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Editorial: Discourse on Technical Education in Times of Corona

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1 Introduction

The imposed restrictions of the Corona pandemic have a direct or indirect impact on all areas of our lives. In public discourse, the topics associated with the school environment play a special role. The focus mostly lays on two topics, the distance and face-to-face instruction, or instruction which alternates between these two. Initially, these changed teaching-learning scenarios pose great challenges in the way didactics are implemented (in the classroom). However, if reversed, the expansion and further development of digitally supported learning and teaching, next to other aspects, represents a potential strength. This mixture of opportunities and challenges currently serves as a starting point for learning-related research and research methodologies, in “Think Tanks” and collaborations between education administration and science. Accordingly, the multifaceted topic has also made its way into scientific discourse: Journals have launched thematic issues, and edited books have been published. The Corona pandemic has also had an impact on (scientific) exchange. Conferences and symposia could not take place as usual or even as planned. The 5th Symposium on Technical Education 2020 planned to be held on-site at the TUM Science & Study Center Raitenhaslach of the TU Munich was also affected by this. Nevertheless, the organizers (TUM Technical Education) and the JOTED editorial team decided to offer alternative opportunities for thematic exchange. This includes this issue of JOTED, in which practical reports are published in addition to scientific contributions. Furthermore, the 5th Symposium on Technical Education 2020 was implemented as an on-demand virtual event. The following sections provide an overview of the nine contributions to this JOTED volume and take a look back at the impressions and implementation experiences of the virtual on-demand Symposium.

2 Subject areas of research and practice on technical learning in general and vocational education

The contributions to Symposium on Technical Education 2020 cover a broad spectrum in terms of content, and research methods. This reflects the interdisciplinary and thus diversified research and practice segment “technical teaching and learning”, which is represented in the current JOTED volume, in a total of six research contributions and three practice reports. It is pleasing to see that the boundary of the discourse on technical teaching and learning between the field of vocational and general education is increasingly provoking and that JOTED and the Symposium on Technical Education are making themselves known as a platform for topic-related exchange in the German-speaking countries. Thus, 17 of the 21 authors have not yet been published in JOTED.

The current volume consists of nine contributions of which five are related to vocational teaching and learning and four to the field of general education. The following topics of vocational education field are, among others, discussed: competence modeling and diagnostics, vocational-technical teacher training, and the interface of production-related (further) qualification.

The two contributions by Wyrwal and Matthes et al. are located in the area of competence modeling and diagnostics. In the paper entitled “Das berufsfachliche Wissen von Schülerinnen und Schülern in der Fachschule Bautechnik”, Wyrwal analyzes the vocational knowledge of students

in the field of construction in a longitudinal study with three measuring points - at the beginning, during and at the end of their vocational training program. The focus lays on the identification of an empirical descriptive and explanatory knowledge of the students' vocational knowledge as well as related correlations and influencing factors. The contribution of Matthes et al. targets the topic of competences in fault diagnosis at vocational schools and at industry-wide training centers. By collecting subjective experiences with regard to factors which impede and promote this competence, the study addresses the development of a methodological-didactic concept for the development of fault diagnosis competence in initial training. The article by Baumhauer and Meyer entitled „Status quo Chemieindustrie: Produktionsfacharbeit zwischen Tradition und digitaler Innovation“ presents an explorative qualitative approach in the context of digitalization.

Denkena et al.'s practice report describes the conception, implementation and evaluation of an online learning platform in the topic of digitalization in production from a practitioner's perspective. The platform provides learning concepts and materials, including virtual learning environments, for employees at the manufacturing level as well as for adult and continuing education institutions. Experiences in the implementation of the platform are outlined. In a practice related article, Körber et al. sketch the challenges and actions to be taken to attract qualified technicians and master craftsmen to enroll in a teaching degree in the industrial-technical disciplines.

In the papers with a focus on general education, a variety of themes and approaches can be detected in the context of a technical literacy. The paper by Goreth et al. describes a mixed methods approach with observational and introspective approaches in the topic of "diversity competence". Stemmann according to the title "Metakognition und Selbstkonzept – Motivationsbezogene Einflussgrößen auf technisches Handeln ", focuses on the technology-related self-concept and its influence on technical problem solving on everyday digitalized technology. The study of Haselhofer and Metzger's named as "Entwicklung und inhaltliche Validierung eines Modells zum Gegenstandsbereich Technik" sheds the light to the development and validation of a model of the subject area "Technology". For this purpose, a different approach was developed, taking into account existing models, theories and reference concepts of general technology didactics and subjected to an expert rating. In the practical report "Methoden der Produktentwicklung und Problemlösung – Ein Ansatz zur Vernetzung technikdidaktischer Perspektiven" by Eisenmann et al., the development and implementation of a teaching and learning concept based on the methods of product development and problem solving is reported. In the process of implementation estimations and ratings of the concept and the value for teaching and learning were obtained.

To complement this overview, the presentation of the nine papers in this JOTED volume, impressions and implementation experiences of the on-demand Online Symposium on Technical Education 2020 will be addressed below.

3 Impressions of the format of the 5th “Symposium on Technical Education” 2020

Due to the situation in the coronavirus pandemic, JOTED editorial team and the organizer team of the TUM Technical Education decided to implement the 5th Symposium on Technical Education 2020 virtually and at the same time organize a face-to-face event as the 6th Technology Didactics Symposium from 17 to 19 November 2021 at the TUM Science & Study Center Raitenhaslach.

In addition to other conferences, the Symposium on Technical Education 2020 was created as a time-independent and thus flexible format for information and exchange in terms of time and space; with interesting and current presentations on the work - in research and practice - in the

context of technical teaching and learning ([link](#)). The submitted keynote and posters were made available to the interested public on-demand as a stream in the form of a video (annotation of presentation slides). Each stream was complemented by the option of a forum, which allows the participants to have an initial exchange with the authors. In further steps, a scientific exchange can be initiated on that basis.

A total number of 22 videos were offered. Nine videos were related to scientific papers or studies and four videos were assigned to the category "practical report", which was offered for the first time. In addition, there were nine poster contributions. All videos were submitted to the organizer by the authors, so that they could be efficiently provided on the TUM's own on-demand platform. Videos were submitted 2 days before and 7 days after the deadline, allowing all submissions to be released in early November 2020. Figure 1 shows the usage behavior (views as well as time transferred).

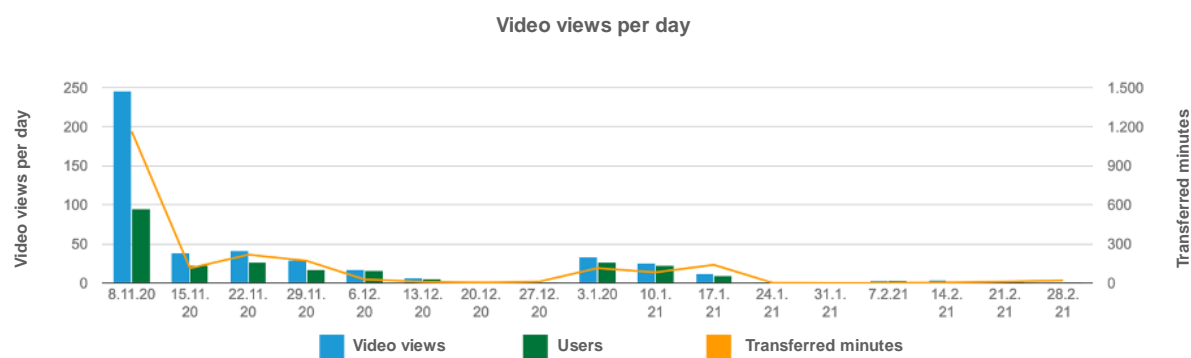


Figure 1: Usage behavior (video views as well as time transferred) of the “Symposium on Technical Education” at <https://wiki.tum.de/display/tds>

There have been 463 views of the video lectures since they were made released on the platform. According to Figure 1, the maximum values are observed in November 2020 and thus at the beginning of the platform activation as well as in January 2021. The duration of video usage so far is 2085 minutes, which corresponds to about 35 h. The comment functions set up for the videos were unfortunately only used marginally, a total of five times. A possible direct contact and exchanges with the authors is hereby excluded or not foreseen. However, this is not uncommon for virtual conferences, but can also be found in other - similarly structured - online formats. Unfortunately, only one participant took advantage of the opportunity to provide feedback on the format, so that the following assessments and impressions are based solely on the perceptions of the organizational team consisting of the JOTED editorial team and TUM Technical Education. The process of adapting the format including the creation of the platform, its structure, keeping contact with the authors to get all the information, downloading the videos, checking them and uploading them to the streaming site can be estimated at about 100 working hours. However, this also includes necessary editing or format-related conversions of some videos as well as additional settings (e.g. sound).

In conclusion, however, it can be stated that the platform in combination with the streaming option offers an interesting supplement and alternative to traditional as well as synchronous online conferences, as it could proactively support publication and presentation activities with scientific papers and posters in the field of vocational and general technology didactics. Despite this positive assessment as a complementary format, the present on-demand approach could not replace a face-to-face conference with its various formal and informal exchange opportunities. However, this can ultimately be seen as an affirmation of the annual symposium, because only by the loss of this

community, one is able to recognize its value for community-building. Therefore, we are currently working on the preparations for the 6th Technology Didactics Symposium from 17 to 19 November 2021 at the TUM Academy Center Raitenhaslach and we hope that it can again take place with interesting contributions and the formal and informal interactions.

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