

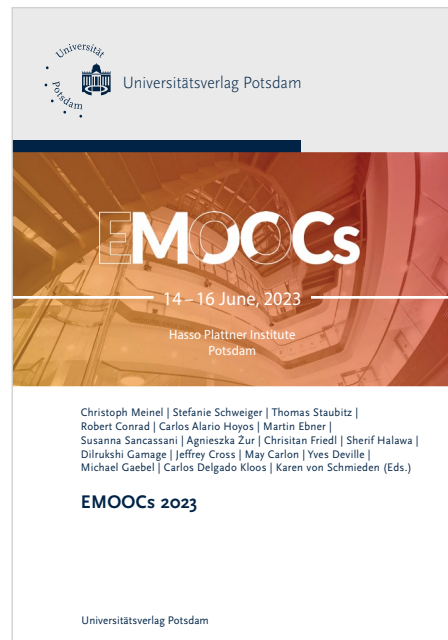
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# Modularization of Open Online Courses on the eGov-Campus Prospects and Challenges

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Modularization describes the transformation of MOOCs from a comprehensive academic course format into smaller, more manageable learning offerings. It can be seen as one of the prerequisites for the successful implementation of MOOC-based micro-credentials in professional education and training. This short paper reports on the development and application of a modularization framework for Open Online Courses. Using the example of eGov-Campus, a German MOOC provider for the public sector linked to both academia and formal professional development, the structural specifications for modularized MOOC offerings and a methodology for course transformation as well as associated challenges in technology, organization and educational design are outlined. Following on from this, future prospects are discussed under the headings of individualization, certification and integration.

## 1 Introduction

More than a decade after inception, Massive Open Online Courses (MOOCs) have become an important element both for academic degree and professional certificate programs [7], blurring the boundaries between these formerly separate spheres [9]. In fact, MOOCs have become a viable alternative for corporate training and professional development [3, 5]. Considering that factors such as high dropout rates or instructional quality remain central to MOOC research [2], there seems to be room for improvements in MOOC design. In line with trends like microlearning instruction [13], mobile microlearning with MOOCs [1] and the shift towards micro-credentials [6], transforming MOOCs from an academic course format into

smaller learning offerings in the sense of “mini-MOOCs” [11] seems to be a coherent alternative, both for learning design and organizational reasons. While some effects of a “modularization” of open online courses on learner behavior have been researched [10], there is still no clear methodology on how to achieve such a transformation. Therefore, this short paper reports on the experiences from a transformation and re-design project with a MOOC provider in Germany linked to both academia and formal professional development. Based on the overarching question, “how can MOOCs be meaningfully transformed into more manageable units?”, we present a modularization framework with its structural specifications and a reference model for implementation. Subsequently, future prospects as well as organizational, technical and educational design related challenges of course modularization are discussed.

## **2 Research Context: the eGov-Campus**

The eGov-Campus (<https://egov-campus.org>) is a learning platform that offers open online courses (MOOCs) for education and training in the public sector in Germany. Its academic level learning offerings center around topics of digital transformation in administration.

In a decentralized project organization, eGov-Campus courses are designed, implemented and administrated by a range of different academic institutions. Coordination meetings help to meet external requirements and to align the curriculum. An active, partially formalized community (bi-weekly meetings, community management) of researchers involved in the eGov-Campus drives the development and research of the platform and takes responsibility for supporting activities such as marketing. By early 2023, 18 courses are available free of charge in open access on the platform, addressing topics like “Process Management in the Public Sector” or “Open Government”. eGov-Campus MOOCs are integrated into different educational contexts and recognized in both academia and professional development for public administration.

To better meet stakeholder requirements and enable more flexible learning designs, a project to modularize eGov-Campus courses was launched in mid-2022. In this context, modularization describes the division of existing courses into smaller, self-contained, combinable and competence-oriented learning offerings. The primary goals of the modularization project are:

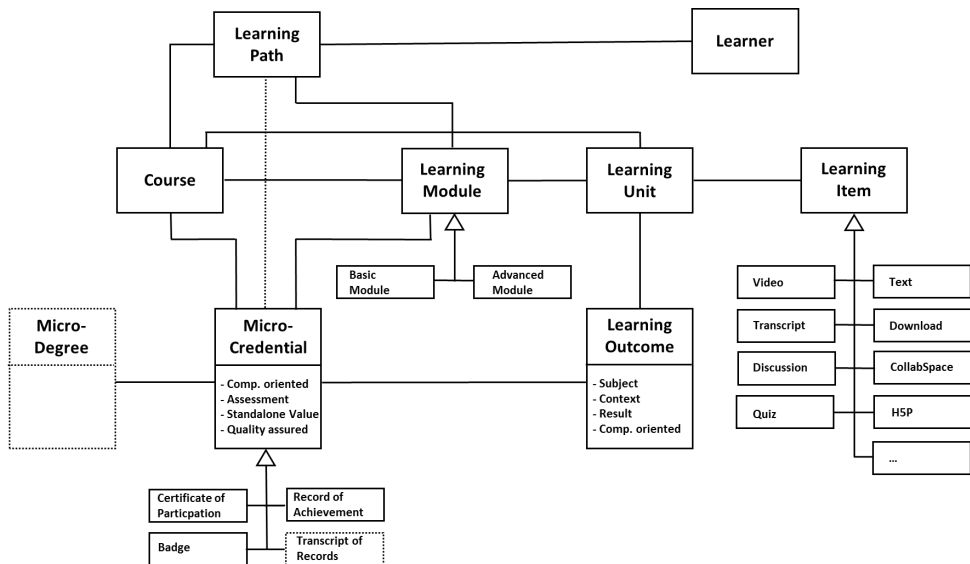
- Facilitated integration of eGov-Campus content into various higher and continuing education scenarios.

- Content differentiation, enabling learners to prioritize according to their own professional role and associated qualification requirements.
- Curricular restructuring of existing offerings, including the establishment of an introductory block.
- Implementation of micro-credentials for learning offerings below the course level.

## 3 Modularization Framework

### 3.1 Structural Specification

Due to definitional ambiguities, the introduction of a unified structure and terminology represents the necessary first step in the modularization project. The specification follows a pragmatic approach that ensures consistency with established terms as well as scientific terminology. Figure 1 shows the concepts used and their structural relationships in simplified modeling [12].



**Figure 1:** Structure of the modularized eGov-Campus offerings

The central element of the modularization approach is the concept of a “learning module”, that is: a learning offering below the course level (in terms of duration and effort) that can be accessed independently on the platform. Learning modules consist of several learning units linked to learning outcomes and are associated with micro-credentials. Learning modules can either be basic modules (introduction and foundations) or advanced modules (specialization and deep-dive), which represents a major curricular transformation. The newly introduced basic modules offer an overview of the subject area and provide orientation and assistance for further studies in order to mitigate initial difficulties and counteract dropouts.

### 3.2 Reference Model for Implementation

To enable the transformation and re-design of existing courses, a heuristic ten-step process model for course designers has been outlined:

1. *Initial delimitation of learning modules*

The initial delimitation of the future basic and advanced modules is based on content-related (consistent units) and organizational (appropriate effort, comparable specifications) considerations. The modules have a duration of four hours (equals half a study day) or eight hours (equals one study day).

2. *Design of the basic module*

The learning outcomes, content, activities and assessments (if applicable) for the basic module (foundations and introduction) are specified. The basic module has an effort of eight hours (equals one study day). Adaptations for the target group “training and further education” are made (e.g. additional real-world examples or similar).

3. *Specification of learning outcomes*

To ensure competency orientation, learning outcomes are formulated for the advanced modules to be implemented.

4. *Specification of learning units and learning items*

The learning items (contents, activities, assessments) required for the implementation of the learning outcomes are specified. At the same time, the different learning units (as parts of the advanced modules) need to be delineated.

5. *Examination and modeling of dependencies between and within advanced modules*

The advanced modules represent self-contained learning offerings that can be completed individually. In the course of modularization, (potential) dependencies between learning modules and between learning units within a learning module must be taken into account. In doing so, entry requirements, possible

connections, the level of difficulty, content depth vs. breadth as well as questions of sequencing (linear vs. parallel processing) must be taken into account. Furthermore, interdependencies within and between the new modules in terms of learning design must be considered and, if necessary, adapted (e.g. in the case of continuous case studies).

6. *Metadata for learning modules*

Based on the previous steps, the learning modules (basic and advanced modules) are described with metadata necessary for assigning them to learning paths. A corresponding template is provided.

7. *Implementation and transformation on the learning platform*

The learning modules are implemented on the learning platform, according to the current planning status as separate course entities. Based on the previous analyses, learning items are curated (if necessary added, changed, or omitted). Adjustments to the content will be made if necessary.

8. *Specification of learning paths*

Based on pre-defined profiles within the target group, learning paths (i.e. sequences of different learning modules) are specified and assigned to the profiles.

9. *Validation of the course transformation (modularization workshops)*

The delineation of learning modules, assignment to profiles, and the specification of learning paths are validated within the eGov-Campus community and with external experts. For each new offering (i.e. modules series as bundles of basic and advanced modules, either based on existing courses or newly developed), a modularization workshop is carried out, where the responsible subject matter experts and their teaching team discuss the results with stakeholders.

10. *Re-design and quality assurance*

Based on the feedback, adjustments to the modularization are made if necessary. Ongoing quality assurance is carried out on the basis of feedback from the evaluation. The necessary instruments are provided. Users are involved in the follow-up process as far as possible.

### 3.3 Design and Development Process

Following an Educational Design Research approach [8], the transformation of three existing courses is being implemented in a joint development effort. A small project team consisting of course designers, teaching assistants and additional educational design support is currently working on prototypical implementations.

In the process, there is feedback from the eGov-Campus community and additional external stakeholders, which has already led to adjustments of the framework. As a short term result of this pilot phase, design guidelines will be derived for providers of existing and developers of future eGov-Campus courses. Likewise, the newly introduced learning modules will serve as proof of concept for the modularization approach and methodology. In the medium term, the modularized offering will allow for the implementation of different tracks within the (former) course offerings, enabling differentiation with regard to different target groups in the context of public administration.

## 4 Discussion and Outlook

Modularization can be a means to address some of current the organizational and educational challenges associated with MOOCs. Learning Modules can provide the desired flexibility for non-academic learners as well as additional opportunities for tailoring and blending learning offerings. In this paper, we have outlined an approach to implementing course modularization using the example of the eGov-Campus platform.

Currently, the modularization project faces a number of challenges in different areas. *Challenges related to the educational design* primarily stem from the change of perspective necessary when also focusing on practitioners. Course designers need to find the right balance between academic style teaching and learning and the affordances of further education in every aspect of learning design (content, activities, assessment). There is also a need for a specific learning design for smaller educational offerings that goes beyond the traditional xMOOC-model (i.e. video plus quizzes). Finally, the content differentiation according to target groups (different roles in the public sector, like manager, IT-specialist etc.) is still subject to further considerations. *Organizational challenges* essentially revolve around the subject of certification. The task is to design learning modules that will be recognized with both academic credit and formal training days. Furthermore, the type of credentialing, be it with the existing credentials “certificate of participation” and “record of achievement” or additional proofs like digital badges must be specified. There is still a lot of conceptual groundwork to be done for the design of micro-degrees, even though initial approaches from related projects can be taken into consideration [4]. *Technical challenges* relate to the means of implementation: Which existing functions of the underlying MOOC-platform can be used; which additional functions would have to be incorporated? How can learning modules be implemented, wrapped or bundled? How can learning pathways be mapped on the platform? How can a transcript of records be implemented?



Once these challenges are addressed, modularization can pave the way for some important further developments of open online learning which can be summarized under the keywords *individualization*, *certification* and *integration*. Modularization opens up the opportunity to follow different tracks within a (former) course or individual learning pathways over learning modules from different subject areas. With future recommendation engines or elaborate adaptive learning systems, a truly individualized learning experience will be possible. A modularized certification system opens up the opportunity of collecting digital proofs and micro-credentials and aggregating them into micro-degrees that can eventually be incorporated into modular online degrees. From a conceptual perspective, smaller learning modules can be more easily integrated into open ecosystems like digital education spaces such as the planned national education platform.

Taking these challenges and prospects into account, the design and prototypical application of a modularization framework can be an important step in the further development of eGov-Campus MOOCs that may well point beyond the context under consideration.

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