DRIVE-X: A COLLABORATIVE MODEL FOR MAKING MOOCS

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Abstract

In 2019, estimations were made that roughly 12.000 online courses are accessible to learners on the largest Massive Open Online Course (MOOC) platforms enabling cross-comparison of MOOCs. Research establishes that the instructional quality in MOOCs is low, meaning there is a demand for innovative approaches and improvement in the quality in digital pedagogies. In contrast, research on learning design is limited in the MOOC research literature, offering few approaches on design principles and strategies that course designers can use. That said, this paper outlines an approach that addresses this particular design challenge. The paper reports from the application of a collaborative model for making MOOCs, called DRIVE-X, which was used to make an online course, 'Preserving Norwegian Stave churches'. The MOOC runs on FutureLearn and is the result of a collaborative partnership between an academic community specializing in digitalization of education, NTNU DRIVE, and a government agency, the Norwegian Directorate for Cultural Heritage. The use of DRIVE-X contributes to devise various learning design principles to create active learning in MOOCs and builds an understanding for social learning and MOOC pedagogy among the participants.

Keywords: MOOC, collaboration, social learning, online course design.

INTRODUCTION

Over the years, researchers have made cross-comparisons of a large number of MOOCs to ascertain pedagogical quality. For example, a study compared over 70 MOOCs and concluded that the instructional quality is low [1]. Such findings imply that the MOOC community needs to innovate digital pedagogy, especially outline particular course design principles. In contrast, the research literature is rather limited and suggests few methods on how to improve the quality in MOOCs. In this regard, this paper tries to close that knowledge gap and describes a research-based collaborative model that course designers might apply. We call this collaborative model DRIVE-X. The collaborative model was applied to make a MOOC about Norwegian Stave churches which now runs on FutureLearn. Two actors entered an explorative partnership, an academic community specializing in digitalization of education, NTNU DRIVE, and a government agency, the Norwegian Directorate for Cultural Heritage (NDCH). Both parties took on different roles in the collaboration and supplied various competences. NTNU DRIVE contributed with competences in MOOC pedagogies and online course production while the NDCH were the course instructors and core experts on the subject matter. They had never previously worked together. They formed a project team and used various advising, mentoring and coaching approaches to learn from each other and to make a MOOC together. The outcome of the collaboration process resulted in devising various learning design principles to create active learning in MOOCs and constructs a clearer understanding for the role of social learning in MOOC pedagogies.

To illustrate the argument above the paper performs an analysis over four parts. First, we do a review on learning design in MOOC pedagogies to position the paper in relation to a relevant research horizon that the paper wishes to contribute to. Second, the methods used to perform the data analysis is outlined. Third, the DRIVE-X model is explained, followed by a discussion on how it was used in the collaborative process to gain insights in MOOC-production. The last part concludes the paper.

PART I: A BRIEF REVIEW OF LEARNING DESIGN IN MOOC PEDAGOGY

In general, two learning designs have been used to make MOOCs, cMOOCs and xMOOCs. cMOOC refers to connectivist and constructionist pedagogies and involves learners connecting or collaborating towards learning goals in a joint project. Second, xMOOCs arose with the arrival of the large MOOC providers and reproduce the traditional lecture centric approach used in teaching on campus. Learners acquire predefined knowledge by completing learning activities, conducting self-tests and assessment and are awarded certificates, reflecting behaviorist pedagogies. In contrast, MOOC researchers and developers have over the years started to develop new learning design formats which is reflected in the emergence of two particular research streams.

The first research stream outlines new frameworks that appear to be inspired by connectivist and constructivist pedagogies. In this research stream, researchers develop new pedagogical frameworks and suggestions for new learning design principles. For example, researchers argue that current MOOCs need to change focus from a *content-centric* to a *user-centered* position [2]. Designing MOOCs is a creative process, and designers must adopt a cycle of inquiry of learning and focus on how target groups can grow through learning processes. This means that one must identify educational challenges, review theory and practice, create a concept, make and evaluate a prototype MOOC, and reflect upon the design process. Dona and Gregory contend for a *participant-first* approach and a learning design principle that attempts to foster collaborative group work [3]. The design process must start with an idea of the intended user, and they suggest design principles that view the MOOC from the learner's perspective. For example, the language must be simple, and learners should only be provided with necessary features and factors that can ease social interaction. Conole presents another framework, the so-called *7Cs of learning design*: its intent is to point out particular pedagogical conditions that course designers need to consider and factors that can help to make better informed decisions when creating MOOCs [4]. For example, learning designers must conceptualize the idea behind a MOOC as well as learning activities that encourage learners to create, communicate, and collaborate. These conditions must be clear before a MOOC is finished. Gynther argues for a learning design that uses *adaptive learning systems*, which can facilitate personalized learning [5]. This involves creating a new series of design principles, such as multiple learning paths, the production of a variety of content resources, and complementary teacher presence.

The second research stream draws on learner behavior in MOOCs and relates to research in learning analytics. This research stream seems inspired by behavioral pedagogies and uses learner data when suggesting new learning designs. Here, it is common to propose instructor-based interventions and designs to increase interaction in MOOCs [6]. For example, Hernández et al. suggest the *Full Engagement Educational Framework*, which facilitates a community building strategy so that learning takes place before, during and after a MOOC is completed [7]. To achieve this, one must break the target group up into smaller groups, provide them with interesting content, and enact specific follow-up strategies to personalize learning using learning analytics. Garreta-Domingo et al. suggest that MOOCs can be predesigned for use with *pop-up communities* [8]. These are temporary network learning communities where learners can meet online, and course designers need to facilitate learning so that learners can do tasks at their own pace and interact across platforms. Gamage et al. present a learning design called *GroupMOOC*, intended to foster structured collaboration [9]. It offers a pedagogy that uses network learning and peer-interaction from cMOOCs but is organized like an xMOOC. It consists of various stages and depends on the presence of a facilitator, who pairs learners throughout the entire learning process. Salmon et al. propose a learning design that embeds social media platforms into MOOCs, because social media is perceived as beneficial to fostering and structuring social learning [10].

To conclude, our observation of the research streams is that they offer vague insights on the organizational design and workflow needed to make a MOOC. We find few papers that explore the creative and collaborative inquiry process and design challenges that emerge when MOOC content developers and educators work together. For example, the fact that course developers lack design strategies to fit learning content to the constraints of an established MOOC pedagogy is a point in case. With this case paper we wish to close a knowledge gap in the MOOC research literature.

PART II: METHODS

The following data analysis is partly inspired by an action research approach which emphasizes an explorative and collaborative inquiry process intended to be a reciprocal learning process between researchers and participants to make an interactive learning resource [11]. Although action research has a long track record with contested approaches, the research design used in this paper was inspired by a collaborative inquiry approach [12]. The collaborative inquiry differs from traditional cooperative inquiries as one did not research '*with*" but '*co-constructed*' an online course with the research participants. In other words, they performed the practical work together with a clear deliverable, a MOOC. This means that the collaborative inquiry process constituted a mutual learning and self-explorative process for both parties. For example, the participants from the academic community had designed a collaborative model for making MOOCs but had never applied it in practice while the participants from the NDCH had never made a MOOC. The data sample used in this paper consists of written project reports, personal research notes, and qualitative semi-structured interviews, using an interview guide. The data was collected from January 2018 to September 2019.

PART III: DATA ANALYSIS

The DRIVE-X collaboration model for MOOC production

The DRIVE-X collaborative model is conceived in earlier works and consists of two parts, an *organizational design* and a *workflow process* [13]. The organizational design is inspired by "ad-hoc organizations" and was conceived as an Educational Action Task Force (EATF) [14]. The EATF supports and collaborates with faculties and administrative staff who wish to make online courses or MOOCs. Normally, they work in small teams ranging from four to seven people. The team members have competencies in online course design and digital pedagogies, multimedia production, learning platforms, etc. The team uses project methodologies and cloud-based technologies to organize a flexible and transparent work process. In the production of the Stave church MOOC one followed the outlined organizing. NTNU DRIVE contributed with a faculty in online pedagogy and a video producer who worked together with two Senior Advisors from the NDCH. They had different roles and responsibilities. The faculty and the video producer scaffolded the online pedagogical experience and the Senior Advisors were the course leaders and experts on the subject matters. The team worked together from January 2018 to September 2019, meeting on a regular basis to create the MOOC.

Figure 1: The Seven steps of DRIVE-X
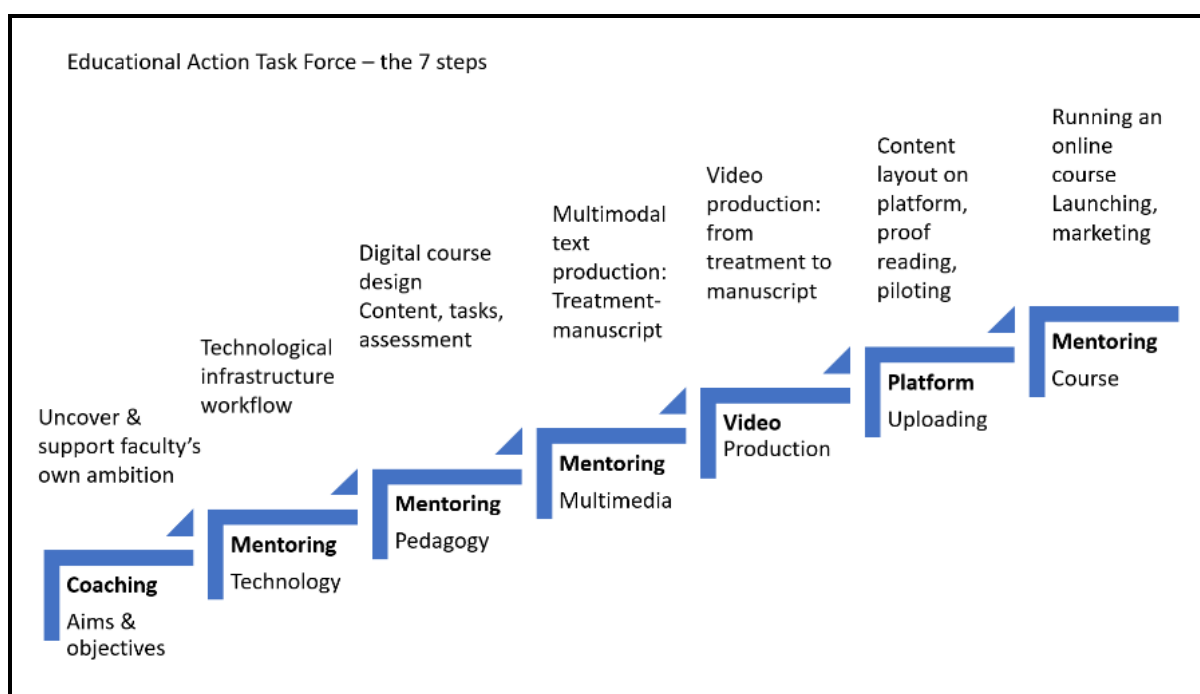
The workflow process is designed to follow a stepwise course production process and consists of seven steps. The DRIVE-X model is displayed in figure 1. The steps are designed to enhance the quality of the instructional design in courses. An important work practice ensuring progression in the workflow process is that the EATF-team members provide ongoing feedback. That said, various coaching and mentoring strategies are used for motivation and to help educators to understand the various parts and actions required to make an online course or MOOC. Coaching has the capacity to motivate educators to stay on track to reach goals and they can gain increased reflectivity, stronger cultures of collaboration, sharing of knowledge and greater engagement with professional development [15]. For example, the coaching model GROW can help educators to see more clearly where they are, where they want to be, and how to reach the goal of getting a course online. It is an approach that can be used to aid educators to positively reach their final goal through a series of supported steps. Below is a brief summary of the content of the seven steps used in the workflow process.

In step 1, **initial clarification of goals and motivation**, the goal is to raise awareness of the educational context. The educator is introduced to particular aspects of making a MOOC; introduction to the workflow process; brief presentation of MOOC platforms and collaborative tools, and formalization of the workflow process. In step 2, **selection of platform and workflow**, the educators are introduced to the EATF-team members and other important elements: limitations and possibilities in MOOC platforms and support process is discussed; selection of appropriate platform; commitment to timeline and

choice of collaborative tools to organize the workflow. In step 3, **course design**, the educators are introduced to instructional design and discuss; learning objectives, course structure, learning activities, assessment, production of multimedia content etc. In step 4, **multimedia workshop**, the educators work with video production methodology and focus on approaches to visualize knowledge and design multimedia learning content. In step 5, **video production**, the team produces videos or other multimedia content. In step 6, **uploading content to platform**, the course content production is completed, and one uploads the course content onto the platform and performs user testing and quality check. In step 7, **evaluation,** the team meets to finalize the online course and explore possible marketing strategies. The workflow process is also evaluated.

An important objective during the production of the Stave church MOOC was to try to follow the designed workflow process. Therefore, an important issue to explore is to what extent the participants experienced that the DRIVE-X model played a role in the collaborative inquiry process:

No, we haven't. We didn't know what we wanted. We didn't know what was possible to achieve. None of us had ever taken an online course. We belong to a generation that hasn't been in that digital race, compared to those that are 10, 20 years younger than us. For them, it's much more natural. The digital was not part of our studies. I think we started with a great thought, to put some of the learning material from another course on an LMS, but we just uploaded files, PDFs, and books. The dream was to make that knowledge available, in a more interactive way. We didn't understand how different it is. We had no idea about the process and the whole learning model. It's been an eye-opener in many areas, not only producing the MOOC, but also understanding what an online course is, the whole underlying pedagogy, learning objectives, and social learning. In fact, that it (MOOC) can exist independently online and be self-organized. It has been a steep learning curve. I think we were pretty far into the process before we understood what we committed ourselves to. (course instructor)

In other words, the collaborative inquiry process shows that the initial design work focused on step 3 in the DRIVE-X model, course design, and that stage becomes the overbearing component for the workflow process to come. This is related to the fact that the design work is constrained by a predefined MOOC pedagogy for social learning, something which the team had yet to realize. The effect of exploring one stage is the development of particular learning design principles that facilitates and enhances self-directed learning in social learning processes. For example, composition of web pages, the balance and logical interplay between various media modalities, the rhythm between various learning objects and activities, etc. needs closer consideration. Also, such insights mean that coaching and mentoring strategies must be applied to deduce what learning content has the potential to engage leaners. Later, the collaborative inquiry process shows that coaching and mentor strategies turn into clearer advising and intervention strategies where one become active co-producers in the course production process.

The motivation for creating the Stave church MOOC was two-folded. On the one hand, the NDCH aimed at changing the overall design of another course, while, on the other hand, NTNU DRIVE looked for partners interested in trying the DRIVE-X model. The NDCH had for years collaborated with another academic community in architecture, preservation and construction in an international campus course in continuing education about wood conservation. The course had been co-arranged with NTNU since 1984 and runs every second year during summer. The educators and students meet for a six-weeks period in Norway, and organize teaching in practical workshops, excursions and lectures. That said, the NDCH explored the possibility of replacing one part of the campus course with an online part. Parts of the campus course could be shortened with a two weeklong theoretical online course. As many of the students came from all over the world, the intention was that the students first meet in a digital space before meeting face-to-face. The NDCH approached NTNU, explored possibilities, and assumed that the online part could be finished rather fast:

When we started talking about digitalization, we thought the books would become interactive by just pressing a button. We had no idea that it was going to be so challenging, that it was a big process. We thought it was much easier, that we could only give the literature to someone and they would come up with something cool we could put online. (course instructor)

initially, the NDCH had been given access to the university's LMS, Blackboard, and assisted in organizing course content. Although the Senior Advisors had previous teaching experiences in a lecture centric pedagogy, they had limited experience with online teaching. In fact, Blackboard was the first introduction to a new approach to organize teaching. Blackboard is perceived as a "drop-box', a digital space for storing of learning material:

We didn't work in Blackboard, really. It was more file sharing, a digital space where we uploaded and shared files with our students. We had a blog, but no one used it. (course instructor)

Later, the NDCH was approached by NTNU DRIVE and asked if they were willing to create a MOOC about wood conservation. The NDCH agreed, but in the initial discussions the team realized that the scope was too large. Instead, the NDCH argued that they had authored a peer-reviewed book on the Norwegian Stave churches, which was also part of the wood conservation course. One of the Senior Advisors had been Project Manager for a nation-wide preservation program of the Stave churches. That said, it was suggested that the team created a MOOC about the NDCH's measures to preserve the Norwegian Stave churches. The book was the academic and professional basis for the MOOC. Thereafter, it was decided to make a MOOC on FutureLearn.

In retrospect, the collaborative inquiry process between NTNU DRIVE and the NDCH suggests devising four learning design principles which were used in the production of the MOOC. These are examined in greater detail in the next part of the data analysis.

Four learning design principles to create social learning

Learning design point 1: Adaptation to a MOOC pedagogy framework

One of the first challenges that needed to be resolved was drafting a course structure that would fit with the FutureLearn's MOOC pedagogy. FutureLearn supports a social learning pedagogy where learners continuously engage with the learning content and interact with other learners. Here, FutureLearn provides a predefined course template that course designers can use to structure a MOOC. A simplified version of it is illustrated in Table 1. The template resembles an 'interactive textbook' containing many blank web pages that need to be filled with learning content and learning goals. Usually, the course design work starts with defining the course's length but involves adapting to FutureLearn's specific course structure. For example, a module is called a 'Week' while a subsection within a Week is called an 'Activity'. Each Week contains a 'Step' which is used for structuring the learning content. A step is a web page and can be structured by the use of a few features. A step can be an article, video, discussion, poll, or quiz. FutureLearn allows for limited use of embedded third-party content (only YouTube videos) while other third-party solutions need to be hyperlinked. FutureLearn has embedded a discussion feature on each web page, which is the main tool for facilitating social learning.

Table 1: Simplified template for course structure.

Week	Activity title	Step	Step name
		1.1	"Needs to be filled in"
		1.2	"Needs to be filled in"
		1.3	"Needs to be filled in"
	"Needs to be filled in"	1.4	"Needs to be filled in"
		1.5	"Needs to be filled in"
		1.6	"Needs to be filled in"
		1.7	"Needs to be filled in"
		1.8	"Needs to be filled in"
	"Needs to be filled in"	1.9	"Needs to be filled in"
		1.10	"Needs to be filled in"
		1.11	"Needs to be filled in"
"Needs to be filled in"		1.12	"Needs to be filled in"
	"Needs to be filled in"	1.13	"Needs to be filled in"
		1.14	"Needs to be filled in"
		1.15	"Needs to be filled in"
		1.16	"Needs to be filled in"
		1.17	"Needs to be filled in"
	"Needs to be filled in"	1.18	"Needs to be filled in"
		1.19	"Needs to be filled in"
		1.20	"Needs to be filled in"

However, a great challenge in the design process was to apply FutureLearn's template. The template is a Google spreadsheet and can in this way be used to form an effective collaboration, but the team spent much time on it without making any progress and understanding it:

The spreadsheet didn't work. It was too abstract. We didn't understand it. It is only now that I understand what a FutureLearn course is. When we started, I hadn't had a look at a course. If we were to do something different, we might have spent more time looking at other courses before we started. It is only now that I understand what you mean with social learning. (course instructor)

The team attempted to use the template in work meetings. The team tried to fill it out as a way to decide on course length and structure of the learning content. Even re-making the template into a simplified spreadsheet proved unsuccessful. Therefore, one needed to re-approach the design work. A design challenge was to *convert the original text into a new re-mediatized text* that is to be part of a pre-defined pedagogical framework. The re-mediatized text has demands that were overlooked. In the design work one needs to consider what role texts, videos, pictures, animations, sound, etc. play in the relationship to each other; what order they come in; and where one places assignments and assessment to create active learning. In other words, the team lacked particular design strategies for *re-mediatization* of a learning content to a MOOC pedagogy. The team lacked insights on how to create a MOOC with balanced rhythm and fair amount of texts; what learning content works for social learning and not. This is essential to get various multimodalities to work together. Therefore, the team skipped filling out the spreadsheet and started to draft and structure the course *directly into* the FutureLearn MOOC platform. This gave a "look-and-feel" of what the MOOC would look like in practice, giving hands-on experiences. Also, the team started to have more in-depth sessions were evaluation of course structure and learning goals was worked on, an effective approach:

When we worked for several hours on the course structure, we did pretty big jumps, in terms of progress. It gave us a better understanding of what we were doing. I don't think we were aware, when we got ourselves involved, how much of the technical stuff we were going to do. We had the belief that there was a guy, somewhere, who was going to take care of all the technical stuff. (course instructor)

The in-depth design work meant that the re-mediatization of the learning content became clearer and the team managed to create a course structure that fulfilled the MOOC pedagogy for social learning. Several design objectives were completed. First, the course length was settled, a two-weeks MOOC. Second, a coherent course and framing of an overall narrative idea was conveyed. The MOOC gives an introduction to Stave churches and Norway's contribution to the world heritage and the measures used to preserve them, showing in the MOOC's main title.

That said, the first week introduces the learner to a basic understanding of a Stave church. The course content of Week 1 is displayed in Table 2. Week 1 consists of three activity sections and 20 steps where the various sections serves different roles to facilitate the social learning process. For example, the two first activity sections outline the technical definition of a Stave church and present the remaining Stave churches and the various groups they belong to. These activity sections are more designed for theoretical instruction to the learner while the last activity section invites learners to engage with normative questions and challenges in the preservation of cultural heritage.

Table 2: Week 1, Understanding the Stave churches.

Week 1	Activity title	Step	Step name
Understanding the stave churches	**Wooden buildings with staves**	**1.1**	**Welcome!**
		1.2	**The course creators**
		1.3	**Learning goals week 1**
		1.4	**What is a stave church?**
		1.5	**Stave church visual guide**
		1.6	**What is your experience?**
	The remaining Stave Churches	**1.7**	**Where are they?**
		1.8	**Different groups**
		1.9	**The simple post stave churches**
		1.10	**Centre post stave churches**
		1.11	**Stave churches with elevated naves**
		1.12	**Other types of stave churches**
		1.13	**What did you learn?**
	Protecting the Stave Churches	**1.14**	**Values and legal protection**
		1.15	**Urnes - world heritage**
		1.16	**Visit to the Urnes portal**
		1.17	**Borgund and Hopperstad stave churches**
		1.18	**Wear and tear of the portals at Borgund**
		1.19	**Church or museum?**
		1.20	**End of week 1**

In contrast, Week 2 takes another perspective. The first week establishes that the Stave churches were in a poor condition and national measures were needed to preserve them. The week tells the story of the Stave church preservation program, a national initiative implemented by the NDCH that

used traditional craftmanship techniques to restore the churches. The various sections explore the meaning and role of craftmanship and what particular challenges the craftsmen faced in in the restoring work. The course content of Week 2 is displayed in Table 2.

Importantly, the choice of working and organizing the course content directly *in* the platform was a far more effective approach to finalizing the MOOC. Also, in this period, direct and ongoing feedback to NDCH was used. For example, the team's digital pedagogue continuously browsed and read through various drafts of the MOOC and made a list of comments for each step and suggestions for improvement. In this way, the course instructors had an external reader of the course content who pinpointed strengths and shortcomings:

At the end, I think it worked well. We had much more contact, closer follow-up, a lot of clear advice from you, about what we should do. Maybe we would have needed that involvement to a greater extent earlier in the process. So having closer focus, having closer involvement, being clearer on where you are going is crucial. (course instructor)

Table 2: Week 2, The craftsmanship and restoration of the stave churches.

Week 2	Activity title	Step	Step name
The craftsmanship and restoration of the stave churches	**The craftsmanship of the Stave Churches**	2.1	**Welcome to week 2**
		2.2	**The craft of building**
		2.3	**The craft of carving**
		2.4	**Have your say**
		2.5	**What did you learn?**
	Craftsmen, tools and materials	2.6	**The stave church preservation program**
		2.7	**The importance of the skilled craftsman**
		2.8	**Repairs from top to bottom**
		2.9	**Selecting the right material**
		2.10	**Have your say discussion**
	Examples, values and choices	2.11	**The bell tower at Borgund**
		2.12	**The stave at Nore**
		2.13	**Replacing the individual shingles at Borgund**
		2.14	**Total replacement of shingles at Hopperstad**
		2.15	**What did you learn?**
		2.17	**A last word**

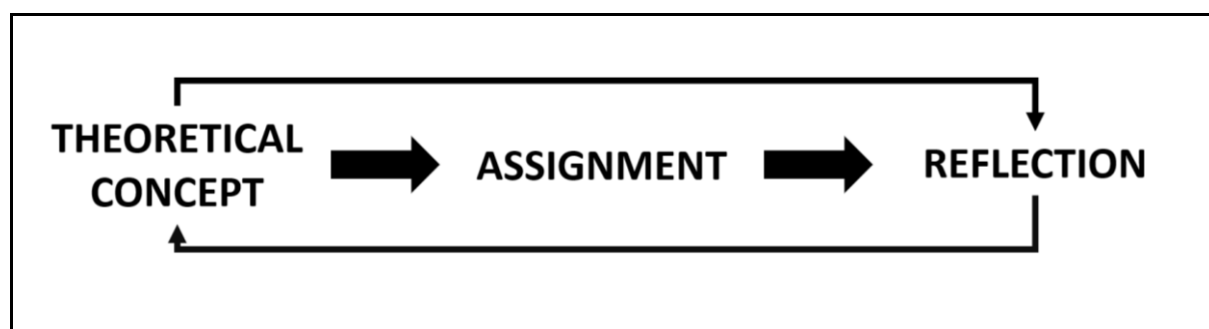*Learning design point 2: Recursive core theory-action-reflection model*

Figure 2. Recursive core theory-action-reflection model.

Another learning design point devised from the collaborative inquiry process was use of a 'recursive core theory-action-reflection model'. This is displayed in Figure 2. The design principle is intended to sustain learner's engagement in a self-directed learning process. The main idea is to have a recurring pattern containing interlinked and logical learning activities that motivate leaners to continuously seek active engagement—a design point used throughout the MOOC. The model is intended to keep leaners occupied with learning activities and follows a three-step logic. First, the learner completes a learning activity that involves being introduced to a defined concept related to the course material. Second, the learner applies the concept to a learning activity designed to be a practical assignment. Third, the learner performs a learning activity where he or she reflects on and discusses with peers the learning activities they have just performed. There is no fixed way of implementing this and it can be done in different ways, however, this model is integrated in each subsection throughout the entire MOOC. In Figure 3, we see the use of the model in Week 2 (from Step 2.1 to 2.5) in a subsection about the

craftsmanship used in restoration of Stave churches. In Step 2.1 the learners are introduced to the learning goals. In Step 2.2 to Step 2.3 one reads about what role craft of building and carving play in modern construction and in constructing Stave Churches. In step 2.4 and 2.5, questions and quizzes are designed and are related to the learning content presented in the previous steps. By embedding questions and a quiz into the various steps within the subsection, this design point aims to sustain engagement, thereby leading the learners to the next subsection.

Figure 3. Screenshot of a subsection in the MOOC.

Learning design point 3: The use of videos as learning objects

The collaborative inquiry process also somehow devised a third design point, the use of videos as learning objects. Videos play an important role in the MOOC and the video production followed the design for multimedia production as outlined in the DRIVE-X model. The team met for a workshop and discussed what type of videos would be relevant to make, in addition to ongoing discussions. The procedure for making videos follows certain steps. For example, it is common that the video producer and course instructors draft a treatment, a short script about what a video should be about. After that, filming is organized in addition to post-video production work. The MOOC contains 13 videos and they last from one to five minutes. The videos can be divided into two sub-genres, *short documentaries* and *video collage*. Uses of videos are illustrate in figure 3. The so-called short documentaries are a short video that describes a particular topic and shows real-life examples and lasts no more than two to five minutes. Several short documentary videos were used throughout the MOOC. Many of them with the course instructors, who explain an aspect about the Stave church or show the work and the tools used in the restoring of the churches. The video collage genre is among other things used in the presentation of the remaining Stave churches. The MOOC does not contain any talking head videos, where a course instructor is in a studio reading a script and talking into the camera.

A challenge with the video production was that the course structure was not set, meaning that the team did not have a clear idea of what videos to make. During the production process, an excursion to the Stave churches and a workshop on wood conservation had been planned by the NDCH for months. It was decided to send the video producer on the excursion:

A lot of the video production happened early on before we got the course settled. Much of that video material was never used. We went for an excursion for a few days and it's a pity that we did not use all the material. It would be nice to have more videos. The video production happened too early, but we had to seize the opportunity. Some of it was used like at Borgen and Urnes, the interview with the students in front of the Urnes portal. (course instructor)

Learning design point 4: Prompts for social learning activities

The last learning design point that the collaborative inquiry process concocts, is the use of videos, quizzes, and discussion prompts to facilitate for social learning. The team decided to design several questions related to the content of the videos and interlink them to a greater topic explored in a particular subsection. For example, in Week 1, a subsection explores contemporary issues on cultural heritage and is a topic that learners can relate to. The team designed various questions on what they think about preserving Stave churches, how one should meet climate change, and whether the churches should be put in museums or remain where they are.

Figure 3. Use of videos in the MOOC.
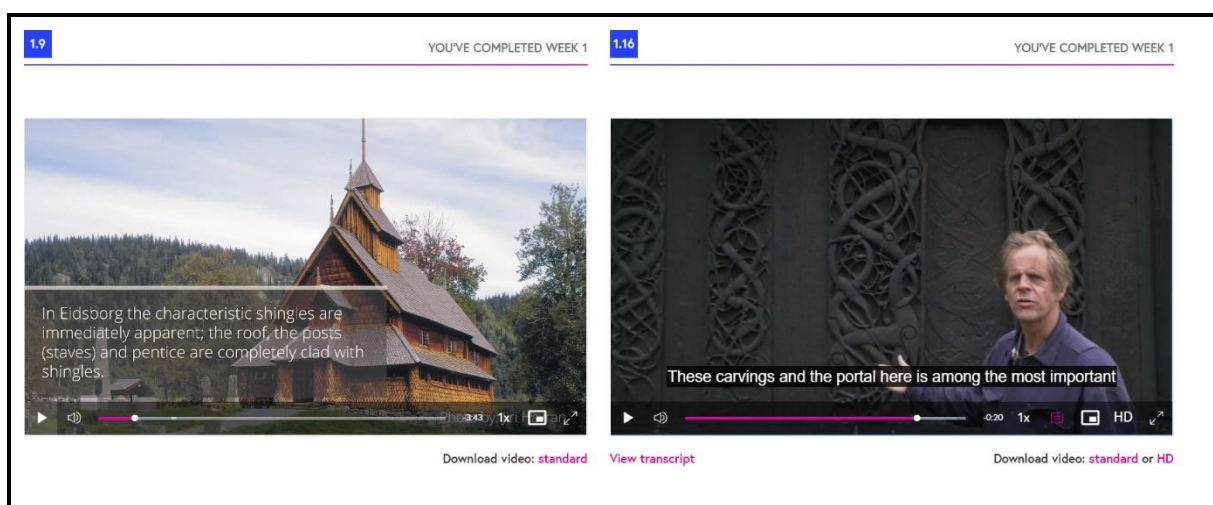
The team spent a lot of effort in creating a coherent course structure and attempting to organize a narrative of the learning content. This meant that an important pedagogical element for creating social learning – like designing questions and quizzes – was overlooked and first became important at the end of the collaborative process.

We worked on the quizzes at the end of the process. We didn't spend much time on that matter. We completed them quickly. It was one of the last things we did. They play an important role in the course. Involvement of the course participants and the questions. We should have worked more with it, considering the important role they play in the overall course design. (course instructor)

Benefits of using the DRIVE-X model

The application and interpretation of the DRIVE-X model and the explorative and collaborative inquiry process used to make sense of how to make a MOOC have obvious benefits. We can point to a number of insights and benefits. First, the DRIVE-X model assists in enhancing and changing the view of the participant on teaching and learning, among other things that social learning in a MOOC setting is a complex endeavor to understand. Second, the participants argue that making a course under supervision has far more added value, both for them as experts on a subject matter and for the organization that they work for. They now possess practical skills and competence in digital transformation, which is far more valuable than taking a course and being rewarded with a certificate. Third, they argue that making a MOOC has far greater value when disseminating professional knowledge than writing a book or a report which is another form of dissemination:

It's been a steep learning curve, a very valuable one. I experience that the knowledge that I have gathered, I wouldn't miss it for anything. The learning and experience is extremely valuable. Now, it's like, "Oh, yes, an online course." That is a far more effective way of disseminating knowledge than writing brochures. (course instructor)

PART IV: CONCLUSIONS

The goal of this paper has been to present a collaborative model that can be used to make MOOCs. The analysis shows that the explorative and collaborative inquiry process devise a set of learning design principles that course developers can use in the future making on online courses. However, a challenge for MOOC designers is that the current research horizon has obvious limitations, suggesting vague design strategies for making MOOCs. In fact, research offers few design tools, outlining general pedagogical frameworks instead that give little insight in to how to put design principles into practice. The design principles suggested in this paper are an effort to close that gap in the research literature. Nonetheless, some strengths and limitations must be pointed out. The design principles are based on a particular MOOC, but they can, however, be applied to other fields. If future course designers choose to apply the design principles and the DRIVE-X model, they must expect further adaptations to the model. A well-conceived learning design is just one step toward creating better learning experiences. The efforts need to be redirected elsewhere and across multiple fronts. One could, for example, focus on the pedagogical management of MOOCs. Today, MOOCs are based on self-directed online learning, meaning that learners sign up for MOOCs without having real course leaders present. This aspect means limited and automated feedback, but also that MOOCs seldom have real educators to supervise and organize online learning when the course takes place. This increases the odds that the effort to create an effective online community based on social online learning can fail. The MOOC field, therefore, needs to develop design strategies not only for creating MOOCs, but also for organizing pedagogical online learning processes, for both synchronous and asynchronous learning in MOOCs. A future focus should be on developing pedagogical strategies for effective online learning.

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