

DIGITAL TECHNOLOGY IN SCHOOLS

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Digital technology - between social challenges and educational traditions

Schools in Germany have been using electronic, or more specifically, digital media since the 1990s to varying degrees. The first more comprehensive experiences were made with the introduction of “notebook classes” in the late 1990s, when desktop computers were also being installed in school computer labs. However, the introduction of mobile tablets and smartphones and their related applications has led to a stronger presence of digital media in the German classroom across the board. Social networks, applications and digital educational materials have played a special role in the school learning environment for about ten years now.

This development is being supported by various educational policies (Bastian, 2017). The challenge is to bring technological innovation into harmony with traditional pedagogy, as well as with political, societal and economic demands. Schooling is thus torn between two drivers: on the one hand, a school is an institution ruled by the primacy of pedagogy; on the other hand, schools are expected to prepare their students for a future that is determined by social change. Anyone who attempts to integrate digital media into the school curriculum must grapple with this contention. Thus, when considering the use of digital technology in schools, the questions of what technology is best suited to certain learning objectives, how easily it can be integrated and how teachers need to be trained for its use, are not the only

questions to be asked. Rather, the following questions must be at the forefront of people's minds: what pedagogical goals can be achieved with the use of digital media? Are these goals justifiable? Do they truly contribute to the role of a school? Do they improve the quality of teaching and learning?

When these questions are asked, the development of schools connects pedagogy with issues around educational content and technological knowledge, for example, as per the TPACK model (Koehler and Mishra, 2009). Thus, the assessment of technology use in schools goes beyond the contemplation of purely technical aspects. Also addressed are questions about how pedagogical goals can be achieved with the use of digital media and how these goals correlate with lesson plans and the curriculum. All actors should support and feed into this process which can never be considered done; it requires continuous review and modification.

How digital media change lessons and learning

Greater integration of digital media into schools is also leading to new forms of teaching and learning, changes to the classical structure of lessons and the communication between teachers, learners and their parents.

Digital media create the potential for more self-directed learning. Students frequently prepare for lessons by watching explanatory videos, drawing on digital research to build their knowledge, or completing digital tests to check their understanding. As self-directed learning is increasing, the teacher's role is changing, too. Increasingly, teachers are choosing appropriate digital materials and facilitating the self-directed learning process.

Communication is also changing apps and social networks allow school officials, including teachers, to communicate more easily and closely with parents in order to better inform them of new developments and educational offers. Digital applications are also providing new avenues for closer communication and cooperation between students themselves. For example, students might collaborate on creating presentations and writing essays. They are thus more likely to participate in group work.

These developments mean that innovative ideas are called for which address how lessons can be different, better, and perhaps even designed in completely new ways (Bastian and Aufenanger, 2017).

Of course, the teachers explaining things and answering questions remain as classic elements of any class. Beyond these elements, however, students must be encouraged to use their own initiative in order to make use of the

new potential that digital media bring to the table.

Nowadays the learning process is not only seen as a process of absorption of information and knowledge; much more, it has become a challenge for students to build their own knowledge base independently. In this context, digital educational tools encourage a student's initiative: from autonomous research, via the collection and evaluation of data, to the presentation of class projects, teachers entrust students with delivering more than just pure repetition.

What does the future hold?

Trends indicate that we will soon see the introduction of Augmented and Virtual Reality into classrooms. This technology will, for example, help to illustrate topics in the natural sciences, such as radiation or the inner human body, that would otherwise be inaccessible and are difficult to explain and visualize first-hand.

Adaptive learning systems will also play a greater role. They support students in the learning process by adapting to different learning environments and strategies, as well as to students' knowledge levels. If a student already has a lot of knowledge on a topic, the system automatically offers more advanced assignments and, for example, more complex language. On the other hand, should a student display learning difficulties, an adaptive learning system will provide appropriate support and simplify linguistic expression and assignments.

In addition, we can expect to see more data driven "learning analytics" to enhance successful learning. Such analytics enable adaptive learning systems to develop and refine their tailored support, and also play a role in assessing the effectiveness of the teaching models and materials being used.

Finally, the marketisation of education will play a significant role. Large media companies have the human and material resources to develop learning technologies which could challenge the role of schools as a place of learning. They also have the potential to develop alternative education models or to influence education policy where governments can no longer shoulder the high costs of digital education on their own. It follows that educational science and media pedagogy play a central role in critically assessing such developments in education.

Problem areas of digital technology in the context of schools

The potential that digital media hold should not distract from problem areas

that must be addressed and tackled with the increased use of digital media. As part of this, students must develop appropriate digital competence and learn to interact with digital media in socially responsible ways, especially with and within social networks. In order to navigate the internet safely, students must be able to discern where data has come from and where it has been processed. They must also learn how they can defend themselves from – or better yet - entirely prevent digital attacks on their privacy.

These competencies must be fostered along with many others, and schools play a central role in this.

An important cornerstone was laid with the strategy paper “Education in the digital world” (KMK, 2016) that was presented at the conference of German ministers of education and cultural affairs. The paper describes six overarching competencies that students need to have acquired over the course of their school years; not only in one specialised subject, but at an interdisciplinary level.

However, more than a strategy paper is required to successfully translate theory into action. The education of and the continuing education of teachers in these competencies is also necessary, so that teachers can acquire the competencies themselves, then develop and master appropriate pedagogical and didactic tools in dealing with digital media, then convey the competencies to their students. Currently such an education programme is not sufficiently developed in any of the phases of teacher training (van Aackeren et al., 2019). Of course, schools must also be equipped with the digital media themselves and their supporting infrastructure. This would allow for competencies to be developed via direct exposure to and experience with the digital media.

Moreover, it is important for teachers to not only become experts in teaching and learning with the aid of digital technology, but also to understand and respect the digital environment their students live in. In practice this means, for example, to not ban mobile phones from schools without the necessary reflection - carried out together with the students - on why smartphones and social networks can interrupt lessons. Such a collaborative approach to solution-finding can be enlightening for all participants.

There is still much to do in German schools to prepare the current generation for a future that will be heavily impacted by digital technology. The special role of schools should not be neglected: to support the development of self-determined personalities who have learned to act competently and in

socially responsible ways.

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