

# A MOOC as part of a curriculum – The importance of instructional design<sup>2</sup>

## Abstract

A conventional five-week MOOC in English was integrated into a German-language Certificate of Advanced Studies (CAS) on “Innovations in Digital Learning” as an elective. Overall, the total number of students showed values in the medium to high range for the enjoyment of learning, and perceived learning success. Of the 23 CAS students, 70% received a certificate, compared to 13% of students not enrolled in the CAS. For many of the CAS students, the English-language videos were a challenge. In addition, there were shortcomings in the MOOC’s instructional design (e.g. instruction of the peer review tasks). The challenge for creating a successful integrated MOOC lies in the instructional design.

## Keywords

MOOC, integration in study programme, learner satisfaction, instructional design

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1 email: [egon.werlen@ffhs.ch](mailto:egon.werlen@ffhs.ch)

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## **Ein MOOC als Teil eines Lehrplans – Die Bedeutung der Unterrichtsgestaltung**

### **Zusammenfassung**

Ein konventioneller fünfwöchiger MOOC in englischer Sprache wurde in einen deutschsprachigen CAS “Innovations in Digital Learning” als Wahlfach integriert. Die Studierenden zeigten bei der Lernfreude und beim subjektiven Lernerfolg Werte in einem mittleren bis hohen Bereich. Von den 23 CAS-Studierenden erhielten 70 % ein Zertifikat, bei den nicht im CAS eingeschriebenen Studierenden waren es 13 %. Für viele der CAS-Studierenden waren die englisch gesprochenen Videos eine Herausforderung. Daneben gab es Mängel im Instruktionsdesign (z. B. bei der Instruktion der Peer-Review-Aufgaben). Die Herausforderung für die Schaffung eines erfolgreichen, integrierten MOOCs liegt beim Instruktionsdesign.

### **Schlüsselwörter**

MOOC, Integration in Studiengang, Zufriedenheit, Instruktionsdesign

## **1 Introduction: MOOCs in higher education**

Massive Open Online Course (MOOC) is a learning format that in most cases belongs to the Open Educational Resources (OER). UNESCO describes OER as freely accessible, cost-free teaching and learning materials (STRACKE et al., 2019, p. 332). A MOOC is an open access online course with a potentially massive number of participants. STRACKE et al. (2019, p. 335) describe its four criteria: A MOOC is “massive” if it has at least 150 participants. The term “open” is highly controversial, as open can mean free of charge, free access, or free licensing. With few exceptions, MOOCs are all conducted “online”. Today, “course” means that the learning activities are embedded in a defined time frame, usually between five and eight weeks.

MOOCs have been discussed as a “disruptive innovation” (KIRCHNER & LEMKE, 2019) that is radically changing the landscape of higher education. They provide a low threshold offer for education and training without the need to complete it. “The potential and challenges of MOOCs at universities” was one of four topics ZAWAC-

KI-RICHTER et al. (2018, p. 248) were able to extract from 362 academic articles on MOOCs. The potential of MOOCs, they argue, lies in facilitating access to good quality higher education, e.g., by building learning communities and reducing tuition fees. Following ZAWACKI-RICHTER et al. (2018, p. 248), MOOCs provide an opportunity for innovative instructional design to promote self-directed learning. This gives students the chance to design their learning more flexibly, as they can acquire knowledge anywhere and at any time, depending on the curricular concept (WONG et al., 2019). According to DE LIMA GUEDES (2020, p. 34), the most important reason of incorporating MOOCs into a (classical face-to-face) curriculum is “giving students a platform to engage in global communities and international conversations”.

In the landscape of higher education, MOOCs are an optimal opportunity to make selected areas of knowledge available to a large audience. However, creating a good quality MOOC is usually even more time-consuming than creating curricular online courses. Therefore, integrating a MOOC into an existing curriculum suggests itself. Such a MOOC is used twofold: 1) to reach a large audience, and 2) for students enrolled in a curriculum. The latter have the advantage that the lecturer has easier and more possibilities to shape the content of the MOOC and directly support the students. MOOCs, like all learning formats, have their challenges and known problems. Examples include high dropout and low completion rates, authentication problems and cheating, as well as adequate support for students (ZAWACKI-RICHTER et al. (2018). According to CONOLE (2015), these problems can be counteracted with a good MOOC design. But it is precisely the conception of a motivating instructional design that presents a challenge (e.g., TOPALI et al., 2019).

MOOCs can be used in different ways in higher education teaching. EBNER et al. (2019) show seven types of teaching and learning scenarios. These differ, among other things, in the inclusion and didactic significance of attendance phases and offerings, the accompanying use of a learning management system, or the forms of examination. Ultimately, such types can be combined and further application scenarios for MOOCs are possible. For a successful integration of MOOCs, it is important to clarify and focus on the goal and the framework conditions of the integration, and to choose an appropriate form of use. The following is a description of the deployment scenario this study is based on.

## 2 Integration of a MOOC in higher education teaching

The MOOC “Basics of Adaptive Learning” – hosted by Swiss MOOC Service (<https://www.swissmooc.ch/>) – was integrated into the curriculum of the Certificate of Advanced Studies “Innovations in Digital Learning” (CAS IDL) at the Swiss Distance University of Applied Sciences (FFHS) for the first time in the autumn semester 2021. This CAS is a part-time continuing educational course worth 10 ECTS credits and lasts 20 weeks. The CAS IDL is aimed at people who are involved in digital learning and its innovations. It is conducted in a blended learning format, with around 90 percent of the entire course taking place in asynchronous, guided online study on Moodle. The remaining 10 percent are teaching that takes place on-site (day workshops) and online (webinars and office hours).

This MOOC was embedded in its completely regular form as an independent and self-contained module (1 ECTS, approx. 25–30 h) in the CAS. The CAS students attended the MOOC in weeks 13 to 17 of their programme. Deviating from the other MOOC participants, the CAS students had an optional consultation hour in the last week of the MOOC to clarify questions and discuss further aspects of the topic. The CAS IDL contains compulsory and optional services. The MOOC was an elective and students could count their final assessment from the MOOC as a partial grade towards their overall CAS grade. A final MOOC score of 67 percent or more corresponded to a sufficient CAS sub-grade.

Due to its independence from the other modules of the CAS IDL, the use of the MOOC corresponds in principle to the type of “conventional MOOC” mentioned by EBNER et al. (2019). This type of MOOC has a defined start and end date, a large scope, offers opportunities for online tutoring and exchange in the forum, as well as optional completion through an assessed examination.

The intention for integrating this MOOC into the CAS was not to digitise or make university teaching more flexible, since the CAS as such already had a very high digital content due to its blended learning format and offered great flexibility. Rather, the aim was to retain the innovative theme of adaptive learning, and to offer it in a different format. The idea behind this is to provide CAS students an experience with another relatively modern, digital form of learning in line with the CAS topic’ of

“Innovations in digital learning” and in contrast to face-to-face teaching and closed online learning. Through the appropriate integration of the MOOC, the variation of teaching formats could be further increased for the students. In addition to working on the primary learning objectives, the CAS students were given the opportunity a) to familiarise themselves with the MOOC format, b) to connect and exchange with a larger learning community beyond their own class boundaries, and c) to experience learning with rather small learning units compared to the learning units of other CAS modules, i.e., a kind of “microlearning”.

To check whether we achieved these goals by integrating our MOOC into the CAS and generally how well the MOOC was received by students, we conducted an evaluation of the MOOC to answer the following questions:

- Was the integration of the MOOC into a CAS successful?
- Was the first implementation of the MOOC successful?

### **3 Realisation of the MOOC and method of evaluation**

The MOOC started with an introduction to personalised and adaptive learning with definitions of adaptation, adaptability and the concepts of domain model, learner model and adaptive model. It also introduced didactic aspects of adaptive instructional design, theories of adaptation, what is adapted and the degree of control by the learner or the system. The course concluded with the content and reflections on ethical concerns, the pitfalls, and the future of adaptive learning.

The MOOC included adaptive elements itself to support learning and demonstrate the concepts explained in the course. The content was hosted on the Open edX platform. Due to technical constraints of Open edX, the adaptive elements were implemented in the LMS Moodle and embedded in Open edX. Learners accessed the adaptive elements such as interactive videos and constrained tasks (tasks that became available when the previous task was completed) via Learning Tools Interoperability (LTI) without the need for additional authentication. The use of two

platforms offered additional features but had drawbacks in terms of course design and implementation (e.g., synchronisation of grades or log analysis).

At the end of each week, there were graded short tests and peer-reviewed assignments. Some of these tests were automatically graded and learners received immediate feedback based on their choices. In addition, there were two peer-reviewed assignments where learners received their grade based on the assessment of at least two fellow students on the content and quality of their answer. There was also one self-assessed task and one with feedback from the lecturer. The results of the different short tests and tasks were averaged per week and calculated with different weighting for the final grade.

The graded tasks at the end of each week were followed by four questions to assess the week. After the questions on subjective learning success and learning satisfaction, there were two open questions, one for suggestions for improvement and one for general comments. Learning success and learning satisfaction were assessed on a three-point scale (no, maybe, yes). Participants mostly took part in the weekly evaluation only if they had learnt and done the graded tasks during the week.

At the end of the MOOC, participants were again asked about their general subjective learning success and learning satisfaction. Three further questions concerned recommendation for the MOOC, the fulfilment of expectations, and whether the students would pay for a certificate. These questions were answered on a five-point Likert scale (not at all = 1; very much = 5). This was followed by three open-ended questions on desired course content, improvements, and general comments.

The first author categorised all responses to the open-ended questions at the end of each week and the final survey according to their content. A total of 195 responses were given. Since some responses contained several statements, a total of 242 statements was collected.

The values for students' attendance and participation as well as their activities on the learning platform Open edX were extracted after completion of the MOOC.

## 4 Results of the evaluation

To answer the first question, i.e., whether the integration of the MOOC into the CAS was successful, we consulted two sources of data. First, we looked at how long the CAS students stayed in the MOOC compared to non-CAS students, and whether they received a MOOC certificate. The second source of data are statements in the weekly feedback and the final evaluation that relate to the integration of the MOOC into the CAS.

Compared to the non-CAS students who finished the MOOC (16%), most CAS students worked through the MOOC to the end of the fifth week (78%). The certificate was awarded to 70% of the registered CAS students and to 13% of the non-CAS students (Table 1).

Table 1: Participants in the MOOC separated by CAS and non-CAS students

	Enrolled	Started	Week 1	Week 2	Week 3	Week 4	Week 5	Certif.
CAS	23	19	19	19	18	18	18	16
	100%	83%	83%	83%	78%	78%	78%	70%
non-CAS	113	38	30	25	30	26	18	15
	100%	34%	27%	22%	27%	23%	16%	13%

Note: The numbers of week 1 to 5 indicate students who completed at least one assessed activity. Certif. = Certificate

A log data analysis showed that participation in the MOOC was always above 80% for students who received a certificate, both for CAS and non-CAS students (Figure 1). For the students who did not receive a certificate, participation in the MOOC is slightly more differentiated. The seven CAS students without certificate all participated in the MOOC in the first week, in the second week there were still four (57%), and after that only one or two students participated per week. Participation thus declined sharply over time. For non-CAS students without certificate ( $n=76$ ), there was also a decreasing trend, but participation was already very low at the beginning (33%) and dropped to 12% in the fifth week.

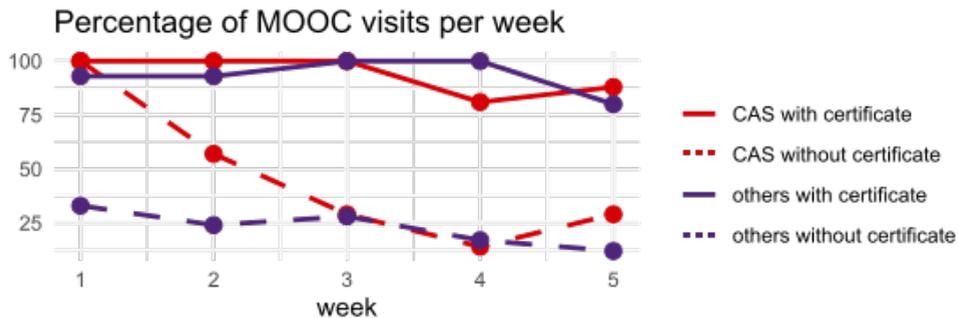


Fig. 1: Percentage of MOOC visits, i.e., active students per week.

There were only three comments from CAS students that were recognisable as such and can be related to the MOOC as an elective module of the CAS IDL. The few contributions expressed a) that knowledge and skills taught in the CAS were not applied in the MOOC, b) that tasks with peer feedback are challenging and should only be given to CAS students, and c) that it is “exciting” to get to know a learning platform other than Moodle.

Of the categorised feedback (Table 2), the categories “English poorly understood” and “Transcripts to the videos desired” are particularly relevant in relation to the integration of the MOOC into the CAS. The instructional language for students in the CAS was German, and not all students were proficient in English on a university level. This led to some difficulty understanding the videos, especially for lecturers with a pronounced accent. Therefore, there was often a request for a transcription of the videos and in some cases for a translation into German (subtitles or transcript).

In the context of comparing the two groups of students, it is useful to clarify whether students not enrolled in the CAS also had external commitments to participate in the MOOC. The participants of the CAS completed the MOOC as part of a curriculum. This was assessed in a short questionnaire on motivations and expectations regarding the MOOC at the beginning of the first week. Fifteen of the 19 CAS students (79%) who started the MOOC completed the questionnaire; for non-CAS students, 33 of 38 (87%) did so. For non-CAS students, the main motivations were further education and personal training / interest, motivations that were also important for the

CAS students. The expectations of both groups were mainly to gain new knowledge and to learn with others. For CAS students, the expectation “to help my company on e-learning” was considerably higher (60%) than for other students (33%). The biggest difference, however, was found in the fact that one third of CAS students said they were learning to get credits and/or to prerequisites for an academic programme. This was not the case for any of the non-CAS students. This indicates that for the non-CAS students’ external commitments were no reason for participating in the MOOC.

The second question i.e., whether the implementation of the MOOC was successful, can be answered with the data of the evaluation at the end of each week and the final evaluation. Overall, the various student feedbacks indicate a medium to high level of satisfaction with the MOOC (Figure 2). The students’ enjoyment of learning and their self-assessed learning success show greater fluctuations over the five weeks. Both values are highest after the first week (learning enjoyment: 91%; learning success: 83%) and then decrease until the third week (67%; 62%). In the remaining weeks, both values are around 75% with small fluctuations. These values are also reflected in the students’ comments on the open questions. Of the 29 explicitly positive responses, 13 were given at the end of the first week. Most negative comments were made in weeks two and three. After week two, students reported problems with the assessed tasks. This concerned 17 of all 38 negative comments on the assessed tests and assignments. The students mainly criticised that the assignment did not match the peer assessment instruction. At the end of the third week, a considerable number of students (11 statements) complained that they had issues understanding the videos due to the speakers’ accents. In total, this point was raised 38 times.

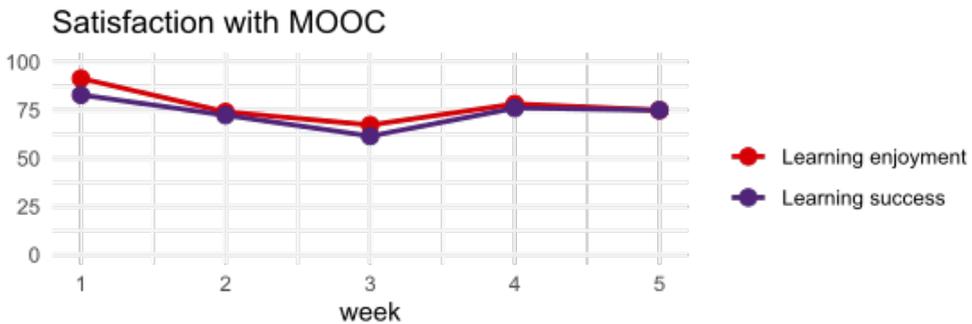


Fig. 2: Satisfaction with the MOOC (learning enjoyment, subjective learner success) over the five weeks (percentages of weighted responses: “Yes” = 1; “Maybe” = 0.5; “No” = 0)

It is also interesting to compare the averages of the results of the assessed activities (quizzes, assignments) over the five weeks with the satisfaction of the MOOC. All students who completed at least one assessed activity in the corresponding week were considered (see Table 1). The following averages in percentage of correct answers were obtained: Week 1: 91%, Week 2: 78%, Week 3: 82%, Week 4: 72%, Week 5: 76%. It is noticeable that, except for week three, the measured learning success is very close to the one assessed by the students.

In the final evaluation, the indication of subjective learning success was 3.5 (on a scale of 1 to 5), and the learning enjoyment was 3.16 (Figure 3). When asked if students' expectations were met, the score was 3.0 and when asked if they would recommend the MOOC to others, the score was 2.95. The lowest score resulted from the question if they would pay for the MOOC, at 2.32. Apart from this value, all were at the level of 66% of the scale or above.

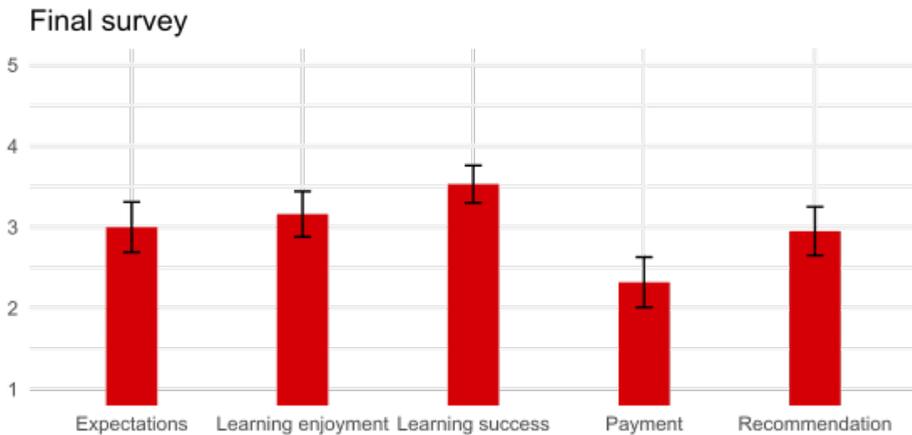


Fig. 3: Final evaluation of the MOOC

The categorisation of the comments in Table 2 shows: Half of all comments were negative, a quarter was positive, and the final quarter concerned wishes and suggestions for changing or improving the MOOC. This applies to all comments taken together and to the comments in the final evaluation only. If the positive and negative comments distributed over the weeks are compared, week 1 also stands out with 68% positive and only 32% negative comments. In the other weeks, the negative comments predominate with over 71% (week 2) to 81% (week 3) and thus correspond to the lower values of satisfaction (learning success, learning enjoyment) in weeks two and three.

Table 2: Categorisation of feedback from MOOC participants

	Survey						
	All	End	Week 1	Week 2	Week 3	Week 4	Week 5
<b>Positive feedback</b>							
Positive feedback (general)	29	7	13	3	2	2	2
Thank you	12	5	3	3	0	0	1
Moderate feedback	2	1	0	1	0	0	0
No comment (explicit)	21	0	5	8	4	3	1
<b>Negative feedback</b>							
Problems with quizzes	38	7	5	17	4	2	3
English difficult to understand	27	7	0	4	11	3	2
Technical problems	15	4	1	2	5	3	0
Poor implementation	14	3	2	2	2	4	1
Communication/deadlines	8	0	0	5	2	1	0
Criticism/problems of videos	6	0	0	5	0	1	1
Criticism of content	5	1	1	0	1	1	1
Data security/ethical aspects	5	1	0	1	0	0	3
Lecturers are nervous/tense	3	0	1	1	0	1	0
<b>Wishes and suggestions</b>							
Transcripts for the videos desired	25	2	8	4	6	0	5
Adaptive learning elements desired	9	3	2	1	1	1	1
New ideas for MOOC	7	1	2	2	1	0	1
Adaptive examples desired	5	3	1	0	0	1	0
More practice, less theory desired	5	0	0	2	2	1	0
New topic suggestions for MOOC	3	3	0	0	0	0	0
Literature lists desired	3	1	1	1	0	0	0

The positive feedback praised individual parts, the whole course or simply say “thank you”. Some of the students stated that they had no specific feedback and, for example, answered the question of whether they had any suggestions for change with a simple “no”.

The negative feedback mainly concerned various problems with the assessed short tests and peer review tasks, “poorly understandable” English and, less frequently, technical problems and remarks about poor implementation. There was also criticism regarding communication, videos, and content.

In line with the language difficulties, by far the most common request was for transcripts or subtitles to accompany the videos. In addition, there were several suggestions to make the MOOC itself more adaptive and to show more adaptive examples.

## 5 Discussion

Overall, the MOOC on adaptive learning received a good rating in the weekly and the final evaluation with a low in the second and especially the third week due to problems in the short tests (week 2) and the videos (week 3). The CAS students rarely commented on the integration of the MOOC into the CAS. Nevertheless, it can be seen from the comments in the evaluation that most German speaking CAS students would like to see a transcription and/or a translation of the videos.

The completion rate (certificate) among students not enrolled in the CAS was 13%, which is in the range or slightly higher than reported for MOOCs (e.g., AYDIN, 2018; GOMEZ-ZERMENO et al., 2016; JORDAN, 2015). The much higher completion rate of CAS students (at 70%) is to be expected due to the integration of the MOOC into a course. The students’ motivation to complete the MOOC is linked to the course and the formal qualification they are aiming for. Regarding the drop-out rate, it must be said that there is no clear definition (GOOPIE & CHEUNG, 2021) of what drop-out means in MOOCs. The reason for this is that many learners have no intention of completing the MOOC, but only want to learn individual content, for example. This is also indicated by the proportion of student participation over the five weeks. The proportion of non-CAS students was very low over all five weeks. The CAS students who did not complete the MOOC were still on the MOOC in the

first and partly in the second week, and only in weeks three to five was the proportion very low. We interpret this that their intention to complete the MOOC was apparently still present at the beginning and only with time was the goal of completing the MOOC abandoned.

Satisfaction with the MOOC, measured with learning enjoyment and subjective learning success, is around 60% or higher, except for week 3. This is in the range of KHALIL and EBNER's (2013) value of 65% satisfaction. The subjectively assessed learning success is very close to the objective learning success, i.e., the results of the assessed tasks. Only the objective learning success in the third week deviates from this. At 82%, it is significantly higher than the subjective learning success at 62%. The higher performance despite lower assessed learning success and learning enjoyment is an indication that the lower satisfaction was linked to problems with the instructional design rather than the content (e.g., difficulty) in week 3.

Compared to the values in the final evaluation, which are around 3 (scale 1 to 5), the values in the review by HEW et al. (2020) were clearly higher at 4.7 (1 to 5 stars). That the first realisation of the MOOC needs improvement is also evidenced by the comments in the open questions (50% negative). Among the constructive feedback, many statements concerned the instructional design (e.g., regarding short tests) and the language (comprehensibility of the English videos). These two points are also described by GOOPIO and CHEUNG (2021) as frequent problems in MOOCs. Language has been a point of criticism, especially among the mostly German-speaking CAS students. Thus, a lot of emphasis should be placed on instructional design when building a MOOC, as also reported by TOBALI et al. (2019) in relation to increasing student motivation.

The most important points that need to be improved in the didactic design concern part of the short tests and peer review tasks as well as the English-language videos. The language skills of the students in the curriculum must be respected and considered in the MOOC, e.g., through subtitles in English and German. Grade-relevant tests and assignments must meet minimum standards and generally the quality of the learning materials (videos, quizzes, texts, etc.) should correspond to the course. This is easier to achieve with MOOCs created in-house, i.e., by one's own university offering the course.

The integration of the MOOC has emerged from practice, which means that many didactic decisions were already dictated by the circumstances. However, some points were given special attention and should be considered when integrating a MOOC into an existing curriculum. Importantly, the MOOC should function as a stand-alone course for a globally interested audience and still fit into the curriculum. A reference to the MOOC should therefore be made in the CAS (e.g., webinar or seminar). For our CAS students, a webinar was included in the fifth week. Grading must be clarified (e.g., passing the MOOC is relevant for the course; or attending the MOOC is considered a pass for the course). Accordingly, the achievement in the MOOC must be converted into the corresponding grading system for the CAS and included in the overall grade. The MOOC's grading (percentages correct) was consequently converted to the CAS grading (Swiss grading scale). The time alignment and time required for the MOOC must be appropriate to the requirements of the course. Thus, our MOOC with 25 hours estimated working time met the specifications for its ETCS value in the CAS (1 ETCS) and the start and end points were coordinated within the CAS. To get more concrete feedback on the success of the integration, it would have been useful to ask the CAS students about the integration of the MOOC into the CAS IDL.

The results of the evaluation and the feedback from the students motivated us to offer the MOOC again in the following year (2022). As mentioned above, some points had to be revised. We corrected inconsistencies and inaccurate instructions in the tests and tasks, improved the texts in the introductions and summaries of each week, and created subtitles in German and English for the videos. Subtitles could not be added for the interactive videos, so we provided PDFs with transcriptions in German and English. As one video in week three was often very poorly understood, we revised and re-recorded it with a new lecturer. Furthermore, we removed two videos we judged as less relevant.

In addition to existing research on the integration of MOOCs into higher education, (e.g., DE LIMA GUEDES, 2020; FAIR et al., 2017; ANDONE et al., 2015), further research on the interaction between CAS students and non-CAS students and the promotion of this interaction is important to be able to promote this aspect. In ANDONE et al. (2015, p. 74), the pedagogical advantages of integrating a MOOC into a curriculum were “Self-paced/active learning”, “Retrieval learning gamification”, “Peer-assessment, assuming objectivity and responsibility”, “Participation in

global communication, instant feedback training”, and “Skills for continuing and for learning autonomy, self-assessment of learning objectives”. These advantages were at least partly relevant in our curriculum.

All in all, we succeeded in integrating our own MOOC into the existing CAS. However, the first run showed that the instructional design needs to be well thought out and implemented. In this case, this mainly concerned general and test instructions, comprehensibility of the videos, and their quality.

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## Authors



Prof. Dr. Egon WERLEN || Fernfachhochschule Schweiz – FFHS, Institut für Fernstudien- und eLearningforschung – IFeL, UNESCO-Lehrstuhl für personalisiertes und adaptives Fernstudium || Schinerstrasse 18, CH-3900 Brig-Glis

<https://www.researchgate.net/profile/Egon-Werlen>

[egon.werlen@ffhs.ch](mailto:egon.werlen@ffhs.ch)



Dr. Tansu PANCAR || Fernfachhochschule Schweiz – FFHS,  
Institut für Fernstudien- und eLearningforschung – IFeL,  
UNESCO-Lehrstuhl für personalisiertes und adaptives Fernstu-  
dium || Schinerstrasse 18, CH-3900 Brig-Glis

<https://www.researchgate.net/profile/Tansu-Pancar>

[tansu.pancar@ffhs.ch](mailto:tansu.pancar@ffhs.ch)



Marc GARBELY || Fernfachhochschule Schweiz – FFHS, || De-  
partement eDidactics, Learning Center || Schinerstrasse 18,  
CH-3900 Brig-Glis

<https://www.researchgate.net/profile/Marc-Garbely>

[marc.garbely@ffhs.ch](mailto:marc.garbely@ffhs.ch)