

Enhancing Reusability Practices in Massive Online Open Courses

Roberta Pireddu and Frederik Truyen

Literary Theory and Cultural Studies, Faculty of Arts, KU Leuven, Belgium

roberta.pireddu@kuleuven.be

fred.truyen@kuleuven.be

Abstract: Over the past decade, the emergence of Massive Online Open Courses (MOOCs) has profoundly transformed the distance learning landscape, capturing the attention of both higher education and professional institutions. This surge of interest has not only spurred the development of innovative teaching and learning methods but has also led to a re-evaluation of content production and reuse strategies. In fact, when producing MOOCs, multiple resources and efforts are dedicated to creating a considerable amount of learning material. This is often housed within the learning environment, which serves as a sort of repository and it is accessible by learners throughout the course. However, due to a lack of management support or internal organisational structure, the use of this material sometimes remains limited to the existence of the MOOC, causing it not to be actively employed and exploited after the course has ended. Lately, issues regarding MOOCs' content management have raised critical questions about the long-term sustainability, reusability and management of the created online learning material even after the end of the online course. By using as a case study the three interlinked MOOCs on European History, Law and Governance developed in the framework of the KU Leuven programme in European Studies and the effort invested in both the planning and afterlife of the MOOC, this paper provides an overview of the formulas adopted to enhance learning content reusability. Drawing from KU Leuven's extensive experience in creating humanities-focused MOOCs, this collection of interconnected online courses represents a novel attempt at offering a series of educational courses that are designed to complement each other not only in terms of content but also in terms of content management. Also, by contributing to the discussion on MOOCs' reusability this paper intends to emphasise the importance of establishing clear guidelines to enhance educational content reuse, ultimately contributing to the long-term educational value of MOOCs.

Keywords: E-learning, Distance learning, Digital sustainability, Reusability, Massive Online Open Courses (MOOCs)

1. Introduction

Since their first appearance in 2011, Massive Open Online Courses (MOOCs) have represented a paradigm shift in the landscape of distance learning education, offering new opportunities not only for learners coming from any part of the globe but also for educators, higher education institutions and also companies interested in the development of new pedagogical business models (Zhang et al., 2016). Subsequently, and especially during the COVID-19 pandemic in 2020, the uptake of MOOCs and the number of enrolled users increased significantly, resulting in a renewed proliferation of MOOC offerings (Steinberger et al. 2023). Therefore, MOOCs have undeniably played a pivotal role in expanding learning possibilities on a broad scale by offering a wide range of distance learning options. Besides the initial enthusiasm, the hype surrounding the "MOOC revolution" has also sparked a range of differing views on broader aspects related, for instance, to the completion rates of learners and the value of MOOC certifications compared to traditional, in-person learning programs (Zhu et al., 2018, Gu et al. 2021). Moreover, in this context, while factors like enhancing the learners' engagement, adopting pedagogically successful strategies, and integrating MOOCs into higher education programs have been subjects of debate since their inception, less attention has been paid to the *life-cycle* of MOOCs or their "afterlife". What happens to MOOCs after their original use has been exploited? Debates on challenges related to the reusability and sustainability of online courses developed and adopted by higher education institutions (HEI) have in fact been somewhat overlooked (Steinberger et al. 2023).

MOOCs are generally employed by educational institutions for a multitude of purposes and scenarios. In addition to their traditional use as part of standalone platforms (such as Coursera, edX, Khan Academy, etc.), MOOCs are frequently integrated into existing curricula and educational programmes. This integration can occur in various ways, such as by adopting MOOCs as equivalent replacements for traditional courses or by incorporating MOOC content into the classroom or as supplementary material to enhance student's learning (e.g. in preparation for future classes or programs) (Steinberger et al. 2023). However, often, the content created for a MOOC becomes obsolete and remains unused and unemployed after several iterations of the course over the years (Billsberry, 2023). This can be often attributed to the inability of the learning institutions to perform consistent updates of the material or the absence of an effective and consistent MOOC content-reuse plan or even to constrained budget. However, these potential scenarios pose significant questions about the necessity for higher education institutions, aiming to integrate MOOCs into their curricula, to devise a robust sustainability plan that facilitates not only widespread course reuse but also guarantees impact (Pérez-Sanagustín et al. 2017). A further factor that has been brought into focus in recent debates surrounding online courses is the current lack of openness

originally associated with MOOCs, whereby access to these courses is not contingent upon fees or requirements. Concerning that, a necessity has been stressed for bringing up the concept of Open Education Resources (OER) (Butcher, 2015) in relation to MOOCs and to introduce updated approaches to open access, whereby the availability and reusability of content are facilitated for both educators and learners (Ruipérez-Valiente et al. 2020)

In line with these considerations, this research aims to share and discuss the reusability methods employed within the context of the joint MOOCs development initiative, which was undertaken by three different KU Leuven faculties. In particular, the research focuses on the development of a strategy for the management and sustainability of MOOCs. Furthermore, this investigation aims to contribute to the ongoing debate surrounding the enhancement of MOOC sustainability in the higher education sector.

2. Case Study: The European Studies MOOCs

In 2021, the unit of European Studies at KU Leuven undertook a joint educational project involving the faculties of Arts, Social Sciences and Law. The primary goal of this initiative was to create three integrated Massive Open Online Courses (MOOCs), tailored to two specific learner groups:

- Prospective or current students aiming to enrol in the KU Leuven Master's programme in European Studies;
- Individuals seeking to broaden their understanding in one of the research areas covered by the online courses;

The MOOCs were developed and launched in September 2023 on the KU Leuven's edX platform - KULEUvenX¹ - and intended to provide a comprehensive but still interconnected learning experience for all participants. In fact, they not only intended to highlight a variety of domains within the realm of European Studies (namely European History, Society and Culture, European Governance and European Union Law) but were also designed to be educationally interlinked while maintaining their own identity in terms of content.

From a conceptual standpoint, the online courses aimed to provide a comprehensive analysis of Europe from a historical, legal, and institutional perspective. They are structured around a series of modules, which address specific topics within the fields of European History and Culture, European Governance, and European Union law. Further attention was also given to the pedagogical methodology. Also, are conceived not only as a traditional learning environment that enables participants to expand their knowledge on the topic but also as a space for personal growth. Learners are encouraged to apply their newly acquired knowledge through a series of focused exercises, readings, video conversations, practical examples and the presentation of currently relevant case studies. This process not only encourages the immediate application of the knowledge gained but also encourages the questioning of previous habits and assumptions and the understanding of how to face new challenges. Furthermore, participants are invited to not only build their comprehension of a series of concepts (such as the role of Europe in the context of modern and contemporary history, or the legal and institutional framework of the European Union, etc.), but also to engage in active discussion with other participants through dedicated discussion forums within the learning environment.

2.1 Rationale and Educational Framework

Despite the multiple experiences of KU Leuven in producing humanities-oriented MOOCs, this can be considered the very first set of combined distance learning courses entirely produced on the basis of internal collaboration among different faculties. From an organisational and educational perspective, the MOOC implementation structure was primarily established through cooperation between the educators (mainly academic staff from the three represented faculties) and three collaborators who managed the internal communication and implemented/adapted the learning design. In addition to ensuring pedagogical alignment and harmonisation across the MOOCs, each of them was responsible for the implementation and coordination of its respective learning environment as well as for ensuring the development of a sustainability plan to be implemented after the first iteration of the MOOCs. As to ensure the flexibility of the three MOOCs both from an educational and reusability point of view, they were developed and designed with a dual purpose in mind. The intention was that they would function as three independent learning entities, each offering a distinctive learning experience that

¹ <https://www.edx.org/school/kuleuvenx>

could also be followed as three interlinked MOOCs. They therefore were incorporated into the KULeuvenX Professional Certificate in European Studies: History & Culture, Law and EU Governance².

This approach, which intended to guarantee more flexibility in terms of reusability of the material/content for each of the MOOCs, required an adapted learning design which was based on two main educational approaches. Each MOOC's learning environment was conceived to be used in a hybrid context and suitable for students with different backgrounds and needs. In fact, the content produced was not only intended for a distance learning context -as is the case for all MOOCs produced and hosted on the edX platform- but also conveyed for reuse and inclusion in blended learning academic courses. Also, their environments were designed to facilitate not only student interaction and engagement with the content but also educators' self-employment of the content.

3. Designing the Learning Environment

The initial phases in the MOOC development process are typically characterised by the definition of comprehensive educational and learning strategies, usually adopted to optimise and facilitate the learner experience (Phan, 2018). These tasks, require a significant investment of resources and are essential for facilitating the learner's engagement and participation throughout their learning path. However, the design of a MOOC learning structure that is both engaging and smooth may prove challenging, depending on the specific features of the chosen hosting platform, the number of educators involved, and the overall complexity of the project.

These challenges emerged also during the implementation of the three European Studies MOOCs and were mainly related to the use of edX as a hosting platform. In fact, like other MOOC hosting platforms, edX does not provide substantial support to educators during the content design process, offering assistance only during the course implementation phase. To face these issues and ensure a smooth but still coherent development of the course's learning environments, we decided to adopt and re-adapt for our purposes the ABC learning design approach, a model originally developed by Dianne Laurillard in 2011 (Laurillard, 2011) that spread especially during the COVID-19 pandemic when education institutions were necessitated to reinvent themselves turning their -originally- academic live courses into digital courses (Young et al, 2016).

While the ABC Design approach was originally developed with traditional academic courses in mind, we identified the potential to leverage it to develop edX MOOCs. The storyboard utilised during the ABC Design session was, in fact, modified and adapted to align with the structure of all edX MOOCs, (which is composed of modules, sections, and units). For this purpose, a collaborative Excel sheet was created, comprising a set of virtual storyboards that reflected the number of modules in the MOOCs. These storyboards were used to recreate the entire learning structure of each module through a set of learning activities derived from the ABC design methodology (practice, acquisition, inquiry, discussion).

Moreover, the collaborative storyboard was expanded to include further details related to the specific type of learning activity, the type of material to be utilized, the status of completion, and the name of the instructor responsible for creating that particular item. These learning theories, together with concrete reusability proposals, were then implemented during recurring meetings where the educators were supervised by learning designers in sketching their own modules. This allowed the educators and learning designers to thoroughly structure each element of the online course based on the type of content they wanted to offer and to think at the same time about the feasibility of reusing the same material. This provided all the partners involved in the MOOC production with the right tools for developing not only a coherent learning environment but also a reusability strategy.

²<https://www.edx.org/certificates/professional-certificate/kuleuvenx-european-studies-history-and-culture-law-and-eu-governance>

Module 2: Actors							
Subsection: Council							
Learning activity 1	Acquisition	Inquiry	Acquisition	Acquisition	Acquisition	Acquisition	Practice
(Learning activity 2)							
What	Council	Council	Council composition	Council decision making	Council functions and powers	Council v Eurogroup	Council v Eurogroup
Materials	Video of Wathelet + Art 16 TEU	Document analysis with voiceover	Text + scheme on workflow within council with voice + table on rotating presidency with voice	Simplified version of 16(4) TEU on QMV and scheme with explanations or ppt with voiceover	scheme with pop up boxes	Text	MCQ
Content	Council: intro to the functions, short history and contemporary issues, members, sessions, seat and places of work	Table on Council configuration (to be done, upgrade doc analysis) Council rotating presidency	Council composition, configurations, rotating presidency, preparatory work (COREPER and working groups)	QMV, unanimity + note on transparency	functions and powers of the Council	Advanced (difference between Council and Eurogroup)	Differences between bodies
Who							
Status							
Subsection: Commission							
Learning activity 1	Acquisition	Inquiry	Acquisition	Acquisition	Acquisition	Acquisition	Practice
(Learning activity 2)							
	Commission intro	Commission composition and appointment	Composition, members, designation and end of	Functioning and organisation and	Functions and powers	High Representative	Commission general knowledge

Figure 1: Example of ABC Design virtual storyboard used for the European Union Law MOOC

4. Creating a MOOC Reusability and Exploitation Strategy

The success and lifespan of MOOCs are not uniquely dependent on the quality of the content and the development of a successful educational strategy. They are also determined on effective course management, especially in the period following its initial launch. Additionally, a well-planned strategy for reusing resources in future iterations and adapting them to different educational contexts is crucial. These elements, which are most of the time addressed at a later stage (e.g. when the online course is already finalised and ongoing), represent a critical foundation of the MOOC development process and therefore should be developed in strict connection with the course design plan itself. The absence of a specific reusability plan makes the practical reuse of the course material, and therefore the long-term existence of the course itself, a challenge.

These aspects were thoroughly considered during the design process of the three European Studies MOOCs and established the basis for their development. The aim of the three MOOCs was in fact to exploit the many potentialities of a distance learning environment not only by creating an engaging, autonomous learning experience but also by leaving space for the further reuse and educational evolution of the course itself and the material/content produced. In particular, the following educational-related aspects were considered when developing the reusability/sustainability strategy for the European Studies MOOCs:

- **Flexible learning structure:** Each MOOC is composed of a series of modules that can be followed both singularly as well as part of a trajectory. This allowed not only for flexibility in learning and teaching but also facilitated the reusability and therefore sustainability of the material.
- **Modularity:** Although the sequence of modules is harmoniously structured and the following of a certain order is suggested, each module is also designed to exist independently of one another. This modular structure also allowed students to give priority to learning pathways that are relevant to them and their needs;
- **Self-paced:** Rather than an instructor-led experience, the MOOC provided a student-paced environment that prioritised individual learning;
- **Downloadable material:** To enhance accessibility and reusability, all video materials are downloadable. This allows learners to engage with the content offline and at their own pace.

4.1 Exploiting the MOOC

The implementation of three interlinked MOOCs in European Studies was carried on together with a comprehensive examination of the potential applications of these MOOCs outside the scope of the edX platform. The MOOCs were originally designed with the academic programmes of KU Leuven in mind, making it clear that the most rational approach would be to focus on repurposing these online courses within the academic

landscape. However, we were equally committed to keeping the door open for future possibilities of leveraging the MOOCs for additional purposes. In light of these considerations, we decided to formulate an exploitation strategy that incorporated the following elements:

- **Use of micro-credentials:** A novel trend observed in the academic business model, particularly in European universities, is the emergence of a micro-credential system.³ Currently, the advent of sophisticated digital platforms and learning tools has led to the diffusion of informal learning, which is often disconnected from traditional education. While there is a clear need for a wide variety of job-oriented learning modules, the certification of knowledge and skills acquired in such a way is also crucial. For universities, there is a clear reason to facilitate the transition from partial, specific learning components to certificate degrees. Micro-credentials are expected to play an important role in facilitating this transition, as they have become an increasingly important part of the MOOC environment and are linked to more official and formal academic learning pathways (Parsons et al. 2023).
- **Integration with higher education Learning Management Systems (LMS):** This element includes the potential integration of the three MOOCs or singular MOOC modules into platforms like Blackboard or Moodle. This would not only increase scalability but also allow for their use in individual courses, thereby enhancing the learning experience and the reusability (or adaptation) of the material.
- **Inclusion into blended learning environments:** In addition to being globally accessible on the edX platform for all students interested in the subject matter, the course is also designed to be embedded into a blended learning environment within the context of dedicated courses offered at KU Leuven.
- **Allowing Creative Commons licensing:** The assignment of a Creative Commons licence to the course content serves to enhance the promotion of open knowledge sharing, while also significantly simplifying the process of reusing the content in diverse contexts, including those outside the higher education environment.

5. Conclusions

This paper presents the reusability approaches applied during the creation of three MOOCs for the European Studies programme at KU Leuven. It also discusses the challenges associated with developing sustainable online courses in the context of higher education. In particular, we conducted a detailed examination of the strategies employed in the creation of the three MOOCs in European Studies. By adopting this case study as an example we argued for the necessity of greater attention to be paid to the issue of reusability, particularly at the earlier stages of course development.

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³ See: <https://education.ec.europa.eu/education-levels/higher-education/micro-credentials>

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