

FIVE LEARNING DESIGN PRINCIPLES TO CREATE ACTIVE LEARNING FOR ENGAGING WITH RESEARCH IN A MOOC

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Abstract

Creating a Massive Online Open Course (MOOC) based on analysis from research requires the adaptation of MOOC pedagogies. For example, course designers need to follow certain design principles and adapt learning content to the pedagogies and constraints of a MOOC platform. That said, this paper outlines five different learning design principles that create active learning in a MOOC. These emerged when adapting knowledge from a research case study. To exemplify the adaptation, this paper examines how research from a sociological, qualitative classroom study about a teacher who used digital technologies in foreign-language training at a Norwegian high school was adapted for a MOOC that ran on FutureLearn.

Abstract in Norwegian

Å lage MOOC (Massive Online Open Course) basert på forskning krever tilpasning til MOOC-pedagogikk. For eksempel, nettkursdesignere må følge visse designprinsipper og tilpasse læringsinnholdet til pedagogikken og begrensninger satt av en MOOC-plattform. Målet med denne vitenskapelige artikkelen er å introdusere fem læringsdesignprinsipper for å skape aktiv læring i MOOC. Disse læringsdesignprinsippene for aktiv læring kom som et resultat av et designarbeid som besto av å tilpasse forskningen fra en sosiologisk studie til et nettkurs. For å eksemplifisere dette, tar artikkelen for seg hvordan man lagde en MOOC ut av en sosiologisk klasseromsstudie om en lærer som brukte digital teknologi i fremmedspråkopplæring på en norsk videregående skole. MOOCen er et 3-ukers nettkurs som ble laget for FutureLearn.

Keywords: MOOC, learning design, research, Norway

Introduction

Research suggests that the instructional quality in MOOCs is low, thereby implying that the approaches used by course creators when designing MOOCs need attention (Margaryan et al., 2015). Greater focus on MOOC pedagogies and concretizing of learning design principles to improve learning experiences is needed. In this regard, this paper answers that challenge and presents five learning design principles to create active learning in MOOCs. These emerged when adapting knowledge from a sociological research case study into a MOOC run on FutureLearn. The sociological study explored how a female Norwegian high school teacher used digital technologies to support learning in foreign-language training. To illustrate this, the paper performs an analysis in three parts. First, a brief review on learning design in MOOC pedagogies is performed. Second, details from the sociological study selected for developing the design principles are outlined. Third, the five design principles for creating active learning are presented and connections between knowledge from the sociological study and the learning content in the MOOC are highlighted.

Part I: A brief review of learning design in MOOC pedagogy

Since the 2000s, two learning designs have been used in creating MOOCs, cMOOCs and xMOOCs. cMOOC is inspired by connectivist and constructionist pedagogies and involves learners connecting or collaborating on learning goals or a joint project. xMOOCs arose with the arrival of MOOC providers and reproduce the lecture approach. Learners acquire predefined knowledge by completing learning objectives, conducting self-tests and e-assessments, and are rewarded certificates, reflecting behaviorist pedagogies. Researchers argue that cMOOCs and xMOOCs represent the past and point out new MOOC formats: associative, cognitive, constructivist, and connectivist (Conole, 2015). In contrast, the MOOC research literature on learning design is split into two research streams showing new frameworks.

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, Mor et al. (2016) argue that current MOOCs need to change focus from a *content-centric* to a *user-centered* position. 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. In contrast, Dona and Gregory (2019) contend for a *participant-first* approach and a learning design principle that attempts to foster collaborative group work. 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 (2015) 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. 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 (2016) argues for a learning design that uses *adaptive learning systems*, which can facilitate personalized learning. 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 (Mohamad et al., 2019). For example, Hernández et al. (2018) 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. 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. (2018) suggest that MOOCs can be pre-designed for use with *pop-up communities*. 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. (2018) present a learning design called *GroupMOOC*, intended to foster structured collaboration. 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. (2015) propose a learning design that embeds social media platforms into MOOCs, because social media is perceived as beneficial to fostering and structuring social learning.

Part II: A sociological study used for formulating learning design principles

The learning design principles developed in this paper are based on a sociological case study (Haugsbakken, 2015). Haugsbakken did fieldwork in a Norwegian high school, researching the ways a female teacher used digital technologies in her foreign-language classes. The teacher's classroom practice can be described as using a technology-enhanced learning strategy. The study applied an explorative research design to understand the ways the female teacher planned and used digital technologies to support learning. The study used a longitudinal perspective. Haugsbakken spent eight months in the teacher's classes, with data collection starting in August 2011 and ending in March 2012. A qualitative research strategy was used, with classroom observation and semi-structured interviews as main methods. Social media metadata was also collected. Haugsbakken's classroom study is published as a large chapter in a monograph and is part of his PhD dissertation.

The sociological study does not use a pedagogical perspective like sociocultural learning theory. In contrast, it is inspired by a social constructionist research lens on technology, as used in organizational analysis: a research tradition that stems from sociological and social anthropological theorizing. This research stream has developed perspectives for understanding technology implementation processes in organizations (Bijker et al., 1987; Bourdieu, 1977; Callon, 1986; Giddens, 1984; Latour, 1987; Pinch & Bijker, 1984). It analyzes how human interaction with technologies creates concepts and mental representations that can be constituted and institutionalized into reciprocal roles and played out by human action (Leonardi & Barley, 2010). Ongoing theory development has resulted in many analytical perspectives regarding the nuances and events in technology implementation processes. Currently, the research field is engaged with the analysis of ontologies, including questioning the ways humans interpret reality, and the role played by the use of technologies.

Haugsbakken developed a research lens inspired by Weick's (2001) sense making framework and Barth's (1966) generative process perspective. The study combines them to formulate a *model-based perspective* on technology. This perspective is used to focus on ontologies and the role that human interpretation and practice plays in the use of technologies. It is used to address the ways that actors in first-line positions in organizations use technology to organize work practices by interacting on *platforms* (Dijck et al., 2018). These platforms are used to bypass the ICT infrastructure provided by organizations to their employees. The model-based perspective is a bottom-up view of how actors approach digitalization in organizational contexts. This perspective is related to Orlikowski's (2000) *technology-in-practice* lens, which argues that the focus should be on the *emergent social structures* coming from peoples' recursive use of technology. It argues for looking for social patterns that become routinized by humans' reengaging use of technologies. Therefore, the sociological study focuses on practice and frames technology use as taking place in social interaction situations occurring in processes over time in an organizational context.

The sociological study describes nuances and events occurring in a structuration process and concentrates on the role played by social interaction and the use of digital technologies in the teacher's classroom practice. To achieve this goal, the teacher's learning design is analyzed from two perspectives, forming an empirical data analysis. First, the analysis focuses on the approaches the teacher uses to plan for the use of digital technologies. Second, the analysis describes the challenges as well as how she puts her plan into practice from a process perspective. However, a focal point is that digital technologies disrupt and challenge the ways teachers organize learning in a classroom. For example, a teacher lectures in front of the class and uses a blackboard and textbook to teach and be the bearer of expert knowledge. In contrast, digital technologies disrupt these aspects: the attention of the students is redirected, and the classroom space changes, meaning that the teacher is less in control of the learning process. Such conditions mean that teachers need other strategies to organize learning.

To describe the first empirical perspective, the study presents four strategies the teacher used in class planning. The first strategy presents the digital technologies the teacher used and the role they played in organizing learning activities and staying updated on new pedagogies and technologies. The teacher used blogs, wikis, YouTube, and newspapers. The second strategy is an approach to managing the teacher role in the classroom. This strategy requires adopting a role performance in which the teacher encourages engagement and uses supervision to guide the students to reflect upon their learning. The third strategy consists of co-constructing and embedding competence goals from the curriculum with students, a method that stresses dialogue with students as well as student empowerment. The teacher called this method working with themes. The fourth strategy concentrates on creating meaningful learning activities that embed the use of digital technologies and aligning them with curriculum learning goals.

Table 1: The different themes in the structuration process

Month	Stage	Name of phase
1	1	Introduction phase
2		
3	2	Challenges in stabilization
4	3	The unexpected enabler of audio-visuality
5	4	The halfway assessment
6	5	Turning point
7	6	The meaning of collaboration and self-organization
8		

To describe the second empirical perspective, the analysis is concentrated on enactment. Here, the study focuses on what happens when the teacher introduces and implements her learning design. The analysis focuses on social patterns that become routinized from the teacher's and students' recursive use of digital technologies. To chart the events in the structuration process, the empirical data analysis describes the challenges and experiences the teacher faced over an eight-month period, starting in August 2011 and ending in March 2012. To give meaning to a vast amount of data, the researcher gives each month an overall theme to indicate what the stage represented. This is illustrated in Table 1.

The first stage is called the introduction phase. It covers the two first months and analyzes how receptive the students are to using digital technologies. In this period the students are introduced to digital technologies while the teacher maps their digital skills, establishes a positive classroom atmosphere, and conducts individual student conversations. The teacher learns that the students are not that digitally skilled and grows skeptical of her learning design. The second stage is called challenges in stabilization. In this phase, the teacher continues to perform negotiative strategies to create trust in the learning design. This is where recursive social patterns in the use of digital technologies emerge. The students are differently receptive to using technology. In some classes, the teacher must terminate learning activities such as blogs. The third state is called the unexpected enabler of audio-visuality. This phase shows breaches in the recursive use of digital technologies but is also a period for experimentation and surprises. In one class, the learning design is well established, and the teacher works with each student and addresses their learning goals. In another class, the learning environment fluctuates as the teacher's gender emerges as an issue and the students do not submit schoolwork. In contrast, there are occasions when students use digital technologies unexpectedly in a positive way. The fourth stage is called the half-way assessment and is used to reflect upon achievements. The teacher learns that students accepted the learning design differently. The fifth stage is called the turning point. This stage shows that the teacher's approach to using digital technology in learning has become standardized. The sixth phase is named collaboration and self-organization. This period shows that the teacher is faced with a student

conformist culture and tries to overcome low engagement in her classes with the use of digital technologies.

Part III: Five learning design principles emerging for creating a MOOC

There were several reasons behind the motive for creating a MOOC based on the sociological study. First, the study is published as a chapter in a monograph; it is 80 pages long, uses an academic writing style, and applies thick description (Geertz, 1973). In other words, the monograph is a hard read. Second, the study is available on the Internet and can be downloaded but there is little chance that it will be used (see <https://bit.ly/31Zp8fL>). In a university campus setting one could organize lectures and group discussions but can only assume limited impact. Third, to achieve effective knowledge dissemination to teachers – the target group for the study– a MOOC was created. A three-week long MOOC ran on FutureLearn, called “Digital Transformation in the Classroom”. It took two years to create and was piloted during fall of 2019 with about 500 learners. The MOOC is ranked by Class Central as among the 100 most popular MOOCs in 2019 (see <https://www.classcentral.com/list/2019-s-most-popular-online-courses-free-d1twlv>).

However, using knowledge from the sociological study when designing the MOOC required adaptations. To use an analogy, the adaptation is not dissimilar from the challenges screen writers face when changing novels into screenplays. That work consists of deleting and creating new material to fit the constraints of the television format. In a similar way, the MOOC course designers were challenged to adapt the knowledge from the sociological study to the constraints of MOOC pedagogies. This work consisted of using a pedagogical framework that invites learners to *engage* with the research through interaction and to become part of an online learning community. A challenge in learning design work is to motivate the target group – teachers – to engage with predefined content. In so doing, course designers must adapt content into an online learning setting using design principles for active learning (Bonwell & Eison, 1991). Below are suggestions for five active learning design principles that emerged from adapting the research knowledge from the sociological study into the MOOC.

Active learning design point 1: Adaptation to a MOOC pedagogy framework

Table 2: 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”	“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”
		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”
	“Needs to be filled in”	1.17	“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”

The first active learning design point is adapting knowledge from the sociological study into the MOOC pedagogy as defined by FutureLearn. FutureLearn supports a pedagogy based on social learning and an online community where learners are supposed to engage with the learning content and interact socially. By asking learners a series of complex questions, learning from social interaction can be realized. The design work involved facilitating for that learning process. FutureLearn provides course designers with a predefined course template that can be used to draft and structure a MOOC. A simplified version of FutureLearn’s course template is illustrated in Table 2. In short, the course design template resembles an “interactive book” containing blank web pages that need to be filled with learning content and learning goals. The course design work starts with defining the course’s length, but also involves adapting to FutureLearn’s specific MOOC 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 limited features offered by FutureLearn. A step can be made in different ways, comprising, for example, an article, video, discussion, poll, or quiz. FutureLearn allows for limited use of embedded third-party content (only YouTube videos) while other third-party content needs to be hyperlinked. FutureLearn has embedded a discussion feature into each web page and is the main tool for facilitating social learning and building an online community.

All learning content to be used must be created and uploaded to the platform, which means that making a MOOC is time consuming and requires a lot of planning. In other words, making a FutureLearn MOOC is similar to being a screen writer, as one creates an engaging “interactive textbook”. However, when using knowledge from the sociological study to create the three-week MOOC, certain design strategies were used. First, a target group was defined: teachers. Second, an overall goal was determined: to introduce learners to the idea of changing from a lecture-centric classroom practice to teaching practice based on digital technologies. Third, the MOOC purpose was to introduce learners to teaching strategies that teachers can use when changing their practice. Fourth, the MOOC does not use traditional pedagogical perspectives on how teachers can use digital technologies in a classroom setting. Instead, it draws on the social constructionist research perspective on technology, the same used in the sociological study. This perspective is needed as teachers are confronted with challenges similar to those seen during technology implementation processes within organizations. Fifth, the MOOC is research based and uses first-hand experience, as the teacher that participated in the sociological study also appears in the MOOC. This aspect could provide for a more authentic learning experience and facilitate better learner engagement.

A great challenge in the design work was adapting details from the study into the learning material to be used in the MOOC and in defining the learning goals. To achieve this, the research knowledge had to become content-driven to support social learning. A design solution was to introduce the learner to three perspectives on digitalization, where certain perspectives draw on analysis from the sociological study. Here, the study’s empirical analysis was adapted, as it focuses on the teacher’s classroom practice. The three perspectives correspond to the three-week length of the MOOC as each week covers a specific topic on digitalization. Nonetheless, the toughest design work was adapting the study’s research knowledge to align with various learning goals. This design work required learning goals to be defined on many different levels. For example, learning goals needed to be defined for each week. Within each week, all subsections and steps required the same approach. The various levels and details of learning goals needed to stand in relation to each other and together reflect a coherent course. In the course design work roughly 70 different learning goals were defined.

Table 3: Week 1, “Understanding digital transformation”

Week 1	Activity title	Step	Step name
Understanding digital transformation	The Fourth Industrial Revolution	1.1	Welcome
		1.2	Who is (removed for review)?
		1.3	What to learn in Week 1?
		1.4	Behave with the mobile
		1.5	From Steam to Data
		1.6	The rise of the Platforms
		1.7	What have you learned?
	Technologies and work	1.8	Technology determinism
		1.9	Production technologies
		1.10	ICT in the office
		1.11	What have you learned?
	The social network	1.12	The network society
		1.13	The fishing net article
		1.14	Your social network discussion
		1.15	What have you learned?
	Adoption and implementation	1.16	Disrupting workflow
		1.17	The implementation
		1.18	Emergent practices article
		1.19	Recursive use
		1.20	Recap of week

The first week of the MOOC has the overall learning goal of introducing the learner to the term *digitalization* and structures a learning path for the learner to talk about digital technologies. This is reflected in the title, “Understanding digital transformation”, and is the first perspective on digitalization. Digitalization is connected to sociological perspectives on social networks and a social constructionist research lens on technology. Therefore, the first week makes no use of knowledge from the research case study. Instead, the overall learning goal is to break the term *digitalization* into five subthemes which are then broken down into steps. Each subsection and step have predefined, interlinked learning goals. The learning material is presented in rewritten texts and videos and is displayed in Table 3.

The first week is divided into four subsections with 20 steps. First, the learner is introduced to the idea that the period we live in is called the Fourth Industrial Revolution. The present day is a data-driven era and platforms are the new infrastructure connecting people. Second, the learner is presented with organizational perspectives on technology and the ways research perspectives changes according to the technology studied. For example, in the 1940s and the 1950s, sociologists studied production technologies in organizations, leading to contingency theory and socio-technical system theory. Learners are also presented with the social constructionist research tradition on technology that gained popularity in the 1970s and the 1980s and its relevance to the study of ICT implementation processes. Third, the learner is introduced to the network society research tradition and the social network studies approaches. Fourth, a practice perspective on technologies and the ways that digital technologies disrupt the ways that new technologies are implemented in organizations is presented.

Table 4: Week 2, “Planning for digital transformation”

Week 2	Activity title	Step	Step name
Planning for digital transformation	Designing a digital classroom practice	2.1	What to learn in Week 2
		2.2	Modeling the classroom

	2.3	Decouple and reconnect
	2.4	What have you learned?
Choosing the digitech kit	2.5	Selecting and creating article
	2.6	Inger's digitech kit video
Mapping social networks	2.7	Node-mapping
	2.8	What learning goes on
	2.9	Share your experience
Forming knowledge	2.10	Create knowledge
	2.11	Themes over chapters
	2.12	Working with themes
Meaningful learning activities	2.13	Acts for engagement
	2.14	The news round
	2.15	Share your experience
	2.16	Blog and YouTube
	2.17	Recap of week

The second week has the overall learning goal of introducing learners to the second perspective on digitalization. This is also reflected in the week's title "Planning for digital transformation". This week ties the term *digitalization* directly to the workday of the teacher and gives a different perspective on lesson planning. The term *modeling* is used as a term to reorient the learner towards the idea that lesson planning shares similarities with challenges in technology implementation processes. For the learner to master planning lessons that use digital technologies the learner is introduced to a set of strategies using real-life experiences from the classroom. Here, the empirical analysis from the sociological study comes into play. For example, four strategies that the teacher in the sociological study used to plan classes are described. These are adapted into the main learning content and are presented as short texts and videos.

The second week contains five subsections and 17 steps, which all are defined by particular learning goals. The learning content is displayed in Table 4. However, the design solution when adapting the knowledge from the research case study was to present the strategies as four specific subsections which explain the strategies as methods other teachers can use in their classroom practice. First, the learner is introduced to a strategy for staying updated on new technologies and given suggestions for composing a digital toolkit suited to classroom practice. Second, the learner is introduced to node-mapping, a strategy for charting students' pattern of using digital technologies. Third, the learner is introduced to a theme approach, which is a different way of operationalizing learning goals from the curriculum, and ways to embed digital technologies. Fourth, the learner is presented with examples of how to embed and organize different digital technologies into learning activities.

The third week follows the same design solution as the previous week. The main learning goal is to introduce the learner to the third perspective on digitalization, which is reflected in the title "Enacting digital transformation". The learning goal is to focus on factors that influence teaching when starting to use digital technologies for learning. Therefore, the goal is to raise awareness of the fact that although a teacher may prepare well in advance, the use of technologies can turn out differently than expected when a plan is set in practice. Again, the objective is to draw parallels to conditions surfacing in technology implementation processes. For example, such processes are difficult to control or predict. Again, aspects from the sociological study's empirical analysis comes into play in the structuring of learning content and learning goals but it takes a different turn. For example, in the sociological study, Haugsbakken (2015) describes a process perspective and focuses on patterns that become routinized from the teacher's and students' recursive use of digital technologies. The original empirical analysis does not offer an analysis that makes it easy to adapt

to learning content that can be used by practitioners. Instead, the design solution was to formulate new strategies that educators can use and that support the learning goals defined for the third week.

Table 5: Week 3, “Enacting digital transformation”

Week 3	Activity title	Step	Step name
Enacting digital transformation	Enacting the digital classroom practice	3.1	Welcome to Week 3
		3.2	Enacting in the classroom
		3.3	Growth in processes
	Trust management	3.4	Establishing trust
		3.5	Success and flop of blog
		3.6	Share your experience
	Reflection-on-technology-in-practice	3.7	Reflect on your actions
		3.8	Situated changes
		3.9	Reflect by debriefing
		3.10	What did you learn?
	Emerging from enacting	3.11	Emergent practices
		3.12	Enacting the news round
	Supervision and self-organization	3.13	To be self-organized
		3.14	Share your experience
		3.15	Recap week 3
		3.16	Continuing the learning

In the third week, the learning content is also adapted into short texts and videos. The week consists of five subsections and 16 steps. The learning content is displayed in Table 5. The course design solution was to formulate four strategies which make up four of the five subsection. In short, the learner is introduced to how the teacher experienced the use of digital technologies and the various learning activities she initiated – strategies based on empirical analysis from the sociological study. These strategies are designed to help teachers predict and control the disruptive nature of digital technologies on classroom practice. First, one learns about how to establish trust in digital technologies. Second, the learner is presented with ways to use reflection as a method of making sense of the impact of digital technologies in a learning process. Third, one learns how to make sense of user patterns emerging from the use of digital technologies. Fourth, the learner is introduced to the benefits of using digital technologies in the classroom, such as making students more self-organized and giving teachers more time for providing feedback and supervising students.

Active learning design point 2: Recursive core theory-action-reflection model

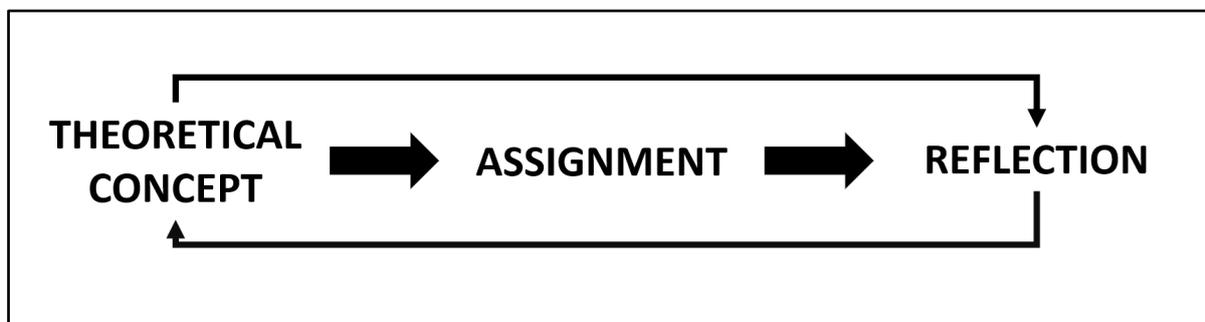


Figure 1. Recursive core theory-action-reflection model

The second active learning design point used was developing a “recursive core theory-action-reflection model”. This is displayed in Figure 1. The idea was to introduce a course design element

that sustains learner engagement in a self-directed learning process without the direct intervention of course instructors. A design solution was to devise a recurring pattern containing interlinked and logical learning activities that motivate learners to continuously seek active engagement – a design point used throughout the MOOC. In other words, learners always need something *to do*. That said, how do you design something to meet that requirement? The model is intended to keep learners 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 differently, however, this model is integrated in each subsection throughout the entire MOOC. In Figure 2, we see the use of the model in Week 2 (from Step 2.1 to 2.4) in a subsection about lesson planning. In Step 2.2 the learners read and are asked questions about how they normally plan their classes, while in Step 2.3 they read about what role digital technologies play in lesson planning. 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 2. Screenshot of a subsection in the MOOC

Active learning design point 3: Real-time challenge in use of digital technologies

The third active learning design point relates to teachers in a classroom setting delivering learning content as an authentic use of digital technologies. In this way, learners are introduced to first-hand challenges in the classroom. They are introduced to the sociological study's participant (the female, Norwegian high school teacher named Inger), who has tried out digital technologies in foreign-language training. In addition, designing the MOOC based on research from a single classroom practice and exploring that in depth, the learning goal is to create a greater symbolic connection between the learning material and the MOOC's target group of teachers. For that reason, Inger is presented as part of the MOOC's master narrative and features in the second and third week. Inger is presented in interview videos running through the MOOC and her perspective on teaching is explained by the course leader, Halvdan, who conducted the research. Inger is presented as a high school teacher of French, English, and Spanish, and as someone who has worked in the Norwegian high school system for decades. Inger has no formal training in computers but has used digital technologies in her classroom for many years. She is an early adopter of technologies and has

gained experience through a trial-and-error approach. In general, one learns that Inger's classroom practice faces similar challenges to those seen in implementation processes of technologies in organizations.

Active learning design point 4: The use of videos as learning objects

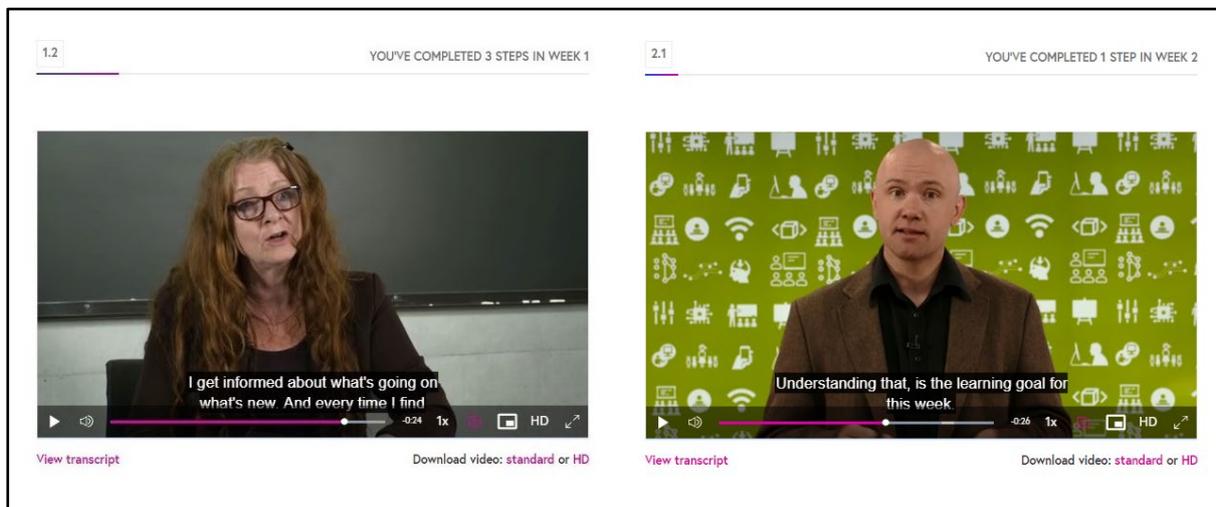


Figure 3. Use of videos in the MOOC

The fourth active learning design point applied to create engagement with the sociological study was the use of videos. Each video has a learning objective. The videos have either been made or embedded and are part of a larger learning context, meaning that they work in relation to other learning content in the MOOC. For example, a video is always added in relation to an article, a piece of text, or an assignment, and fitted within a relevant place in the course structure. Overall, the MOOC contains approximately 40 videos, 28 of which are produced by a professional video producer, the rest are embedded YouTube videos.

The videos are designed to create engagement among learners in three ways.

First, the MOOC uses videos for *instructional purposes*: to explain learning objectives, theoretical concepts, and research knowledge; and raise prompts for discussion. These are talking head videos where the course leader talks into the camera, and they are edited with pictures, illustrations, interviews, and other video elements. For example, some videos explain strategies for planning classroom practice by use of digital technologies. Talking head videos are used to explain the learning objectives for each week and ask questions intended for the discussion forum. All these videos were made and inspired by a film treatment approach used in film making. In this regard, a treatment for a video as a learning object is a short script describing the intended content of the video. For each video designed for instructional purposes a script was made containing suggestions for dialogue and illustrations. There were 18 instructional videos made, each between three and five minutes long.

Second, the MOOC contains *interview videos* with the teacher. The interview videos are made from a three-hour, semi-structured in-depth interview with the teacher covering various topics. Later, it was edited into eight interview videos that explore the teacher's experience with using digital technologies in learning. The interview videos are edited according to a three-point tell, meaning that each video interview explains three essential experiences related to a given topic. The three-point tell is an approach that condenses relevant citations from a long interview and makes them more coherent for the learner. For example, in one interview video the teacher explains a learning activity she designed called the news round; the video covers three topics related to this activity.

Third, the MOOC *reuses other learning objects* by embedding YouTube videos. YouTube videos include recorded lectures, animations, or instructional videos. The YouTube videos serve various learning purposes. Some are used to spark social interaction, while others are used to explain a theoretical concept. The MOOC contains 11 YouTube videos.

Active learning design point 5: Prompts for social learning activities

The fifth active learning design point relates to the use of prompts for online learning activities. The learning design of the learning activities is intended to engage and involve learners in the research knowledge and teaching practice of the teacher to enable and inspire them to use digital technologies in their classroom. In total, the xMOOC has 33 learning activities for generating engagement and uses two features: discussion questions and quizzes. The xMOOC has 27 discussion questions and five quizzes. The use of discussion questions follows a rigid structure throughout the xMOOC and is the main strategy for creating engagement among learners. The discussion questions are clearly marked on each page with “Have your say in the discussion”. The discussion questions are related to a text or video and invite learners to participate in a conversation and be part of a learning community that grows as the xMOOC progresses. Along with the quizzes, they function as formative assessment, allowing learners to validate their understanding of theoretical concepts.

Conclusion

Using MOOCs as a means for spreading knowledge is not a new concept and has been discussed as far back as the nineties. In addition, there are MOOCs on record that have used and adapted research when establishing pedagogies (see <https://www.futurelearn.com/courses/anthropology-social-media>). In fact, we can assume that many MOOCs are based on the adaption of previous learning materials. However, a challenge for MOOC designers is that the current research horizon suggests limitations in suggesting vague design strategies for high-quality MOOCs, especially in relation to adapting specific knowledge recourses into a MOOC pedagogy. In fact, current research offers few design tools, instead outlining general pedagogical frameworks. These give little insight in to how to put design principles into practice. The five design principles suggested in this paper are an effort to close that gap in the research literature. However, some strengths and limitations must be pointed out. The design principles are based on a sociological study and are specific to the embedded pedagogies of the FutureLearn platform, however, they can be applied to other research disciplines. If future course designers choose to apply the design principles, they must expect further adaptation work.

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 site 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 any real course leaders present. This aspect means limited feedback, but also that MOOCs seldom have real educators to supervise and organize online learning when the course takes place. Another challenge is that MOOCs suffer from an information-overload problem in the management of discussion forums. 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 MOOCs. A future focus should be on developing pedagogical strategies for effective online learning. Educators should create a professional identity that is *digitally present* and acquire concrete strategies for organizing online learning. Case studies show that when educators are authentically present during online courses, completion rates are higher (Engeness & Nohr, 2019).

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