Creating Multilingual MOOC Content for Information Literacy: A Workflow*

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Abstract. A massive open online course (MOOC) is an online space for learning with no prerequisites for entry. All content is delivered online and learners interact with the content by navigating through it, assessing their progress, writing down their knowledge, and sometimes interacting with other students. The European project Information Literacy Online is an example of a MOOC. It has a number of set goals: it should teach the basics of information literacy to undergraduate students, it should offer study in six European languages, it should deliver content that can be re-used, it should be used mostly by *self-paced* learners who progress at their own speed through the content, and subsequently assess and see their progress as they go.
The aim of this paper is to discuss how to build a multilingual MOOC in a location-independent and distributed collaboration scenario. The project requirements have shaped a content creation process, an authoring workflow, which we present in this paper. While the MOOC is delivered on the OpenEdX platform, the authoring workflow is centered around a versioning system which has allowed quality control processes, automated transformation processes, and the contribution of content from multiple places to occur in an asynchronous manner.
This paper describes the workflow, sketches the technical choices made in the process, the issues encountered and their workarounds and reports on the experience gained thus far.

Keywords: authoring · MOOC · multilingual · web-based

1 The Idea of a MOOC for Information Literacy and its Content Production Systems

A massive open online course (MOOC) is an online space for learning with no entry barriers. All content is delivered online and learners interact with the content

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by navigating through it, assessing their progress, writing down their knowledge, and sometimes interacting with other students. MOOCs have emerged from online learning systems as a distinctive way for self-regulated learners to enhance their knowledge using diverse sources. Based on the realisation that the online side of learning tools can scale massively, MOOCs started to emerge as an interesting complement or alternative to university courses [22].

Information Literacy (IL) is 'the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning' [1]. The project *information literacy online* (ILO) has a set objective of creating an open course where students anywhere in the world can learn the basics of IL. However, the required IL skills differ between different languages and cultures [20]. Thus, creating this MOOC implies to adapt it to multiple languages and local cultures.

While MOOCs developed in fields close to the open-educational-resources world [3], there is no requirement for them to be comprised of open educational resources or to make their content available under open licenses as noted by [4]. In the ILO project however, the open nature of the content is a requirement (inherited from the formal aspects of Erasmus+) and so the desire is to make the content more useful to the general public.

Both of these aspects introduce requirements on how the content should be organised when it is offered for re-use and when it is offered as a MOOC: the content should be easily extractable, and easily translatable. Moreover, enhancements to the content in one language should be made visible so that they can be translated to others.

The creation of MOOC content is rarely documented and the lack of such is highlighted in the literature review [22] who mention the *paucity of research examining instructor-related topics*. Most of the stages of e-learning content creation are applicable, e.g. as documented in [5] or [17]. Subsequently, very little literature can be found on the processes involved in creating MOOC content. While beginners' tools and methods exist such as [21] or [11], most tools remain close to the traditional online-learning environments with phases such as structure, gather, sketch, author, assemble, and revise.

Most of the literature that proposes a workflow for translations that we have found document language tools in action for the translation process (such as translation memories or grammar and spell checkers) but we have seen no statement about content organisation, except that they should be compatible with these tools, which requires simple content encoding.

The literature about the re-use of learning content has followed the seminal concept of learning object [23]. Re-usable learning objects are often studied in the world of open-educational resources, of which [4] is a recent description which highlights the role of re-using and re-mixing. The re-use model [12] has been an inspiration. Thus, the aim of this paper is to discuss how to build a multilingual MOOC in a location-independent and distributed collaboration scenario.

1.1 Outline

This paper starts by sketching the learning competencies and thus content objectives that we set forth for the realisation of the course: The specificities of learning information literacy are highlighted. In section 3, we outline the technical goals that we set forth to deliver a solution that can be sustained in the future. This is followed by a overview of relevant tools that were applicable in the project. Section 5.1 depicts the architecture of the system chosen to create and deliver our content followed by the description of the steps of a workflow from the first sketch until the realised MOOC. Finally, section 6 reports on the experience applying this workflow and the tools to create the content.

2 Content and Pedagogic Objectives of the MOOC on Information Literacy

In November 2016, the European Union funded project ILO was started with the aim to develop, evaluate and disseminate a multilingual open access MOOC designed to improve students' abilities to cope with the demands of today's information society.

IL as a social key competence is particularly essential in post-secondary education and research. According to many studies [16,15], student's IL levels are generally low. Most college curricula do not include content aimed at the development of IL, and the efforts libraries invest in IL seem to be insufficient. However, since the concept of IL is widely unknown outside of the information science community, an engaging tutorial is needed which can be developed on a broad range of available material. Thus, when considering these issues, MOOCs seem to be an ideal solution to develop IL [6].

An analysis of existing MOOCs on IL showed three major shortcomings [7]: First, existing courses tend not to emphasize country- and culture- specific dimensions of IL instruction. Usually existing courses are available in only one language and focus on resources suitable for the respective country. Second, existing courses tend not to emphasize subject-specific dimensions in their content. A few of the MOOCs only make a vague and short mention of subject-specific needs when dealing with information. Explicit chapters addressing these issues are missing in all of them. Third, quizzes are usually designed as single- or multiple-choice questions. They do not go as far as to provide real-world items, using already tested technical solutions.

Thus, the content of the ILO MOOC consists of both a generic section, which focuses on IL elements which are relevant for all subjects, and of subject-specific extensions. Examples for generic IL elements are Boolean operators or basic knowledge of copyright law. As it would be too ambitious to provide subject-specific extensions for all subjects/disciplines, the ILO MOOC focuses on Business Administration and Psychology. Guidelines are provided to encourage further subject-specific extensions in the future. A special aspect of the ILO project concerns offering the MOOC content for six European cultural and language

groups: English, German, Spanish, Catalan, Slovenian and Croatian. By addressing three of the largest language groups in Europe, the MOOC will be available to many citizens with different native languages. The multilingual approach of the content does not only consider formal translation but also cultural-specific differences in the various realizations. As existing IL MOOCs lack of more complex self-assessment possibilities, a central innovative approach of the ILO MOOC is the implementation of standardised technology based assessment components which allow students to get feedback on their learning success and hints on how to improve by taking advantage of scaling [8]; research such as [9] shows that the IL is often coupled to other forms of competencies.

The content framework of the ILO MOOC is based on the SCONUL Seven Pillars of Information Literacy [19], on the ACRL Framework for Information Literacy for Higher Education [2] and on the Metaliteracy model [10]. These concepts are integrated into the course objectives, learning outcomes and specific course units. The content does not only consider lower level IL skills (access to sources and finding information), but also IL skills on the higher level (evaluation, interpretation and use). A good practice analysis in IL education [18] was also an important guideline when designing the content framework.

On this basis, a content framework with the following modules was drafted:

- Module 1: Orienting in an information landscape
- Module 2: Research is a journey of inquiries
- Module 3: The power of search
- Module 4: Critical information appraisal
- Module 5: Information use: the right and fair way
- Module 6: Let's create something new based on information and share it!

The content of the modules was first collaboratively developed by the partners in English. A sketch was drafted and shared, before the more detailed content like videos and quizzes were developed. Each of these realizations was consolidated by the project partners, who commented on feasibility and corrected and enriched, where necessary. After that, the content was translated into German, Spanish, Catalan, Slovenian and Croatian by the local partner institutions. These translations also considered country- and culture-specific adaptations [13]. Such adaptations include changes of examples and exercises and references to country- and language-specific literature resources. For example, as the exercise 4.3.8 in the ILO MOOC students in the English version have to evaluate several citations from an English newspaper article. In the German version, these examples have been substituted with an German newspaper article.[3]

While the content framework of the ILO MOOC focuses on students, the MOOC is also intended to be available to all other interested groups, including but not limited to pupils, senior citizens and other educators. To allow the

[3] The content sketch of this exercise can be found under section 4.3.8 in the files `https://gitlab.tba-hosting.de/ilo-team/ilo-content/blob/master/4_Critical/4.3_Critical-Collaboration/4.3_Critical-Collaboration.md` and `https://gitlab.tba-hosting.de/ilo-team/ilo-content/blob/master/4_Critical/4.3_Critical-Collaboration/4.3_Critical-Collaboration_de.md`.

MOOC to be used in the most flexible manner, it is designed to be a self-paced MOOC, where learners are free to navigate through the content at their own pace without any restrictions. This shall also allow other educators to easily include the whole MOOC or only parts of it into their own teaching, e.g. through a blended-learning approach.

The content is provided through open licenses to encourage re-use and adaptation. To encourage this further, the content is not only available through a MOOC platform, but also through a public repository, which includes raw files that can be easily edited.

3 Technical and Sustainability Objectives of the MOOC

The following technical requirements have emerged as more or less natural consequences of the content and project objectives: On the delivery side:

- The ILO MOOC aims at being as open as possible, and therefore registration should be simple, requiring only a single registration form. This process should include the authorization of the user data collection and be accessible from any place.
- The ILO MOOC aims to offer content that is easy to access from any place and should thus support delivering the content on the web to devices as small as mobile phones and as big as large TVs. To this end, a design that responds to the various delivery channels should be adopted [14]. This puts requirements not only on the web servers but also limits the graphic design of the content, as overtly rich graphic elements are less responsive and may become unreadable when viewed in radically different environments.
- Because of the requirement for the MOOC to be self paced (see previous section), the ILO MOOC should offer ways for the students to track their progress. Information such as which quiz was taken successfully is important.
- As it aims to teach the art of manipulating information, the ILO MOOC should also be a model example in terms of insuring the privacy of users. Thus, on the contrary to most MOOCs, videos should not be delivered by popular video hosting services (that may collect user data as depicted, e.g. by [24]), but by more respectful means.
- Standardised assessment should be available to students, and delivered with as much fidelity as possible.
- Finally, the ILO MOOC should be able to be used in parallel with classroom learning. We estimate about 100 users to be a good minimum for a synchronous user-base. Moreover, the system should be sufficiently easy to maintain to be able to run for several years after its first installations.

On the authoring side, the distributed nature of the authoring team and its multilingual aspect allows us to formulate the following requirements:

- It should be possible for the content to be sketched, input, reviewed, and previewed in an almost synchronous manner using web based tools.

- Each step of the work performed by collaborators should be visible to others, even if considering it for inclusion after other changes have been made.
- Content sketching should be doable using a freely structured medium where only a human reader is enough.
- Content structuring and content entry should be made using agreed conventions that others can easily see and which allows others to find the content quickly.
- Content used for the input should be available for re-use as well as for consumption in a well-presented fashion.

Based on these requirements, we have analyzed that only the following content types will be supported within our MOOCs: texts (with a limited styling information), images (which may include tables), videos, quizzes and assessment. We have also concluded that a versioning system will be necessary to share and host the content.

4 Relevant Tools and Methods

In this section, we exhibit the tools and methods that we have found relevant for the realisation of the MOOC, and how they correspond to the requirements expressed in the two previous sections:

Sketching Tools for sketching are as flexible as possible so as to leave space for creativity before the technical constraints limit authors' intentions. Most authors, being used to word-processing tools, have found Microsoft Word (to draft initially) and Google Docs (to share and review) to be satisfactory tools.

Content Sharing While email exchanges have made the first steps and online editing tools such as Google Docs have allowed the sharing of sketches, this has not been satisfactory for sharing in a more controlled fashion where one needs the composition structure of collections or directories, plus a way to manage multiple author changes to the content, or perform other subsequent actions.

Content management systems are often used for content-sharing within teams and are the basis of multiple OER sharing platforms. However, content management systems generally lack programmable interfaces that allow complete collections of content to be read and maintained (e.g. to be served on the web). Versioning systems are also a common tool to this effect but they often require particular training. Thus far, the best compromise we have found is a versioning system that presents a web-interface where authors can also view and upload content, becoming a de-facto content-management-system. To date, the system we have found for this is GitLab. It allows modest version workflows (updates of text files, creation and updates of files, previews of some elementary types) to be performed and handles the display of changes in text files particularly well, e.g. encoding using the MarkDown format.

Content Processing The sharing of content is not sufficient to build a delivery. It still needs to be encoded in a delivery platform which requires its assembling using easily readable navigation structures, its re-encoding into a web-format, and its verification as an valid online content.

For **texts**, we have found the conversion of MS Word documents to be properly handled by the `soffice` command available with OpenOffice installations. It extracts raster pictures in PNG formats, vector pictures in SVG formats, and produces an HTML code that contains as much text as is found in the original file, except if tables are included. Obtaining HTML code is, however, not yet satisfactory to obtain a uniform presentation with only elementary styling. To this end, we have found the NodeJS library TurnDown to be relevant, it produces MarkDown out of HTML.

For **images**, authors are able to encode pictures into web-pictures, converting to PNG if needed. This ability goes hand in hand with the concerns of the limits of image sizes where readability can be a challenge: Authors who perform the conversion themselves can control the quality of the conversion result.

For **videos**, there is a contrary situation: video consumption is popular using online services while video reencoding is largely an uknown skill and requires an understanding of both the codec cultures and calculations for an acceptable web-delivery. While most MOOCs leave this work to online services, our wish to deliver videos and maintain users' privacy respect has brought us to process the videos ourselves. The `ffmpeg` command-line tool has offered us satisfactory means to create individual target files but we need to completed it with a streamlined encoding to downscale and re-encode to a "normally acceptable" web-format which simple browsers can show (e.g. through the use of the `video` element using a bandwidth of about 500 kbit/s on a video of about 800 pixels in side).

Standardised Assessment While the OpenEdX platform allows quiz contents, it does not allow the construction of assessment items which are satisfactory for the standardised psychometric assessments. Other learning management systems also do not. Among the reasons for this are flexible and faithful layout of the assessments, as well as the security of a delivery where all necessary content is readable. Other reasons include the need to collect detailed logs of the interactions for later data analysis and calibration.

As a result, not many solutions currently address the above issues. Thus, we have taken the same approach as [9] which has been reliable on multiple occasions: the CBA ItemBuilder and its execution-engine.

Delivery Engine Delivering content for each student in a way that allows them to control their progress, and allows the interactions we aim for (navigation and quizzes) is the traditional work of a learning management system: It involves registration, enrolment, content presentation, progress tracking, quiz display, and assessment display.

We have considered most contemporary learning management system systems on the critera of being translatable (and hopefully already translated

partly), being widely used, and supporting self-regulated courses. Among open-source choices major players appeared such as OpenEdX, Moodle, and Canvas. The first, OpenEdX, seems to be the most developed and most stable for the foreseeable future: Canvas appeared to carry considerably less translations efforts and Moodle's core technology, PHP, appeared to carry a higher security risk; moreover, OpenEdX involved the most modern use of JavaScript.

5 The Chosen Realisation Method for the ILO MOOC

In this section we describe the concrete aspects of our authoring workflow, embedded among its tools and its delivery environment.

The architecture is summarised in Figure 1.

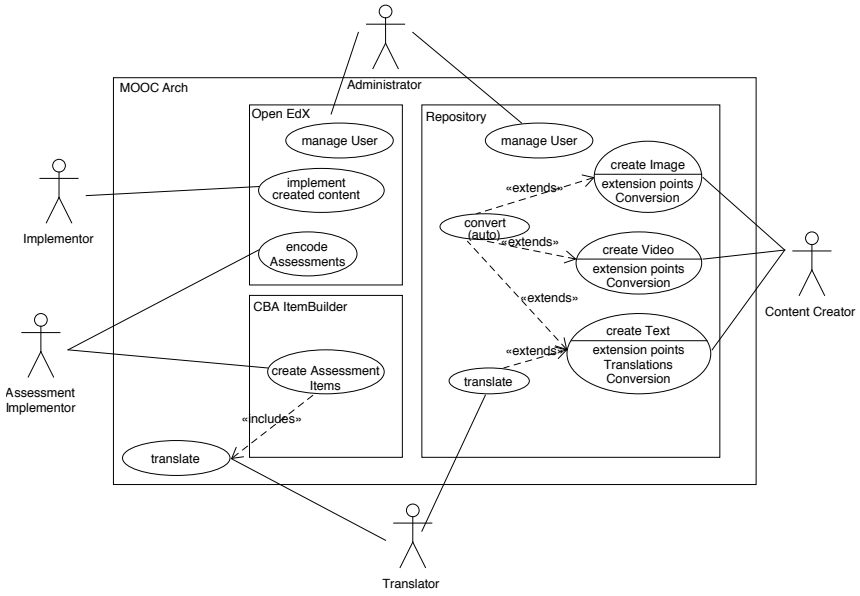

Fig. 1. Architecture of the authoring and delivery workflow of the ILO MOOC.

5.1 An Architecture for Delivering and Creating the MOOC

In order to deliver our MOOC, the choice of OpenEdX was compatible with our Linux hosting infrastructure. There are multiple ways to install the software, in a set of Docker containers – for local development, or as a native installation. We chose the native installation on a supported Ubuntu 16 system that met hardware

requirements of a dual-core processor and 8 GB memory. These dimensions have been sufficient although the virtualization still allows us to adjust the hardware if it appears necessary due to high runtime resource consumption..

The installation is heavily based on the automatic configuration management tool Ansible. This is used to automate the installation process, which has needed a number of subtle adjustments. It installs several components, of which the main ones are the learning management system (for delivery) and a content management system (the "studio", for authoring). We have not deployed other available application modules such as the Analytics or e-commerce modules. The use of the Analytics module is being considered in comparison to other analytics enablers; thus far the minimal self-regulation has appeared sufficient (display of the last visited section and the completed quizzes).

The included modules are Django apps. Django is a Python Web framework for building, installing and deploying web applications. The processes of these apps are controlled via Supervisor, a system that is dedicated to monitor and control a number of processes. Finally, all web-serving tasks are packaged by the webserver nginx, an open-source system that is known to scale well in very demanding conditions and cares for static assets (images, videos, scripts...). Altogether, the delivery environment offers us a manageable and upgradable installation, for which we shall be able to sustain long-term hosting.

One of the main obstacles we have faced is the translation of the platform. OpenEdX is delivered in English and relies on the online platform Transifex to include translators. While some languages such as French or Portuguese have a nearly complete translation, other languages that were relevant for the project, Croatian, Catalan, and Slovenian, are unfortunately missing almost all content. It has thus been decided not to use these translations. The effort to translate the platform has also been given up, as too little guidance is provided to link between the translations' sources and the aspects of the applications – and as incorporating the translations has been an error prone process.

As described above, we have selected the content sharing platform GitLab to share the content sources. The separate GitLab server has been configured with two repositories for the ILO MOOC content:

- a repository where **text and picture content** is hosted; in this repository, the semi-automatic translation from MS Word files to Markdown has supported the implementors in creating content sources with the intended and moderate amount styling. Copying and pasting from the rendering of Markdown files delivers HTML content which can be easily pasted within the OpenEdX studio. The repository can be seen at `https://gitlab.tba-hosting.de/ilo-team/ilo-content`.
- a repository for **videos** where source video files can be uploaded. This repository needed particular configurations to allow the upload of very large files (as big as 2GB), and to be endowed with an automatic process which converts the videos to web-friendly formats after a file has been uploaded. The repository can be seen at `https://gitlab.tba-hosting.de/ilo-team/ilo-videos`.

The separation allows the content repository to be copied in multiple places without taking up too much space on the disk. Both repositories are constantly *checked-out* on the web-server of the OpenEdX server so as to deliver the files.

Both servers are backed-up twofold. We are using the backup function integrated in our virtualization system (Proxmox) as well as rsnapshot. Restoring from backup has proved helpful while moving our servers to a new location or to give confidence while attempting complex installation processes such as the incorporation of new languages.

5.2 A Content Creation Workflow for Reusable MOOC Content

The content creation workflow has employed the following roles:

- Designer: The subject matter experts who sketch the content, inspired by other sources of content, in a way that is readable and sufficiently detailed so that the implementors can create a sequence of texts. In our project, the designers have produced Word files, uploaded them to GitLab's content repository, where they become converted to Markdown.
- Video producer: Video production is a domain in its own right for which the project has budgeted *on the side*. The result of a video production, which might also be the extraction of an existing video after having obtained permission, is uploaded to the separate video repository. Once uploaded it gets re-encoded to be web-suitable.
- Implementor: The implementors take as source the design documents and all media encoded in the content and video repositories and *deploy* it to the learning management system. Deploying means to create the necessary structure, as interpreted in the design, copy the content (from the GitLab preview of the Markdown text), and insert the pictures. This is presented in Figure 2. In the case of videos, the implementor uses the result of the video encoding process which delivers the HTML source that, in turn, delivers the self-hosted video using standardised HTML elements. Doing so, the implementors can preview the content as they write; the OpenEdX platform, for this purpose, is endowed with a rich preview functionality anchored in the studio.
- Translator: The translator has the mission to take the design text documents as well as all assessment text documents and translate them. Implementors then edit the copy of the English course content using the same implementation workflow.
- assessment implementor: Separate from the course content implementors, the project workers that encode the standardised assessments use a different tool as the OpenEdX platform. Texts written in Word files (and translated in these) are brought into the authoring environment and adjusted there.
- Administrator: The administrator assigns roles to individual persons, and supports their work,

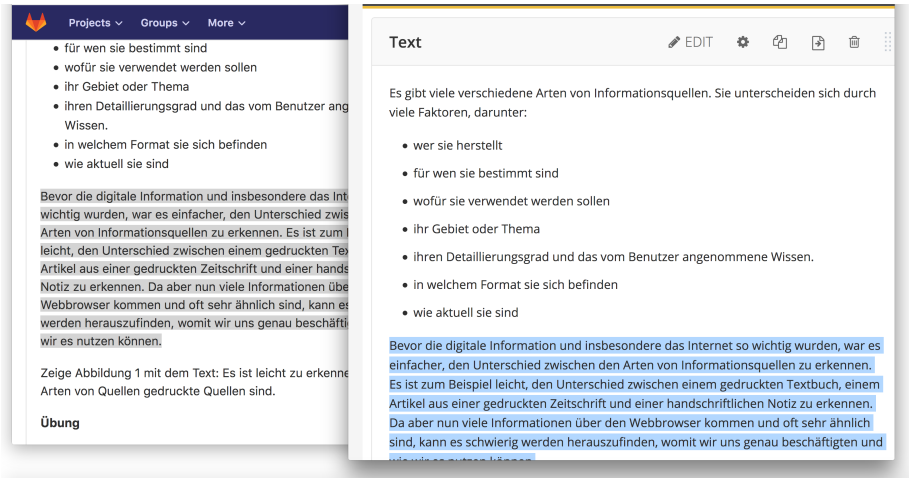

Fig. 2. Copy and pasting from GitLab's preview to OpenEdX studio, e.g. after a translation has been finalised. Note that the design is largely made of text but also contains textual hints about an insertion.

6 Experience Report on Creating the Content

The initial introduction of the workflow lead to some challenges and later adjustments. Not all of the involved partners had the same degree of technical background. Some partners had been overwhelmed with the use of the Markdown syntax and the functionality of GitLab. Thus, several workshops have been organized – both through Skype and in-person – to conduct the first steps together and address all arising questions and issues. The conversion of the already existing content within Microsoft Word to Markdown files turned out to be challenging and an automated conversion has been implemented, carried out after the files have been committed to GitLab. Some of the Word files had complex formats based on tables, that had to be reduced first to simpler formats. It also turned out to be necessary to agree on a common standard for the separation of the content chunks and the format of the file names implementors could understand the designers' sketches.

As OpenEdX uses a special syntax for creating the quizzes, these text elements were not ready to be copied directly, but needed further editing in OpenEdX. To allow an easier transfer after future changes, e.g. the creation of translations, it became apparent that is was useful to copy these finished quizzes in the OpenEdX syntax back to the GitLab repository.

Besides technical challenges, the content production also turned out to be challenging regarding the workload. Producing a high quality MOOC content that includes all important information in a well-structured and bite-sized form proved to be much more challenging and time consuming than initially expected. Also, the translation process was more time-consuming than initially expected.

Terms have to be carefully dealt with, which requires translators that are aware of the subject. Cultural differences are not always obvious and thus need close consideration. Multimedia elements like videos and images need to be produced in a well coordinated form. But even then, they are time-consuming to re-produce in other languages [13].

Some issues emerged in the translating process of the videos included in the MOOC. First, a permission from the original authors to use the embedded videos under a CC-BY license was sought. However, even after some reminders the quota of responses remained at around half of the authors actually replying. For the videos with received permission for use, transcripts were created with the help of the video editing software Screencast-O-Matic which automatically generates captions. Even so, the automatically generated captions needed further editing as not every word or phrase was recognized properly or the captions did not match the time sequence. Still, after the completion of the English version of the captions in the video editing software, the translation to other languages proved to be rather simple as the framework for captions was already established and provided in a `.sbv` format. Using this `.sbv` file the translations simply had to be pasted in the right time sequence. The finished translation of the video could then be uploaded onto GitLab and integrated into OpenEdX.

While it was planned that all translation was conducted within the GitLab repository in copies of the original Markdown files, some partners preferred to download these files and conduct the translation in Microsoft Word. The use of the spell-checking and grammar-checking functionality, as well as track-changes mode for comments and corrections within Microsoft Word was one of the main reasons for this choice, as well as established workflow within some of the departments, where files are usually sent around and commented on by e-mail. The Word files were uploaded to GitLab afterwards and went again through the auto-conversion process.

Over all, the workflow turned out to be useful in terms of providing the content both in the form of easy-to-adopt raw files within a repository and on a MOOC platform at the same time. Nevertheless, a higher degree of automation would enhance its practicability even more. The need to copy the content of the Markdown files manually to the OpenEdX platform proves to be time-consuming and also needs careful consideration, as there is the risk that smaller changes in the Markdown files are not transferred to the actual MOOC immediately and get overlooked at a later point. An automated synchronization between the repository and OpenEdX might eliminate this issue. However, this would require the content designers to structure their content in advance in the right format.

7 Conclusion

The aim of this paper was to discuss how to build a multilingual MOOC in a location-independent and distributed collaboration scenario based on the workflow applied in the ILO project. The findings show, that a common approach is neccessary for the content sharing, content processing and content delivery

process. The ILO project used first E-Mail and Google Docs during sketching, but changed for the content creation process to create files in the MarkDown format hosted on GitLab, which allowed versioning and tracking of all changes. An automated video encoding was implemented to support video publishing. A lack of existing translations figured out to be a challenge when chosing the delivery engine. The ILO project finally decided on OpenEdX, which appeared to be the most developed and most stable solution on the long run. In the final stage of the publication process, the content has been copied from GitLab to OpenEdX. This process allowed to deliver a MOOC as well as open educational resources in a separate repository without entry barriers. The workflow turned out to be suitable for creating a multilingual MOOC among various involved partner institutions. Nevertheless, further automation regarding the automated transfer from changes in the repository to the MOOC platform itself might be desirable for future projects.

Contrary to many authoring efforts, the work distribution of the workflow does not impose a strict separation between the technical implementors and the designers of the content. And indeed, some of the partners insisted on writing their content in a more technical fashion, directly using HTML markup, while most others were comfortable with the simplicity of Markdown. Such a flexibility is allowed by the general purpose character of the tools used to collaborate, applying generic paradigms such as simple text encodings and copy and paste functionality to transfer between the different media.

Among the custom ingredients of this workflow, the facility to copy and paste was central but has represented an interesting challenge: At the start of the project, the up-to-date GitLab versions were fully compatible with it. Later versions appeared which changed the text when a Markdown rendering was copied: it was converted to a plain-text representation. We could interpret this as an attempt to make the Markdown preview be copy and paste-able further in Markdown; however this meant that efforts to copy and paste moderately-styled text failed. Small adjustments to the GitLab's JavaScript were needed in order to restore the original function.

The effectiveness of the learning content and the student satisfaction with the user interface of the MOOC is subject to future evaluations, that shall be carried out in the final phase of the ILO project. One of the particular aspects which this workflow has supported, the translation to the five other languages, is a challenging task as it is not clear that examples and/or cultural concepts can at all be translated. The evaluation shall also measure this aspect, especially for cultures where it is often common to have a part of the content seen on the web in another language.

References

1. ACRL: Framework for information literacy for higher education. https://doi.org/10.1080/00049670.1995.10755718, `http://www.ala.org/acrl/standards/ilframework`

2. ACRL: Framework for information literacy for higher education. https://doi.org/10.1080/00049670.1995.10755718, http://www.ala.org/acrl/standards/ilframework
3. multiple authors: Massive open online course. Wikimedia Foundation (https://enwikipediaorg/wiki/Massive_open_online_course 2019), consulted on February 2nd 2019
4. Barker, P., Campbell, L.: Technology Strategies for Open Educational Resource Dissemination. OpenBook Publishers (2018), in Patrick Blessinger and TJ Bliss (eds), *Open Education: International Perspectives in Higher Education*, http://dx.doi.org/10.11647/OBP.0103.03.
5. Clark, R., Mayer, R.: e-Learning and the Science of Instruction. Pfeiffer, San Francisco (2002)
6. Creed-Dikeogu, G., Clark, C.: Are you MOOC-ing yet? a review for academic libraries. Kansas Library Association College and University Libraries Section Proceedings **3**(1), 9–13 (2013). https://doi.org/10.4148/culs.v1i0.1830
7. Dreisiebner, S.: Content and instructional design of moocs on information literacy: A comprehensive analysis of 11 xmoocs. Information and Learning Science (2018). https://doi.org/10.1108/ILS-08-2018-0079
8. Dreisiebner, S., Mandl, T.: Entwicklung und evaluierung einer plattform zur vermittlung von informationskompetenz: Vorstellung des von der europäischen union geförderten projekts "information literacy online". Bibliotheksdienst **51**(9) (2017)
9. Hahnel, C., Goldhammer, F., Kröhne, U., Naumann, J.: The role of reading skills in the evaluation of online information gathered from search engine environments. Computers in Human Behavior **78**, 223 – 234 (2018). https://doi.org/https://doi.org/10.1016/j.chb.2017.10.004
10. Jacobson, T.E., Mackey, T.P. (eds.): Metaliteracy in practice. Neal-Schuman An imprint of the American Library Association, Chicago (2016), http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&AN=1651897
11. Lhommeau, C., Bourgade, J.C.: MOOC & COOC: Creating effective and impactful digital training programs. Guest post by 360Learning LMS Corp at eLearningIndustry. (2017), available from https://elearningindustry.com/creating-a-mooc-examples-module-structure-case-study.
12. Libbrecht, P.: A model of re-use of e-learning content. In: Proceedings of ECTEL 2008, Maastricht, Markus Specht and Pierre Dillenbourg (eds). LNCS, vol. 5192. Springer Verlag (Sept 2008)
13. Mandl, T., Dreisiebner, S., Libbrecht, P., Boté, J.J.: Challenges for international and multilingual moocs: Experiences with the information literacy online (ilo) learning service. In: Aparac-Jelušić, T., Casarosa, V., Macevičiūtė, E. (eds.) The Future of Education in Information Science, pp. 135–142. Osijek (2018)
14. Marcotte, E.: Responsive Design. A Book Apart (2015)
15. Massis, B.E.: Moocs and the library. New Library World **114**(5/6), 267–270 (2013). https://doi.org/10.1108/03074801311326894, http://www.emeraldinsight.com/doi/10.1108/03074801311326894
16. Maurer, A., Schlögl, C., Dreisiebner, S.: Comparing information literacy of student beginners among different branches of study. Libellarium **9**(2), 309–319 (2016). https://doi.org/http://dx.doi.org/10.15291/libellarium.v9i2.280
17. Murray, T., Blessing, S., Ainsworth, S.: Authoring Tools for Advanced Technology Learning Environment. Kluwer Academic Publishers, Dordrecht (2003)
18. Robinson, L., Bawden, D.: Identifying good practices in information literacy education; creating a multi-lingual, multi-cultural mooc. In: Kurbanoğlu, S., Boustany, J., Špiranec, S., Grassian, E., Mizrachi, D., Roy, L. (eds.) Information

Literacy in the Workplace, Communications in Computer and Information Science, vol. 810, pp. 715–727. Springer International Publishing, Cham (2018). https://doi.org/10.1007/978-3-319-74334-9_73
19. SCONUL: The sconul seven pillars of information literacy: Core model. https://doi.org/10.1108/00907320610716486, https://www.sconul.ac.uk/sites/default/files/documents/coremodel.pdf
20. Secker, J., Coonan, E.: Rethinking information literacy: A practical framework for supporting learning. Facet Publishing, London (2013)
21. Sharika, T., Kumar, A., Bijlani, K., Ravi, R.: Authoring in mooc with wizard based recommendations for improving learner engagement. Procedia Computer Science **58**, 422 – 429 (2015). https://doi.org/https://doi.org/10.1016/j.procs.2015.08.055, http://www.sciencedirect.com/science/article/pii/S1877050915021663, second International Symposium on Computer Vision and the Internet (VisionNet'15)
22. Veletsianos, G., Shepherdson, P.: A systematic analysis and synthesis of the empirical mooc literature published in 2013–2015. International Review of Research in Open and Distributed Learning **17**(2) (2016), http://www.irrodl.org/index.php/irrodl/article/view/2448/3629
23. Wiley, D.: The instructional use of learning objects. Association for the instructional technology (2001), available from http://reusability.info/.
24. Zuboff, S.: Big other: surveillance capitalism and the prospects of an information civilization. Journal of Information Technology **30**(1), 75–89 (March 2015)