From Learners to Educators
Development of Online Courses by Students for Students

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Abstract

The rapid growth of technology and its evolving potential to support the transformation of teaching and learning in post-secondary institutions is a major challenge to the basic understanding of both the university and the communities it serves. In higher education, the standard forms of learning and teaching are increasingly being challenged and a more comprehensive process of differentiation is taking place. Student-centered teaching methods are becoming increasingly important in course design and the role of the lecturer is changing from the knowledge mediator to moderator and learning companion. However, this is accelerating the need for strategically planned faculty support and a reassessment of the role of teaching and learning. Even though the benefits of experience-based learning approaches for the development of life skills are well known, most knowledge transfer is still realized through lectures in higher education. Teachers have the goal to design the curriculum, new assignments, and share insights into evolving pedagogy. Student engagement could be the most important factor in the learning success of university students, regardless of the university program or teaching format. Against this background, this article presents the development, application, and initial findings of an innovative learning concept. In this concept, students are allowed to deal with a scientific topic, but instead of a presentation and a written elaboration, their examination consists of developing an online course in terms of content, didactics, and concept to implement it in a learning environment, which is state of the art. The online courses include both self-created teaching material and interactive tasks. The courses are created to be available to other students as learning material after a review process and are thus incorporated into the curriculum.

Keywords: *future curriculum, digitalization, online courses, COVID-19*

1. Introduction

Against the background of digitization and for decades, new educational technologies have been in development, and the need for new pedagogical concepts and teaching methods has been discussed. However, they remain rather isolated, individually driven closed solutions, and have not yet had the promised transformative effect on the education sector, as they did not become necessary until now. During the 2020 COVID-19 crisis, the need became a reality overnight. Universities all over the world were placed in a situation that made offline teaching impossible. Besides all the negative effects that the COVID-19 crisis has brought with, it can also be seen as an opportunity to recognize one's limits in terms of digital education and to gain experience.

This paper aims to present an innovative learning method for universities, which plays a special role in the context of digitization: By developing online learning courses as a learning output, students are involved in the creation and delivery of teaching content, which can lead to curriculum change. At the same time, the application of the new learning method leads to students acquiring the necessary skills of the future and thus being prepared for living and working in a digital world.

The current COVID-19 crisis has shown how important such competencies are, so the paper aims to show how students can become part of the education at the university. The development of the courses via Moodle is a free, interactive, and easy to be applied. With the plugin H5P [1], that can be used as a plugin since 2016, students can choose of 20 different interactive learning formats (educational videos, interactive presentations, knowledge retrieval using flashcards, etc) and to motivate them to actively participate, as in the case described here.

In this paper, the current developments and challenges of university education are briefly described, followed by a presentation of the framework for the application of methods, the concept of creating online learning courses, and the evaluation criteria for a structured review process. In conclusion, the paper provides an overview of the challenges and next steps.

2. The current challenges of higher education

In higher education, teaching does not only concern the objective of conveying and assessing specific learning content. Rather, students should also be prepared for their professional future by acquiring a wide range of competences - subject-related (representing knowledge and know-how in a specific field), behavioral and social competences and other so-called future competences, such as the four Cs: communication, cooperation, critical thinking, and creativity, which are part of the general objectives at the global level (e.g. [2]). From the perspective of students' future employers, skills such as developing new concepts and ideas and the willingness to present one's ideas and challenge the ideas of others, as well as attention to opportunities, coordination of activities, acquisition of new knowledge and media literacy were identified as the most important ones, not only in the context of innovation [3]. Digitalization is an accelerator of demand for these skills and a more comprehensive process of differentiation is taking place in higher education, where the standard forms of learning and teaching are increasingly being challenged. This leads to a shift from instructive learning, e.g. in the form of lectures, to experiential learning in which students take an active role in the learning process and teachers act more as learning facilitators and instructors. Even though the benefits of experience-based learning approaches for the development of life skills are well known, most knowledge transfer is still realized through lectures in higher education [4].

3. Framework and goals of the innovative teaching concept

Against this background, this paper presents an innovative teaching concept, which has been introduced and tested in Germany. Students deal with a scientific topic, but instead of a presentation and a written elaboration at the end of the semester, their exams consist of developing an online course in terms of content, didactics, and concept and realize it in the learning platform Moodle. The online courses include both self-created teaching material and interactive quizzes. Students are placed at the center of knowledge transfer. This allows them to show how a topic should be prepared and conveyed. Besides, students also get to know the limits of online courses and learn to critically reflect on how their broad knowledge on the topic, that was collected during the semester could be best summarized and transmitted. In doing so, the students have to particularly reflect on their knowledge to be able to pass it on in the form of an online course. Furthermore, students develop new necessary digital and learning skills. On the one hand, during the preparation phase, they deal with the selected scientific topic in great depth and learn not only to understand the content, but also to convey it in a focused and expert manner. Students deal with didactic concepts and learn through a practical application on how to handle a digital learning medium. Also, they receive feedback from other students and have the opportunity to use it for a reflection of their work.
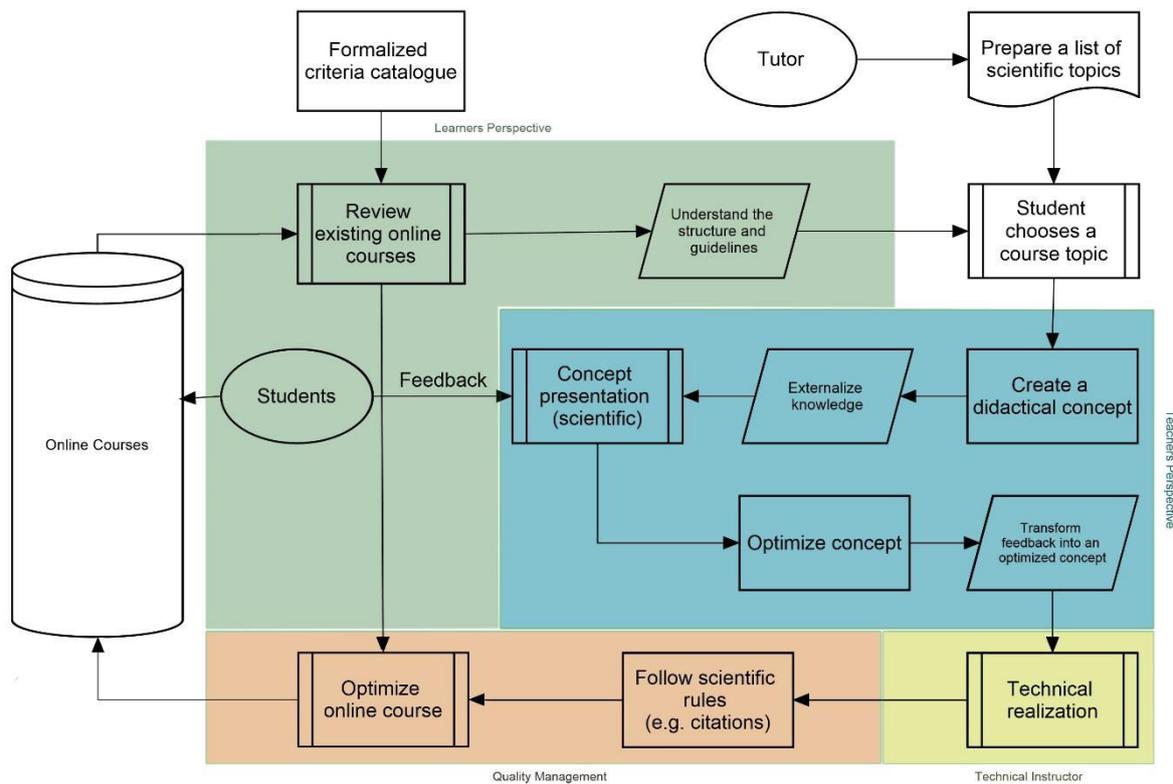
Fig1: Framework for creating online courses by students in a seminar

4. Concept to create online courses in a seminar

Before starting to create a new online course, students have to participate in several already existing courses (at least two) to evaluate them. Therefore, a general guideline was prepared that includes context-based and technical-based restrictions, and recommendations, including notes to consider copyright issues. In that step, they participate in existing courses from the student's perspective to learn critical thinking and how to give constructive feedback. Besides, they get in touch with the guidelines that also have to be followed by them. Detailed notes about the evaluation criteria can be found in the next section.

The tutor of the seminar prepares a list of scientific topics, similar to a usual seminar where students have to write a seminar paper. Students can choose one topic or propose their own. Then students change their perspective, from the students one to a teacher's perspective. In that step, students have to think about how to pre-process the knowledge and how to externalize it to teach the topic. This step is comparable with the preparation of a lecture in class. At the same time, students must be aware of a few limitations that occur due to missing face-to-face communication in an online environment. They have to choose an appropriate didactical concept that works best to teach their topic to students. This concept has to be shown in a local 15min presentation to get feedback from other students, that evaluated other already existing courses before as well. In that presentation, students have to follow classic scientific rules to present scientific contents that are state of the art including giving references. After getting feedback, students can optimize their concept. Then they change their perspective again to a technical instructor. In that step, students have to create their new online courses on the platform. There they have to deal with technical limitations but also use opportunities in creating interactive tasks. Students learn how to transfer their concepts to a technical environment. This is what they do not learn in their curriculum in general. In this seminar, the learn it by doing.

After the creation of the online course, students have to check whether all scientific rules are followed (e.g. citations) according to the guidelines. Similar to a seminar paper, created online courses should not contain any plagiarism and the validity of taught knowledge has to be proven by giving references. This is important to obtain valid online courses and to meet high-quality standards. The created course

will be reviewed by other students afterward and the student (or others) can optimize the online course again.

5. Evaluation criteria of the review process

In the review process, students have to evaluate online courses on different layers according to the evaluation criteria. This includes different objective metrics (details can be found in Table 1). The review process is an important step to get online courses at high-quality. Online courses that reach a high score will be published later. As students can use their online course as their reference in the future, this is a motivation to be allowed to publish it. Otherwise, it remains hidden.

Objective metrics	Description
Novelty of the overall course	Is the course new or is the topic already taught a lot in online courses?
Completeness	Does the online course include all necessary parts like the introduction, knowledge requirements, a final summary, references, and related material? Does a section have at least 2 items?
Technical implementation	Are there display errors? Are videos embedded properly [not just links]?
Scalability	Can tasks be corrected automatically and do not necessarily need to be corrected by a tutor?
Copyright rules followed?	The idea is to publish online courses. Therefore, the use of own media or media under a creative commons license (CC) is necessary.
Course duration	15min, not more, not less

Didactical metrics	Description
Media-Mix	Are different methodologies used to teach and test knowledge? A broad variety of concepts, not only multiple-choice questions should be used.
Feedback	Do interactive tasks give feedback on correct and incorrect answers?
Visualization methods	Does used images support in understanding the contents?
Different Difficulty Levels	Are different difficulty levels in interactive tasks and the final test according to Bloom's Taxonomy [5] are used? Tasks should not be too easy and not too difficult.

Context metrics	Description
Correctness of contents	All information should be correct with given references.
Correctness of the course title	The title should not be a "fancy" teaser, it should be descriptive enough to describe what the course is about.
Selection of examples	Is the example selection good? Are there other examples that support the understanding in a better way?
Appropriateness of contents	Is the content appropriate for the target group (e.g. students at university)?
Independency of sections	Is the course structured, are sections independent, or should they be merged?

Table 1: Evaluation criteria for online courses

5. Conclusion

The application of the method and the creation of online courses open up a new opportunity for students to critically reflect on processes of knowledge transfer in the digital society and to get to know their chances and limits. Also, a change of perspective takes place, which contributes to a better understanding of the teaching process and the challenges facing teachers. The innovative concept presented opens up many opportunities for research on the topic of digitization of teaching at universities. There is also the potential for a transfer to the academic community and for initiating new research and application-oriented projects in the context of digital education and Learning Analytics.

During the first experiences, some aspects have emerged as points of discussion. The question arises whether the versatile possibilities that H5P offers students are not only positive but also overwhelming. Additionally, some students do not have such well-developed digital skills. Besides, we are currently reviewing whether the metrics and criteria for the review process are sufficient and whether subjective characteristics of the reviewers, emotional aspects, previous knowledge, experience, etc. also need to be taken into account. Concerning the application of the method, a dependency on the institutional framework, culture and framework conditions, especially for the evaluation and grading at the university must be taken into account.

Two characteristics of the created courses are particularly positive - on the one hand, the possibility to not only create texts and videos and to query content (which is common in online courses), but also to create interactive elements instead of creating multiple-choice tests only. Their application stimulates other senses and increases the learning effect. On the other hand, certain cultural barriers are reduced because students receive learning content that has been prepared by their subgroup.

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