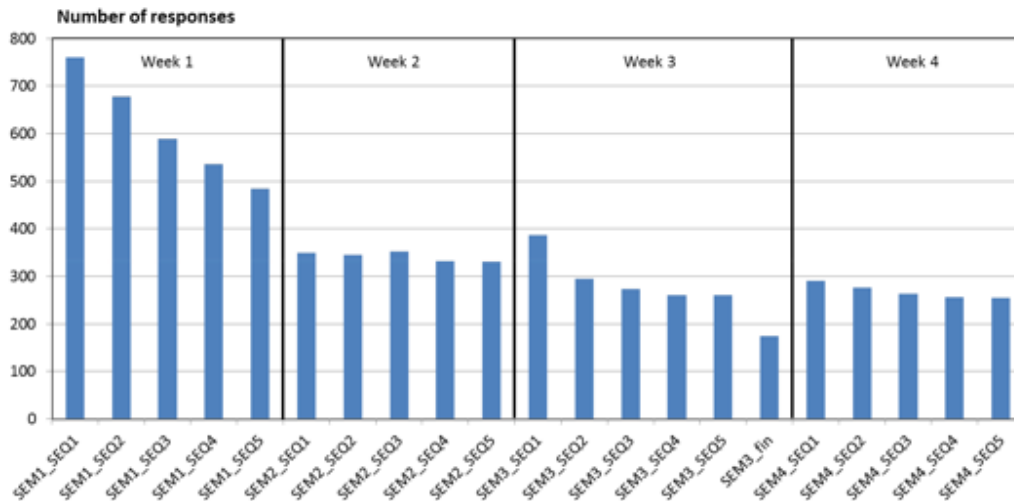


Figure 1. Number of responses to the quiz provided at the end of each learning sequence, as an indicator of the number of active participants

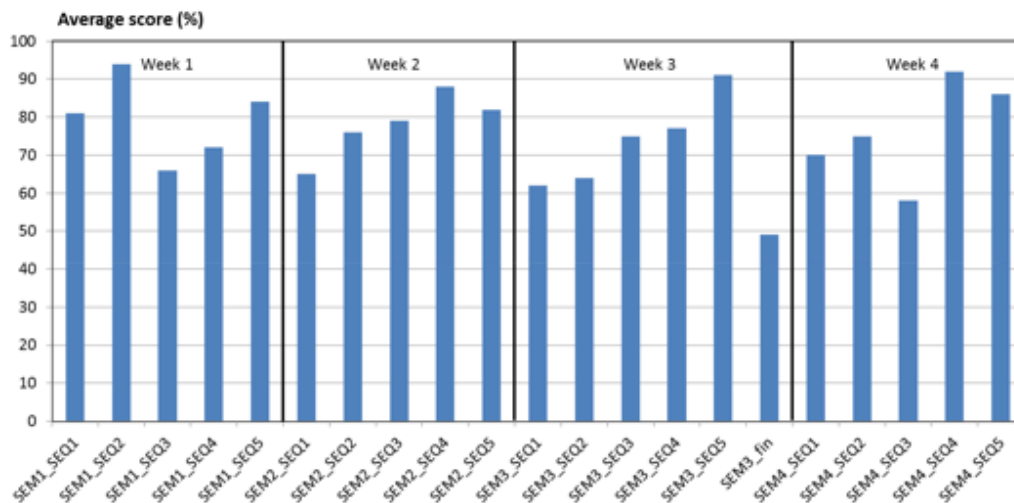


Figure 2. Average score of the participants who responded to the quiz provided at the end of each learning sequence

## Nice surprises, nasty surprises

### Preparation and implementation

Each teaching team had his own experience in terms of pedagogy. An agreement about pedagogical aspects was sometimes tedious to reach, some teachers favoring description and illustration of river features, other more attracted by design and calculation aspects. It was finally decided to accept some heterogeneity between sequences, though with a uniform layout and style, each of them reflecting the background of its author.

Regarding the platform, as the French-speaking community was targeted and as main supports were in French, FUN was selected as supporting platform. Unfortunately, MOOC platforms do not provide usual Learning Management System functionalities. For instance, it was rather easy to manage multiple-choice quiz and numerical answers but it was impossible to organize a cascade of answers, blocking question 2 until question 1 was replied. Moreover, while drawings and graphs may be included in the question form, no possibility is offered to the learner to post his own figure in his reply, which is a real limitation for engineering themes.

### Progress of the course

The first pleasant surprise was the number of learners interested by the topic, but their geographical repartition was unexpected. Most of them were issued from France, the other French-speaking countries in the North as well as countries in the South being underrepresented. That clearly means that channels used for advertising were not adapted to the foreign audience, despite efforts made in that sense. This predominance of French learners was still more marked in the participation to the interactive processes: quiz, forum, exercises and final project. This is a little disappointing and will constitute a challenge for season 2, where partners from the South will be involved in the production.

The discussions open to learners after each sequence also revealed some surprises. While the target audience of engineers and technicians were expected to be familiar with mathematics, the first appearance of an equation to be solved at the beginning of week 2 appeared as a real stress for many learners, at least those who participated to the open discussion. The surprise was great to see that some learners were unable to handle a fractional exponent and the surprise was still greater to observe that a nice solidarity network rapidly organized, some learners giving pertinent information to the other ones.

Another nice observation was the fair play of the participants. Most of them were demanding of more solved numerical examples to help them in solving the proposed problems, but, in their mutual interventions, they always defended the point of view to keep a good level of difficulty to maintain the quality of the certificate they could get at the issue of the course.

### Lessons from collaborative work

One of the most original aspects of this MOOC “Des rivières et des hommes” relies in its collaborative initiation and production. Involved institutions had their own culture and experience and collaboration was not so evident. So, it is not really surprising that this way of working presents some difficulties besides some real advantages.

### Advantages and drawbacks

More than distinct institutional practices, distinct background of teachers may be a challenge, each of them being accustomed to specific student audience: audiences of geographers, of environmentalists, of physicians or of engineers are completely different in their expectation and approaches. This heterogeneity of teachers and approaches may be a real enrichment for learners as well as for teachers themselves. Being teachers ourselves in the hydraulic part of the course, we have learnt a lot of interesting concepts from colleagues' lessons. The counterpart of this heterogeneity is the difficulty for the learners to adapt from one sequence to the other one, with a change in point of view and sometimes a sudden jump in difficulty.

In terms of project progress, an invaluable advantage, that is also a severe constraint, may be found in the momentum inspired by the group. For instance, if your sequence is delayed for any good reason, you cannot relax your own effort as you could be responsible of a delay for the whole group, with the risk of missing a window reserved in the platform calendar.

Another added value could also rely in the mutual criticism the group could exert for improving your own production and to ensure a better complementarity between sequences. From the beginning, it appeared that even the basic definitions were not always the same for the various teachers (for instance the concept of 'uniform flow' was not defined in a common way). So the idea of a common vocabulary was pitched as well for learners as for teachers themselves. This was unfortunately not realized for lack of time. Another idea was the possibility of a mutual review of all the sequences, in a multiple steps process. In a first step, the layout of each sequence had to be presented by the person

in charge of the sequence to the whole group. The intention was to provide to the whole group an overview of the whole course, and to identify possible repetitions, or needs for more details. Then, in a second step, a “reviewer” was identified within the group for each sequence, with the task of checking the slides before recording the sequence. Finally, in a third step, all filmed sequences had to be reviewed by the whole group. Once again the tight schedule did not allow this kind of brain storming. Only the first step was achieved, and some parts of the third step, as not everybody could watch and comment in details the existing sequences.

Actually, the potential advantage of a work in team was not really exploited in this particular case, probably as a counterpart of the pushing effect of the group schedule: most of the teachers were very tight in their own timing, so considerably reducing the availability to take an operational interest in the colleague’s sequences. It is expected that the perspective of a season 2 will let more time to interaction between the actors, but this remains to be checked against the hard reality of busy schedules.

## Perspective of season 2

Regarding this second season, two main challenges have to be faced: open the teaching staff to southern teachers, and improve the homogeneity of the course, with the special difficulty that the opening of the teaching staff is of course a potential new source of heterogeneity.

## Acknowledgements and thanks

The authors thank the partner institutions: the Université Lumière Lyon2 and the Institut de Recherche et Développement. They express special thanks to the group leader Florence Michau, to the contributing teachers: Hervé Piegay, Oldrich Navratil, Julien Nemery and Huynh Thanh Son, and to the supporting team: Coraline Bel, Patrick Paris, Estelle Dutto, Sandra Carenini, Catherine Simand, Françoise Docq and Sophie Labrique and university audio-visual teams.

They also acknowledge the financial support of UNIT, Région Rhône Alpes (CEDES, UNRRA, CMIRA), OSUG and EPFL, coordinating collaborative MOOCs in RESCIF network.

As regards the homogeneity of the course, it is foreseen in a debriefing session to try to recover at least partially the reviewing process that could not be achieved in the preparation of the first season. All sequences will be analyzed by the group, in terms of difficulty, length, workload and presentation, also taking into account the comments received by the learners, in order to identify what should be improved for the next season.

The widening as well the proposed material as the audience to the South is not an easy task. Often, available data that could illustrate southern examples are missing or not compatible with methodology from the North: for example Digital Terrain Models with high resolution are seldom available in developing countries, while they become common in industrialized ones.

Also the teaching culture may be different. Distance learning on an individual basis is unrealistic in some countries where Internet connection, already often limited or intermittent in privileged institutions like technology schools, is seldom available at home. So, the whole learning process has to be adapted to local conditions, maybe by creating local hubs where the MOOC could be deposited with Intranet connections, supervision and evaluation by local teachers, themselves with close assistance by staff from the North.