DIGITAL MEDIA IN SCHOOLS AND UNIVERSITIES: FIRST STEPS FOR A COMMUNITY OF PRACTICE WITH DIGITAL VIDEO ANALYSIS

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Abstract

The Corona pandemic makes it clear where societies need to develop. In the education sector, the focus is, particularly on digitization. In Germany, only 25% of schoolteachers have already been prepared for working with digital media during their training. Technical and didactic competencies, also reflexive skills about volitional beliefs about digital media, one's own media habitus, and the willingness to adopt new teaching paradigms with cooperative forms of teaching and learning are considered essential prerequisites for modern digitally supported teaching. Closely related to this is the teachers' attitude towards inclusive and internally differentiated teaching. Digital media can provide significant technical and didactic assistance in this regard. The proposed concept was related to an interdisciplinary research and teaching project (DEGREE 4.0), funded by the federal government (BMBF). In close cooperation with schools, student teachers practice their media behavior technically and didactically, test themselves in school teaching situations, and learn to reflect on their teaching behavior. Their reflections are evaluated in terms of content analysis by working with a video platform. In the long term, the plan is to develop a "community of practice". Schools and universities mutually benefit from each other and agree on a joint theory base that is aligned with the requirements of current digital teaching at school and university and mutually accepted.

Keywords: *digital media competence, ICT, teachers' beliefs, community of practice, video analysis, teachers' education*

1. INTRODUCTION

Digitization poses technical, content-related and didactic challenges for the German education system in all institutions. These problem areas are being addressed at different levels. The *technical side* is the local authorities and school boards' responsibility – whether national, municipal, church or private. They are ultimately responsible for providing and expanding internet connections and for data protection standards. The changes in *content* due to digitization are laid down in the curriculum. Serious restructuring in the education sector in Germany is one area where things are particularly laborious. Digitization is no longer a new phenomenon worldwide. Still, Germany performed relatively poorly in international comparative studies on digital media use in secondary education at the teachers' level, even in the second survey of *International Computer and Information Literacy Study* ICILS in 2018 (Fraillon et al. 2019). However, there is an unmistakable political will to consider ICT via corresponding mandatory curricula in the media sector. *Didactically*, the universities are challenged: In the course of study, the possible uses of digital media must be communicated, justified and accepted by the students to develop a corresponding understanding of the profession. German teachers see much less potential in digital media than their international colleagues for individual support, sustainability and collaborative learning (Richter & Pant 2016, p.8). The research into the causes of this is primarily in the area of teachers' beliefs: a media moralization (Kerlen 2005), which always concerns the latest media, seems to have been historically quite strongly developed in Germany. It is based on attitudes and beliefs conveyed at an early age, which are not easy to change individually even later in life (Pajares 1992). This is all the more true because these beliefs are built up during one's school years and is further reinforced in the second phase of teacher training and renewed contact with schools. The intervening phase of university education has not yet established new convictions (Delere & Rath 2018).

Digital media represent a broad social context. They are more than technical aids for didactic teaching. This broader meaning was not included in the educational science model for teacher professionalization TPACK (Koehler & Mishra 2008, 2009). The adaptation of the model to current societal needs and

theoretical backgrounds of inclusion and mediatization were suggested by Marci-Boehncke (2018) in the ITPACK model. Students of subject didactics, especially of the respective national languages, face the challenge of understanding and considering mediality as the linguistic context of an era (Rath 2014) – also concerning their relevance for the participation of learners with special needs. This context is in constant evolution. Therefore, it also demands lifelong attention in teachers' professional biographies. It is precisely at this interface that tasks for the continuous development of a professional habitus arise: the more vital collaboration with the second phase of teacher education in a "*community of practice*" (Lave & Wenger 1991, p. 98), linking theory and practice, is to be established as a corrective to this situation.

The project described below shows the first results of student video analysis of teaching practice samples based on an international curricular reference framework for digital media action, the *European Framework for the Digital Competence of Educators* DigCompEdu (Redecker & Punie 2017). What becomes clear is the need for the more substantial and more ideal joint practice of pre-service teachers of the first and second phase and strengthening their self-image as scientist-practitioners (Barlow, Hayes & Neson 1985; Wright 2020). Blackwell, Lauricella and Wartella (2014) were able to show that teaching routines have an inhibiting effect on openness to working with digital media and that self-efficacy expectations and attitude are the decisive factors for successful adaptation to current media. Therefore, self-reflection can question routines repeatedly, and the comparison with current scientific developments and new theories should be continuously promoted and demanded as part of teachers' professional habitus. However, the teacher's role as a scientist-practitioner is quite controversial from the teachers' perspective (Puustinnen, Säntti, Koski & Tammi 2018). Language teachers, in particular, often emphasize a more vital practical relevance over a theory orientation (Ur 2019). Working with video reflections seems to be motivating for the students at this point (Yang 2021). To put this in practice, we developed a model for accessible teaching and learning using a digital video platform at the Technische Universität Dortmund (Germany) to enable students to reflect on the use of digital media in videotaped lessons. As a model, it offers potentials for international use in the university context and can be linked to the second phase of the practice-accompanying teacher training.

The article starts with a presentation of the scientific assumptions and research results. These include, on the one hand, the particularities that arise with digitization as compared to analogue forms of instruction. They presuppose an understanding of the meta-theory of mediatization (Krotz 2007, Krotz 2009, Krotz 2018). On the other hand, we give an overview of significant results of the international comparative study ICILS and other studies on the international state of digitization. Furthermore, the teaching/learning scenario of video analysis will be developed and first results of student observations based on the DigCompEDU will be presented. Finally, it will be discussed how the teaching/learning setting looks like, which could promote standard processing of teaching situations on the use of digital media in a structured way in a community of practice (Lave & Wenger 1991; Wenger 1998).

2. MATERIALS AND METHODS

2.1.1. Materials A: Digitalization as a disruptive technology in a mediatized society

Digital media have comprehensively changed the practices of action in our society. Their distribution ensures real-time communication in different medialities. Every person can digitally receive and produce worldwide (Bruns 2008). That changes previous information- and sales-monopolies. New professions are emerging, and the exchange of information and goods is being adapted to digital possibilities. Banking and visiting libraries becomes digitally possible, but above all, information can, in principle, be made freely available to different communities. Private communication can become public, and digital creativity enables new forms of existence.

These private and public life changes are so severe that they can be described as "disruptive" (Bower & Christensen 1995; Christensen 1997). They have quickly taken hold worldwide, replacing analogue practices of action only successively and now more and more thoroughly (Krotz 2012).

In education, scientific research is now increasingly carried out via digital media. That is associated with time savings, faster access to worldwide resources, and the difficulty of selecting from the multitude of offers at all. On the one hand, individual search algorithms are helpful, but on the other hand, they can easily obscure the actual diversity. Collaborative work is also possible independent of location and time via shareable documents. Diverse media alternatives enable a "Universal Design for Learning" (Rose & Meyer 2006). On the one hand, this is designed in the technical possibilities of digital devices – for example, through read-aloud and dictation functions and other operating aids – and on the other hand, the selection from written-text and moving-image-based or auditory offerings on the net enables alternative ways of accessing information for different reception preferences and offers just such forms of expression.

Orientation in such texts requires particular competencies associated with the form of digital textuality (Fraillon et al. et al. 2013, pp. 19-20; Buckingham 2008; Hobbs 2017) and of course still the classic written textual "literacy" that is also necessary for analogue texts. Besindes the fundamentally different dexterity and practical media skills for putting digital devices to work, the reading process itself is also different. The key is to orient quickly to ever-changing interfaces and to recognize and apply standard structural features. The hyperlink structure is similar to the reference structure in analogue reference books. Above all, it requires forming global coherences that allow anticipating what is expected from the other search. Also, additional search functions can be used directly, and other medialities can be selected. Moreover, different meta-texts about the selected texts are quickly available and help assess one's selection. Besides, a knowledge of economic contexts is also necessary – for example, to identify texts financed by advertising. Knowledge of these digital possibilities is necessary for teachers to assess the opportunities and risks of the changed mediality adequately.

Another theoretical aspect that teachers should reflect on is the meta-theory of "mediatization" (Krotz 2007, Krotz 2009, Krotz 2018). It helps to talk about medial conditions in a systematized way. Krotz understands mediatization as a social process that describes the relationships between media resources and forms of communication. He assumes that communication continually adapts to technical conditions, that new forms of communication develop from new technologies, which were not foreseen or planned from the beginning when the technology was developed.

Mediatization is not a fundamentally new phenomenon – it has always existed (Rath 2014). However, the technical possibilities have changed and will continue to do so – in this respect, and it is also not a closed process. Krotz's theory allows us to describe the relationships and consequences – for example, on the different social levels (Bronfenbrenner 1979) the communication partners are involved: human-human, human-machine, machine-human, machine-machine (Krotz 2018, p. 48). In this way, however, medial relations in society can also be described and systematized in narratives. These then, in turn, allow references to other meta-theories such as economization, individualization, globalization and others. Media thus become understandable as systemic factors and can be analyzed for different historical epochs and milieus in the various natural environments or texts/narratives. Teachers can thus, on the one hand, structurally reflect and adapt their own media working conditions and, on the other hand, develop well-founded, criteria-guided perspectives on social conditions in the past and fictions.

2.1.2. Materials B: ICILS and other studies on the state of digitalization in education

In addition to systematizing epistemic foundations on the current (meta-)theory of media, we will now take a look at empirical research on the state of digitization in education. As the *Digital Quality of Life Index* of 2020 (Surfshark 2021) shows, Germany is economically vital and, in many cases, also a financial leader within Europe. Nevertheless, it is striking that in terms of digitization in education, Germany is far behind. While teachers in Denmark, for example, appear to be optimally prepared in terms of technology and didactics and use ICT for various purposes and daily in the classroom, there were not enough schools in Germany willing to participate in the ICILS/IAE survey. The participating schools' teachers then show significantly more restrained results in an international comparison – especially in the assessment of their teaching activities. They use digital media much less frequently and tend to emphasize their risks rather than their opportunities. They tend to use digital media more for administration and promoting gifted students and less for supporting lower-performing students. At the same time, German teachers also possess significant scepticism as regards the use of data: Apps and

participatory resources such as *Wikipedia* are used much less, communication via digital media tends to be avoided, and productive processes involving external data or platform use are also used less or are even restricted in the classroom (Fraillon et al. et al. 2019, pp. 175-214).

Moreover, it tends to be the natural sciences that take up ICT – at least as working tools based on algorithms (e.g. calculators, data-processing), maybe not so much as didactical tools. Overall, the general instructional practices of German teachers also seem to be more cognitivist in orientation. Top-down strategies take precedence over student-centred, interactionist learning settings. The schools' equipment is still unfavourable concerning robust and, above all, freely available Wi-Fi and sufficient mobile devices for students and teachers. In Bulgaria, which was not involved in the IAE/ICILS study, a lack of broadband coverage does not limit general network satisfaction – presumably also in schools – because of good mobile communications (Surfshark 2021). However, mobile communications would not be an official alternative for network access at schools in Germany for data security reasons. It is also clear that German schools are currently still more concerned with computer and information literacy (CIL) and that computational thinking (CT), i.e., the level of programming, is only hesitantly finding its way into schools, and if so, then primarily in science and mathematics-oriented subjects of secondary schools.

Teachers in Germany have different media orientations. The three habitus distinguished by Biermann (2009) and Biermann & Kommer (2012) are also found concerning digital-media activities (Delere & Rath 2018). Only a quarter of the teachers surveyed in Germany stated that the use of digital media had been a component of their teacher training (Eickelmann, Massek & Labusch 2019, pp. 11-13). Thus, overall, only 23% of German teachers use digital media in the classroom daily – the mean value of all IAE/ICILS participants is 48% (Fraillon et al. et al. 2019, p. 179). The frontrunners are Moscow (76%) and Denmark (72%). Worse than Germany is only Uruguay with 16%.

Nevertheless, Germany's results have more than doubled since the first ICILS survey in 2013. At that time, Germany was at 9.1% (Eickelmann et al. 2014, p. 204) and Denmark at 40.2%. Canadian teachers were already using digital media at 73% at that time. The structural deficits described today by teachers for digitally supported teaching are similar to those described years ago for media-integrated teaching in the various institutions along the educational chain: whether daycare (Six & Gimmler 2007), elementary school (Breiter et al. 2013; Eickelmann 2013), secondary school (Breiter, Welling & Stolpmann 2010), even university (Gast 1999):

- Lack of school facilities,
- time deficits for lesson preparation,
- lack of didactic knowledge and further training,
- lack of materials and
- lack of support in one's institution (Fraillon et al. 2019, pp. 190-193).

Unfortunately, a closer look reveals that these assessments are not all objectively correct – at least not necessarily. Germany is not in the wrong position in terms of computer equipment and is definitely in the midfield internationally. However, there are significant differences depending on the type of school (Schmidt, Goetz & Behrens 2017; Lorenz et al. 2017). German *Gymnasiums*, which enable university entrance qualifications, are preferentially equipped. Simultaneously, elementary schools have the worst ratio of children to computers – which is fatal given the social, educational differences that have been known since 2000 from PISA and IGLU and have not yet been eliminated in Germany.

Further training on media education is still perceived far too sparingly (Fraillon et al. 2019, p. 199). Materials are indeed available in large quantities. Nevertheless, teachers do not find them. However, this may also be related to a less than optimal professionalism of the search. It is already striking, that teachers themselves do not take on this task of teaching how to provide references for digital information sources or how to explore a range of digital resources when searching for information (Fraillon et al. 2014, p. 216; Fraillon et al. 2019, p. 208). What is indisputable is that the equipment with free and robust

WiFi in Germany and suitable software that enables digital collaboration has been delayed for decades due to school bureaucracy.

Germany is also, on the one hand, one of the countries that offer a high digital quality of life because it is a guarantor of very high data protection standards (Surfshark 2021); on the other hand, for the educational situations of the preschool and school phases, this leads to a lack of opportunities for participation in the digital world – which perpetuates the digital and social educational divide. In most schools in Germany today, preparation for digitality that is adequate for the real world cannot be provided. Education is comparable to a driver's license acquired on a traffic training course. Jenkins and Kelley (2013, p. 9) described this – obviously not only German problem – for the USA as early as 2013 thus: "Skills, practices, and dispositions students are encouraged to develop are filtered through a system designed for an outdated world." Children from educated families not only have higher analogue literacy in Bulgaria and Germany (OECD 2020, p. 53), they also have better access to digital tools and use digital resources more effectively (Fraillon et al. 2019, p. 82). Search algorithms reinforce these inequities: the better students do better, the worse do worse.

As training institutions for the next generation of teachers, universities are failing to even out the differences. Two factors are central here: on the one hand, the different subject cultures integrate digitization to a greater or lesser extent in their teaching offerings or make it mandatory. Natural sciences use digital media primarily for calculations and in dealing with data – as teaching and learning media with presentational functions, they are used more in the humanities. The second point seems to be that there is already a pre-selection of students who decide to become teachers. It is precise that many students in Germany are applying to become pre-service teachers, who are digitally more conservative and less motivated by digital resources (Schmid et al. 2017, pp. 37-39).

2.2. Methods: Video analysis in teacher education and a community of practice with the second phase of teacher education.

In the subject didactics, the promotion of reflection on digital media and digital media action in the classroom is of great importance. In principle, the promotion of reflection can take place both orally and in writing. Possible approaches to promotion can be differentiated by the settings, the number and role of participants, and the reflection goals (Te Poel & Heinrich 2020, p. 2). The methods differ in terms of the use of media. Thus, analogue and also digital methods exist, such as the use of instructional videos (Wyss 2013, p. 71; Kleinknecht 2013, p. 13), work on portfolios, written or oral group discussions (Moon 2004), feedback methods (Hilzensauer 2017, p. 62), observation assignments, reflection presentations or casuistic casework (Hilzensauer 2017; Pauli & Reuser 2006; Te Poel & Heinrich 2020).

Reflection using prompts and guiding questions is particularly beneficial with learning protocols (Hartung-Beck & Schlag 2020, pp. 78-79). "Prompts are questions or hints that induce productive learning process" (Berthold, Nückles & Renkl 2007, pp. 566-567). These hints for activation serve to avoid superficial processing and stimulate justifications that refer either to actual – or just subjective theories.

So what is the role of digital video reflection as a method of promoting reflection? As a medium, instructional videos enable the distanced and professional observation of others and one's teaching actions. This reflection can continuously be repeated and is therefore flexible in terms of time and content. These characteristics of videos enable a large number of variable analysis approaches and the viewing of the material under different objectives (Hilzensauer 2017, p. 69). When analyzing others' teaching situations, it is easier to maintain a critical distance when observing what is happening in the classroom than when making one's recordings, as there is less consternation (Krammer 2014, p. 166). Thus, professional reflection on the teachers' medial actions appearing in the video can lead to reflecting on one's teaching actions (Pauli & Reusser 2006, p. 792).

For teacher education, digital video technology offers an opportunity to capture the complex structures of teachers' classroom actions empirically. Besides, videos can be used to work with very authentic material, which, through observation and analysis, enables a reconnection of practice to theoretical reflection and, conversely, the reconnection of theory to real phenomena (Dorlöchter et al. 2006, p. 24). Collaborative networks are particularly well suited for this purpose. Unfortunately, the university and

the centres for practical school training, in which practical training at schools is further supported in Germany, have acted instead in opposite directions: one emphasizes theory (universities), the other (centers for in-service-teacher education) practice. Through a shared space for reflection, essential media pedagogical assumptions and bodies of knowledge could be exchanged, and media pedagogical teacher action is to be made analytically accessible. The joint presence of protagonists of old networks in new, joint networks promises an exchange and a mutual recognition of the previously different practices and needs. As a consequence, an alternative to old practices becomes possible through everyday discourse. For the transformation of the media-pedagogical habitus of teachers (Delere & Rath 2018) and a better interlocking of the training phases, this exchange becomes crucial (Sutherland et al. 2005; Wenger-Trayner & Wenger-Trayner 2014; Hafetz & Ben-Zvi 2020; Eaton & Pasquini 2020;) both in terms of epistemic foundations and in terms of self-reflexive strategies and the establishment of shared beliefs (Pajares 1992; Ertmer et al. 2012; Tondeur et al. 2012; Admiraal 2017) on contemporary mediatization and inclusion (Miles 2007; Marci-Boehncke 2018; Marci-Boehncke & Vogel 2018;).

2.2.1. Categories: The DigCompEDU as a set of criteria

The objects of reflection in the teaching videos result from recorded teaching situations. In principle, all subjects and situations are conceivable here because digital action belongs to all subjects in teacher training. Linguistic subjects of the respective national language are particularly suitable because the mediality itself belongs to the subject area of "language reflection". As an orientation for the evaluation, the categories of the European Framework for the Digital Competence of Educators DigCompEDU can be used. This international competence framework offers a valuable system for reflecting on teachers' actions (Redecker & Punie 2017).

The four competency areas, labelled as educators' pedagogic competencies,

– Digital Resources
– Teaching and Learning
– Assessment
– Empowering Learners

refer to operationalizable behaviours (fig. 1).

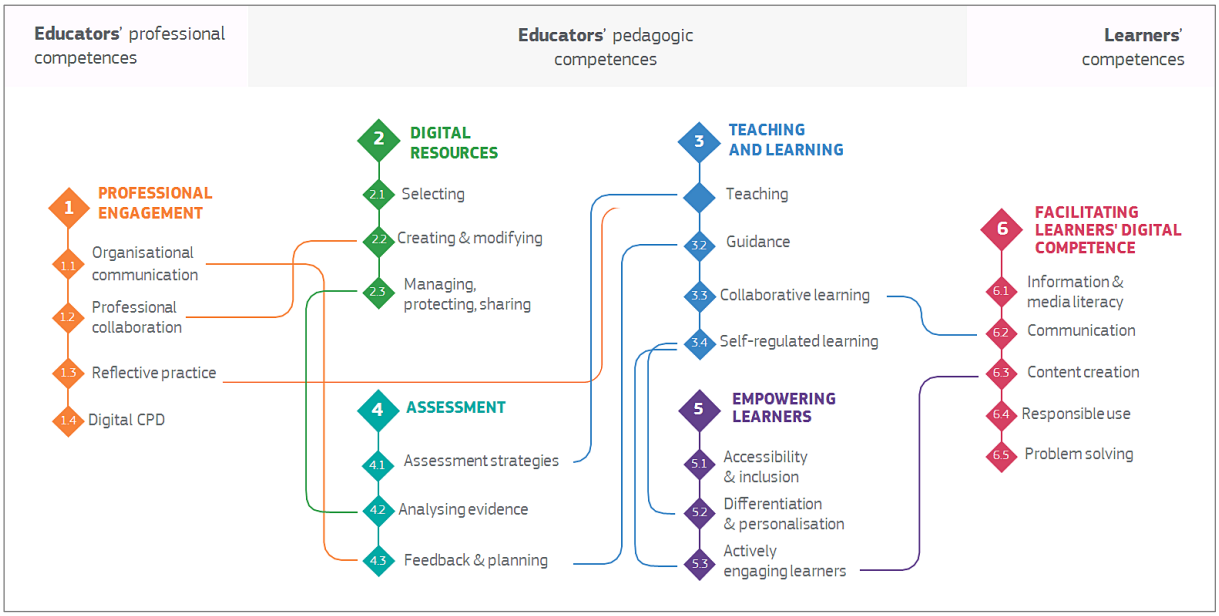


Fig. 1. DigCompEdu Framework

Source: EU Science Hub 2018.

In the videos related to these categories, students can observe

- what digital resources have been selected, developed, and distributed,
- the extent to which learning and support has been enriched with digital resources,
- the extent to which collaborative and self-regulated forms of learning were enabled with digital media,
- to what extent quality assurance was carried out with the use of digital media, and
- to what extent motivational support, differentiation and accessibility for and with digital media were established and considered.

2.2.2 Sampling and Setting: Analyzing pre-serving teachers' teaching

Two different master courses (fig. 2) during the teacher training in German studies at Technische Universität Dortmund (1st course: 'Digital learning within heterogeneous learning spaces', Marci-Boehncke Summer 2019 & 2nd course: 'Researching about literature didactics', Marci-Boehncke Winter 2019/20) are initially involved in the presented project: In a first seminar in the master program, the focus was on the theory-based development and testing of teaching and learning scenarios for teaching with digital media in the subject of the national language – here: German. University students developed a teaching unit for a school for special education with particular needs in the area of "learning". The topic was to produce a content description of a book in form of a film trailer. The group of students carried this lesson out as a short unit in five partly blocked lessons. This teaching experiment was videotaped. It became the subject of a second seminar in the master program the following semester, which focuses on "didactic research". In this seminar, students receive the same theoretical framework on mediatization, inclusion and the national and international competence frameworks as in the practice-oriented seminar. Extending this, they engage in research on videography and content analysis with digital tools.

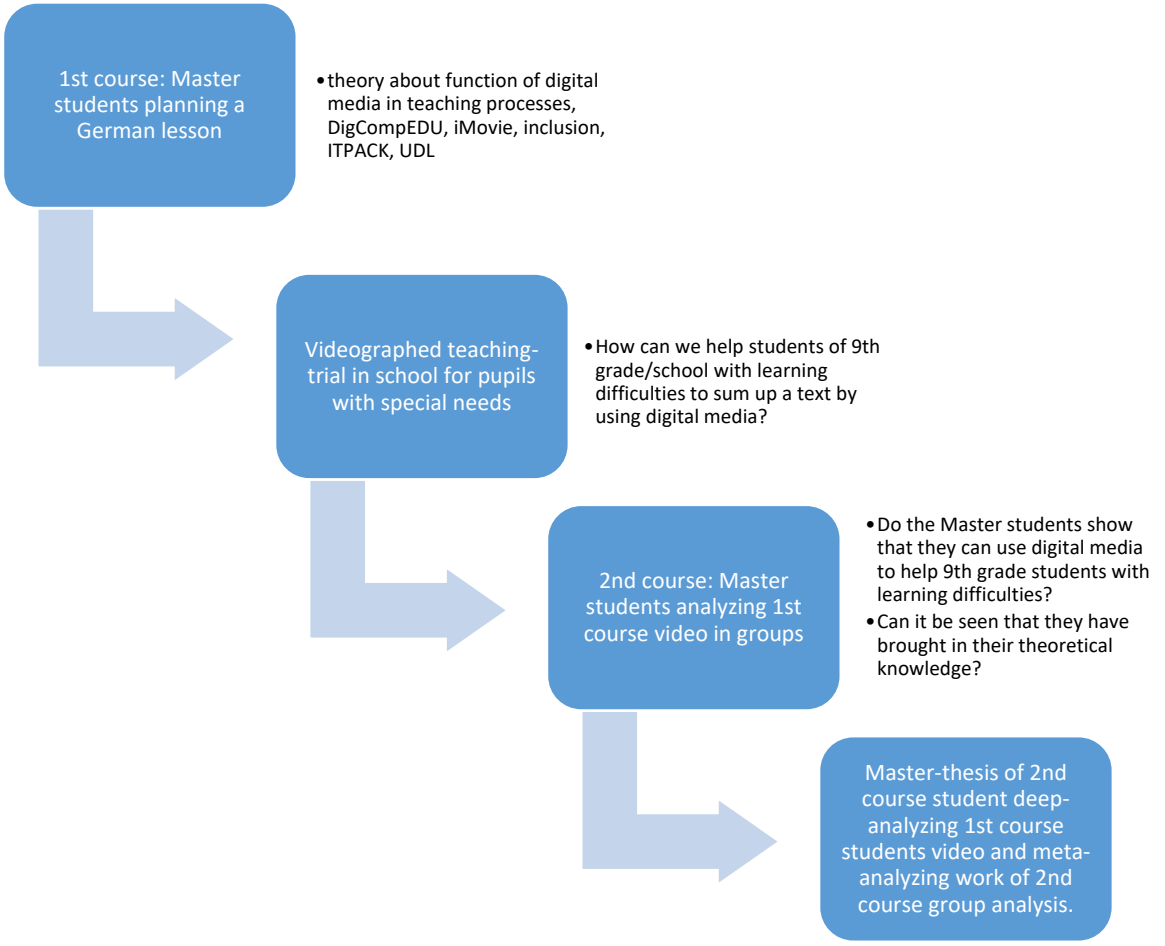


Fig. 2. Process of teaching, planning and analyzing video-taped teaching trials in master courses – TU Dortmund.

Source: own illustration.

The students of the second seminar now investigated the extent to which the first seminar's teaching students could consider the theoretical background for their lesson design. Four female master students conducted the lessons considered here and were accompanied by a teaching assistant and an integration assistant. The lessons video included a total length of 28 minutes and 29 seconds and was shortened by the greeting. The first of five lessons within the lesson series and thus the organizational and content-related introduction was analyzed. The lesson series's goal belonged to the subject German and consisted of connecting the development of narrative competencies of the students using the app *iMovie*. Instead of traditionally writing content statements about narrative texts, the students were asked to create video trailers. The work was interactionist and participatory in small groups. The focus was clearly on creating a media-based unit.

The following research question was formulated for the analysis of this videotaped lesson:

– What pedagogical competencies for digital action do the teachers demonstrate in the videotaped unit?

That was done by first inductively using the data analysis program *MAXQDA*® to an open coding process, observing, where the student teachers referenced media at all, and then deductively recoding these passages using the DigCompEdu and assigning the observed media actions to the appropriate categories. This coding process resulted in a large number of codes (71 codes). As part of the deep analysis within a master thesis of one students from the 2nd course, it became obvious, that these codes were partly composed of in vivo codes, paraphrases, one-word utterances, and questions. In a post-coding process as part of the thesis, 55 codes remained. In the other process, the codes classified as

relevant were to become subcodes from first-level codes. Therefore, relations and interdependencies had to be recorded. Since, at this point, all 55 codes represented upper-level codes, increasing theoretical sensitivity should lead to the formation of subcodes. The questions, "Which potentials of digital media do the prospective teachers recognize?" and their negation, "Which potentials of digital media do the prospective teachers *not* recognize?" helped to define the subcodes since hierarchical relations became clear through these questions. Thus, the sorting of all 55 codes was done under these two upper codes. This sorting was realized by the Creative Coding function of the *MAXQDA*® program and reduced the set of codes to 33. The video was analyzed again, and some codes could be assigned to both recognized and unrecognized potentials.

3. INITIAL RESULTS OF STUDENT ANALYSES

The prospective teachers from the first course – according to the student analyses of the second course – basically use the productive and creative potential of digital media for teaching. In doing so, they grasp the motivating effects of the generative design of digital media. Besides, they seem to be aware that the use of digital media in the classroom requires guidance and explanations for the learners to ensure all students' participation. However, the learners' active involvement and self-directed learning are not yet recognized and realized as potentials by the teachers, although the settings would have allowed this as a group work phase. Active work with digital media is limited to only one phase of the lesson, namely the immediate creation of the trailers, which means that potentials for individual support are not fully exploited. As a result of the master thesis analysis, the teaching students of the first course do not yet recognize the structuring potential of digital media for planning and implementation, so that lesson transparency and worksheets are still primarily used in analogue form. Especially the participative potential is not perceived by the prospective teachers. Because of this, a large part of the pupils in class only passively participates in the lessons. Also, aspects are taken into account, which do not relate specifically to German lessons but can be declared interdisciplinary – greeting rituals, creating lesson transparency, etc. That applies equally to the students in the teaching trial situation and those who analyze the videos afterwards in the second course.

Opportunities through digital media to support the skill acquisition of students learning German as a second first language or for students with learning difficulties, as seen in the sample class, are not yet recognized. The same is true for inclusive reading support through digital media, especially for students who are getting qualified for pupils with learning disabilities. Still, within the class-related four areas within DigCompEdu – the *use of digital resources*, *teaching and learning*, *assessment* and *empowering learners* – some competencies are addressed by the students. They are mainly in selecting digital resources – even though, apart from the basic student work situation of creating trailers, these were planned more analogously using a blackboard and worksheet, although digital devices were available. Students were to demonstrate "creating & modifying" and also had to protect (sharing, managing, protecting), distribute and share resources. Learning was to be collaborative – but the necessary scaffolding was missing. Accessibility options were available via the use of digital accessible devices but were not addressed. Nevertheless, it was clear that students could incorporate many of the areas of DigCompEdu. Theoretical knowledge about digital media, which is part of domain 6 "Facilitating Learners Digital Competence", was not explicitly taught in the lesson.

The detailed analysis of the video in the second seminar shows that it is the research-oriented perspective with its systematic consideration of classroom management based on the categories of the DigCompEdu that brings the most significant learning success. Essential for this was initially a collaborative work in student groups on the videotaped teaching experiment with the digital research software *MAXQDA*®. Coding was first practised together, both technically and in terms of content. In this phase, the exchange was essential – the students, who mainly worked traditionally hermeneutically in their studies and were not very familiar with digital and empirical analysis, needed the peer exchange to gain technical confidence and interpretive trust. The in-depth work within the master thesis that emerged from this second seminar context then revealed three things:

The renewed systematic deepening of the qualification thesis's theoretical background represented a critical precondition for the following independent detailed and confident video analysis.

- The instrument of video analysis, combined with the clear interpretive framework of the DigCompEdu, which also allows extensions and concretizations for in-vivo coding, provides a suitable context for systematic instructional analysis used internationally.
- The empirical examination of the results leads to focused profiling of the places where the students of the practice lesson show a need for further elaboration so that targeted teaching materials can be developed for this purpose.
- The handling of peer materials led to great respect and a very critical, accurate and at the same time appreciative, solidary self-reflection of the students of the second seminar.

The code tree (fig. 3) shows exemplarily at which points of the DigCompEdu, specifically the practical lesson's potentials, were identified. The result shows that more differentiated processes – such as differentiation and individualization – have not yet been performed or observed. However, the multiple coding passes described in the paper sharpened the observation a lot, which is also illustrated by many memos that were recombined.

4. DISCUSSION

The structure of teacher training at universities, which always brings together new learning groups in each semester and seminar, prevents a theory and practice experience that is the same for all students in terms of content and form. Although all students are privately open to digital media, student teachers as a cohort are still ambivalent about it as an orientation for their teaching practice. Half of them bring instead preservationist pedagogical convictions to their studies, which have not yet been dispelled.

Videography makes it possible to reconstruct a practice – both during studies and in the second or third phase of teacher training and continuing education. Concerning digital competencies, lessons from all subjects can be used as sample videos since taking current mediatization into account is a cross-sectional competency taught in all school subjects. ICT should be used and promoted in all subjects – and this worldwide. The setting presented here in university master education, offered for all teaching degrees in German, is intended to show that the DigCompEdu can be used as an orientation framework for practical training and as a framework for reflection within different phases of education. It provides meaningful systematics for analysis and focused material development for those less considered in practice. Observation on peer products has proven useful. On the one hand, the possibility of distancing oneself, as already described by Krammer (2014), because it was precisely not one's product, and the respectful solidarity with the fellow students, on the other hand, has led to careful and appreciative handling of the videographed lesson. Through this offering, a broader group of students can directly or indirectly gain experience with practice and theory while still in college, leading to more theory-based planning and reflection of classroom events in which digital media are more than just mediation tools.

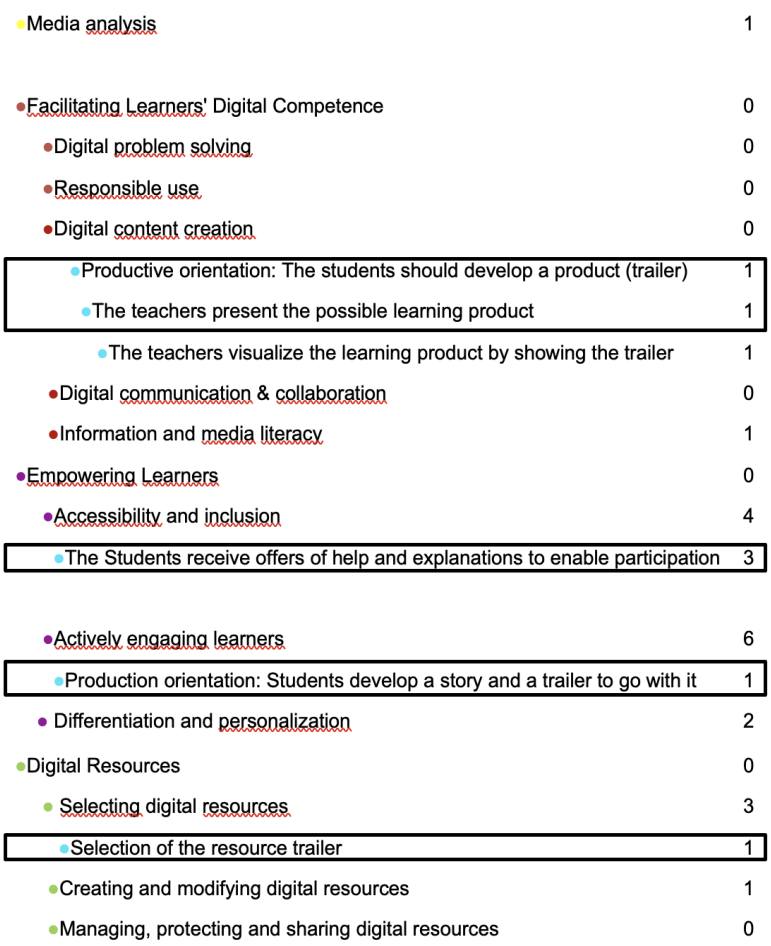


Fig. 3. Code tree

Source: Molzahn 2021, pp. 67, own translation.

5. CONCLUSIONS

The further development of this teaching-learning scenario is to take place in two directions at the Technische Universität Dortmund: First, an attempt will be made to integrate this setting into the practical semester's preparation and supervision. As part of the interdisciplinary project *DEGREE 4.0* to build an inclusive video platform for teaching analysis, this will reliably reach about half of the German students at the Technische Universität Dortmund. They acquire theoretical knowledge and the curricular orientations at DigCompEdu and already practice reflection on concrete videographed teaching examples in the preparatory seminar. As a result of the experimental phase, they – hopefully – will provide their video recordings and analyze and reflect on them independently as part of the evaluation of the practical semester in the accompanying seminar on subject didactics. Second, based on this platform, extended use is to be drawn into the teacher training's second phase. Here it is planned that, on the one hand, further videographed lessons can be made available for student analysis from this phase and, on the other hand, that the analysis of later teaching attempts can also be continued there based on the same theoretical background and tools so that individual developments can also be considered. Students could create their portfolios with their teaching experiments. Small excerpts would also allow focused observations of specific phases or more holistic systematized tracings of specific criteria.

In this way, this community of practice leverages expertise from both areas of teacher education. Collaborative and ever-changing coding opportunities allow for multi-perspective considerations and could thus prevent the encrustation of teaching routines. Universities thus gain insight into current teaching conditions, and second-phase in-service teacher education has access to theories and tools that

can also be used individually to address their questions. There are various ways for an exchange between the two institutions: from a side by side, where only the resources are used by both sides in their settings, to joint events that look at teaching experiments with two "scientist-practitioners" – both with the view of the researcher and the view of the practitioner (fig. 4).

The time is right for better dovetailing of the educational phases. Digitization and the participatory work on asynchronous and net-spatial learning platforms make possible such an approach of researcher practice, as already described by Kurt Lewin (1946) as action research (Marci-Boehncke & Rath 2014). Perhaps the digital space manages to re-establish the connection at eye level between teacher educators of the first and the second phase, which was torn off with the academization of teacher education in the 1960s in Germany, and at the same time a joint conquest and appropriation of the digital forms of action.

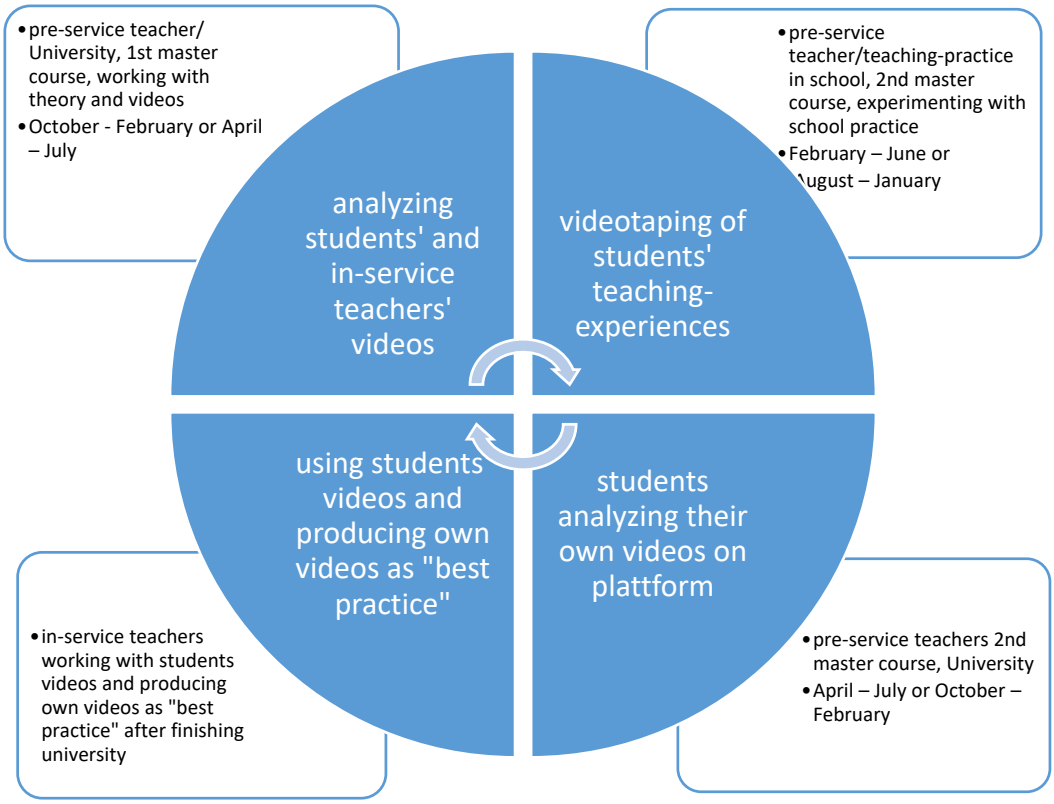


Fig. 4. Use of the digital video-platform as a mean of reflection in a community of practice.

Source: own illustration.

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