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# Teacher Professional Development based on the DigCompEdu Framework

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**Abstract:**
The European Framework for the Digital Competence of Educators (DigCompEdu) describes in six competence areas, which digital competences educators need specific to their profession in order to be able to integrate digital technologies in education. By referring to DigCompEdu we examine how a teacher professional development (TPD) course should be designed to promote them. Current research results on effective TPD courses, were used as a basis for the design of TPD courses to promote DigCompEdu competences. In three iterations the TPD concept was analysed, conducted and further developed. The last iteration of the execution was paused due to Covid-19. Preliminary results suggest that the TPD supports teachers in improving their digital competence. A final analysis of the data is expected in early 2021.

**Keywords:** Teacher Professional Development, DigCompEdu, Digital Competence

## 1. Introduction

Digital learning tools (e.g. tools for online collaboration, learning management systems) are not yet used by teachers in all countries (Fraillon et al., 2020). The use of information and communications technologies (ICT) by teachers in the classroom is limited in frequency and complexity (Fraillon et al., 2020). There are significant differences between countries in the expectations and requirements for teachers' qualifications for the use of ICT and for teachers' participation in professional learning activities related to ICT use (Fraillon et al., 2020). It is up to teachers not only to promote the digital competence of their students, but also to integrate digital technologies into their teaching in order to improve and innovate it. The European Framework for the Digital Competence of Educators (DigCompEdu) describes which profession-specific digital competences teachers need.

In this article we examine how a teacher professional development (TPD) course should be designed to promote the DigCompEdu competences. After a short introduction of the DigCompEdu framework, design principles for TPD courses derived from literature are presented. The resulting TPD program is currently being conducted and evaluated in Germany. First results will be presented.

## 2. DigCompEdu - European Framework for the Digital Competence of Educators

DigCompEdu describes the digital competence of educators at all levels of education in six competence areas (Redecker, 2017). In this article we focus on the digital competence of secondary education teachers. The first area includes competences concerning the use of digital technologies for professional communication, collaboration and development. For example, a teacher should choose an appropriate communication tool according to the occasion. The second area describes competences for preparing lessons and deals with the selection, modification and publication of digital resources and the associated legal requirements. Hence, teachers should be familiar with copyright and data protection. The implementation and orchestration of digital technologies in teaching and supporting self-regulated learning processes as well as collaborative learning activities is addressed by the third area. The fourth area focuses not only on the collection of data through formative and summative assessments, but in particular on their critical analysis and the resulting adaptation of teaching strategies and feedback. According to the fifth competence area, teachers should be able to use digital technologies to support learner-centred pedagogical approaches. In addition to learner activation and differentiation, this also includes ensuring accessibility for all students. Pursuant to competence area six, it is also one of the

teacher's responsibilities to actively promote the digital competence of students by fostering learners' information and media literacy and their digital communication and collaboration skills.

Each DigCompEdu competence is described in six proficiency levels (A1, A2, B1, B2, C1, C2) with a cumulative progression. A-level teachers have little or no experience in teaching with digital technologies. B-level teachers integrate different technologies in a variety of ways and contexts. C-level teachers are role models for colleagues and experiment and reflect on new innovative approaches.

Based on DigCompEdu and its progression model, a self-assessment tool (SAT) was developed and piloted with 335 participants (Ghomi & Redecker, 2019). The results suggest that the SAT is a reliable and valid instrument to measure teachers' digital competence. However, teachers can use the tool to identify their weaknesses and determine training needs. In order to empower teachers to use digital technologies in class, TPD courses are an appropriate instrument (Lipowsky & Rzejak, 2015).

## 3. Effective Teacher Professional Development

Lipowsky and Rzejak (2015) and Darling-Hammond et al. (2017) summarized results of research on TPD and identified several characteristics of effective TPDs, which will be briefly outlined here. In order to develop competencies, TPD participants need time and opportunities to apply new knowledge, deal with deeper learning tasks and reflect on their experiences. It is not possible to specify a specific length of training courses, but a one-time and short workshop is not recommended for the further development of competences. It is therefore not surprising that research on effective TPDs often examines training series that are planned over several days and a longer period of time, where input, practice and reflection phases are combined. This also allows to promote long-term cooperation between the teachers and to initiate peer learning, thus creating a professional learning community. In the time between the courses, new methods and knowledge can be practised in class and reported and reflected on in the following session. In all phases, there should always be a focus on the mostly subject-specific learning process of the students and how this can be improved. Furthermore, the results of research into the effective design of school teaching (e.g. effective classroom management, clarity and structure of instruction) also highly applicable to TPD teaching.

Based on DigCompEdu and the characteristics for effective TPDs, a TPD program consisting of four one-day events in intervals of at least 3-4 weeks was developed for secondary school teachers in Germany. In a design-based research approach, a first a theory-based TPD concept was piloted with 23 teachers in 2018 (Wang & Hannafin, 2005). By analysing the feedback surveys and observation sheets, the concept was further developed and evaluated once again with five teacher groups ($N_2 = 72$) in 2019. The following table shows the design principles derived from it, which were now also used for the third iteration of implementation with eight teacher groups ($N_3 = 150$). Due to school shutdowns during the Covid-19 pandemic, the study is paused for the time being. It is planned to complete all TPD courses in winter 2020 and finally to evaluate the entire data collected in 2021.

Table 1. *TPD Design principles to promote DigCompEdu*

| TPD Design Principles for each DigCompEdu Competence Area | |
|---|---|
| 1. Professional Engagement | • Systematically use tools for communication and collaboration during and for preparation and follow-up of the TPD, e.g. discussion forum, experience blog<br>• Initiate exchange of experience and reflection<br>• Integrate online courses and materials, e.g. as a blended learning concept |
| 2. Digital Resources | • Present a variety of tools for the creation of digital resources of different types<br>• Allow teachers to try out and test tools and discuss the benefits<br>• Show several websites for Open Educational Resources and let teachers rate them<br>• License materials, show how to license properly and sensitise to copyright<br>• Protect teachers' data and sensitise to data protection |
| 3. Teaching and Learning | • Use methods that they will later use as teachers in class<br>• Be a role model in dealing with technical problems<br>• Let teachers develop collaborative teaching concepts<br>• Arrange group work online collaboratively<br>• Offer a choice of topics and let teachers choose which ones they want to work on |

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|---|---|
| | • Challenge teachers to implement new content and methods directly in their class |
| 4. Assessment | • Use a variety of formative and summative assessments in appropriate situations<br>• Use interactive exercises when working on CPD topics with automated feedback<br>• Analyse the generated data and provide targeted feedback to teachers<br>• Discuss together the benefits and limitations of assessments<br>• Obtain feedback from participants using digital technologies |
| 5. Empowering Learners | • Ensure that all they have access to materials and meet the technical requirements<br>• Identify the learning needs of the teachers and design the lessons so that everyone can achieve their own learning goals at their own pace and level<br>• Integrate hands-on activities in which teachers are expected to work creatively and actively with a subject matter |
| 6. Facilitating Learners' Digital Competence | Integrate projects (if possible over a longer period):<br>• have teachers research a topic they are not yet familiar with<br>• let them create digital content in compliance with copyright and privacy laws<br>• encourage them to communicate and collaborate online after the course |

To evaluate the design principles and the effectiveness of the TPD, a pre- & post- as well as follow-up online survey was or will be sent to all participants. In addition to the IT equipment, type of use and frequency of use, the main questions asked are attitude, motivation, media-related self-efficacy, the DigCompEdu self-assessment and experience with TPDs. After each event, two teachers were interviewed and all participants were asked for feedback via an online survey on the respective event.

Related to the DigCompEdu self-assessment of the participants, first results of the conduct in 2019 suggest that more teachers reached DigCompEdu levels B1, B2 and C1 after the program. Especially in the four competence areas 2, 3, 4 and 5, the participants achieved on average more points and thus a higher level after the training. Preliminary results of the interviews and the feedback indicate that teachers at A1 level in particular need additional support, e. g. in the form of a technical briefing and step-by-step instructions as there is often a lack of everyday experiences with digital technologies.

## 4. Conclusion

In order to use the potential of digital technologies to improve teaching and learning, and to promote digital competence among students, teachers themselves need to develop their profession-specific digital competence as described in the European Framework DigCompEdu. As an outcome of a design-based research approach with three iterations of analysis, design, development and implementation, a proposal for a design of an effective DigCompEdu-TPD is presented in Table 1. Preliminary results suggest that the program supports teachers in improving their digital competence. A final analysis of the data and evaluation of the TPD is expected in 2021.

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