

RALF TENBERG (Technical University Darmstadt)

**Editorial: Teaching between course concepts and Responsive Learning**

**Herausgeber**

BERND ZINN

RALF TENBERG

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**Journal of Technical Education (JOTED)**

ISSN 2198-0306

Online unter: <http://www.journal-of-technical-education.de>



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## **Editorial: Technical teaching between course concepts and responsive learning**

The eighth Technology Didactics Symposium took place at TU Darmstadt from November 9-10, 2023. The central topic was personalized learning. Experts from various technical and educational fields took part in the conference, including guests from the TU Munich, the TU Dortmund, the University of Stuttgart, the University of Hamburg, the Ruhr University Bochum, the TU Dresden and the University of Wuppertal. In four parallel sessions, keynotes, posters and a panel discussion, the current research and development in the field of technology-accentuated vocational and general education was presented and discussed over two days. Studies and findings from a wide range of educational segments, from elementary school to university, were discussed, not only in relation to skills development, methods and media, but also on topics such as education management, sustainability promotion, troubleshooting, etc.

Although the conference was based on the leitmotif of personalized learning, there was hardly a single presentation that focused exclusively on this topic. What is "personalized learning" anyway, what does it mean, is there a theory or a model? It does indeed exist, but not in a binding or empirically proven framework, but so in a rather loose juxtaposition of different descriptions and emphases. The concept of "personalized learning" can be perceived as a current phenomenon between individualization didactics and e-learning. Although this indicates one (among many) didactic "modern phenomena", the term nevertheless appears suitable for conceptually framing various didactically and methodologically valuable approaches. Fundamental points of reference here are the ideas of internally differentiated teaching (Klafki et al. 1976) and individual support in the classroom (Klieme et al. 2011). Robinson (2010) highlighted the personalization of learning with the help of digital technologies as a key benefit of computer-assisted learning. Ebner stated personalized learning environments for schools in 2011. Sturgis (2011) and Engeli (2014) identified personalized learning arrangements for competence-enhancing teaching, i.e. a concept that offers more than just individualized learning (Wallach, 2014). Petko (2017) linked this concept to student-oriented teaching. In addition to this, Sabourin (2016) referred in particular to the promotion of learning strategies through self-regulated learning in tutorial settings or in serious games. Current research into adaptive (Rummel et al. 2016) and responsive (Schmitz 2017) learning environments (otherwise referred to as learning analytics) brings a new, higher standard to the idea of personalized learning. Digital technologies should now not only act as interactive machines to optimize learning for the individual, but should also do so in a continuous implementation of learning feedback, i.e. react directly to learning progress or even learning obstacles. Although there are also critical voices (e.g. Lockett, 2017) that call for a decoupling of personalized learning from digital technologies, this hardly seems comprehensible, as this would in turn result in a concept that has already been conceptually framed (in the past). On the other hand, the concept is also currently overloaded: Vander Ark (2017) defines personalized learning with a variety of intentions and differentiates between 15 (!) separate dimensions. The following could be used as a working definition:

Personalized learning is individualized learning at school or in the workplace in technologically supported, responsive settings for the differentiated acquisition of skills and the promotion of learning strategies.

The central challenge for individualized learning in class or group groups is computer-supported personal feedback. The quality and effectiveness of self-learning processes are largely determined by the feedback provided (Hattie, Timperley, 2007). Digital technologies offer a wide range of options for obtaining and giving individual feedback. However, they depend on the technology available and the relevant teaching skills on the one hand, and on the skills to be taught and the media available in this regard on the other. For this reason, it is not currently possible to identify a (consistent) conceptualized practice for personalized learning in schools or companies. Accordingly, it must be assumed that a variety of approaches are being tested now. One example of an approach that is currently being implemented as a pilot project in schools is smartPAPER (<https://smart.arnoldbodeschule.de/>). This complex digital learning environment comes relatively close to personalized learning, for example through the use of a teacher dashboard and AI-regulated input diagnostics.

The theoretical and experimental level of digitally accentuated personalization methodology that has now been achieved is in stark contrast to the situation in our schools. Traditional book or course teaching is still a reality there, whether with a blackboard or overhead projector or with a document camera and projector. According to the latest ICLIS study (International Computer Literacy Study), when digital media is used, it is mainly for presentations. The context in which lessons are organized therefore often corresponds to our traditional lessons, in which one person speaks and the others listen, in which there is a lot of talking but little action, in which everyone has to follow a single intellectual path: the students have to follow the teacher's path. This means that the use of digital media alone cannot guarantee personalized teaching; on the contrary, the old teaching paradigm is proving to be so resistant to development that it has so far been able to outlast even this disruptive media innovation.

This current problem is also particularly evident in current digitization-related training courses for vocational teachers. The Department of Technology Didactics at TU Darmstadt has been designing and implementing digitization-related training courses in a wide variety of formats in the state of Hesse (and beyond) for more than 10 years. Regardless of the respective focus in a digital methodology (e.g. hybrid learning landscapes), or in professional digitization (DigiBB Hessen), the central hurdle always arises initially not in the technological or media methodology, but in the fundamental idea of teaching. This affects some of the participants in such training courses. They assume that traditional lessons can now simply be enriched with modern media, i.e. they expect a digital version of Klippert's method kit (2002). When they are told that the strengths of digital media lie centrally in the personalization of learning and teaching, they become disillusioned, as it becomes clear that in order to implement digitality in their own teaching in a sustainable way, they have to abandon the paradigm that has long been practiced and manifested in many concept documents. This is not well received by all teachers, with the result that these training courses fall well short of expectations in terms of their transfer effects on lessons. Simply knowing about the possible concepts, methods, media and contexts is not enough if they are not compatible with the individual didactics of the teachers. Andreas Schelten's keynote speech at the Technology Didactics Symposium was also in line with this problem. He referred centrally to the founder of teaching research in the USA, Nathaniel L. Gage from the Stanford Center for Research and Development of Teaching. Among other things, this great American learning psychologist dealt intensively with

the question of why a demonstrably deficient form of teaching persists in our schools worldwide. He called this way of teaching "Conventional-Direct-Recitation Teaching" and meant something like what we currently understand by frontal or instructional teaching.

The teacher has systematized the subject matter and pre-structured it in a way that he himself understands best. He follows this structure by explaining, illustrating and clarifying things. He assumes that the students will listen to him, follow him and understand things. From time to time, he asks the students comprehension questions. If these are answered correctly, he moves on, if not, he explains the relevant detail and then moves on. Some teachers also have the pupils read something out of a book instead of saying it themselves, some conduct a questioning and developing classroom discussion in which the pupils are not pulled by the teacher's knowledge, but are pushed through it by asking small questions. This is currently the most common way of teaching, not only in Germany, despite various and ongoing attempts to get away from it.

"What's so wrong with that?" is then often asked. The answer: pretty much everything! The basic idea alone that pupils have a similar system of understanding to the teacher is naïve. Their initial knowledge is individual, as are their approaches to understanding and learning speeds. Another misconception: when pupils are quiet, they must not be concentrated, maybe they only listen to a limited extent, not for long and above all not all of them. The longer such a lecture lasts, the more students drop out. Interspersed questions don't help either, because they are either answered by students who are paying attention or not answered by students who have been called on to wake them up. The question-developing teaching conversation has been identified by Franz Weinert in scientific studies as a "stress-induced choreography" in which (ideally) both sides do their best to arrive objectively where the teacher's instructional plan envisages. This retrieval of suitable answers has nothing to do with real questions; the students do not try to understand the new things but think intensively about what the teacher wants to hear in order to make progress. But why is conventional direct recitation teaching so widespread, even though everyone now knows that it is a deficient form of teaching? Andreas Schelten has found the following answers in Gage:

- 1) It is a form of inheritance. This concept is therefore passed on generation after generation, just as one experienced it as a student, one reproduces it as a teacher.
- 2) It is seen as obviously appropriate. It is assumed that if it were really bad, it could not possibly be so widespread.
- 3) Alternatives place high demands on teachers. Non-frontal teaching requires more preparation and is more complex to implement. Teachers need to be more flexible in their interactions and also more confident in their subject matter, as unexpected questions may arise.
- 4) The so-called pedagogical freedom, manifested in our schools letting go of monitoring and evaluating the teaching practice of individual teachers. As long as teachers don't attract attention, they can do what they want to do.
- 5) If you want to realize alternatives to frontal teaching, you have to create the necessary framework conditions, because our schools are mostly not equipped for this in terms of space and media.
- 6) There is a lack of resources for consistent reforms that lead away from face-to-face teaching, as this would require considerable expenditure on change management, school development, further training and follow-up support.
- 7) The internal and external incentives to move away from frontal teaching are low. Pupils often find self-organized lessons more strenuous than the usual teacher-led instruction, and the resulting improvements in individual skills development are hardly noticeable from the outside. The additional effort required here is therefore not explicitly rewarded either by the pupils or by the system.

These are understandable, albeit certainly not good reasons to remain in an outdated teaching paradigm, especially when new and ever better media are constantly emerging that not only make personalized teaching possible, but also effective and efficient. The gap between media-distanced traditionalists and innovative personalizers is currently widening and we are probably still only at the beginning of letting go of conventional direct-recitation teaching. At the next conference in fall 2024, we will see whether and to what extent we have made any progress here. We can be curious ...

## Bibliography

- Engeli, E., Smit, R., & Keller, A. (2014). Kompetenzorientierung in der Unterrichtsplanung. Eine Einsatzmöglichkeit eines Qualitätsrasters für personalisierte Lernarrangements. *Beiträge zur Lehrerinnen- und Lehrerbildung*, 32(3), 385 – 398.
- Klafki, W., & Stöcker, H. (1976). Innere Differenzierung des Unterrichts. *Zeitschrift für Pädagogik*, 22(4), 497 – 523.
- Klieme, E., & Warwas, J. (2011). Konzepte der individuellen Förderung. *Zeitschrift für Pädagogik*, 57(6), 805 – 818.
- Klippert, H. (2002): *Methoden-Training. Übungsbausteine für den Unterricht*. 12. Auflage. Weinheim und Basel. (zitiert als MT) (Erstauflage 1994)
- Lockett, P. (2017). It's time to take back personalised learning (online-ressource).
- Petko, D., Schmid, R., Pauli, C., Stebler, R. & Reusser, K. (2017). Personalisiertes Lernen mit digitalen Medien. Neue Potenziale zur Gestaltung schülerorientierter Lehr- und Lernumgebungen. *Journal für Schulentwicklung*, 21(3), 31 – 39.
- Robinson, C., Sebba, J. (2010). Personalising learning through the use of technology. *Computers & Education*, 54 (3), 767 – 775.
- Rummel, N., Walker, E., Alevin, V. (2016). Different Futures of Adaptive Collaborative Learning Support. *International Journal of Artificial Intelligence in Education*, 26 (2), 784 – 795.
- Schmitz M., van Limbeek E., Greller W., Sloep P., Drachsler H. (2017). Towards Personalized Learning: Opportunities and challenges in using Learning Analytics in Learning Design. *Proceedings of the 12th European Conference on Technology Enhanced Learning*. Tagungsband, EC-TEL 2017, Tallinn, Estonia, September 12 – 15, 2017.
- Sabourin, J., Shores, L., Mott, B., Lester J. (2013). Understanding and Predicting Student Self- Regulated Learning Strategies in Game-Based Learning Environments. *International Journal of Artificial Intelligence in Education*, 23 (1 – 4), 94 – 114.
- Sturgis, C., Patrick, S. (2011). It's not a matter of time. Highlights from the 2011 Competency-Based Learning Summit (online-ressource).
- Vander Ark, T. (2017). 15 Dimensions of Personalised Learning (online-ressource).
- Wallach, S. (2014). Personalised Learning vs. Individualized Learning (online-ressource).

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Cite as:

Tenberg, R. (2024). Editorial: Teaching between course concepts and Responsive Learning. *Journal of Technical Education (JOTED)*, 12(2), 1-4.