

Prof. Dr. Thomas Köhler

TU Dresden | Institute of Voc. Educ.

The acceleration of digital technologies and its meaning for theorizing TVET talent development at the interface between education and industry.

Keynote @ 3rd International Conference on Vocational Education and Technology (IConVET) "The Future of TVET Graduates: Developing Talent for Industry 4.0 and the New Normal."

Hosted by Faculty of Engineering and Vocational Training, Universitas Pendidikan Ganesha, November 7th, 2020,

via <https://conference.undiksha.ac.id/iconvet/main>

ABSTRACT 1/3

From an educational perspective **developing talents for industry 4.0** cannot be understood without a **media didactic framing**. As there are only single pieces of a **theory of digital learning** available so far, the author suggests discussing the **acceleration of digital technologies** and its meaning for theorizing TVET talent development at the interface between education and industry.

Digitization is accompanied by the **transformation of analogue media formats and communications into (permanent) digital mediatisation**. This leads in particular to **changing roles and representation of human actors in knowledge development** (research) as well as **knowledge distribution** (education) **towards data-based representations** of all (!) actors. Since this has not yet been modelled theoretically, it can be assumed that such a modelling in form of a media-didactic theory can provide a **renewed understanding of how talent development may be designed** - especially for Industry 4.0.

Any media didactic framework must derive design approaches for meeting the **complexity in digitized worlds**. Indeed it is discussed design approaches in theory versus implementation may take into account (educational) roles in order to support the educational process effectively. Especially **data-based versus object-based versus personal representation** does not only allow but necessarily lead to multiple representations. However, those representations may even be possibly **without implementing classical educational roles** carried out by human actors.

ABSTRACT 2/3

What might be a basic conclusion? The above mentioned actors (experts, educationalists, learners and virtual supports) meet each other (possibly exclusively) via their data-based representations. For an effective implementation of development processes, their roles must be recognized and mapped in a suitable way. It remains an open question whether such a theorization has to focus even more on the perspective of knowledge genesis [=research], which clearly goes beyond the perspective of knowledge transfer [=education].

Based on the above-mentioned theoretical considerations, the following didactic basic questions are to be concluded by the theory-based derivation of specific education design approaches:

- (1) For didactic media design a theoretical approach from the field of connectivist theory would have to be added to any knowledge processing theory in order to model design variants of digitally supported modes of co-construction in knowledge generation and processing (Köhler, 2005)
- (2) For understanding differentiated roles in educational practice versus support a theoretical approach toward the mode of action and the expectations of impact for such roles in virtual educational communities should be applied (cf. Köhler & Kahnwald, 2005)

ABSTRACT 3/3

There is a **stronger need for socio-technical guidance** than ever before as the development and deployment of complex, networked, **digital systems poses ethical challenges**. These challenges differ in terms of both their scope and the level (individual, organizational and societal) at which they can occur and must therefore be reflected and addressed in each individual case.





Since the educational **guidelines/models/theories** currently already in use **have a high degree of abstraction** and therefore often **have little power of orientation** in practice due to a lack of transfer to the individual case, instrumental support needs to be co-constructed which provides assistance in the ethical formation of judgement and thus orientation.


Furthermore, the **construction of the knowledge intense production systems of industry 4.0 is complicated** by the fact that those bring together different perspectives of complex, socio-technical arrangements, which **are not well aligned**.

STRUCTURE

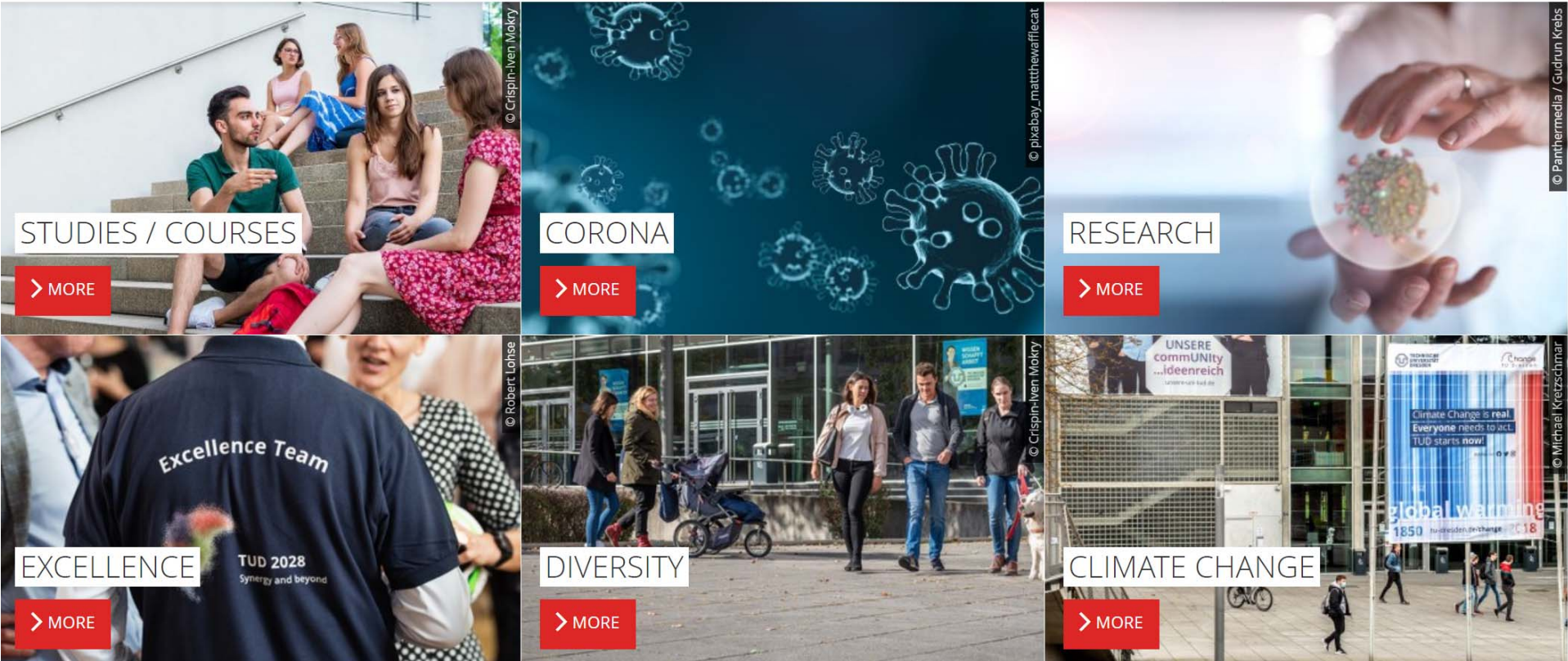
1. Background in TVET & Affiliation
2. Trends in (TV-)Education
3. Accelerating TVET through Digitization
4. A new Interface of Education and Industry
5. Discussion + Invitation: global conferences @ TUD 2021

Background in TVET

Faculties & Units  Language  Search  Internal 

 TECHNISCHE UNIVERSITÄT DRESDEN

TU DRESDEN STUDIES RESEARCH & TRANSFER CAREER COOPERATION



STUDIES / COURSES [MORE](#)

CORONA [MORE](#)

RESEARCH [MORE](#)

EXCELLENCE TUD 2028 Synergy and beyond [MORE](#)

DIVERSITY [MORE](#)

CLIMATE CHANGE [MORE](#)

Background in TVET

TUD INSTITUTE OF VOCATIONAL EDUCATION & DIDACTICS [<https://tu-dresden.de/gsw/ew/ibbd>]

The history of the institute goes back to the **founding of the Pedagogical Institute at the Technical University of Dresden in 1924**. Both, business education and vocational school teachers had been graduated with a diploma degree almost without interruption at the Dresden University of Technology since then.

In 1991 the Department of Education has been found to offer a new start also for the Institute for Vocational Education, which has been extended by the special didactics institute in 2012. Characteristic for research and teaching at the Institute is a **close cooperation with the engineering disciplines of the TU Dresden and with many enterprises around**.

Since decades the institute has a **very strong devotion to the international market and is running international Master Programmes** in different languages both in-house and abroad, but also Ph.D. training networks in cooperation with developing countries world-wide. Coining for the Institutes profile are academic teaching and research, particularly in the international context and in close cooperation with developing countries as well as the acquisition of evaluation studies and experiments for a scientific monitoring of educational development world-wide. This **includes all fields of vocational education and adult education** and continuously deals with staff development for vocational education and training.

Background in TVET

TUD INSTITUTE OF VOCATIONAL EDUCATION & DIDACTICS [<https://tu-dresden.de/gsw/ew/ibbd>]

Today it is the largest institute for vocational teacher training in Germany, with 11 Chairs!

Scientific areas of the Institute are the **Chair** of the Teaching of Vocational Learning, the **Chair** of Educational Technology, the **Chair** of Adult Education, Vocational Training and Professional Education and Training in Developing Countries, the unit of Systematic and Historic Vocational Education and the unit of Engineering Education, the **Chair** of Construction, Wood Technology as well as Colour Design / Vocational Didactics, the **Chair** of Nutrition and Home Economics / Vocational Didactics, the **Chair** for Health and Care / Vocational Education, the **Chair** of Metals and Machine Technology / Vocational Didactics, the **Chair** of Social Education and Didactics of Social Education, the Junior **Chair** of Mechatronics, the Vocational Subject Area Chemical Engineering, environmental protection and environmental studies and the Vocational Subject Area Electro Technology, Junior **Chair** for organizational development, the **Chair** for economics, technology and household / social issues .

Research at the institute is characterized by the **combination of analytical projects with transfer oriented activities** devoted to educational development.

Background in TVET

TECHNISCHE UNIVERSITÄT DRESDEN Institute of Vocational Education and Vocational Didactics

Language Search Internal

CHAIR OF EDUCATIONAL TECHNOLOGY THE CHAIR STUDIES RESEARCH COOPERATION



CHAIR

<http://tu-dresden.de/bt>

The chair for educational technology includes tasks of teaching and assistance for courses of study vocational teaching degree in the faculty of educational science. Also for other pedagogic courses of study.

The main research is analysis, conception, configuration and evaluation of using new media & multimedia in different focal points. This includes for example:

→ https://www.researchgate.net/profile/Thomas_Koehler5

STRUCTURE

1. Background in TVET & Affiliation
2. Trends in (TV-)Education
3. Accelerating TVET through Digitization
4. A new Interface of Education and Industry
5. Discussion + Invitation: global conferences @ TUD 2021

Trends in (TV-) Education

A) Inclusive potential of Educational media technology

- Does a video lecture already mean **openness** for the learners / audience?
- Does participation of a docent in an (online) seminar via video lecture already mean **inclusion**?
- Does opening up the seminar to the wider public in form of OER already mean **equal participation**?
- Is inclusion focused on people with **special physical needs** only?

Cf. Zhang, X., Köhler, T. & Lucke, U. (in press). Educational media technology and its inclusive potential. A multidisciplinary review of recent approaches in informal, formal and continuous education. DeLFI 2020 <https://inclusive-edtech.dfki.de/program/>

Trends in (TV-) Education

B) 'Datasation' of all educational activity

- Examples: Learning Analytics, Tailored Training, Online Assessment
- What happens? All educational activity is taking place in an digitally mediated way with a permanent recording of those activities' data traces.
- Educational activity is continuously monitored and the data may be used for instant and long-time feed back process (e.g. online assessments) and resulting an individually tailored learning support (e.g. augmentation by a teacher or in an automated way by the software)

Cp. Stützer, C. M., Breiger, R. & Köhler, T. (2015). Social Academic Analytics in Higher Education; In: Abstracts of the Sunbelt XXXV International Sunbelt Social Network, ISNA Publishers, Brighton;
<http://insna.org/sunbelt2015/>

STRUCTURE

1. Background in TVET & Affiliation
2. Trends in (TV-)Education
3. Accelerating TVET through Digitization
4. A new Interface of Education and Industry
5. Discussion + Invitation: global conferences @ TUD 2021

Accelerating TVET through Digitization

What does that mean for interpreting edu tech?

Focus on inclusive, open and participative aspects (are there supportive professional practices)?

- **Tutoring – Mentoring – Teaching**: Do we still need education professionals in settings of Open Education with Peers, Parents, Experts?
- **Measurement**: Are we able defining indicators which allow us to empirically determining the effectiveness of education professionals and other actors in settings of Open Education?
- *We will use the ZOOM voting function + chat for a short discussion* and in order to collect arguments. Please do the following:
 - 1) Do **answer question 1 with yes or no**.
 - 2) Do **suggest an indicator** for determining the effectiveness of education professionals / peers / parents in Open Education.

Accelerating TVET through Digitization

Participative practices of innovation through independence of learning behaviour

- **Examples:** Open Class, virtual school, mobile learning
- **What happens?** Educational activity can be realised as wished by the learner
 - Every learner may decide by itself where, when and who learning experience is most suitable but doesn't necessarily follow the way prescribed by the educational institution and its representatives.
 - Learning becomes possible even without the physical embedding into a learning organizations context (e.g. attending university seminars) or meeting the pre-selected staff (e.g. the one and only physics teacher)

Cp. Köhler, T. & Kahnwald, N. (2013). Online Communities: Enterprise Networks, Open Education and Global Communication. Proceedings of the GeNeMe 2013; Dresden, TUDPress.

Accelerating TVET through Digitization

Participative practices of innovation through socialization in new community forms

- Examples: CoP, virtual learning communities, inverted classroom
- What happens? Educational activity can be realised in non-traditional social forms.
 - Learning experience is embedded in to new social contexts (e.g. communities)
 - Such often happens at the interface between academia and practice (e.g. with educationalists and practitioners)

Cp. Kahnwald, N. & Köhler, T. (2007). Microlearning in Virtual Communities of Practice? An explorative analysis of changing information behaviour. Micromedia & eLearning 2.0: Getting the Big Picture. Proceedings of Microlearning 06; Innsbruck, University Press.

STRUCTURE

1. Background in TVET & Affiliation
2. Trends in (TV-)Education
3. Accelerating TVET through Digitization
4. A new Interface of Education and Industry
5. Discussion + Invitation: global conferences @ TUD 2021

Accelerating TVET through Digitization

Participative practices of innovation through informal Learning with OER + Open Science

The opening up of any knowledge through digitization means that educational programs or learning objects from various providers – from education, industry, research and society – are becoming more and more widespread.

At the same time, offers from any TVET institute will be accessible to external users - which, although technically possible, has barely been implemented:

Köhler (et al., 2019) suggested that a variety of digitally supported configurations serve as a virtual (possibly open) learning location *but not necessarily the traditional classroom*.

Accelerating TVET through Digitization

Co-constructing realities at the interface of education and industry

Typical patterns are:

- **Connectivist learning** with students' sharing knowledge production for students;
- Not all learning objects are clearly assigned to the educational institute, but rather are taken from a **virtual information market**;
- Such is constituted in the form of **Trusted Repositories** as extensive subject-related collections of digital teaching and knowledge objects in the form of OER, OAP, etc.;
- The university enables the **portfolio-based networking of learners**, whereby these are brought together due to suitable portfolios, also when working on interdisciplinary topics ("**knowledge dating**")

Cf. Köhler et al. 2019: Scenarios of Technology Enhanced Learning (TEL) and Technology Enhanced Teaching (TET) in Academic Education. A forecast for the next decade and its consequences for teaching staff. Proceedings of the 8th International Congress on Advanced Applied Informatics IIAI-AAI 2019; Danvers, IEEE Publishers. <https://doi.org/10.1109/IIAI-AAI.2019.00055>

STRUCTURE

1. Background in TVET & Affiliation
2. Trends in (TV-)Education
3. Accelerating TVET through Digitization
4. Interface of Education and Industry
5. Discussion + Invitation: global conferences @ TUD 2021

5. DISCUSSION + INVITATION

Do you share my perspective and support my approach?

→ *What might be the specific meaning for developing talents for industry 4.0 in your branch?*

→ *Why not have a joint paper to be submitted in 2021?*

Please be invited to discuss the most recent approaches now – or @ one of the global conferences @ TU Dresden around TVET talent development:

September 2021

→ 50th IGIP International Conference on Engineering Pedagogy

→ 24th International Conference on Interactive Collaborative Learning

October 2021

→ 24th GeNeMe Communities in New Media Conference

Please find all papers as full text in ResearchGate
→ https://www.researchgate.net/profile/Thomas_Koehler5

References

- Fischer, H., Heise, L., Heinz, M., Möbius, K., Köhler, T. (2015): Let's Look to Future! ELearning-Trends and Hypes in Academic Teaching. In: EURODL – European Journal of Open, Distance and E-Learning. Special Issue Best of EDEN 2013-2014, S. 129-140. Online via: http://www.eurodl.org/materials/special/2015/Zagreb_Fischer_et_al.pdf
- Köhler, T. & Drummer, J. (2018). Recent technological challenges in (vocational) education; In: Drummer, J., Hakimov, G., Joldoshov, M., Köhler, T., Udartseva, S.: Vocational Teacher Education in Central Asia. Developing Skills and Facilitating Success. Berlin: Springer. Online via: https://link.springer.com/chapter/10.1007/978-3-319-73093-6_1
- Köhler, T. (invited keynote; 2019). From Datazation of Education towards a Theory of Digital Learning; 12th Education & Technology Summer School 2019; KGTU "Razzakov" / Manas University, Bishkek, 28.10.-01.11.
- Köhler, T., Wollersheim, H.-W. & Igel, C. (2019). Scenarios of Technology Enhanced Learning (TEL) and Technology Enhanced Teaching (TET) in Academic Education. A forecast for the next decade and its consequences for teaching staff. Proceedings of the 8th International Congress on Advanced Applied Informatics IIAI-AAI 2019; Danvers, IEEE Publishers. <https://doi.org/10.1109/IIAI-AAI.2019.00055>
- Köhler, T., Kahnwald, N. & Reitmaier, M. (2008). Lehren und Lernen mit Multimedia und Internet; In: Batinic, B. & Appel, M.: Medienpsychologie; Berlin, Springer.
- Köhler, T. & Kahnwald, N. (2005). Does a class need a teacher? New teaching and learning paradigms for virtual learning communities; In: Online Communities and Social Computing. Proceedings of the HCI 2005. New York, Lawrence Erlbaum Associates.
- Köhler, T., Münster, S. & Schlenker, L. (2013). Didaktik virtueller Realität: Ansätze für eine zielgruppengerechte Gestaltung im Kontext akademischer Bildung; In: Reinmann, G., Ebner, M. & Schön, S. (Hrsg.) Hochschuldidaktik im Zeichen von Heterogenität und Vielfalt. Doppelfestschrift für Peter Baumgartner und Rolf Schulmeister; Norderstedt, BIMS e.V.; online via <http://openaccess.bimsev.de>
- Marquet, P. & Köhler, T. (2017). The empowerment of users: rethinking educational practice online; In: Dobrick, F. M., Fischer, J. & Hagen, L. M.: Research Ethics in the Digital Age. Ethics for the Social Sciences and Humanities in Times of Mediatization and Digitization; Berlin, Springer.
- Reitmaier, M., Köhler, T. & Apollon, D. (2011). Rollen bei der Entwicklung von multimedialen Lernangeboten; In: Köhler, T., & Neumann, J. Wissensgemeinschaften. Digitale Medien – Öffnung und Offenheit in Forschung und Lehre; Reihe: Medien in der Wissenschaft, Band 60; Münster, Waxmann.
- Vagliano, I., Guenther, F., Heinz, M., Apaolaza, A., Bienia, I., Breitfuss, G., Blume, T., Collyda, C., Fessl, A., Gottfried, S., Hasitschka, P., Kellermann, J., Köhler, T., Maas, A., Mezaris, V., Saleh, A., Skulimowski, A.M.J., Thalmann, S., Vigo, M., Wertner, A., Wiese, M. & Scherp, A. (2018). Open Innovation in the Big Data Era with MOVING: An Integrated Working and Training Approach for Data-savvy Information Professionals; IEEE MultiMedia Transactions.
- Zhang, X., Köhler, T. & Lucke, U. (in press). Educational media technology and its inclusive potential. A multidisciplinary review of recent approaches in informal, formal and continuous education. DeLFI / ECTEL 2020.